

Capital Flows, Monetary Policy and Economic Growth in the Southern African Customs Union (SACU)

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Dedication

This thesis is dedicated to the Almighty God, my parents, Mrs. Aromolaran Grace, Mr. Aromolaran Sunday, and my siblings, Adekanmi, Dayo, Bosede, Oluwafemi, and Oluwayemisi.

ABSTRACT

This study explored the nexus between capital flows, monetary policy, and economic growth in the Southern African Customs Union over the period 1990–2019. Specifically, it examined the trend and pattern of the respective components of capital flows, gross domestic product per capita, and monetary policy measures, as well as other macroeconomic variables such as the globalization index, real exchange rate, monetary credit to the private sector, and gross capital formation growth rate. It also examined the dynamic interaction between capital flows, monetary policies, and economic growth in the union. Efforts were made to ascertain the threshold level of capital flows and monetary policies in relation to economic growth. Moreover, the direction of causality was analyzed through the examination of the responses of the macroeconomic variables to shocks as well as the design of a macroeconomic framework.

The study employed annual secondary data for the empirical analysis. The data on GDP per capita, FPI, FDI, Inward Remittances, Official Aid and Development Assistance, monetary credit to the private sector, broad money growth, and gross capital formation growth rate were sourced from the World Development Indicators (WDI). Moreover, the data sets on the globalization index were obtained from the KOF Globalization Index, the real exchange rate from Bruegel data, and the inflation rate (proxied by the consumer price index) from UNCTADSTAT. The central bank policy rates of South Africa (proxied by repo rates) were obtained from the SARB, while those of Lesotho, Namibia, Eswatini, and Botswana, as well as the United States of America (World Interest Rates), were sourced from the IMF.

The panel study utilized descriptive and other econometric techniques. These include graphs, the Pooled Mean Group, the Common Correlated Effects, the Fixed Effect Panel Threshold, Feasible Generalized Least Squares, Panel corrected least squares, the Panel Granger Causality test, and Panel Structural Vector Autoregression of Pedroni (2013).

The trends and patterns show that there are similar fluctuations in the log of GDP per capita across the countries, while FPI is more volatile in South Africa, Namibia, Botswana, and Eswatini, but relatively stable in Lesotho. Swift fluctuations in FDI, inflation rate, central bank policy rate differential (having some approximative similar pattern in the CMA), broad money growth, Official Aid and Development Assistance though relatively stable for South Africa, gross capital formation and central bank policy rate characterized all the countries. However, there is a minimal swing in the log of the globalization index, while the log of the real exchange

rate and the pattern of swings exhibit some similarities in all the countries except Botswana. Also, though monetary sector credit to the private sector has some instability, it is still relatively minimal in fluctuations. An observation of the log of inward remittances into the region also shows some fluctuations over time.

The FGLS regression provides evidence that the central bank policy rate differential is statistically significant but negatively impacts the log of GDP per capita. The dynamics among the variables show that while FPI is not statistically significant in the short-run or long-run of either the PMG or the xtdcce2-cce, FDI is, however, statistically significant and exhibits a short-run negative effect on GDP per capita in the xtdcce2-cce model. It also shows that while broad money growth is found to be statistically significant and promotes the GDP per capita in the long-run (PMG), it nevertheless decreases living standards in the short-run (PMG), while it is not statistically significant in either periods in the xtdcce2-cce model. The policy rate differential significantly decreases GDP per capita in the long-run (PMG), but significantly increases it in the short-run of the xtdcce2-cce model. The ECM term in the PMG relays the evidence of a long-run joint causality among the variables. The panel causality shows a unidirectional causality from FDI and FPI to GDP per Capita respectively. The results also show that, no direction of causality operates between FPI and CBPD as well as FDI and CBPD. A similar conclusion of no causality is also the field day between FDI and CBPR, as well as FPI and CBPR. The findings from the threshold analysis convey that CBPD is statistically significant below the threshold of 10.1600 and is found to stimulate FDI by 0.32, arising from a unit increase. Conversely, CBPD is statistically significant below the threshold of 2.5000 with respect to FPI. However, unlike in the case of FDI, it decreases FPI.

The interconnectivity of impulse responses and variance decompositions stemming from the three categories of shocks also provides information on the need for effective coordination among capital flows, monetary policy, and economic growth in the region.

On a general view, the relationship between capital flows, monetary policy and economic growth is very paramount and thus requires the effective design and management of sound monetary policies to achieve sustainability in the living standards of the Southern African Customs Union.

Keywords :Capital flows, Monetary Policy, GDP per Capita, Dynamics, Threshold, Causality
SACU

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List of Abbreviations

IMF – The International Monetary Fund

WDI – World Development Indicators

SARB – South African Reserve Bank

BON – Bank of Namibia

SACU – Southern African Customs Union

CMA – Common Monetary Area

UNCTAD – The United Nations Conference on Trade and Development

UN – The United Nation

SSA – Sub Sahara Africa

CD – Cross Sectional Dependence

CCE – Common Correlated Effects

PARDL – Panel Autoregressive Distributed Lag Model

PMG: Pooled Mean Group

FPI – Foreign Direct Investment

FPI – Foreign Portfolio Investment

ODA – Official Aid and Development Assistance

GDPC – Gross Domestic Product per Capita

FGLS – Feasible Generalized Least Squares

PCSE – Panel Corrected Standard Errors

CHAPTER ONE

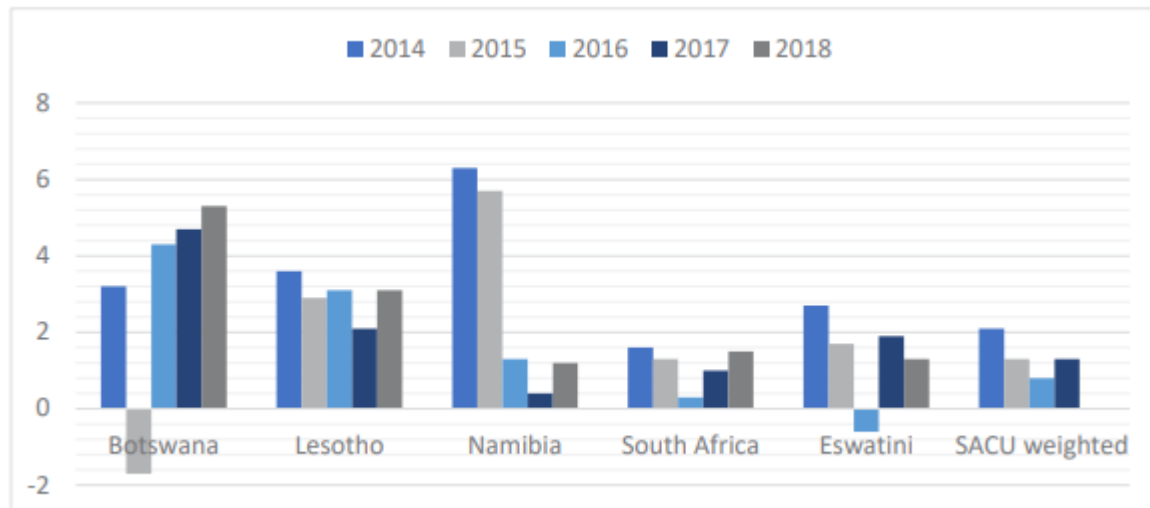
1.1. Background to the study

Economic growth is one of the key fundamental economic variables used by economists to evaluate the performance of an economy over time. In the neo-classical context, steady and sustainable economic growth occurs through a mix of labor, capital, and technology. This study examines the pattern of capital flows and monetary policy measures in respect of the growth process of the Southern African Customs Union (SACU).

A documentary from the Annual Report 2018 of the Southern African Customs Union revealed that growth persisted as being uneven among the member countries in 2017. The average weighted growth rate increased only marginally in 2017, rising from 0.8% in 2016 to 1.3% in 2017. Despite the improvement in growth in the period covered by the report, only Botswana and Lesotho had enhanced economic performance. The growth rate was 4.7 percent for Botswana in 2017, which is a 0.4 percent increase with respect to the performance in 2016. However, that of Lesotho was 2.1 percent in 2017 compared to 3.1 percent in 2016. Namibia, South Africa, and Eswatini, on the other hand, experienced less than 2.0 percent growth rates in 2017. The economic performance was adjured to the global economic recovery in the context of better prospect of commodity prices as well as a rally in world merchandise trade with respect to mid-2016. The gross domestic product of Botswana at market prices stood at P180.1 billion in 2017, an improvement of P170.6 billion in 2016. Botswana's economy was expected to expand by 5.3 percent in 2018 and 4.5 percent in 2019. The economy of Eswatini's nominal GDP was E 58.8 billion in 2017, which was an improvement from E 54.8 billion in 2016. This implies a growth of 1.4 percent in 2016 compared to 1.9 percent in 2017. The economy of Eswatini was forecasted to follow a downward trend from 1.9 percent in 2017 to 1.3 percent in 2018, but was expected to appreciate to 2 percent over the medium term (SACU Annual Report, 2018). The economy of Lesotho exhibited a nominal GDP of M 37.6 billion in 2017 compared to M 34.3 billion documented in 2016. GDP fell from 3.1 percent in 2016 to around 2.1 percent in 2017, and it was expected to be 3.1 percent on average in 2018 but 2.6 percent in 2019. During the reporting period, Namibia's GDP at constant prices declined from 0.7 percent in 2016 to -0.8% in 2017. Despite the downward trend, the economy was projected to the rate of 1.2 in 2018, but it increased to 2.1 percent in 2019. The South African economy was not left out in the growth examination as it recorded R 4.6 trillion of nominal GDP at market prices in 2017, which is about a R 300 billion increase from 2016. Due to commodity price increases,

improved business and consumer confidence, and lower inflation, South Africa was projected to have 1.5 percent and 1.8 percent economic growth in 2018 and 2019, respectively (Southern African Customs Union, 2018).

The graph below displays the uneven GDP growth rates (%) of the countries in SACU.



Source: SACU based on Member States Budget Speeches and National Accounts

Southern African Customs Union (2018)

The foregoing pattern of economic growth across the countries that constitute SACU is a reflection of the need to examine the impact that resources, which could be domestic or foreign, have been having on the economies. This study focuses on the concept of capital flows alongside monetary policy. Over time, the respective economies have been experiencing capital flows, but the extent to which they have impacted the Southern African Customs Union and the role of monetary policy measures in stimulating capital flows towards the attainment of sustainable economic growth and living standards for SACU needs to be examined.

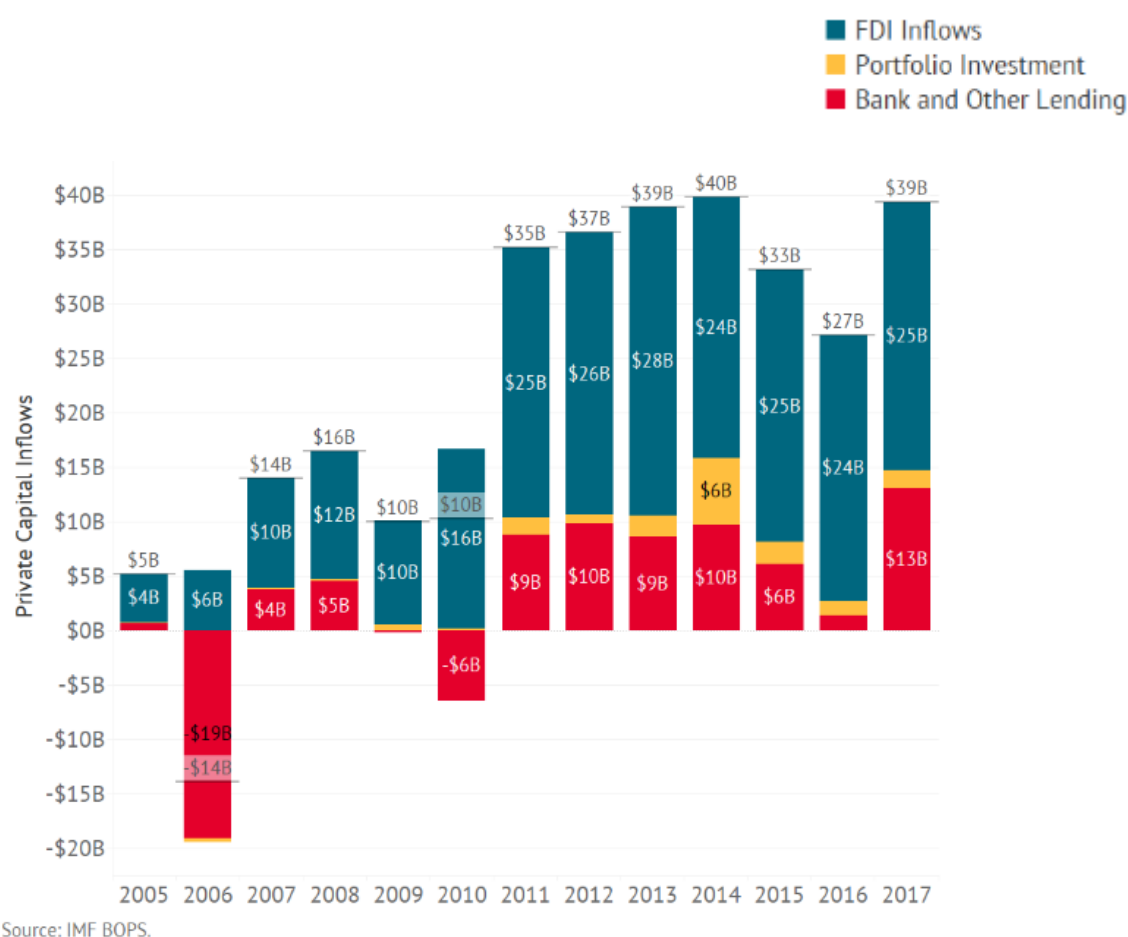
1.2. Introduction

The current study critically examined the impact of capital flows on the economic growth of the Southern African Customs Union and provided measures on how to maintain its sustainability. The increased globalization of the world economy has increased the intensity of the flow of capital resources in search for optimal returns and, in the process, minimized the dearth of resources, mostly in the developing economies. The inflows of capital resources into the emerging markets range from foreign direct investment, foreign portfolio investment, remittances, as well as official aid and development assistance, among others.

African countries have a high reliance on official aid, nevertheless, they are experiencing an influx of more private capital. It was observed that net private flows were characterized by a rise from \$6.8 billion on average in 1998-2002 to \$17 billion in 2005. However, there was a decrease from \$1.2 billion in net official inflows to a net outflow of \$9.5 billion (Economic Commission for Africa, 2006). It was of the view of Calvo *et al.* (1996) that “large capital inflows can also have less desirable macroeconomic effects, including rapid monetary expansion, inflationary pressures, real exchange rate appreciation and widening current account deficits”. Moreover, Sarno *et al.* (2016) asserted that portfolio flows may exert a crucial impact on the prices of domestic assets and economic growth prospects in the circumstance of increased globalization characterized by a high level of international capital mobility. It was further explained by the author that a soar in portfolio inflows can result in the boom of real estate and inflation, while a period of weak growth, greater levels of interest rates, and a swift depreciation in currency can occur due to a sudden stop. It is therefore opined that the effective management to some degree of the size, direction, and volatility of capital flows is crucial for host economies. Also, the formulation of an effective policy mix, which may constitute structural reforms, specific macroeconomic policies, or capital controls, counts on understanding the dynamic determinants of inter-country flows of portfolio.

Private capital inflows split into the various components to low-income countries (LICS) are expressed in the figure below, displaying their relative significance. It can be observed that FDI constitutes the largest proportion of private capital inflows, followed by banks and other lending institutions. Non-FDI flows show more vulnerability to global situations such as global commodity prices and global interest rates (Lee & Sami, 2019).

FDI contributing a higher percentage of investment will tend to have a more desirable impact on low-income countries as they tend to be more sustainable compared to foreign portfolio investments, which tend to be more volatile.

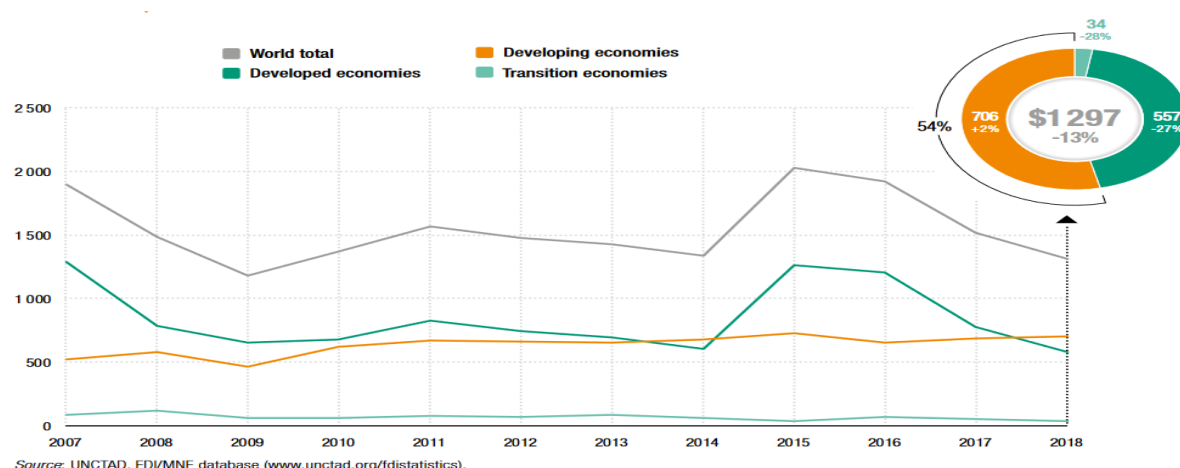


Source :Lee and Sami (2019)

In another development, global flows of foreign direct investment continued to fall in 2018, with a 13% drop to \$1.3 trillion from a revised value of \$1.5 trillion in 2017. The fall in FDI was majorly as a result of massive repatriations of piled up foreign earnings by United States multinational enterprises within the first two quarters of 2018, following the introduction of tax reforms at the close of 2017, and inadequate compensation from rising trends in the second half of the year. The flows of FDI were reported to swiftly decline in developed economies and countries in transition, but those to developing economies exhibited stability, ascending by 2%. Consequently, developing countries constituted a growing proportion of global FDI, at 54%, up from 46% in 2017 (UNCTAD, 2019a).

The following figure pictorially describes the inflows of FDI globally and by economic group.

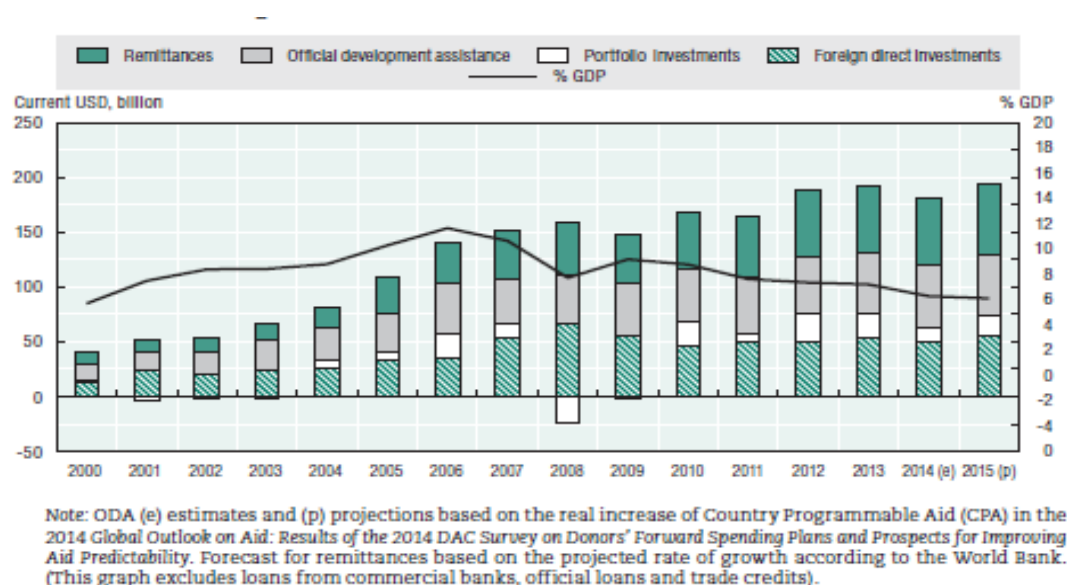
FDI inows, global and by economic group, 2007–2018 (Billions of dollars and per cent)



Source : UNCTAD (2019a)

A documentary by Outlook (2015) provides more information on capital flows to Africa. It was reported that external flows to Africa had an estimate of USD 181 billion in 2014, which accounts for a decrease of 6% when compared to 2013. This is attributable to a swift decline in portfolio flows as well as a moderate fall in FDI flows. The foregoing situation is unconnected to the gloomy global demand and weak commodity prices, mostly in respect of metals. Generally, foreign flows accounted on average for an estimated 7.3% of GDP in 2014, in contrast to 8.2% in 2013. The following graph summarizes the external financial flows to Africa over the period 2000–2015 (Africa Development Banks *et al.*, 2015).

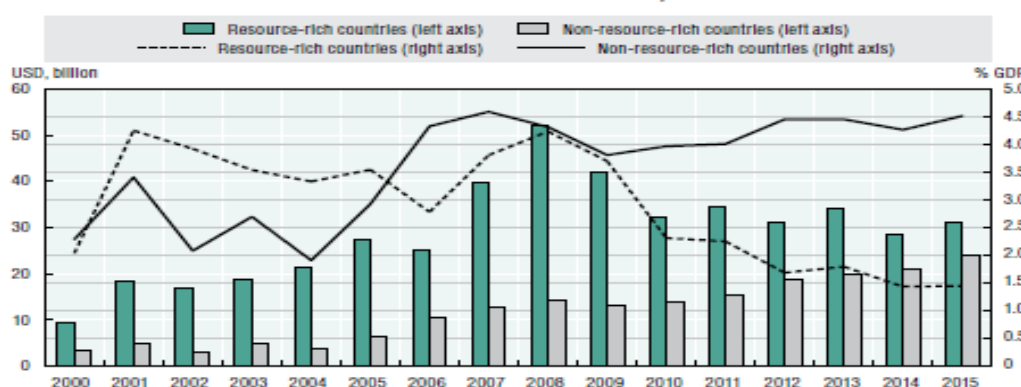
External financial flows to Africa, 2000-15



Source : Outlook (2015)

As reported by Outlook (2015), there has been a rise in portfolio flows. For instance, starting from 2011, quite a number of countries, inclusive of Nigeria, Uganda, and Kenya, for the first time released international sovereign bonds in order to finance large infrastructural projects.

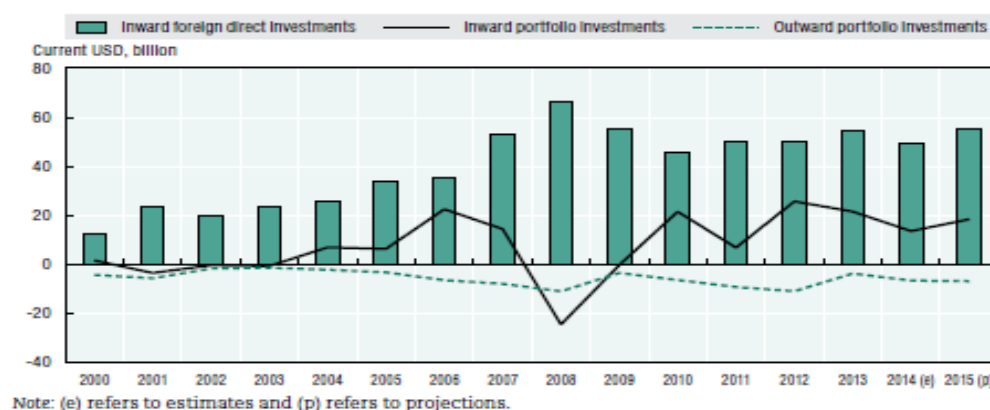
However, the proportion of ODA in aggregate flows to the external sector reduced from 37% in 2002-06 to 30% in 2010-14, showing a deviation in respect of regional aid allocation characterized by a decline in grants to low-income countries in Africa, while there was a rise in soft loans to middle-income Asian economies (UN, 2014) as cited in (Africa Development Banks *et al.*, 2015). Information from the IMF provides that non-resource-rich economies had an estimated 42% of the proportion of FDI in 2014 but declined to 19% in 2008. Furthermore, the proportion of FDI to GDP in 2014 in respect of non-resource-rich economies was 4%, which when compared to 2002 is twice the amount. However, that of resource-rich economies declined from 4% to 1.5% over the same period. The following graph displays the information on foreign direct investment into Africa with respect to resource-rich and non-resource-rich economies over the period 2000–15.



Source : Outlook (2015)

On a regional basis, East Africa had the highest rise in the inflows of FDI, with overall investment rising by 9% to USD 9.5 billion in 2014. However, inflows into Southern Africa declined by 20% to USD 9.7 billion in the aftermath of record-high flows in 2013 to South African infrastructure. Within the context of West Africa, inflows declined by 20%, characterized by investment falling to USD 8.3 billion, majorly due to incessant political and security issues in Nigeria. North and Central Africa experienced a marginal decline in FDI flows as well. Non-oil manufacturing projects were adversely affected on the basis of political uncertainty in North Africa, while excluding Libya, oil and gas were not affected.

Also from the African Economic Outlook documentary, it was found that the inflows and outflows of portfolio investments appeared highly volatile. The inflows, inclusive of international investments comprising of equity and debt securities issued by non-residents, decreased in 2014 while outflows of portfolio characterized by international equity and debt investment by residents increased (Outlook, 2015).



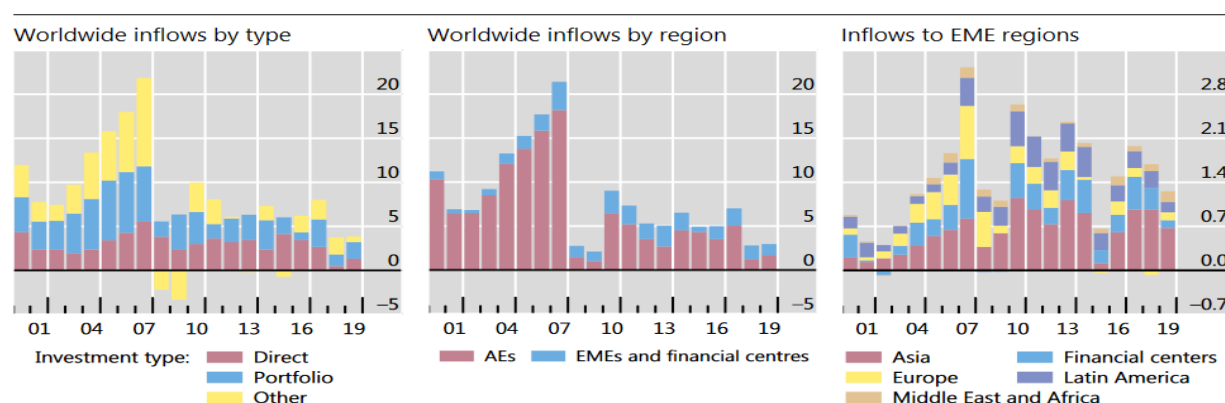
Source : Outlook (2015)

López and Stracca (2021), had a comparative look at global flows with respect to their pre-GFC trend. It was observed by the bank that the global financial crisis (GFC) resulted in a turning point with respect to the global trend of gross capital flows. Inflows and outflows were found to have rapidly increased between 2002 and 2007, attaining a high of \$12 trillion, or around 22% of global GDP. However, in the era of the GFC, they followed a very steeply downward trend, later on trending sideways, but were unable to recover their upward momentum of the pre-GFC. Moreover, the global trend majorly described flows to the advanced economies (AEs). It was observed that inflows to AEs stood at 18% of world GDP in 2007, which never surpassed 7% in the aftermath of the GFC. Flows to financial centres were observed to contribute to the rise in trend prior to 2007, while they were characterized by volatility over the period 2009–19. Also noted is the fact that the fraction of assets in financial centres maintained a rise over the past decade, though their proportion of global GDP declined over the same era (Lane & Milesi-Ferretti, 2017).

A further report by López and Stracca (2021) revealed that in the aftermath of the GFC, inflows to the emerging market (EMEs) were reasonably good. Nevertheless, they slowed swiftly in some years, though the slowdowns tended to be transient. Notable is the fact that emerging Asia uniquely stands as the only region characterized by a sustained increase in capital flows

in the aftermath of the GFC. The following figure summarizes the capital flows by type and region, obtained from López and Stracca (2021).

Capital flows by type and region as a percentage of world GDP.



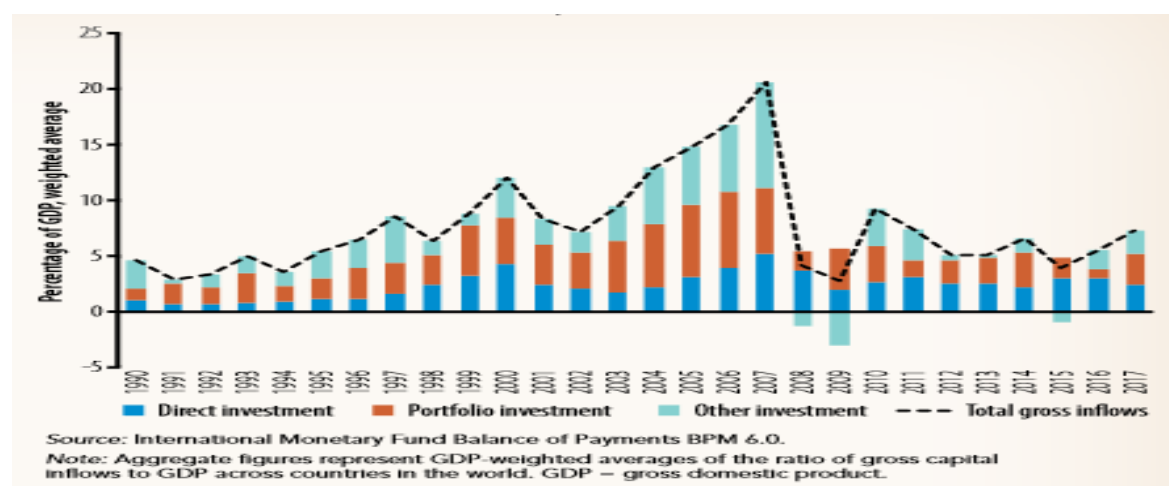
Sources: IMF, Balance of Payments Statistics; CGFS Working Group calculations as obtained from López and Stracca (2021).

Economic growth is the process through which factors of production such as skilled labor, capital, and funding for new productive activities are converted into economic outcomes such as wage growth, new businesses, or job creation (Hall & Sobel, 2006). However, the wide resource gap in Sub-Saharan African countries constrains public investment as well as social service delivery (Boyce & Ndikumana, 2012), which is traceable to the dearth of savings, large saving-investment gaps, and protracted budget deficits (Feltenstein & Iwata, 2002; Ndikumana, 2014). The Southern African Customs Union is a subset of Sub-Saharan African countries with the vision of an economic community having equitable and sustainable development, devoted to the welfare of its citizens for a common future (Southern African Customs Union, 2018). The role of capital flows and their management via appropriate use of monetary policy cannot be overemphasized. Sub-Saharan African (SSA) countries have seen an increase in capital inflows, with the magnitude of foreign financial flows increasing from \$20 billion in 1990 to more than \$120 billion in 2012, primarily driven by remittances and private capital flows (Sy & Rakotondrazaka, 2015).

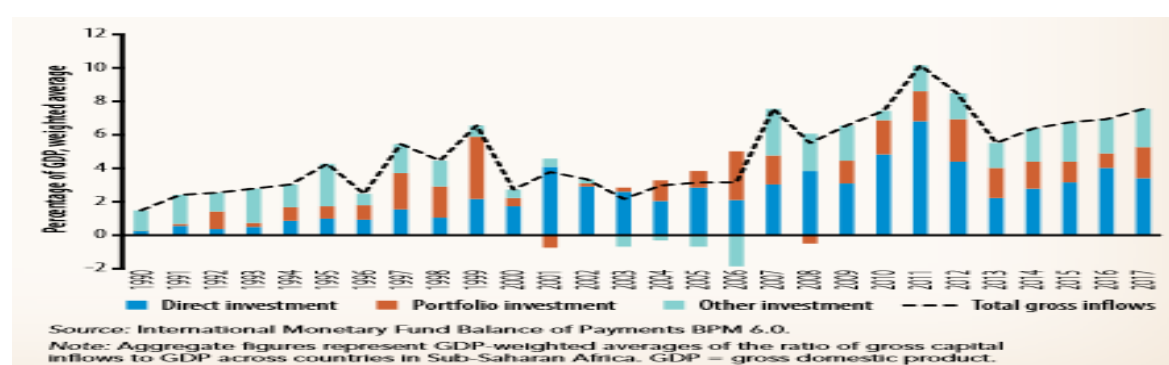
It is noteworthy that both the global financial crisis and the European sovereign debt crisis had an impact on Sub-Saharan Africa, with the latter exerting more influence on the volume of external finance in Sub-Saharan Africa. When compared to global capital flows, there was a divergence in the development of gross capital inflows to Sub-Saharan Africa in the first half

of the 2000s. While world capital inflows had steady growth in the early 2000s till the global financial crisis in 2007, foreign capital inflows with respect to Sub-Saharan Africa improved after 2006 with oil prices around US \$65 per barrel. It was noted that FDI, characterized majorly by crude oil projects, was adjudged as the key source of the influx of capital to Sub-Saharan Africa rather than other investment and portfolio investment of the 2000s. In terms of stocks, South Africa and Nigeria control half of the region's inward FDI stock, accounting for nearly 80% of the total stock. World gross capital inflows increased between 2002 and 2003, while Sub-Saharan Africa's increased in 2006 due to an increase in oil prices (World Bank Group, 2018).

Evolution of Global Capital Inflows



Evolution of Gross Capital Inflows to Sub-Saharan Africa

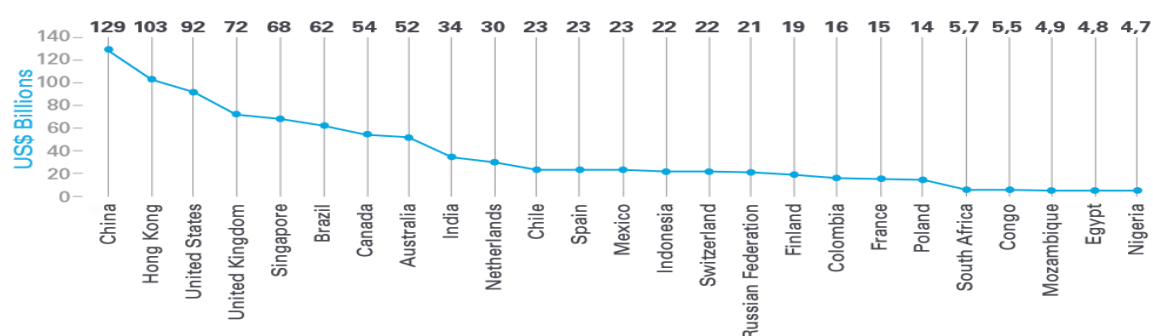


Source : World Bank Group (2018)

In another development, the observation of the table below shows that the inflows of FDI to the top host economies in Africa appeared significantly less than the volume received by the top 20 recipient countries globally. This trend has become more observable in 2015,

characterized by FDI inflows to developing Asia rising by 15%, with Hong Kong being the dominant recipient of the inflows of FDI of US \$163 billion. The United States recorded US \$384 billion in 2015 and, as a result, became the highest host economy for the inflows of FDI globally. Nevertheless, based on UNCTAD, the rise in the inflows of FDI to Hong Kong and the United States entailed transactions that did not produce the movement of materials in actual resources. The negative resources cycle greatly affected the inflows of FDI to Africa during 2015 (KPMG. *et al.*, 2016).

FDI inflows in 2014 – World top 20 and Africa top 5



Source: *World Investment Report, 2015*

KPMG. *et al.* (2016)

Deléchat *et al.* (2009) analyzed the effect of foreign capital in respect of 44 SSA countries, covering the period from 2000 to 2007. A directly significant association between capital flows and economic growth was found in the study. Calderón and Nguyen (2015) examined the nexus between capital inflows and economic growth in 38 Sub-Saharan African countries. By utilizing the technique of a two-step estimation technique in order to account for reverse causality and the issues of omitted variable, they observed that the growth of output in economies within SSA fails to promote the inflows of capital. Nevertheless, FDI inflows and aid promote economic growth but are contrary with respect to sovereign debt inflows.

Capital flows could be in terms of foreign direct investment, portfolio investment, remittances and debt. The constituents of capital flows changed from debt instruments to equities, both direct and portfolio, but with more portfolio flows (Fernandez-Arias & Montiel, 1996; Sy & Rakotondrazaka, 2015). Capital flows have increased considerably in relation to global gross domestic product. They have the prospects of generating new opportunities for developing economies, promoting efficiency, enhancing investment, and lowering risks, while they may also be the reason for economic instability and the magnification of distortions (Wei, 2018).

In the view of Borensztein *et al.* (1998), capital inflows have the capacity to generate extra capital for local savings and enhance the accumulation of capital. Developing economies, such as those in the SACU region, exhibit the constraints of insufficient resources required to spur growth and improve certain macroeconomic fundamentals.

Capital inflows, therefore, generate an avenue for finance and, consequently, investment in the recipient countries, which invariably promote growth (Calderón & Nguyen, 2015; De Mello, 1999; Fernandez-Arias & Montiel, 1996). Given the standard Cobb-Douglas production function of the form $Q=AK^{\alpha}L^{\beta}$ and assuming that other variables and parameters are constant, the variation in output and, consequently, growth can be traced to the specific state of the efficiency parameter A, the level of capital stock, and available labour. The efficiency parameter can be enhanced through inter-country movement of resources, which consequently stimulates the level of productivity.

Capital flows facilitate the transfer of technical know-how and managerial skills, which improves the performance of domestic financial markets (Borensztein *et al.*, 1998; Calderón & Nguyen, 2015; Kose *et al.*, 2010). The benefits that developing economies stand to enjoy from capital flows cannot be overemphasized. However, there are constraints that capital flows impose on the domestic economy (Cardarelli *et al.*, 2010; Combes *et al.*, 2012; Glick & Hutchison, 2009; Pradhan *et al.*, 2011a; Singh, 2003). These include policy constraints in the form of appropriate exchange rate policies to be adopted as well as control measures (Bosworth *et al.*, 1999; Elbadawi & Soto, 1994b). Other consequences of the flows of capital could be in the form of excessive credit creation as well as bubbles in asset prices, overheating of the economy, weak competitiveness arising from currency appreciation, as well as a higher probability of being exposed to crisis (Bacchetta & Van Wincoop, 2000; Bekaert & Harvey, 2000; Bosworth *et al.*, 1999; Cardarelli *et al.*, 2010; Forbes & Warnock, 2012; Pradhan *et al.*, 2011a).

The various compositions of capital flows seem to affect growth in varying degrees. For instance, Agbloyor *et al.* (2014) discovered that foreign equity portfolio investment, FDI, and private debt flows negatively affect economic growth, while Museru *et al.* (2014) show a positive effect of foreign aid on growth by utilizing a Generalized Method of Moments (GMM), attributing the weak performance of aid to the volatility of public investment. This study examined the economic growth effects of capital flows in the Southern African Customs Union (SACU), the role of the region's monetary policy, and analyzed the differential effects of the

various components of capital flows on growth. It also examined structural shock effects in order to establish a standard monetary policy framework that guides capital flows in the region. The CMA in 2004 had a combined GDP estimate of US \$224 billion, which constitutes around 43% of the entire sub-Saharan Africa . Nevertheless, there exists a disparity in economic and social development among the member countries that constitute the currency area (Masha *et al.*, 2007).

SACU was described on historical grounds as having minimal levels of intra-regional trade. However, it has experienced improvement in recent times, reaching 14% of total member-country trade, exceeding African averages. The driving force behind the foregoing improvement is the relatively strong growth of exports from other economies in SACU into South Africa. There is the dominance of trade with South Africa, accounting for 97% of all trade in the region. Also, it runs a considerable trade surplus with the region, such that about 80% of BLNS imports are obtained from South Africa (Harmon, 2015). In the linear regional integration model, SACU is deemed to be an appropriate example of variable geometry (McCarthy, 2013). Harnessing the benefit of capital flows to the regions requires proper and well-coordinated monetary policy management by the monetary authorities.

Due to the surge in foreign capital that has characterized some developing economies, since the early 1990s, international economists and policymakers have divergent views as regards the management of capital flows. Some are of the view that the inflows of capital are considerably exogenous to the economies of their destination and also produce destabilizing outcomes, for instance, (Agosin & Ffrench-Davis, 1996, 2001). On the contrary, there is a deviation from the belief that capital flows considerably react to variables in the domestic economy, whether they are long-term or associated with short-term demand management (Agosin, 2003). The essence of monetary policy in the LNS economies is to ensure the maintenance of the Rand pegged exchange rate through adequate foreign reserves as well as maintain interest rates at levels that will prevent any variance to the fixed exchange rates (Nielsen *et al.*, 2005).

Aziakpono (2008) examined the nexus regarding financial integration, financial development, and economic growth in the SACU economies. The author observed that there is massive evidence describing that the respective financial sectors of the economies in SACU exhibit a high level of integration. It was also noted, on the basis of the indicators, an obvious asymmetry in the capital flows among the banks in the Southern African Customs Union such that the

capital flows appear significantly advantageous to South Africa and Namibia relative to the other economies. This was ascribed to the underlying features of these economies, mostly their fragile institutional development.

According to economic theory, economic growth will be enhanced through financial integration because of a more rational allocation of resources, portfolio, and risk diversification. Such integration has the tendency to stimulate greater profitability of investment as well as better financial development (Agénor, 2003; Lane & Milesi-Ferretti, 2003; Obstfeld & Taylor, 2004). Efficiency gains, greater diversification of opportunities, and the development of the financial sector of advanced economies are all traceable to the liberalization of their financial markets (Edison *et al.*, 2004:4).

Net private capital flows received by developing countries had a rise that exceeded six-fold to arrive at US \$230 billion yearly during 1995-97, from about US \$36 billion yearly during 1987-89 (World Bank, 1998). This supports the theoretical proposition of developing economies being able to access capital flows through an appropriate process of internal and external financial liberalization. This is expected to have a positive effect on welfare and development (Nissanke & Stein, 2003). Moreover, developing economies experienced a rise in net private capital flows from around \$110 billion in 2008 to around \$386 billion in 2009 (United Nations, 2011). Given the surge in financial flows, a spate of currency and financial crises characterized the late 1980s and 1990s. It is widely viewed that developing economies that allow capital flows exhibit more vulnerability to these crises relative to industrial countries, and have been more negatively affected. These outcomes have triggered an intense debate among academics and practitioners about the costs and benefits arising from financial globalization (Kose *et al.*, 2006). The theory of capital flows and economic growth has generated a plethora of empirical studies (Aizenman *et al.*, 2013; Bailliu, 2000a; Chinn & Ito, 2006; Klein & Olivei, 2008; Levine & Zervos, 1998; Reisen & Soto, 2001). It was observed that the intensity of financial flows has experienced a dramatic increase since the mid-1980s, with the early 2000s characterized by significant acceleration, implying an early signal of financial integration among developing economies (Selvarajan & Ab-Rahim, 2020).

On a theoretical basis, financial integration generates more opportunities for economies, resulting in greater economic growth; capital moves freely in a financial system that is integrated, and participating economies can gain via the return of portfolio diversification (MAHAJAN & VERMA, 2015). Prasad *et al.* (2007) contends that the large sum of foreign

private gross capital flows of developing economies is accounted for by the relatively minimal group of economies that are more financially integrated, mostly in the 1990s, while economies that are less financially integrated, where most SSA economies undoubtedly belong, attract a very minimal level of private capital flows.

This study seeks to examine the data in the context of the Southern African Customs Union in order to institute macroeconomic policies that will result in sustainable economic growth. The current arrangement of the SACU, such as pegging the currencies of the LNS to the South African Rand, which invariably influences the monetary policy direction of the union, requires in-depth examination in analyzing the state of capital flows for the Southern African Customs Union. It therefore becomes necessary to formulate appropriate macroeconomic policies that will promote capital flows into the Southern African Customs Union.

1.3. The research problem

The sustainability of economic growth, to a large extent, is influenced by the level of investment, which is a function of the degree of savings rate in an economy (Solow, 1956). However, developing economies, and SACU in particular, still grapple with the required capital accumulation that is needed to spur growth and development.

According to the documentary by UNCTAD (2019c), the flows of FDI to Southern Africa improved to around \$4.2 billion in 2018, from its 2017 of -\$925 million. Specifically, South Africa experienced flows of FDI in 2018 that more than doubled to \$5.3 billion, supporting the government's move to encourage \$100 billion of FDI by 2023. It was noted that the advancement in inflows was majorly as a result of intracompany loans. Moreover, the inflows of equity were reported to be characterized by sizeable expansion. Furthermore, the report has it that South Africa was among the top five host economies that experienced FDI in 2018, with \$5.3 billion at 165.8%, while the country was also observed to be among the top ten investor economies by FDI stock in 2013 and 2017 in billions of dollars, but in terms of outflows, South Africa was observed as being among the top 5 home economies in billions of dollars and 2018 growth.

The foregoing description of South Africa as being one of the major economies that hosts the capital flows of FDI is an indication that the economy and, by implication, the SACU region

have been experiencing FDI flows considering that South Africa is the dominant economy in the union.

Suleiman *et al.* (2013) observed that though there have been impressive FDI inflows, the respective economies of SACU still exhibit minimal and unsteady economic performances. It was noted that the overall region recorded 3.54% of growth in 2008, which declined acutely to -1.73% in 2009. However, the economy's performance improved, resulting in 3.03 percent growth. The economies of Botswana and Swaziland were observed prior to the 1990s as being characterized by high performance relative to the other economies in SACU, while in the aftermath of the 1990s, Botswana and South Africa were the only ones that were characterized by massive growth. However, Namibia and Eswatini, over the span of 1995 to 2004, experienced progress while the other member economies showed a reducing trend, with Botswana recording a tremendous decline in economic growth.

Another view of the economy of South Africa is in terms of the foreign exchange market. For instance, de Beer (2017) observed that the circumstances with respect to the foreign exchange market for rand right from the financial crisis influenced the increased attention on inter-country flows of capital as well as the inference it exhibits for an economy's capacity to cope with surges and reversals in inter-country flows of capital. The exchange rate regime in South Africa is seen as being mostly flexible in the EME's while intervention in foreign exchange is rare. Also, ever since the swift depreciation that occurred alongside the financial crisis, it was observed that the rand earlier gained strength by 45% with respect to the United States dollar over the span of October 2008 and April 2011. However, right from April 2011 in April, the rand was characterized by swift era of depreciation, having momentary appreciation, depreciating by 44% on average between the periods of April 2011 and May 2015. Circumstances in the domestic and international environment were observed to influence the performance of the rand. Given the worsening economic prospects in the external sector in the second half of 2011, the flows of capital dwindled significantly, which resulted in the cancelling of a great deal in respect of the gross currency gains since the era of the financial crisis.

The pattern of development of the rand which is expected to be affected by the monetary policy of the Reserve Bank among other factors is expected to filter mostly on the economies comprising of Lesotho, Namibia, and Eswatini while Botswana may be indirectly affected.

The research problem is that developing economies, of which the Southern African Customs Union is part, have been attracting capital flows in varying degrees over the years, but the monetary policies of these countries have not been able to translate them into sustained economic growth. The monetary experts have the responsibility of using the monetary policy to influence economic variables such as a stable price level, output, interest rate, exchange rate as well as the overall soundness and stability which have indirect effect on the level of capital flows into an economy.

SACU exhibits a pattern that definitely influences monetary policy management for the region, which invariably has implications on capital flows. For instance, Lesotho, Namibia, Eswatini, and South Africa are in the same Common Monetary Area (CMA), with the currencies of Namibia, Lesotho, and Swaziland (NLS) defined to the South African Rand. This invariably implies that the policy framework of the Reserve Bank, which will indirectly dictate the direction of macroeconomic performance in the LNS economies as well as determine the capital flows to the region, will indirectly influence the monetary policies of the NLS economies. The LNS monetary experts, therefore, lose monetary autonomy. However, Botswana does not belong to the CMA, though it is part of the Southern African Customs Union. This pattern will clearly produce variations in monetary policy management and, consequently, the volume of capital flows into the region towards promoting sustained economic growth.

This study admits that several empirical studies abound regarding the issue of capital flows, monetary policies, and economic growth. Some studies focused on specific economies, while others on a set of economies. For instance, Berument and Dinçer (2004) analyzed the effects of the influx of capital on the macroeconomic performance of Turkey. They used monthly data covering the period from 1992:01 to 2001:06 and used the technique of a recursive vector autoregression model. Their results showed that positive innovations in capital inflows increase the value of the domestic currency and also stimulate a rise in output and money supply. It, however, causes a decline in interest rates and prices in the short-run. It was also discovered that the exchange rate system has no influence with regard to the effects of capital flows on macroeconomic performance. Another study is that of Chang (2010) who examined long and short-term nexus comprising of FDI, domestic capital and growth with respect to Taiwan. Utilizing threshold error-correction econometric technique, a long-term equilibrium which exhibits stability with asymmetric adjustments was found for the three variables. Other findings

include three short-term relationship, Improved economic growth as a perneacea for domestic capital accumulation, as well as enhanced domestic investment as a channel through which the influx of FDI positively impacts on growth. Panel studies include, among others, the work of Seetanah and Khadaroo (2007), who conducted a panel study comprising 39 Sub-Saharan African economies over the span of 1980–2000 with the aim of examining the effect of FDI on growth. The authors adopted an extended Cobb-Douglass production function that ensures the division of investment into the various components of domestic private, foreign direct, and public investment. Using static and dynamic panel data estimates, it was found that FDI is crucial in determining the economic outcomes of Sub-Saharan African countries, but not as other types of capital. The evidence of endogeneity in FDI-growth was established from the study; that is, FDI both leads to and follows growth. Moreover, Tsaurai (2017) analyzed the economic growth effects of foreign portfolio equity investments in a panel study that comprises 14 Asian and European emerging markets. The technique of Generalised Methods of Moments was employed for the study with the view of accounting for the dynamic peculiarity of growth data alongside endogeneity issues between economic growth and foreign portfolio investments. The author found that foreign portfolio equity investments exhibit an insignificant positive effect on growth in the context of Asian and European emerging economies.

Furthermore, Suleiman *et al.* (2013) Suleiman and et al. (2013) conducted an empirical analysis of FDI and growth in respect of the Southern African Customs Union in a panel analysis of data covering the period 1980-2010. The econometric technique of Dynamic Ordinary Least Squares was used, which produced evidence of a direct and significant effect of FDI on the growth of the countries that constitute SACU.

A study was conducted by Mkhonta (2017) to examine "The Impact of Discount Rate Differential with South Africa on Capital Flight in Namibia and Swaziland". Findings from the study reveal that higher interest rates in Swaziland and Namibia compared to South Africa result in capital flight to South Africa in the long run due to the influence of South Africa in the monetary area. The Johansen-Juselius cointegration technique and the Vector Error Correction Model were used to examine the behavioural pattern above. It was revealed from the estimated model that Swaziland and Namibia's differentials in interest rates with respect to South Africa exhibit a significant inverse effect on net portfolio investment. The author established, from the impulse response function, that capital flight undermines economic growth in Namibia and Swaziland. The causality tests reveal that the budget deficit, differential

in interest rates, and growth all granger cause capital flight. Noteworthy from the study is the fact that the budget deficit and economic growth in respect of Namibia and Swaziland do not significantly affect capital flight in the long run. It was concluded from the study that, in the short run, monetary policy appears more sensitive to financial sector developments in the case of Namibia compared to Swaziland, owing to the divergence in financial market developments.

This study endeavoured to provide an extensive coverage of the literature with the observation that though there exist empirical works in the respective member countries of the Southern African Customs Union, there exists a dearth of studies on the empirical studies on the nexus of capital flows, monetary policies and economic growth in one of the world's oldest customs unions. Therefore, the study significantly contributes to appropriate policy measures in the Southern African Customs Union.

1.4. The research questions

1. What is the trend and pattern of the various components of capital flows, monetary policy, and economic growth in the Southern African Customs Union (1990–2019)?
2. What is the dynamic interaction of capital flows, monetary policy, and economic growth in the Southern African Customs Union?
3. What is the threshold level of capital flows and monetary policy that will produce the optimal level of economic growth for the Southern African Customs Union?
4. What is the direction of causality among capital flows, monetary policy, and economic growth in the Southern African Customs Union?
5. What are the dynamic responses of capital flows, monetary policy, and economic growth due to shocks in the Southern African Customs Union?
6. What is the macroeconomic monetary policy framework for capital flow management towards promoting sustainable economic growth and development?

1.5. Aim and objectives of the study

The essence of this research work is to critically examine the constraints on why capital flows have not produced sustained economic growth in the Southern African Customs Union (SACU).

The broad objective of the study is to assess the contribution of net capital flows to economic growth in the Southern African Customs Union over the study period. The specific objectives of this study are to:

1. analyze the trend and pattern of the various components of capital flows, monetary policy, and economic growth in the Southern African Customs Union (1990-2019);
2. examine the dynamic effect of foreign portfolio investment, foreign direct investment, and monetary policy on economic growth in the Southern African Customs Union;
3. determine the threshold level of capital flows and monetary policy that will result in the optimal level of economic growth in the Southern African Customs Union;
4. determine the direction of causality in the Southern African Customs Union between capital flows, monetary policy, and economic growth;
5. analyze the effects of capital flows and monetary policy on economic growth in the Southern African Customs Union; and
6. formulate a macroeconomic monetary policy framework for managing capital flows in order to promote long-term economic growth and development for the Southern African Customs Union.

1.6. Justification of the study

SACU has been experiencing varying degrees of growth over time, with South Africa being the dominant economy in the arrangement. The peculiarity of the arrangement within SACU will, to a large extent, influence the performance of the respective countries in the region.

Within the SACU, there is another arrangement referred to as the "Common Monetary Area." This is the relationship existing between Lesotho, Namibia, Swaziland (LNS) and South Africa,

with the exclusion of Botswana. The CMA implies the pegging of the currencies of the LNS economies to the South African Rand, which implies that the South African Reserve Bank (SARB) influences the monetary policies of the LNS central banks. LNS countries, therefore, do not enjoy independence of monetary policy as the Rand flows easily across them. However, Botswana is distinct from the arrangement. The Botswana economy is, therefore, not strongly affected by the monetary policy target of SARB compared to the LNS countries.

According to the United Nations ECA (2018), inflation was reported to be minimal in Botswana on the premise that it operates a monetary policy independent of South Africa. It was also observed that Botswana's inflation rate had achieved the target range of 3–6 percent in 2017, showing prudence in monetary policy measures, lower import prices of fuel, as well as the appreciation of the local currency against the South African Rand recently (United Nations ECA, 2018).

Wörgötter and Brixiova (2019) examined the topic “Monetary Unions of Small Currencies and a Dominating Member: What Policies Work Best for Benefiting from the CMA?”. They specifically analyzed the convergence performance in respect of present small size member economies as well as previous members in relation to the Common Monetary Area against the standard of South African provinces. It was observed from their findings that a monetary union solely does not provide the assurance for satisfactory outcomes. The authors discovered that, within the CMA, there is overperformance in Namibia, Eswatini is on the average while Lesotho underperforms. The study therefore provides policy recommendation options for country-specific as well as CMA-wide towards stimulating higher level of economic growth among the economies that constituted the CMA.

Also, the characteristics of economies globally stresses that being a member of a monetary union does not warrant improved economic performance while being external to a neighbouring monetary union can be advantageous. There exists documentation that other harmonizing policy settings, and specifically reliable fiscal policy, dictate the advantage of being part of a monetary union. Moreover, the style of a specific exchange rate system also counts on preferences for realizing likely conflicting policy targets (Nguyen *et al.*, 2020).

Infact, as observed by Campos *et al.* (2019), synchronization in business cycle is very probable in monetary unions while according to Beck (2019), structural resemblance as well as intra-industry trade appear to be more potent determining factors than the mere involvement in a

monetary union. Considering the foregoing observations in relation to the instance of a monetary union comparably signals the need to analyze the performance of the Southern African Customs union given its strong monetary policy coordination and the implication it has on capital flows in the region.

The special arrangement within SACU, therefore, calls for a close examination in that there are two separate monetary policy approaches in the region. There is an independent monetary policy between Botswana and the CMA, while the LNS relies on the discretionary monetary policy of the SARB. This may invariably affect capital flows into the region. Some studies concentrated on each member country in the CMA (Dwight, 2006; Gons, 2006; Lledo *et al.*, 2005; Tjirongo, 1995), or if the CMA results in an optimal currency area (Cobham & Robson, 1994; Masson & Pattillo, 2005; Metzger, 2004; Van der Merwe, 1996). More studies need to be conducted in order to ascertain if the region's monetary policy structure will promote capital flows and sustainable economic growth.

The African Development Bank Report (2004: i) as cited in Memela (2010) reveals that SACU has attained a higher degree of stability and macroeconomic convergence compared to some countries in SADC. The indicators used include the two sister policies of monetary and fiscal policies, inflation rates, interest rates, and income per capita. SACU's macroeconomic convergence was reported to be faster than the rest of the countries in SADC (Duma, 2000; Jenkins & Thomas, 1997). Noteworthy of macroeconomic variables of convergence in SACU are inflation rates, interest rates, and real exchange rates (Maleke, 2010). These macro variables will generate an effect on the flows of capital into the region. For instance, in the neoclassical perspective, interest rates influence the direction of capital flows, with regions exhibiting higher interest rates being prospective destinations for hot money.

The resultant state of the exchange rate in the aftermath of capital flows and inflation rate to a large extent influences the competitiveness of a country's exports. In the final analysis, all these factors will influence the intensity of economic activities, employment, standard of living and economic growth of the region. However, the level of economic progress among some of the countries in SACU, such as Lesotho and Namibia, is still low. There are different blocks in Africa, but the degree of monetary policy coordination predominantly influenced by South Africa is very strong within the Southern African Customs Union. By implication, SACU will be more appropriate for the study. The study will help the union identify the constraints to capital flows into the region. It will also provide insight for the South African Reserve Bank as

well as the respective central banks in the union on the appropriate conduct of monetary policy that will translate capital flows into sustainable economic growth.

1.7 Organization of the study

The study is divided into six chapters. Chapter one introduces the topic while chapter two reports the theoretical and empirical literatures. Chapter three analyzes the trend and pattern of capital flows and economic growth among the countries in SACU. The research methodology is expressed in chapter four while data analysis, interpretation of results and the discussion of results occupy chapter five. Summary, policy recommendations and new knowledge are expressed in chapter six.

CHAPTER TWO

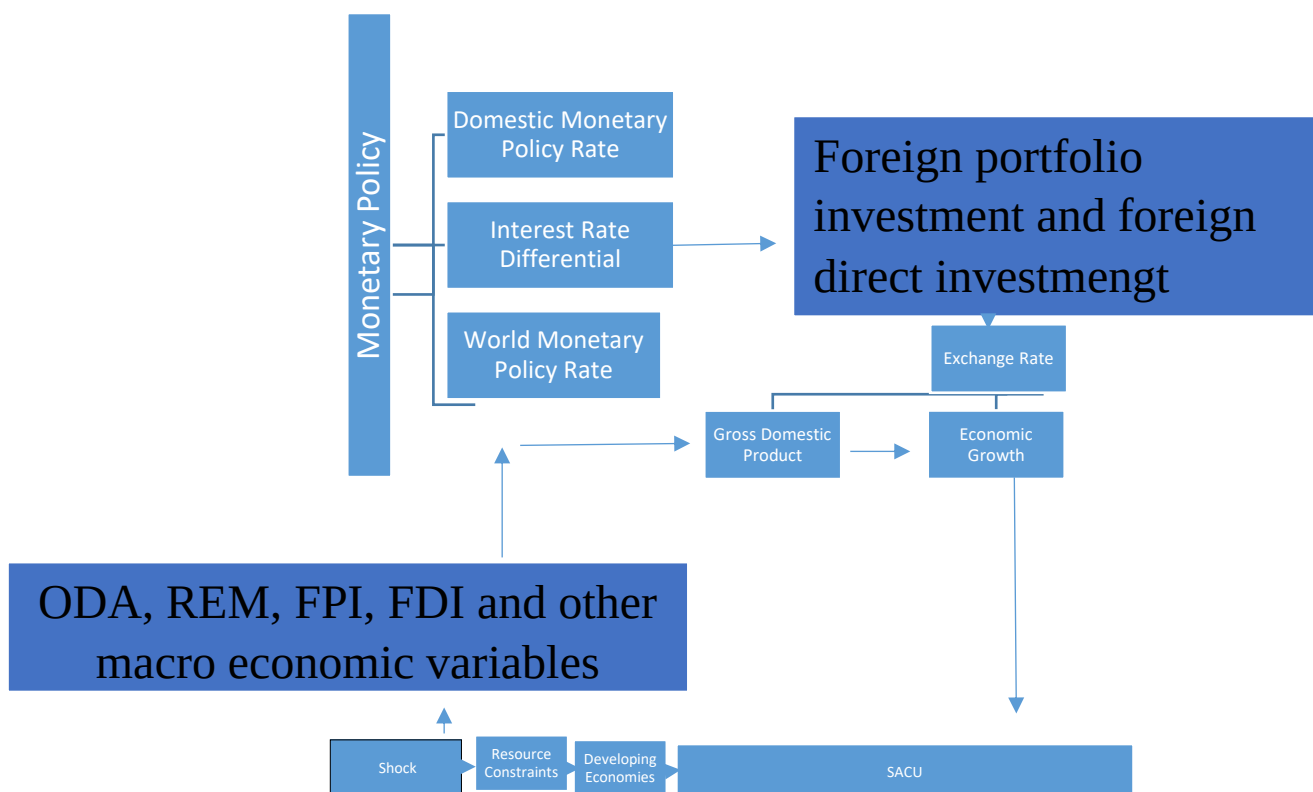
Theoretical and Empirical Literature Reviews

2.1. Introduction

This chapter relays the various works, both theoretical and empirical, on the subject matter of capital flows. It gives insight into the theoretical dynamics of capital flow movement across international boundaries, while the empirical findings give credence to the variations in the research output by academia over time. The chapter is divided into five sections. The introduction is contained in 2.1, while the conceptual framework and theories on capital flows are expressed in 2.2 and 2.3, respectively. Empirical literature on capital flows occupies 2.4, while 2.5 concludes the chapter.

2.2. Conceptual Framework

As contained in the figure below, a number of concepts related to the study of capital flows and their interrelationships are specified in this unit.



Source: Author's design (2021)

Figure 2.0: Conceptual Framework

Figure 2.0 above is a conceptual framework displaying a diagrammatic relationship among the variables. It can be observed that monetary policy is viewed from the perspective of domestic and world policy rates, whose difference generates the interest rate differential. Based on the neoclassical theory of capital flows, the differential in interest rates has an influence on capital mobility because resources will be driven to economies that generate higher returns on investment. Consequently, the inter-country movement of resources will affect the exchange rate depending on the direction of capital flows. The state of the exchange rate, either appreciating or depreciating, will greatly describe the competitiveness of the external sector, which invariably influences gross domestic product and economic growth.

Moreover, it becomes pertinent to include shock effects in the framework. Macroeconomic variables are structurally connected, which implies that policy makers must put into perspective the possible impact shocks to other variables have on an indicator variable. On that basis, the shock is described in the diagram running to the capital flows and other macroeconomic variables that may also lead to resource constraints and invariably describe the state of the developing economies. The Southern African Customs Union, which is in the purview of a developing region, can therefore be explained by these chains of reactions.

2.3. Definition of Concepts

2.3.1. Monetary policy

Monetary policy is the policy parameters of the monetary authorities to ensure the effective management of the flow of funds in an economy towards achieving some macroeconomic goals. According to Friedman (2000), monetary policy is observed as one of the two major avenues (considering the other as fiscal policy) through which government in a market economy consistently affects the speed and direction of general economic activity, which encompasses not only the magnitude of total productivity and employment, but additionally, the rate at which the price level rises or falls. Monetary policy basically influences the macroeconomy on the basis of its effect on financial markets (Gust & López-Salido, 2014).

2.3.2. Interest Rate

The interest rate specifies the returns on financial assets such as equities, government or corporate bonds, etc., as well as real sector investment such as FDI. The prevailing level of interest rates, *ceteris paribus*, influences the flow of funds across international boundaries, with investors keen to delve into regions of viable returns.

2.3.3. Investment

Investment is the extent to which the capital stock of an economy is increased. This could be in the form of business fixed investment, residential investment, or inventory investment. The subject matter of capital flows will influence the level of investment prevalent in the Southern African Customs Union, which consequently determines economic growth and the general welfare in the region. The rate of change of investment is therefore a crucial factor of consideration. For example, policy papers (Furman, 2015; IMF, 2015; Vashakmadze *et al.*, 2017) as well as academic papers (Alexander & Eberly, 2018; Fernald *et al.*, 2017; Hall, 2015) have considered the issue of a fall in investment. It has impacted the United States, Europe and other emerging markets (Bucă & Vermeulen, 2015; Bussiere *et al.*, 2015; Döttling *et al.*, 2017; Kose *et al.*, 2017; Lewis *et al.*, 2014).

2.3.4. Foreign Direct investment

FDI is a real sector investment in a host country. This could be motivated by a variety of factors, including returns on investment, the need to expand the market frontier, mergers and acquisitions, and so on. *Ceteris Paribus*, it transmits benefits to the host country.

FDI has the propensity to improve economic growth not only by generating foreign capital but also by crowding in more domestic investment. Through the creation of forward and backward linkages with the local economy, more employment is indirectly generated and additional economic activity is created (Jenkins & Thomas, 2002). It provides neighborhood effects in the likes of enhanced opportunities to the world market, development of human capital, government revenues through tax as well as the use of internationally acceptable standards of employment practice (Jenkins & Thomas, 2002). Despite the foregoing, the resultant effect of FDI may be complicated.

2.3.5. Foreign Portfolio Investments

Foreign portfolio investments comprise the investments by the residents of an economy in the equity and debt securities of an organization in another economy with the primary aim of capital gain and do not necessarily imply a crucial and lasting stake in the organization. (Elekwa *et al.*, 2016).

This category of investment is more volatile in nature. It is the financial investment in such assets as equities and bonds, which may either be government or corporate, as well as treasury bills, treasury certificates, etc. Hot money continuously moves across international boundaries in search of optimal returns. However, according to Grabel (1998), the level of global foreign portfolio investment has increased exponentially.

2.3.6. Gross Domestic Product per Capita

The Gross Domestic Product (GDP) of a country measures the overall market or monetary value of all the final goods and services produced within the domestic territory of an economy, irrespective of the nationality of the producer, while GDP per capita measures the output per head and, consequently, the living standards of the citizens at a particular period of time.

2.3.7. Economic growth

Economic growth is a sustained increase in the productive capacity of an economy over a period of time. It can be used to examine the growth pattern and speed as well as the set of factors that stimulate it, such as technical progress, human capital development, the economic environment, and government macroeconomic policy.

2.3.8. Shocks

Economic shocks are changes to significant macroeconomic variables that exhibit profound effects on such indices as the price level, unemployment rate, and consumption. Shocks, in most instances, cannot be predicted and can be the result of events which defy the coverage of regular economic transactions (Investopedia, 2021).

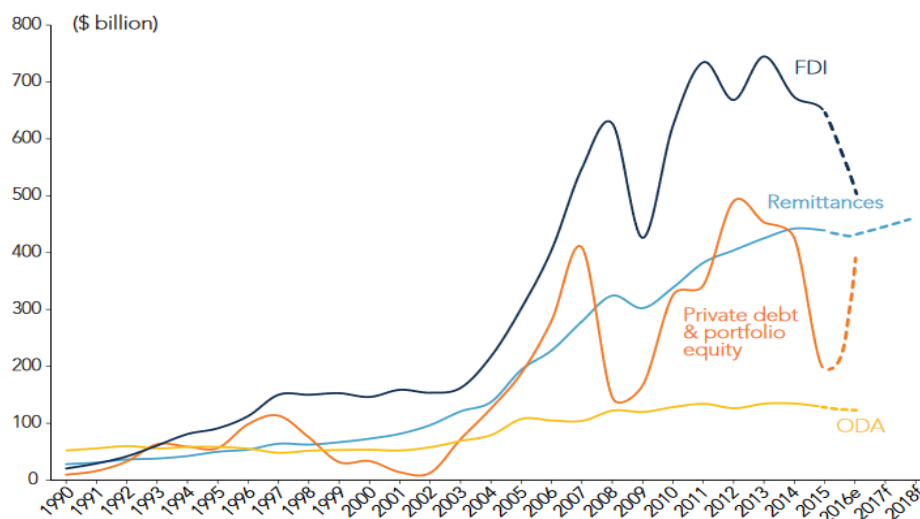
2.3.9. Developing Economies

Developing economies are generally countries characterized with low performance in certain key macroeconomic variables such as GDP, inflation rate, unemployment rate, low level of industrial activities, low foreign exchange reserve, high population growth rate and predominantly agrarian societies. The Southern African Customs Union falls under the purview of developing countries.

2.3.10 Remittances

Remittances fall into the category of unrequited transfers from one country to another. Ratha *et al.* (2018) documented some information about the flow of remittances. For instance, it was observed that the flows of remittance to developing economies were estimated to have reduced by 2.4%, to \$429 billion in 2016, following a fall of 1% in 2015, as contained in the figure below. It was noted that in recent years, remittance flows have declined for the first time in two successive years.

Remittance flows to developing countries are larger than Official Development Assistance and more stable than private capital flows.



Sources: World Bank staff estimates; World Development Indicators. See annex A for data and forecast methods. Note: FDI=foreign direct investment; ODA=official development assistance.

Ratha *et al.* (2018)

It was also found that this category of capital flows commands the second largest share of finance from foreign economies after FDI (Aggarwal *et al.*, 2011; Giuliano & Ruiz-Arranz, 2009; Glytsos, 2005).

2.3.11. Exchange Rate

The study of capital flows is incomplete without a consideration of the exchange rate. The exchange rate is the domestic price of a foreign currency and is very prone to frequent fluctuations due to the free market state of the international financial market.

2.4. Capital flow theories

The relationship that exists between capital flows and certain macroeconomic variables has been explained theoretically. The neoclassical, Lucas Paradox, and general equilibrium theories sourced from the Central European Review of Economics and Finance are contained below.

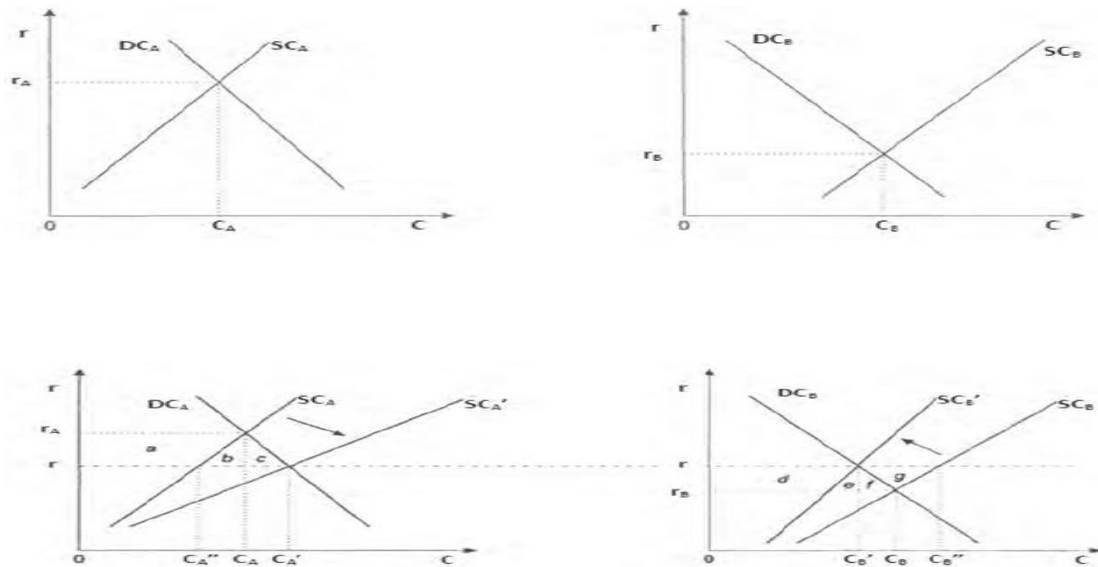
2.4.1. Neoclassical Theory

The neoclassical theory postulates the movement of capital from developed to poor countries. On the basis of the work of Janicka (2016), the following exposition runs.

Prior to the emergence of the global financial crisis in 2008, the issue of the unrestrained movement of capital across international boundaries was influenced by inferences drawn from neoclassical economics. The Neoclassical theory came into existence in the gold standard era (1870–1914), during which capital flowed unrestrained across international boundaries. The theory was in consonance with the economic styles of those times, establishing clear-cut benefits as a result of the free movements of capital. From the perspective of the neoclassical model, the world economy may experience the state of an optimum condition of full liberalization of capital flows. Any other option for a restrained or partial state was deemed sub-optimal. The implication is that countries that encourage cross-border restraint of capital flows will receive returns on capital below their potential.

A look at the case of static equilibrium partial analysis for two countries reveals that some changes in the domestic economies will be observed as restrictions are removed on cross-border capital movements. Assuming the available stock of capital in country A is less than that of country B, this implies that the returns on capital will be higher in country A compared to B. If both countries put barriers to the flow of capital, the returns on capital in country A will remain high while they will remain low in country B. Given the graph below with supply of capital on the X –axis while interest rate that captures the returns on investment on the Y-axis. DC_A and DC_B are the respective demand for capital with respect to their respective interest rates r_A and r_B . The supply of capital at the rate of interest r_A and r_B are respectively SC_A and SC_B . From the foregoing, a restriction between these countries will result in a higher rate of interest in country A than country B. This scenario will be sustained unless the limitations to the flow of capital are removed. Consequently, capital will tend to move from B to country A.

As this trend continues, the supply of capital will begin to increase in country A while it reduces in country B which may eventually lead to the equalization of interest rate between the two countries considering the fact that differential adjustments will also occur in demand.



Source: Czarczyńska and Śledziewska (2003:66-67), McDonald and Dearden (1999:52) A.

The assumptions on which the neo-classical model was premised were unrealistic given the current reality of the global economy.

The model operated on the provisions of the gold standard monetary system, which obviously shows the direction of international mobility of capital. The flows continue until the rate of returns are equalized. This trend of capital flows from advanced to developing or emerging market economies was established in a study by Schularick (2006) as cited in Janicka (2016)

2.4.2. R. Lucas Jr contradiction of the Neo-Classical theory

Information from the publication of Janicka (2016) documented vital information. For instance, a paper published by R. Lucas Jr. in 1990 queried the relevance of the conclusions from the theoretical neoclassical model (Lucas, 1990:92-96). The submissions of Lucas contradicted the provision of the neoclassical theory in that it was confirmed that world resources do not move from developed to developing economies, but are invested majorly in the developed and in the richest economies like the United States (Singh, 2002:20). Lucas compared the United States and India. Based on the assumptions of the neoclassical theory, he asserted that in 1988 the marginal return of capital in India was bigger than that of US by 58 times.

Going by the neoclassical theory, capital resources will have to flow from India to the U.S. economy until the marginal returns between the two countries are equalized. This expectation did not occur at all, and there was no evidence to prove that the process took place. The conclusions by Lucas challenged the use of marginal products in determining the flow of capital between countries. Economists became interested in substantiating reasons for the divergence of economic theory and reality, as demonstrated by R. Lucas.

The main factor of distinction between theoretical and practical conclusions is the imperfection of human capital in less developed countries. This imperfection undermines the returns on investment in the developing economies. Many economists became curious to re-examine the submission of Lucas by considering the fact if variation in marginal returns of capital does not influence the international mobility of capital.

In a study by Clemens (2002), as cited in Janicka (2016) it was found that not only developed countries export capital resources to other developed countries, but also capital borrowers from poor economies have difficulty obtaining capital in their country due to the incentives for local capital owners to invest in rich countries. This is the case when the market fails to effectively allocate resources in developing economies. In another study by Reinhart and Rogoff (2004), a consideration of the Lucas paradox was observed. They established the frequent inability of developing economies to take care of their financial obligations associated with the servicing and repayment of foreign debts. This is why developing economies are seen as risky destinations for investment.

Alfaro *et al.* (2005) assert that the widely known institutional quality of the economic, social, and political environment alongside the economic policy style used by a country are part of the factors influencing capital inflows. Some studies concentrated on the Lucas paradox on the premise that the marginal product of capital in poor countries exceeds the rate of capital in rich countries (Janicka, 2016). The findings of Caselli and Feyrer (2006) contradict the foregoing.

2.4.3. The Neoclassical Model of General Equilibrium

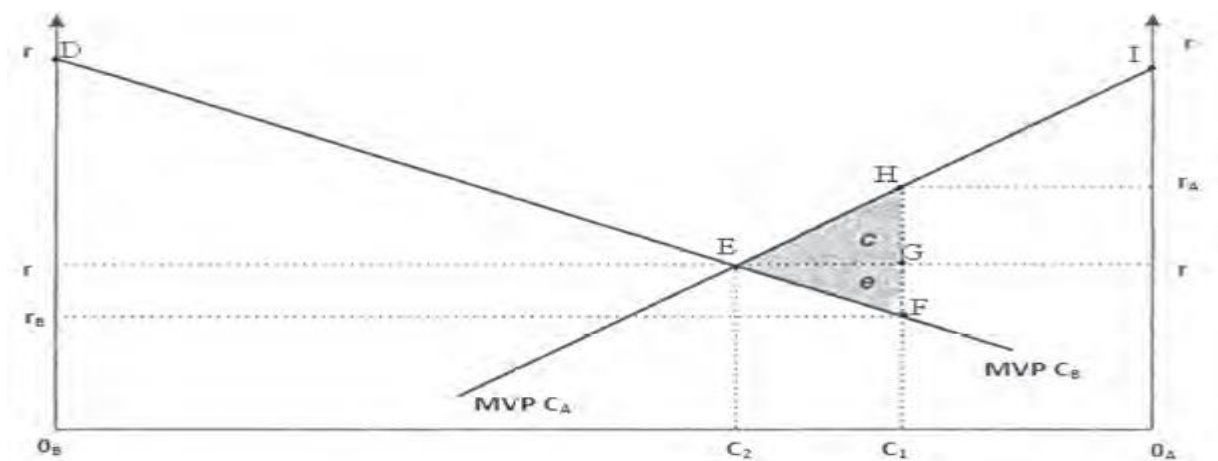
A detailed analysis of the model and how it works is given below as described by Janicka (2016). It is premised on a short-term production function. In this context, producers conclude on the amount of capital required, which is a function of the revenue obtainable from the use of an extra unit of capital. The procedure is based on the marginal product of capital.

Optimization in the units of capital employed is a function of the price of capital and its marginal productivity. The producer will therefore be in equilibrium, optimizing returns provided the marginal product of capital equals its price.

Considering the figure below, country A has few capital resources compared to country B. Given the price of capital in country A, the amount of capital resources utilized is equal to the area of $0AC1$, while that of country B is $0BC1$, while the entire value of capital resources equals $0A0B$. The imposition of restrictions on capital flows will result in the world production of the area being $0AIHC1$ by country A, while the receipt by capital owners is $0ArAHC1$ and HrA received by other owners. However, a homogenous situation exists in country B with a global output of $0BDFC1$ from which $0BrBFC1$ is received by capital resource owners while the rest receive $rBDF$.

The elimination of trade restrictions changes the state of activities in both countries. Capital will begin to flow to country A with few capital resources, which will result in the downward movement of prices of capital. However, prices of capital begin to rise in country B as they become scarce gradually. This mechanism of adjustment will eventually result in the equalization of the prices of capital to r in both economies. The profit level drops from r in country A while global output rises from $0AIHC1$ to $0AIEC2$ (Output $C1C2EG$ is attributed to the foreign entrepreneurs).

Notable is the fact that the return to capital owners falls from $0ArAHC1$ to $0ArGC1$, while the return to other owners of resources increases from $rAIH$ to rIE . The level of output in country B is $0BDEC2$, while the level of output generated in economy A because of the capital that left economy B is $C1C2EG$. The national output rises to $0BDEGC1$ in country B, which exceeds the former by EGF . The returns to the owners of capital in economy B rose with the value of $0BrGC1$, while other factor owners had a reduction in returns of rED . The liberalization of capital flows results in the rise in net welfare represented by the triangle EFH . It can be concluded that the elimination of constraints to the mobility of capital will result in the convergence of returns on capital, which ultimately stimulates the improvement in the performance of the global economy (Janicka, 2016).



Neoclassical model of general equilibrium – output and income effects under free mobility of capital.

Source: Czarczyńska and Śledziewska (2003:72)

2.4.4. Endogenous Growth Theory

Economic growth is a long-term concept that describes the sustained or steady rise in real productivity per capita and per worker over a period of time. Such a narrow definition entails an economy and an economy-wide path of structural change as well as economic development. The endogenous growth theory is a branch of growth theory that requires the rate of growth to be determined by evaluating the equilibrium of the growth model without any external foisting on the model. It could also be observed as a situation that ensures that technical progress is explicitly modelled and not exogenously provided (Arestis *et al.*, 2007).

The new growth theory considers two crucial factors. Firstly, it considers technological progress as a product of economic activity. The theory is often observed as an "endogenous" growth theory on the basis that it incorporates technology into a model of the way markets function. Moreover, new growth theory is based on the idea that, unlike physical objects, increasing returns are the attributes of knowledge and technology, while the process of growth is driven by increasing returns (Cortright, 2001). The new growth theory queries the neoclassical model in some ways. For instance, the exogenous growth models generated by Solow and other scholars in the neoclassical purview, to a large extent, did not elucidate what makes technology experience improvement over time. Assuming that technology "just happened" resulted in a focus on the accumulation of capital and improvement in the labour force as sources of growth (Cortright, 2001).

Pack (1994) is of the view that the theory of endogenous growth has the benefit of describing the forces that generate technological change rather than embracing the basis of neoclassical theory, which holds that such change is exogenous.

Several endogenous growth theories find their relevance in the expression $Y = AK$ (Lucas Jr, 1988; Rebelo, 1991; Romer, 1986). "A" in the foregoing equation implies factors that have an impact on technology, while "K" is capital that comprises physical and human capital. It should be understood that in this context, the non-existence of diminishing returns to capital is on the basis of some externality that neutralizes any likelihood of diminishing returns. Enhancement in productivity will surpass private gain as a result of investment in either physical capital by an organization or investment in human capital stemming from an individual. The model therefore projects the chance that the stimulation of the rate of investment has the prospect of resulting in growth sustainability provided robust external economies are induced by stemming from investment. The Solow model, therefore, exhibits having a unit value. It therefore provides a nice perspective with respect to the diminishing returns as well as the lack of any sustainability effect on growth, which is a trait of the Solow model in terms of its simplest version (Pack, 1994).

The following are explanatory theories on capital flows as obtained from the work of Li (2018) and the respective citations as obtained from the article.

2.4.5. Flow theory

The focus of this theory is to analyse the nexus that exists between capital flows and interest rates. The theory explains international capital flows as a function of interest rate differentials. According to the theory, capital outflows will be on the increase provided foreign interest rates are high and remain at a high level relative to domestic interest rates. Conversely, the domestic economy will experience inflows of capital and a retardation of capital outflows provided the local interest rate exceeds the prevailing foreign interest rate. The following model was proposed by Meade for the analysis of the flow theory:

$$\text{Trade balance: } T = T \left[Y^-, e/P^+ \right]$$

where T is the net export, Y represents gross output, e is the exchange rate and a measure of the price level is P.

Capital Flow: $F = F(i^+, i^{*-})$

where capital flows, domestic interest rate and prevailing interest rate abroad are F , I and i^* respectively.

Balance of payments: $\Delta R = T + F = T \left[Y^-, \frac{e}{P^+} \right] + F(i^+, i^{*-})$

Based on the model, the state of the balance of payment becomes better on the condition that the local interest rate exceeds the foreign interest rate, which promotes the influx of foreign capital, provided output and price level are given.

In the context of the flow theory, international capital flows were explained by Mundell and Fleming as being influenced by interest rates. A high domestic interest rate relative to the foreign interest rate is expected to increase net capital inflows or result in a reduction in net capital outflows (Mundell 1960). However, Fleming (1962) asserts that the mobility of capital across international boundaries shows more sensitivity to interest rates in the context of a floating exchange rate regime compared to a fixed exchange rate system. The research work of Mundell (1963a) ascertained interest rates and exchange rates as the key determinants of international capital flows.

2.4.6. Portfolio Theory

Given the context of the portfolio theory, Branson (1968) distinguished between the determinants of short term and long-term capital flows. Imports, exports, interest rates and exchange rates influence short-term capital while domestic income, interest rates as well as foreign interest rates influence long-term capital flows. Branson's analysis of the foregoing factors in Markowitz Tobin model and reached the premise that foreign assets to a given wealth depends on domestic interest rate, foreign interest rate, risk and the stock of wealth.

Mathematically; $\frac{F}{W} = f(i - i^*, E, W)$

where foreign asset and wealth are respectively F and W . The local interest rate is I , foreign rate of interest is i^* while the risk factor is E

The difference between income and risk determines the proportional allocation of assets by investors within the context of the model. The prevailing proportion of assets is not

concomitant with the willing portfolio proportion when the market is in a state of disequilibrium, which will result in the adjustment of the existing portfolio. The rate of return, the risk forecast, and the investor's wealth influence the flows of assets.

2.4.7. Monetary analysis theory

This theoretical view is based on the fact that monetary policy influences the international mobility of capital, which is in the purview of a monetary phenomenon. International capital flows are expected to be a determinant of domestic monetary policy as well as the rate of change in reserves. The balance of payments position is determined by the net flows of capital.

The following monetary analysis model was given by Harry (1972) for the analysis of international capital flows.

Money demand function: $H_d = H(P^+, Y^+, i^-)$

Money supply function: $H_s = H\left(\frac{1}{\phi}\right)(R + D)$

The measure of the price level is P , gross level of output is Y , i is the interest rate, D represents the domestic credit, the international reserves is R while the statutory reserve ratio is ϕ .

Balance of supply and demand of money: $R + D = \phi H(P, Y, i)$

Balance of income and expenditure: $dR = H d\phi + \phi H_1 dp + \phi H_2 dY + \phi H_3 di - dD$

The balance of payments will experience improvements according to the monetary theory provided an economy is experiencing a rise in gross output or an increase in inflation, which will stimulate the demand for money. The reverse will occur if there is a reduction in monetary demand due to higher interest rates. This claim is at variance with the flow model. However, the variance is analyzed in the general equilibrium model of Frankel and Honeywell (1980), which asserts that the short-term movements of international capital are functionally dependent on the prevailing state of interest rates, while the adjustment of money stock and local credit policy determine the long-term international capital flows.

2.4.8. Transaction Cost Theory

Since 1990 the rise of globalization of financial market has been with the peculiarity of international mobility of capital in the likes of large scale, multi-direction and securitization, which brought difficulty in the capacity of the existing theory to explain the challenge.

A transaction cost model, according to Kim (1999), was developed for the analysis of the globalized state of capital flows as presented below:

$$\frac{dY_t}{dl^*} = r^* (1 - C^*) - r(1 - C)$$

Y is the composite of domestic and foreign investment returns, l and r are both the domestic investment and interest rate respectively. C^* is the foreign transaction cost while the domestic counterpart is C . The interest rate abroad is signified by r^* . This theory states that the transaction cost influences the international mobility of capital which include search and access to information costs, deliberation and the cost of reaching a compromise as well as the cost of administration and monitoring of activities. The transaction cost theory recognizes the role of interest rate differentials in determining international mobility of capital as contained by the flow theory, but will not be adequate. It is expected, according to the theory, that prospective investors do put into cognizance domestic and foreign transaction cost in their decision making process (Li, 2018).

2.5. Empirical literature on capital flows

2.5.1 General review

The subject matter of capital flows encompasses a plethora of studies examining the relationship that exists between it and other macroeconomic variables in emerging markets and developing economies. Several studies have considered the subject matter of capital flows.

The neoclassical theory reveals that capital moves from capital-surplus economies to capital-scarce economies in order to attract a higher rate of return. Despite this flow of capital, several developing and emerging economies have not been able to optimize capital flows to augment domestic resource gaps.

The macroeconomic effect of capital flows can be examined through shocks as well as the allocative efficiency of the recipient economy, the factors warranting the inflow, the

macroeconomic context of the domestic economy, and factors that cause capital inflows to be sustainable (Fernandez-Arias & Montiel, 1996). Choong, Yusop, *et al.* (2010) corroborated this with the conclusion that FDI enhances economic growth through an efficiency effect, while portfolio investment promotes economic growth through an investment effect. De Vita and Kyaw (2008) attribute the pattern of capital flows to developing economies by shocks to real variables such as foreign output and domestic productivity.

The state of financial development influences the appropriate utilization of capital flows. It was established that countries whose financial development is weak encounter a negative effect on performance in the scenario of a more open capital account (Edwards, 2001).

The nexus regarding capital flows and growth is the subject of an ongoing debate. The findings about the relationship between the two are inconclusive. Some of the studies that established a direct association between the two include Cho and Tien (2014) as well as Omri (2014). This contradicts the negative outcome of the works of MacDonald (2015) as well as Gourinchas and Jeanne (2013). Several country specific time series investigation found the case of inverse or insignificant relationship between foreign capital and economic growth (Duasa & Kassim, 2009; Khaliq & Noy, 2007). In some previous years, there has been a surge in capital inflows in the context of Sub-Saharan African countries (Kundu, 2015; Murinde, 2009). Cho and Tien (2014) examined thirty-two countries in Sub-Saharan Africa (SSA) in terms of sources of growth. It was found that growth has more affinity with a higher proportion of the working-age population, capital accumulation, and total factor productivity. The foregoing is in consonance with Calderón and Nguyen (2015) findings that aid and FDI inflows affect growth positively but not with sovereign debt inflows.

Utilizing cointegration and panel Granger causality tests, Abbas *et al.* (2015) found a disparity regarding the relationship in respect of the co-integration of the panel examination, using data from 65 countries. Nevertheless, a unidirectional causality from FDI to GDP was established. Albulescu (2015) confirmed that direct and portfolio investments have an influence on long-term economic growth by considering equity and investment funds instruments. They concluded that both types of investments should be encouraged.

Okwu *et al.* (2020) utilized thirty leading global countries, covering the period 1998–2017, in order to examine the impact of FDI on economic growth. The study controlled for variables comprising of consumer price index, credit to the private sector, trade openness, gross fixed capital formation and unemployment. On the basis of econometric analysis, it was found that FDI has a direct and significant impact on economic growth.

The relationship between net capital inflows and productivity exhibits a negative outcome on the claim that it is due to the liquid assets of a country, such as foreign exchange reserve purchases (MacDonald, 2015).

De Vita and Kyaw (2008) conducted a panel study comprising thirty-two developing economies spanning 1990–2004. The relative significance of crucial economic determinants of foreign direct investment and portfolio flows was analyzed. The authors estimated a model on the basis of a variety of developed panel data approaches, which put into cognizance individual and time effects as well as potential heterogeneity among the respective members of the panel. Other considerations include integration and cointegration properties, as well as endogeneity and serial correlation. The authors found that domestic productivity growth is the key determining factor of FDI flows to developing countries. However, domestic money growth is the dominant ‘pull factor’ in respect of portfolio flows.

Capital flows have also been found to influence some macroeconomic variables such as exchange rates, asset prices, lending rates, and bank lending (Brooks *et al.*, 2001; Elbadawi & Soto, 1994a; Jansen, 2003). Capital flows and economic performance have also been linked to the influence of global factors, and by implication, surges and stops (Nyang'oro, 2017). Studies such as that by Forbes and Warnock (2012) show global factors and their contagion effects play significant roles in the reduction of capital flow volatility.

Net capital inflows received by emerging markets have been found to be influenced by growth, differentials in interest rates, and global risk (Ahmed & Zlate, 2014). Noteworthy is the fact that swift surges in the inflows of capital give concern for policy considerations because they may not be in consonance with the policy goals of domestic macroeconomic policies (Pradhan *et al.*, 2011b). A strong positive correlation was observed between private capital flows and GDP at constant prices in a study covering 44 SSA countries over the period 2000–2007 (Deléchat *et al.*, 2009). In their findings, savings and investments were found to be positively and significantly associated with capital inflows. They concluded that the countries are not

really constrained by investment. Their research had a short-term frame and made use of the OLS to establish the association.

Private capital flows were ascertained by Alley (2015) to impact economic output and growth positively. Alley used panel cointegration in the analysis of 14 SSA economies to establish the research findings. Several studies have shown that empirical findings have not conclusively given credence to either positive or negative impacts of capital flows on growth (Aizenman *et al.*, 2011; Prasad *et al.*, 2003).

The concept of capital flows is within the whims and caprice of the monetary experts to manage in achieving desirable results. The inflows have a direct impact on a country's exchange rate and, consequently, its impact on economic growth.

Researchers have analyzed the nexus existing between exchange rate and growth (Aurangzeb *et al.*, 2005; Chen, 2012; Eichengreen, 2007; Garofalo, 2005; Petreski, 2009; Schnabl, 2007; Shehu & Youtang, 2012) while some that considered exchange rate with respect to trade flows include (Aliyu, 2008, 2009; Aziakpono *et al.*, 2005; Bahmani-Oskooee & Kovyryalova, 2008; Bahmani-Oskooee & Wang, 2008; Bravo-Ortega & Di Giovanni, 2005; Esquivel & Larraín B, 2002; Hosseini & Moghaddasi, 2010; Joseph & Akhanolu, 2011; Omisakin *et al.*, 2010; Omojimito & Akpokodje, 2010; Ozturk, 2006).

A study by Idris (2019) utilized data covering the period 1980–2017 for the analysis of the effect of interest rates on economic growth in Nigeria. The techniques of vector autoregression as well as the Granger causality test were used. Evidence of a negative relationship was found between interest rates and economic growth based on the VAR impulse response function as well as the variance decomposition. It was also established from the Granger causality test that a bidirectional causality characterized interest rates and economic growth. It was therefore advised, from the study, that for Nigeria to achieve the desired growth, policy lines that focus on growth, as well as having the capacity to drive the economy to higher productivity and the sustainability of economic growth, should be pursued by the monetary authorities and policy makers.

Sumon (2014) examined gross domestic product as a function of foreign direct investment, external debt, and remittance in respect of Bangladesh. The author utilized econometric techniques such as stationarity tests through ADF and PP, OLS, and Granger causality tests on

the basis of yearly data covering the period 1986–2013. It was found that FDI and remittances are directly related to GDP, while external debt is negatively related to GDP.

The macroeconomic effect of capital flows depends on the component of the flow. Portfolio and other categories of flows in the context of developing economies have been observed by previous studies to produce a more destabilizing effect on the macroeconomy, such as economy overheating, excessive credit growth and overvalued currencies, which invariably tend to negatively affect the tradable sector, undermines competitiveness as well as excessive credit growth while the least risky is FDI (Caballero, 2016; Combes *et al.*, 2012; Ghosh & Qureshi, 2016).

The state of the exchange rate is an indispensable component of the international mobility of capital. However, the prevailing real exchange rate at a point in time may deviate from the equilibrium exchange rate, which results in the issue of exchange rate misalignment. A period of fixed exchange rate, for instance the case of Botswana, often manifests in the problem of misalignment (Chowdhury & Wheeler, 2015; Dubas, 2009; Ghosh *et al.*, 2015). Pesaran *et al.* (2001) viewed such misalignment in terms of the percentage difference between the observed exchange rate and the equilibrium real exchange rate.

Krušković (2017) views the exchange rate as a more significant transmission mechanism relative to the interest rate. A reconsideration of issues emanating from studies linking interest rates to exchange rates will assist the monetary authorities in emerging economies to prevent exchange rate volatility better by the use of an active monetary policy (Cabral *et al.*, 2018).

Combes *et al.* (2010) showed that private and public inflows caused the appreciation of real effective exchange rates. From the components of private inflows, portfolio investment had a greater impact on currency appreciation in the range of about seven times that of foreign direct investment or bank loans, while private inflows had the least effect. A de facto measure of exchange rate flexibility was used and produced the outcome of a more flexible exchange rate, which dampened appreciation of the real effective exchange rate due to capital inflows.

The relationship between real exchange rate, capital flows (level and volatility), fiscal and monetary policy indicators as well as the current account surplus were examined by Dua and Sen (2006) for the economy of India. Quarterly data covering the period 1993Q2 to 2004Q1 were used for the study. The existence of co-integration was established among the variables,

with each variable granger causing the real exchange rate. In an earlier work by Chakraborty (2003) with respect to India and using quarterly data over the period 1993:2 to 2001:1, it was found that the real exchange rate is determined by foreign capital inflows.

Agrawal and Khan (2011) examined the impact of FDI on economic growth in respect of China and India. In order to account for structural variation, the study used 1993–2009. They developed a modified growth model from that of the basic growth model. In the growth model, GDP, human capital, labour force, FDI, as well as gross capital formation were considered. GDP captured endogenous variable while the remaining four were exogenous variables. Following the estimate from the ordinary least square, the author established that the GDP of China would rise by 0.07% due to a 1% rise in FDI while it causes a 0.02% rise in the GDP of India. Comparatively, the authors found that the impact of FDI on China's growth is higher relative to that of India. Ahmed and Zlate (2014) found that net capital inflows received by emerging markets have been found to be influenced by growth, differentials in interest rates, and global risk.

Yang and Li (2017) used vector autoregression models to analyse the dynamic relationships in terms of real exchange rates and international fund flows in China. They concluded that a large volume of investments from international funds has the tendency to appreciate the RMB. However, in the first month, the appreciation of the real effective exchange rate results in a decline in the flows of funds, but generates more fund investments thereafter. The study also found that the interaction of equity flows and the exchange rate produced more significance when compared with bond flows.

Gossel and Biekpe (2013) examined "The Cyclical Relationships Between South Africa's Net Capital Inflows and Fiscal and Monetary Policies". On the basis of correlation analysis, it was found that most of South Africa's capital inflows do not exhibit a significant cyclical relationship in respect of fiscal policy. The authors found that capital inflows are characterized by procyclical and reactive cyclical relationships in relation to monetary policy. Moreover, causal evidence shows that fiscal policy reacts to monetary policy and capital flows, while capital flows react to monetary policy. The authors concluded that the country's capital inflows are better controlled by monetary policy than through the use of fiscal policy.

Kinda (2010) considered the mix of the classical "push-pull factors" alongside the "Lucas paradox" as well as taking into cognizance the association between the constituents of capital

flows. The author used Three-Stage Least Square techniques. It was established from the study that in developing countries, physical infrastructure and financial development have a direct effect on foreign direct investment as well as portfolio investment.

A study in respect of 21 developing countries for the period 1990–2013 examined the impact of the various components of capital flows on economic growth. Techniques such as panel unit root test and pooled mean group for short and long-run analysis was adopted. It was found from the study that capital inflows, inclusive of net external debt and net official development assistance, negatively influenced economic growth significantly. However, net foreign direct investment and remittances exhibit a direct and significant influence on long-run economic growth. Evidence of long-run equilibrium convergence was also observed given the negative sign of the error correction term (Rehman & Ahmad, 2016).

Awad (2021) analyzed the long-run effect of identified foreign capital inflows, comprising of aid, foreign direct investment, remittances, trade and debt, on the growth of twenty-one low-income economies in the context of Sub-Saharan Africa covering 1990-2018. The authors used a parametric approach (dynamic ordinary least squares) as well as a non-parametric method (fully modified ordinary least squares). It was established from both models that trade and aid positively influenced the per capita income growth rate in the long run, while external debt had a detrimental effect on growth. A study by Nishiyama and Yamaguchi (2010) found evidence that the inflows of foreign direct investment from developed economies to developing economies stimulate the GDP of developing economies. Also, Zhao and Zhang (2010) assert that FDI affects GDP per capita positively and industrial productivity at the macro level.

The study of Bruno and Easterly (1995) asserts that inflation has a direct impact on economic growth on the ground that inflation stimulates savings, while, as pointed out by Erçel (1999), the Bruno and Easterly (1995) study was based on the analysis of data covering periods when the growth rate is high and the inflation rate is relatively low.

Mughogho and Alagidede (2019) analyzed the impact capital account liberalization has on the inflows of capital to Sub-Saharan Africa. For the study, a panel analysis of 13 SSA economies from 1996 to 2013 was used. The authors utilized the Fixed Effects and System-GMM estimators. Other techniques used include sample splitting and threshold effects in order to check the possibility of asymmetries as regards the flows of capital to SSA. They established that the liberalization of the capital account enhances the flow of capital to SSA. Another

characteristic of their study involves threshold effects in terms of financial sector development and institutional quality. The attainment of a particular level of development threshold becomes imperative for countries to take advantage of capital account liberalization (Kose *et al.*, 2011; Noy & Vu, 2007).

Rashid and Husain (2013) worked on the effect foreign capital inflows have on domestic price levels, volatility of the exchange rate and monetary expansion in Pakistan. The study used linear and nonlinear causality tests, and the authors found a significant inflationary outcome of inflows of capital, particularly during surges in the flow. They found a significant unidirectional nonlinear Granger causality of capital inflows to the variation in domestic prices, while domestic prices have no linear causation in terms of domestic debt growth and the ratio of money supply to GDP. There was no significant relationships of market interest rate and the nominal exchange rate with respect to domestic prices.

Okwu *et al.* (2020) empirically examined the effects of foreign direct investment inflows on economic growth by using appropriate econometric techniques in respect of 30 leading global economies, covering 1998 and 2017. Several variables such as gross fixed capital formation, inflation-consumer price index, domestic credit to the private sector, trade openness, and youth unemployment were used. The authors found that FDI had a direct and significant impact on the economic growth of the economies under consideration within the study period.

Ekanayake and Chatrna (2010) studied the economic growth effects of foreign aid in respect of developing economies. The sample comprises 85 developing economies and utilizes yearly data that spans 1980–2007. The economies of Asia, Africa, Latin America, and the Caribbean were used for the analysis. They tested the hypothesis that foreign aid can stimulate economic growth in developing economies using panel data for foreign aid. The authors considered variations across regions and income levels in Asian, African, and Latin American countries as well as the Caribbean countries. They concluded that foreign aid generates mixed outcomes in developing economies' growth.

Adusah-Poku (2016) considered the effect of three types of foreign capital inflows, the likes of FDI, foreign aid, and personal remittances, on the economic growth in Sub-Sahara Africa. A panel dataset spanning 1990–2010 and the pooled mean group (PMG) estimator, which takes care of dynamic heterogeneous panels, were employed for the study. The author found that, in the long run, all three types of inflows exhibit direct and significant impacts on economic

growth. Nevertheless, from the study, the only component among the three capital flows variables used in the study responsible for stimulating short-run economic growth in SSA was personal remittances.

Osei-Assibey and Adu (2016) examined, spanning 1996–2010, the determining factors of portfolio equity flows with respect to Sub-Saharan Africa. The authors used the system generalized techniques of moment dynamic panels for the estimation, encompassing 14 Sub-Saharan African economies. Ascertaining the robustness of the results, random effects-generalized least squares (EGLS) were examined. The authors established a significant direct association with regard to financial development and portfolio equity flows. Other outcomes show that trade openness is significantly inversely related to portfolio equity, while political stability exerts a statistically significant direct relationship. They further observed, from the robustness test, a robust direct association between financial development and the flows of portfolio equity in the context of SSA, while trade openness and political stability are not.

Olayungbo and Quadri (2019) examined the nexus among remittances, financial development, and economic growth in the context of 20 Sub-Saharan African countries spanning 2000–2015. They utilized pooled mean group and mean group/ARDL as well as panel unit root and cointegration tests. The authors found that in the short and long runs, remittances and financial development exert positive effects on economic growth. The interactive term revealed the evidence of financial development being substitutionary in the remittances-growth relationship. They found that causality runs from GDP to remittances as well as from financial development to GDP, but found no evidence of causality in respect of remittances and financial development.

Ding and Sui (2021) examined how capital flows in the context of G20 economies are significantly influenced by pull and push factors through the use of regressions, dynamic system GMM, and panel-VAR models. The authors established that the flows of international capital have a significant relationship with local financial development, which is captured by the liquidity of the stock market and local credit. Also, the flows of international capital are influenced by "push" factors, like the growth of the global economy and variations in the price of crude oil. The authors controlled for foreign currency, real interest rate and capital restriction on the ground that the government and macroprudential measures are crucial factors influencing the stabilization of capital flows.

Yi (2021) took inventory of the financial overview in respect of international capital flows over the period 2001–2020 as well as the need to comprehend the dynamics underlining the cyclical state of market fluctuations. It was observed that international capital flows are influenced by varying domestic and external factors and the fact that they are extremely reactionary to the variation in the macro-environment. Observation of the internal system of capital flows in the context of advanced and emerging countries provide the view that emerging markets have more tendency to be influenced by externality in the likes of financial crisis, exchange rate and international relations.

Another study by Ndong (2015) examined the influence foreign portfolio equity investment exerts on economic growth as well as equity returns in respect of 11 major African stock exchanges. The author employed panel data analysis models entailing data that spanned 1990–2013. It was found that foreign portfolio equity investments had a nonsignificant positive impact on economic growth and equity returns.

Mowlaei (2018) analyzed the various types of foreign capital inflows in the likes of foreign direct investment, personal remittances, and official development assistance in 26 key African countries' economic growth in order to identify the most effective capital inflows for economic growth. The author employed the Pooled Mean Group technique in the estimation of the heterogeneous panels spanning the time frame 1992–2016. It was confirmed by the study that in the short and long run, all the three types of capital inflows exhibit positive and statistically significant effects on economic growth, with personal remittance exerting the most effect.

Another study by Jena and Sethi (2020) empirically analyzed the effectiveness of foreign aid in stimulating growth potential in the South Asian region, covering the period 1996–2017. Econometric techniques like Pedroni and Johansen-Fisher panel cointegration test, panel fully modified ordinary least square as well as panel dynamic ordinary least square were used in order to determine the dynamics of long-run and short-run existing variables in context. A total of eight South Asian countries were utilized for the study. It was found that foreign aid, economic growth, investment, financial deepening, price stability, and trade openness exhibit both long-run and short-run associations. Evidence of a unidirectional causality was established from foreign aid to economic growth. The long-run relationship and the causality in the short-run with respect to foreign aid and growth are unequivocally positive.

Kosztowniak (2016) analyzed the effects on economic growth of the factors of production in Poland over the period 1992–2012, placing emphasis on the impact of FDI and utilizing the technique of VECM in order to ascertain if a causality exists between GDP and FDI. On the basis of impulse responses and variance decomposition, evidence of bi-directional relationships was found between FDI and GDP in Poland. It was also established that GDP exerts a stronger impact on the attraction of FDI inflows compared to FDI on GDP growth. According to the author, a weaker effect of FDI on economic growth occurs from the structure of the inflows of FDI in which debt securities prevail.

Anetor (2019) made use of quarterly data spanning the period 1986Q1–2016Q4 with the aim of studying the effect of shocks as regards the components of private capital inflows with respect to growth in Nigeria. Impulse response functions alongside the forecast error variance decomposition in the context of the structural vector autoregression model were used to generate relevant information. The author found that shocks in respect of foreign direct investment inflows as well as portfolio investment inflows are characterized by a direct and statistically significant impact on Nigeria's economic growth. Further outcomes revealed that FDI shows significant variation in respect of economic growth, with the next being portfolio investments and the least, personal remittances.

De Vita and Kyaw (2009) investigated the influence of FDI as well as portfolio investment flows on growth. The authors carried out the study by encompassing low, lower middle, and upper middle-income economies. The study captured 126 developing economies in a dynamic panel model covering 1985–2002. System-generalized methods of moments estimation technique were used, and they found that both FDI and portfolio investment flows promote growth strictly for developing economies that have attained a minimum state of economic development and absorptive capacity.

Shen *et al.* (2010) worked on the nexus as regards foreign capital flows and economic growth, taking into consideration certain conditional factors that have the propensity to affect the relationships. They used panel data for 80 countries spanning the period 1976–2007. The authors, by dissolving foreign capital inflow into foreign direct investments as well as foreign portfolio investments, discovered that only FDI exhibits a direct effect on economic growth, while FPI produces an unfavourable outcome on economic growth. The positive impact of FDI on economic growth was undermined by conditional factors comprising of banking liberalization, high-income level, twin crises, lower corruption as well as human capital. It was

also found by the authors that the middle-income level and good shareholder protection result in a direct effect. However, the behavior FPI with respect to growth is traceable to the level of financial liberalization, being in a Latin American region, the wealth of countries, and market governance. Nevertheless, the effect FPI has on economic growth is not determined by the conditional factors of twin crises and human capital.

Combes *et al.* (2019) examined the effect of financial flows along with their composition on the real exchange rate and growth in some low- and middle-income economies spanning 1980–2012. They employed the generalized method of moments for dynamic panel and found that net financial flows influence economic growth directly and indirectly. Specifically, the real exchange rate appreciates by 0.5% due to a 1% rise in total financial flows. Moreover, remittances resulted in a real exchange rate such that it has twice the impact of aid but is ten times higher than the effect of foreign direct investments. It was also observed that financial flows enhance economic growth irrespective of the level of development. A rise of \$10 per capita financial flows resulted in a benefit of 0.08 points of yearly growth. However, the benefit was 0.15 because the negative effect of the real exchange rate was controlled.

Ojewumi and Akinlo (2017) examined the dynamic interactions with respect to the inflow of FDI, economic growth, and environmental quality in the context of Sub-Saharan Africa. They conducted their studies on a sample of thirty-three countries by using the techniques of Panel Vector Autoregressive (PVAR) and Panel Vector Error Correction. The stationarity of the variables and the long run relationship were determined by analyzing the panel unit root as well as the panel cointegration test accordingly. The authors found evidence of dynamic interactions among foreign direct investment, economic growth, and environmental quality, characterized by 13.1% and 32.8% in their magnitude of influence on one another. It was suggested by the study that governments of Sub-Saharan African countries should ensure an appropriate balance in respect of investment-friendly policies and policies that protect the environment.

Olagbaju and Akinlo (2018) established that FDI promotes growth for Sub-Saharan African economies provided there is a developed financial system. According to them, there is a stronger causal association between financial system development and FDI in respect of low-income economies relative to middle-income economies in Sub-Saharan Africa. Similar findings were found by Yeboua (2019), covering 26 African economies and reaching the conclusion that requires African policymakers to prioritize the environment that promotes the domestic financial market to benefit from FDI. They utilized the panel smooth transition

regression model, which permits the determination of the effect of FDI on growth to differ over both cross-sectional dimensions as well as time series.

Ndiweni and Bonga-Bonga (2021) examined the nexus regarding international capital inflows and economic growth in developing economies. The authors utilized threshold regression to ascertain if capital flows exert varying impacts in developing countries characterized by weak institutions relative to those with satisfactory institutional infrastructure. They established the evidence of a threshold effect in respect of capital inflows and growth. It was found that capital inflows exert a positive and significant effect on economic growth provided a particular threshold of institutional quality is surpassed. The relationship between capital inflows and growth disappears below the threshold. They therefore attributed their findings to being in consonance with the state of institutional development of an economy as being an influencing factor in the nexus between capital inflows and economic growth. It was concluded that policymakers and the government should enhance the institutional environment in order to promote growth via capital flows.

Moreover, Kulu *et al.* (2021) analyzed the economic growth impacts of the respective and the combined effect of FDI and institutions in Ghana. The Auto-Regressive Distributed Lag approach alongside secondary data spanning 1995–2019 was used for the study. The authors found evidence of a direct and significant economic growth effect of both foreign direct investment and a quality institutional index relative to their respective impacts in both the short-run and long-run. They suggested that government policies be geared towards stimulating foreign direct investment alongside the enhancement of institutions and regulations to promote the growth of output.

Another study by Yakubu (2020), still on Ghana, utilizing time series data over the period 1985–2016, found a direct and significant impact of institutional quality on FDI was ascertained by the use of the technique of the autoregressive distributed lag model. It was also observed that there is a significant effect of inflation on FDI either in the short-run or long-run, while trade and per capita GDP growth exert a significant effect on FDI in the short run.

Furthermore, Makoni (2021) employed the Kunčič (2014) data set on institutional quality in order to study the nexus in terms of stock market development, FDI, and institutional quality covering nine African economies spanning 2009–2016. The author found a direct and

significant association between FDI and stock market development. However, institutional quality had a negative effect on the flows of inward FDI.

Another study by Helali and Kalai (2021) analysed the non-linear effect of foreign direct investment in relation to the development of the Arab Maghreb Union (AMU) countries spanning 1980–2019. The author employed the Panel Smooth Transition Regression Model (PSTR) as well as the Panel Smooth Transition Autoregressive Model (PSTAR) models. It was established from the study that there was an opposite impact of FDI below and above the estimated threshold. It was therefore concluded that it is due to the asymmetrical effect of unforeseen shocks in respect of its volatility.

2.5.2 Empirical evidence on monetary Policy and economic growth

The empirical literature is replete with studies analyzing the nexus between monetary policy and economic growth.

A study by Islam *et al.* (2021) analyzed the nexus in respect of monetary policy and economic growth, and an effort was made to determine the long-run and short-run impact of monetary policy on the economic growth of Bangladesh and that of the United Kingdom by utilizing secondary data over the period 1980–2019. The author ascertained the stationarity of the data set by using the augmented Dickey-Fuller test as well as the Phillips-Perron test. The long-run relationship in terms of monetary policy and economic growth was verified through the F-bounds test. The long-run coefficients became obvious on the basis of the auto-regressive distributed lag model, while the short-run coefficients were obtained through the error correction model. They also employed the technique of vector error correction model Granger causality in order to determine the causality among the variables under consideration, as well as confirm the robustness of the models through a number of diagnostic tests. The authors found, on the basis of the F-bounds test, that in the two countries, a long-run relationship characterizes monetary policy and economic growth. Specifically, money supply exerts a positive effect on economic growth in both economies in the long-run. It was also observed that, unlike that of UK, exchange rate generates an undesirable impact on Bangladesh's economic growth while the bank rate appears to enhance economic growth in the UK. They also established that a rise in lending interest rates undermines economic growth in both economies. Moreover, the short-run coefficients show random impacts at separate lags in both instances.

Mugableh (2019) examined the equilibrium as well as the dynamic causality relationship in terms of monetary policy tools and economic growth in Jordan over the period 1990–2017. The author, by utilizing the ARDL model, ascertained that, real interest rate, and money supply were found to stimulate economic growth in either the short run or long-run except inflation rate. Furthermore, a bidirectional causation was observed in respect of economic growth and monetary policy variables on the basis of the VECM technique. Another study by Islam *et al.* (2018) found that a number of monetary policy tools, including variable reserve ratio, flexibility in controlling credit, as well as the fixation of smaller margin conditions, were found to exert significant effects on Bangladesh's economic growth. Rahman *et al.* (2019) analyzed the nexus between monetary policy and Bangladesh's economic development through the use of multiple regressions. It was found from the study that Bangladesh's monetary policy exerts a significant effect on the country's economic development.

Tan *et al.* (2020) examined the effect of monetary and fiscal policies on the economic growth of three selected economies comprising of Malaysia, Singapore and Thailand spanning 1980:Q1 – 2017:Q1. The authors used the technique of the autoregressive distributed lag model in order to ascertain the long-run relationship. Some other econometric models comprising of the fully modified least squares approach, dynamic ordinary least squares, canonical cointegration regression were used for the purpose of robustness. They confirmed the robustness and stability of their findings on the basis that all the models generate consistent results. It was established from the study that interest rates negatively affect economic growth in the three economies.

Furthermore, Omolade and Mukolu (2018) utilized data covering thirty-seven economies in Sub-Sahara Africa (SSA) in order to examine the impact of monetary policy dynamics on economic growth. They used dynamic panel data to estimate the model, which produced a description of the nexus between economic growth and monetary policy variables in SSA. Among other variables, the exchange rate and inflation rate were included in the dynamic panel model. The authors found that the monetary policy rates could not result in sustainable growth in the region due to the limited impact they have in stimulating domestic output. The authors are of the view that the expected impact of a monetary easing policy is constrained as a result of the financial deepening weakness that is prevalent in many economies in Sub-Sahara Africa. Policy direction from the study requires that monetary policy, which is not only monetary

easing but produces the required financial deepening such that it exhibits a significant impact on the real sector of the domestic economy, should be motivated in SSA.

Feldkircher *et al.* (2021) examined whether the policy directions that were used by the US Federal Reserve proved effective in stimulating the real sector and stabilizing the financial markets, given the COVID-19 recession. An effort to measure the effects at high frequencies resulted in the use of a novel mixed frequency vector autoregressive model that provides the avenue to integrate weekly and monthly details into a unified framework. The model used for the study integrates a number of economy-wide aggregates comprising of production from industry, unemployment rates, and inflation as well as high-frequency information in respect of financial markets comprising of stock prices, weekly information on balance sheet size of the Fed and interest rate spreads. The authors used the high-frequency time series variables for the purpose of the dynamic interpolation of the monthly series to determine macroeconomic measures on a weekly basis. The approach was to the essence of stimulating counterfactuals in the scenario of the non-use of monetary stimulus. They found from their study that monetary easing resulted in greater output growth as well as stock market returns, more beneficial long-term financing requirements, and a fall in the American dollar relative to a no-policy benchmark situation.

Lastauskas and Minh (2021) developed a new empirical model for the estimation of the global effect of a rise in the volatility of US monetary policy shocks. The authors acknowledge the time-varying variances of domestic structural shocks through the specification of stochastic volatility. They permitted dynamic interaction in respect of the endogenous items as well as time-varying volatility within the global framework. It was found that a drive of the domestic output as well as inflation volatility are not only caused by the uncertainty of the US interest rate; the uncertainty in the rate also results in a fall in production, price level, and the interest rate. The authors took inventory of strong global effects that resulted in a synchronous movement of the world. Also, they are of the view that the impact of spillback appears to be significant for the US economy.

Taderera *et al.* (2021) analyzed the nexus between interest rate, inflation rate and economic growth in a panel study of the economies of Southern African Customs Union spanning 1991-2018. The authors employed the Panel Autoregressive Distributed Lag (ARDL) of the Pooled Mean Group estimators, the Dynamic Ordinary Least Squares and the Fully Modified Ordinary Least Squares (FMOLS) in order to isolate short and long run impacts as well as to ensure the

robustness of the study. It was found from the study that inflation exerts a direct effect on economic growth while lending rates generate a negative effect on economic growth in the long run. The authors, on the basis of the findings, concluded that policymakers are to ensure the high sustainability of the inflation rate for the purpose of enhancing economic growth, while the interest rate can be utilized as an instrument of monetary policy towards the achievement of the appropriate rate of inflation that will directly influence economic growth.

2.5.3. Empirical Evidence on Monetary Policy and Capital Flows in Developing Countries

The intensity of liquidity and the monetary policy structure that is operational, to a large extent, impact on capital flows and, consequently, on economic growth. An examination of the monetary policy effects of capital flows was analyzed by Bond (1998) with respect to the countries of Indonesia and Thailand. According to the author, monetary policy played a significant role in Asia's experience with capital inflows. It was noted that the threat of overheating is contained by central banks through the use of monetary policy, while the increased interest rates that occur promote extra inflows. The author established that contractionary monetary policy was a crucial source of inflows to Thailand and Indonesia in recent eras, as well as a decrease in the independence of monetary policy during the period of inflows. Jain-Chandra and Unsal (2014) utilized the dynamic factor model as well as the structural vector autoregressive model to examine the effectiveness of monetary policy in the context of international capital flows. They concluded that the monetary policy transmission mechanism remains valid in Asia.

Cavoli and Rajan (2005) analyzed the problem of capital inflows in some identified Asian economies in the 1990s: the role of monetary sterilization. Data on variables such as net foreign assets, interest rates, prices, exchange rates, output, and money supply were analyzed by adopting ordinary least squares and granger causality tests. They established a simple model for the examination of why the issue of capital inflows surged in selected Asian economies before the financial crisis of 1997–98. It was revealed from the model that consistent uncovered interest differentials and the resultant capital inflows may be likely due to complete monetary sterilization, weak reaction of interest rates to domestic monetary equilibrium, perfect capital mobility, or some mix of the three. Capitalizing on the model, the paper embarked on a series of related empirical tests to examine the dynamic links amidst international capital flows, their depth of sterilization, as well as uncover differentials in interest rates with respect to Thailand,

the Philippines, Malaysia, Korea, and Indonesia during the era 1990:1–1997:5. The impact of monetary policy direction is unconnected with the magnitude of capital flows.

The key target of monetary policy in the CMA is to ensure the sustainability of the pegged exchange rate. Achieving this through sufficient foreign exchange reserves as well as controlling the interest rates at levels that will not result in compromise of the peg (Nielsen *et al.*, 2005). It is noteworthy that South Africa, being the biggest economy in SACU, discretionally controls the monetary policy direction. The common monetary area, which comprises of the SACU members excluding Botswana, gives an avenue for full convertibility of the South African Rand. The case of Botswana, nevertheless, is that the Pula is fixed to a basket of currencies which is to a large extent weighted to the Rand. The implication is that the monetary policy decisions by the South African Reserve Bank and exchange policies are transmitted across SACU (Talkmore, 2018). However, Dumsile reveals that the monetary authorities in the smaller economies utilize a variety of techniques to influence monetary policy. For instance, liquid asset requirements, lending, and deposit facilities are used by Namibia, while Lesotho utilizes Treasury bill auctions to constrain excess liquidity in its economy. Swaziland's approach is to ensure the direct control of interest rates that prevail in the domestic economy in order to act as a check on capital flows while also protecting its economy from the monetary policy effects of measures that majorly tackle the South African economy.

Khatriwada (2017) utilized a novel dataset on international capital flows in order to investigate the effect of the Fed's quantitative easing (QE) in respect of flows to emerging markets and the EU economies. The author took separate consideration of episodes of QE, having the last episode categorized between pre-and post-tapering. It was found from the study that QE had an affinity for a rise in capital inflow but a period of retrenchment characterized that of tapering. Specifically, the extent of the effect varied with varying episodes of QE as well as the categories of assets (bonds or equities). The EU economies were observed to behave differently relative to the EMEs. Moreover, the relevance of "pull factors" and individual country features for capital inflows were identified. It was established that episodes of QE provided the basis for the majority of the variation in capital inflows over the period 2008–2014. During the QE era, G20 statements relayed that economies are increasingly aware of their inability to control flows, necessitating better monetary policy coordination in order to avoid excessive volatility and negative spillovers.

The consequences of the "taper talk" were not similar across emerging markets. Severe pressures hit vulnerable macroeconomies such as Brazil, Indonesia, South Africa, India, and Turkey. These economies ("Fragile Five") experienced high deficits in their current accounts, which made them vulnerable to reversals of foreign flows and the decline of economic growth (Subramanian, 2014).

Studies by (Agrippino & Rey, 2013; Blanchard *et al.*, 2015; Rey, 2015; Shin, 2014) relay the place of the world financial cycle in stimulating capital flows, growth in credit and asset prices across countries. There is a probability that the global cycle limits and weakens domestic monetary policy, provided the monetary authority does not put in place the management of the capital account. Therefore, utilizing foreign exchange intervention to correct currency misalignments stemming from capital flows expands the sphere of domestic monetary policy (Cavallino, 2019).

Two unique possibilities result as a result of utilizing foreign exchange intervention along with monetary policy. It optimizes the present discounted worth of domestic consumption via the terms of trade and enhances monetary policy objectives by minimizing the deviation of the Philips curve and promoting the output/inflation trade-off. It was, therefore, concluded that foreign exchange intervention mitigates, indirectly, the negative growth due to capital inflow via the Phillips curve effect (Cavallino, 2019).

Capital inflows have also been found to have an impact on domestic credit expansion. For instance, there exist empirical works that confirmed a direct relationship between capital inflows and expansions in credit (Bakker & Gulde, 2010; Duenwald *et al.*, 2005; Gourinchas *et al.*, 2001; IMF, 2004, 2011). This calls for the indispensability of the monetary authority to ensure appropriate management of liquidity in the system. For instance, the IMF (2011) asserts that "given the high cost of credit boom-bust cycles, policymakers should closely monitor the joint behavior of capital inflows and domestic lending," utilizing "a combination of macroeconomic, exchange rate, prudential policy, and capital control measures to mitigate the adverse effects of large capital inflows".

Orhangazi (2014), in the analysis of "Capital flows and credit expansion in Turkey", found from the analysis of logit a positive correlation of the influx of capital and the era of rapid credit expansion. Agbloyor *et al.* (2014) in their analysis of "Private capital flows and economic growth in Africa: The role of domestic financial markets" over the 1990–2007 period used the

panel Instrumental Variable Generalized Method of Moments and dissolved private capital flows into its components. It was found from the empirical study that foreign direct investment, foreign equity portfolio investment, and private debt flows all exhibit a negative impact on economic growth. Noteworthy from the study is the role of the financial market. It was found that economies characterized by strong domestic financial markets have more prospects given their capacity to transform the negative outcome of private capital flows into positive impact. It was, therefore, concluded from the study that the presence of strong domestic financial markets is a panacea for translating private capital flows into economic growth.

Other studies that concur with the view of strong and dynamic financial markets in terms of growth sustainability include the one by Alfaro *et al.* (2004). The study confirmed the desirable impact of having strong financial markets institutions for FDIs to produce a direct impact on economic growth. It was also confirmed from their research work that economies that have sound domestic financial markets have more benefits from the influx of FDI. The effect of financial intermediaries with respect to output growth and technological change has been highlighted by the Schumpeterian view of finance and development. In another instance, a plethora of development economics literature contends that the accumulation of capital is the major factor that underlies economic growth. This view is of the opinion that stronger financial intermediaries affect growth basically by enhancing local savings rates and promoting foreign capital (Beck *et al.*, 2000).

Davis and Zlate (2019) analyzed the monetary tightening effects of major developed economies on net capital flows. They utilized the structural VAR framework with quarterly panel data to estimate the impulse response functions of domestic policy variables and net capital flows with respect to contractionary monetary policy shocks from abroad. The empirical findings show that the endogenous response of domestic monetary policy has a functional dependence on the capital account openness of the respective economies as well as the exchange rate regime. They computed counterfactual impulse responses to net capital outflows. It was assumed that the domestic policy rate is invariant with foreign monetary contractionary policy. They concluded that if the endogenous response of domestic monetary policy is not taken into cognizance, it biases down the estimated elasticity of net capital flows in relation to interest rates from abroad by one-third for economies that operate open capital accounts.

Tian and Xu (2008) examined the offset effect in respect of foreign capital flows on the host economy's monetary policy. They provide that the offset effect is a function of the nature of

foreign capital flows. Zhang (2010) is of the view that short-term capital flows on the basis of profit-seeking factors have the tendency to undermine the independence of monetary policy, enhance its passivity, and may result in an offset effect between monetary policy and other policies. Chung (2001) analyzed capital liberalization, capital flows, and monetary policy responses in the Korean exchange market. Using the indexes of capital liberalization on controls of the influx and exit of capital, exchange market pressure, and exchange rate in terms of nominal and real, the author found that differentials in interest rates do not give credence to the Korean economy's capital flows. It was therefore concluded that the portfolio theory does not play a role in Korea's capital flows. Chung (2001) found that the monetary approach, given that the variation in domestic credit is significant, is very crucial in the analysis of capital flows. Utilizing Vector Autoregression, the author also found that the negative shock to domestic credit changes influences the appreciation of the exchange rate, either nominal or real.

In the analysis of "International Capital Flows and Monetary Policy Spillovers", MacDonald (2016) showed a puzzling inverse association with respect to net capital inflows and growth in productivity in the context of developing and emerging markets. The author justified this evidence in terms of capital outflows expended on the acquisition of liquid assets from rapidly growing economies. It was also evident from the study that, to a large extent, the variations in EMEs' asset price adjustments in the aftermath of an expansionary monetary policy by the FED (1980–2014) were a function of the intensity of the bilateral capital market frictions between the United States and the emerging markets.

Margaux and Michal (2016) examined the impacts of unconventional monetary policy in Canada. They employed recently proposed methods to generate a shadow interest rate that take cognizance of monetary policy at the zero lower bound and evaluate a small open economy Bayesian structural vector autoregressive model. The authors established, by controlling for the US macroeconomic and monetary policy variables, that Canadian output increased by 0.23% monthly on average over the period of April 2009–June 2010 due to Canadian unconventional monetary policy. Moreover, the impact of US unconventional monetary policy resulted in a rise in US and Canadian output by 1.21% and 1.94% monthly, respectively, on average, spanning the period 2008-2015.

Dahlhaus and Vasishtha (2020) investigated the effect on portfolio flows to emerging markets arising from US monetary policy news by utilizing a Bayesian Vector autoregression that takes inventory of expectations for upcoming monetary policy. According to the authors, the US

"monetary policy news shock" is described as one that results in a rise in monetary policy expectations without altering the policy rate. It was found that the effect of the shock on the flows of the portfolio as a fraction of GDP is economically little on total but differs substantially across economies. The economies that were identified as being the most influenced are also characterized by substantial volumes of capital in-and outflows before and in the aftermath of the 2013 taper tantrum episode, accordingly. They also hold the view that macroeconomic performance as well as external susceptibilities may matter. It was concluded that financial openness seems not to be related to variations in capital flows over the study period.

Unger (1996) analyzed "Monetary Issues and Financial Innovation between a Small Country and its large neighbour: the case of Swaziland and South Africa." Utilizing primary data through field studies in the two countries, the author arrived at certain key conclusions. A monetary union that connects a dominant economy with a relatively small one leads to the weakness of independent monetary policy for the small-sized economy. In another respect, the liquidity operating in a small sized economy as a result of the union is not usually beneficial to it, and sourcing for funds out of the monetary area results in an unpalatable burden of debt servicing. It was also concluded from the study that a small-sized economy should harness the financial innovations obtainable in the more developed financial markets of the big economies in the union with the goal of managing interest rate, commodity, and currency risks. Moreover, the exchange rate policy that characterizes the monetary union does not benefit the small-sized economy, provided there is divergence in the direction and structure of trade between it and the dominant economy.

Through time series data, Nwokoye and Oniore (2017) worked to find out how monetary policy affects foreign capital inflows in Nigeria spanning 1994–2015. The authors found from the ARDL that the short-run and long-run broad money supply, nominal exchange rate, and interest rate spread show significance in determining international capital inflows. However, the inflation rate is not statistically significant in the long run. The error correction model reveals the trending towards long-run equilibrium with an annual correction of around 89% of the short-run deviation from the long-run equilibrium.

Kiendrebeogo (2016) worked on the nexus between unconventional monetary policy in relation to foreign capital flows. The methods include descriptive statistics, ordinary least squares, and a generalized method of moments. The focused items used for the study are data on capital flows in terms of foreign residents' portfolio holdings of U.S. securities, along with portfolio

holdings of securities abroad by U.S. residents, measured in nominal U.S. dollars, the monetary policy of the Fed, a year-ahead futures rate, the Federal funds rate, and financial openness data. The study showed that unconventional monetary policy exercised by the Fed has connectivity with increased net portfolio flows to developing economies and, minimally, non-unconventional monetary policy with respect to developed economies.

Bruno and Shin (2015), in a study titled, "Capital flows and the risk-taking channel of monetary policy," confirmed the case of monetary policy spillovers in respect of cross-border bank capital flows and the rate of exchange of the US dollar via the banking sector. It was established by the authors that a contractionary shock regarding the monetary policy of the United States results in a decline in inter-country banking capital flows as well as a fall in international banks' leverage.

Arimurti and Morley (2020) examined the possibility of an international impact of capital flows on domestic economic monetary policy by utilizing an augmented Taylor rule model. Aside the standard determinants of nominal interest rates, the authors appropriate capital flow measures into the study in order to describe how monetary authorities take consideration of this crucial factor in the determination of the most suitable monetary policy. The authors ascertained that capital inflows and outflows are salient determiners of nominal interest rates by utilizing a panel of inflation-targeting countries as well as the dynamic panel method.

Dağlaroğlu *et al.* (2018) consider, with respect to Turkey, a developing economy, how short-term capital flows signal the necessity for innovative policy parameters. The reason for the paper was the volatility of capital flows, which was resulting in some challenges to local financial stability. The capital flows variable was approximated by a risk premium measure utilizing EMBI (JP Morgan Emerging Market Bond Index plus Turkey) as well as Credit Default Swap Spreads (CDS). The authors are of the view that the characterization of the financial market by a negative shock may result in a rise in the risk premium, which may lead to the devaluation of the local currency as well as the contribution to a rise in inflation through exchange rate pass-through. The categorization of the observations into pre-and post-2010 enabled the authors to establish a significant role from global financial elements, as constituted by EMBI, as well as VIX within the augmented Taylor rule in the post-2010 era, suggesting that Turkey's interest rate policy has been affected by the external measures.

Ebire *et al.* (2021) investigated the effect of varying forms of capital flows on the financial stability in middle-income economies over the period 2010–2017 on the basis of the World Bank's categorization of 121 countries. The authors employed a panel spatial correlation consistent method for the study. They found that in the middle-income economies, capital flows exhibit direct and significantly predict financial stability. Also, the financial systems in advanced countries show more stability relative to the emerging and developing economies. It was noted that outward foreign direct investments exhibit far-reaching prospects for achieving financial stability.

Wang *et al.* (2019) examined the quantitative relationship in respect of international capital flows and the monetary policy of China. They put into consideration the impact of the variations in the reserve requirement ratio as a key innovation over the majority of erstwhile studies. By using the approach of the Federal Reserve Bank of St. Louis, the paper translates the variation in the reserve requirement ratio into the variation in the monetary base while ensuring the constancy of the money multiplier. The variation in the reserve requirement ratio is integrated with the other monetary policies that have a direct impact on the monetary base to develop a consolidated measure of monetary policy. The authors thereafter developed a modified offset as well as a sterilization coefficient model. It was found that the unaccountability of the changes in reserve ratio underestimated both the extent of sterilization and the mobility of capital as accounted for by the offset coefficients. According to their findings, China's capital flows are characterized by limitations, while the monetary policy of the country has the capacity to virtually entirely sterilize the variations in the monetary base emanating from international capital flows. It was concluded that China has been able to sustain a considerable deal of local monetary policy independence in spite of an insubstantial degree of exchange rate flexibility.

Yildirim and Tastan (2012) examined "Capital Flows and Economic Growth across Spectral Frequencies: Evidence from Turkey". Interactions and feedback with respect to capital flows components and economic growth over the period 1992:01–2009:08 were analyzed. They adopted a new version of the causality test by John Geweke (1982: 77) and Yuzo Hosoya (1991: 88). The authors, through standard methods in spectral analysis, disintegrated the total covariance of capital flows and growth over key frequency bands, taking note of lead/lag interactivity. The outcomes of their study show that variations in the respective capital flow components are mostly centred on high frequencies. The feedback in terms of economic growth

and capital flows significantly changes in the span of the frequency and the capital flows components. Short-term borrowing from abroad as well as portfolio investments in government bonds in the context of business cycle frequencies stimulate economic growth, while growth is the motivating factor for long-term borrowing as well as investment in a share portfolio. However, bi-directional causality between long-term borrowings from abroad and economic growth was significantly observed in the aftermath of the post-2001 financial crisis. Short-term borrowings from abroad, portfolio investments, and bond flows exhibit no long-run effect on economic growth.

Willmore (1986) is of the view that foreign investors promote economic growth on the ground that they exhibit more efficiency compared to domestic firms. The author observed by examining a sample of 282 pairs of foreign and local firms of identical size, obtained from 80 manufacturing industries in Brazil. It was discovered that the ratio of value-added to output of firms from abroad exceeded that of local firms.

The study by Gheeraert and Mansour (2005), titled "The Impact of Private Capital Flows on Economic Growth and Development," Based on a structural econometric model, the authors found the presence of a significantly direct association in respect of capital flows and economic growth. However, using a simple correlation analysis, they did not observe any significant correlation in terms of capital flows and development.

Empirical results from other countries, therefore, clarify the imperative of promoting a sound financial system that will convert capital inflows into periods of sustainable growth and development. This, however, is unconnected with the monetary policy framework in force. The monopolist structure of monetary policy in SACU requires proper reorganization in order to ensure that the domestic financial markets of its component economies are strong and dynamic in order to prevent skewness in economic growth.

2.5.4. Empirical evidence from a mix of developed and developing countries

According to Subramanian (2014), the monetary policy actions by the FED influences the global economy basically through the channels of capital flows, trade and exchange rates, as well as global risk-taking and stability. This section concentrates on the behavioural patterns of capital flows, monetary policy, and economic growth in a mix of developed and developing economies. The developed economies, given the level of economic development and the extent

of pull factors that attract capital flows, are expected to experience favourable growth from the influx of capital. Moreover, developing economies that are capital scarce may tend to be characterized by high interest rates, which, on the basis of the neoclassical theory, is expected to result in the inward flow of resources. Also, some foreign investors may concentrate their investments in extractive activities, which subsequently, after industrial production, command higher values.

Gordillo (2012) examined the "Effects of United States Monetary Policy on the Capital Flows to the Latin America Countries". It was found by the author that US Monetary Policy influences capital flows to Latin American countries. The "push factors" impacted the total capital flows mostly via the global liquidity in terms of the monetary stock growth in the advanced countries of the US, European Union, United Kingdom, and Japan. *Ceteris paribus*, a unit percent rise in the US monetary stock was found by the author to stimulate capital flows to the Latin American Countries between 0.47 and 1.71 percentages of GDP. Making use of the US solely resulted in a greater effect compared to the use of the combined advanced economies. Pull factors were found in the study to have more pronounced relevance compared to push factors in the Latin American countries.

Tchorek *et al.* (2017) examined the topic "Determinants of capital flows to emerging and advanced economies between 1990 and 2011". It was noted by the study that domestic factors influenced FDI and portfolio investment equities capital inflows in advanced economies covering the periods 1990-2007 and 1990-2011. However, it was also established from the study that in respect of advanced economies, debt capital inflow in the category of PID and OI in total was a determinant of both domestic and global factors. In regard to PID, only domestic factors had statistical significance for the two periods, provided investors from abroad accord great relevance to risk factors. Nevertheless, OI was inversely correlated with public debt with respect to GDP for the 1990–2007 period, showing stronger turnover in the stock market.

Kandil (2011) worked to develop a model in order to examine the determinants of financial flows, portfolio, and foreign direct investment flows. The author also considered their impacts on economic variables in some selected developing and developed economies. A number of reduced-form equations in difference form were used in respect of the yearly data covering the balances on the current and financial accounts. A number of economy-wide indicators that show the condition of the business cycle as exogenous variables were put into consideration. The variables include economic growth, the exchange rate, and energy prices. The effects of

positive and negative shocks to the foregoing variables as well as other cyclical variables with respect to the items of the balance of payments were analyzed. The author summarized the outcomes of the analysis in three perspectives. The observation over the samples of the two categories of economies, there was prevalent evidence of negative correlation in respect of the responses of the balances of the current and financial accounts in terms of the diverse sources of cyclicity in the model. Moreover, a rise in financial flows results in the financing of a broader current account deficit through the use of time-series regressions. The impact of movements in trend, alongside the variability of financial flows in respect of key economic signals covering the samples of developing and developed economies, was achieved via cross-country regressions. FDI flows differentiate growth outcome significantly amidst and over developing economies, but exhibit restricted impact on the performance of growth in developed economies. On the account of portfolio flows, they show more importance when compared to FDI flows in the financing of a more current account shortage in both categories of economies.

Freckleton *et al.* (2012) considered economic growth, foreign direct investment, and corruption in developed and developing countries. The study included 42 developing and 28 developed countries, and data from them was analyzed using a panel dynamic ordinary least squares econometric technique. It was established from the study that FDI exerts a significant impact on economic growth for both developing and developed economies in the short and long run. However, alleviating corruption in the developing economies promotes the influence of FDI on economic growth.

Nguyen (2021a) analyzed the difference in respect of foreign direct investment-private investment associations in terms of developed and developing economies spanning 2000–2013. Two-step GMM Arellano-Bond estimators comprising system and difference were employed to examine a collection of 25 developed countries and a set of 72 developing economies, while the robustness of the estimates was verified via the PMG estimator. The author discovered that a difference exists in respect of FDI—private investment relationships between advanced countries and developing economies. It was also found that the governance environment, economic growth, as well as trade openness enhance private investment, while the impact tax revenue has on private investment in the context of developed economies is completely at variance to what it is in developing economies.

Nguyen (2021b) analyzed the topic "The difference in the FDI inflows—income inequality relationship between developed and developing countries." The author examined the effect of

FDI on income inequality in respect of a group of 24 developed economies characterized by a good governance environment as well as a group of 37 developing economies with a weak one. Given the time span of 2005 to 2018, the technique of two-step system GMM Arellano-Bond estimation was used. It was found that while FDI enhances income inequality in developed economies, it decreases it in developing economies. Moreover, governance and education were found to minimize income inequality in either category of economies, but economic growth broadens it. The author used the PMG estimator as a robustness check of the estimates.

Choong, Baharumshah, *et al.* (2010) analyzed, within the context of developed and developing economies, the economic growth-stimulating effect of the receipt of foreign direct investment, portfolio investment, and foreign debt. They accessed stock markets as a medium for translating foreign capital flows for the enhancement of economic growth. The authors found that FDI exerts a positive impact on economic growth, but across all the countries used for the study, foreign debt and portfolio investment impact economic growth negatively. From their results, they were able to establish the possible relevance of stock markets as a medium that transfers the effect of capital flows on economic growth. They concluded that the stock market's development needs a certain degree of threshold for it to convert the negative impact of private capital flows into a positive outcome, irrespective of whether it is domiciled in developed or developing economies. On the basis of a sample comprising nineteen MENA countries over the period 1984–2011, it was observed that the flows of FDI promote economic growth only in countries characterized by good institutional quality (Brahim & Rachdi, 2014).

However, several studies have been conducted on the concept of capital flows with respect to macroeconomic variables such as economic growth in the context of emerging markets and developing economies. Studies with respect to the Southern African Customs Union are very limited. This study will therefore contribute immensely to promoting the sustainability of economic growth in the Southern African Customs Union through the appropriate management of capital flows.

2.6. Conclusion

This section took inventory of various theoretical propositions and empirical findings. It remains obvious that empirical findings across economies or groups of economies may not always be theoretically consistent given the peculiarities, structure of economies and the macroeconomic environment prevailing in an economy.

CHAPTER THREE

Capital Flows and Economic Growth in the Respective Countries in the Southern African Customs Union

A review of the respective economies that constitute the study is considered in this chapter. Information on capital flows as well as empirical evidence on capital flows and economic growth within the context of the target economies were considered. It is organized into six sections, with Namibia and South Africa in 3.1 and 3.2, respectively, while Botswana occupies 3.3. Eswatini and Lesotho are respectively expressed in 3.4 and 3.5, while 3.6 concludes the chapter.

3.1. Namibia

3.1.1 An Overview of Namibia's Economy

Namibia, being one of the SACU members, has not sustainably benefited from the influx of capital flows.

The economy of Namibia was estimated to have experienced growth by 1.1 percent in 2016, which is grossly low relative to the 6.1 percent growth in real GDP recorded in 2015. The dismal growth in 2016 was largely as a result of a swift decline in construction and the weak performance of the mining and quarrying sector. However, the Bank of Namibia anticipated a further contraction of growth to 0.6 percent in 2017 but recovering respectively to 2.2 and 3.1 percent in 2018 and 2019. The yearly inflation rate in 2016 was 6.7 percent, up from 3.4 percent in 2015, due to increases in the prices of electricity, water, gas and other fuels, housing, and food. (Economic Commission for Africa, 2017). Over the period of 2010–15, the Namibian economy achieved exceptional growth. However, macroeconomic instability occurred, which resulted in public debt swiftly rising while foreign reserves declined below sufficient levels. House prices were fast rising, as well as increased private sector indebtedness due to swift credit growth. Growth robustness concealed decreasing output growth and falling external competitiveness, constraining the long-term growth potential of the economy. The level of unemployment and inequality of income remained tremendously high (IMF, 2019). Despite being a low and commodity-reliant economy vulnerable to external shocks, Namibia has experienced annual per capita GDP growth of 2.6 percent on average over the last two decades.

The growth performance resulted in a better standard of living and minimal poverty, making it one of the most gender-equal economies globally. The institutional and governance framework are admirable and provide the platform for positive development, being rated in the category of best-rated in the context of Africa (IMF, 2019).

The economy of Namibia being in the category of low-income signals that the determinants of growth, such as various components of capital flows and other sources of growth in the domestic economy, have not been in their appropriate magnitudes despite being a member of a common monetary arrangement.

In the aftermath of independence in the 1990s, the country had a resolution to remain defined by a common monetary arrangement comprising South Africa, Swaziland, and Lesotho. This common monetary arrangement permits the unilateral influence of monetary and exchange rate policies by South Africa. The Namibian dollar, initially introduced in 1993, has been on a one-to-one parity pegged to the rand and has consequently become legal tender in Namibia. By implication, a significant percentage of the Bank of Namibia's monetary liabilities are backed by the reserve currency or assets from abroad (Kalenga, 2001).

The monetary policy direction of the Bank of Namibia seeks to ensure prices (consumer and interest rates) are in conformity with that of South Africa. The essence of this is to promote stable and low levels of prices (inflation rate). Also, more than 80% of Namibia's imports are obtained from South Africa. The pegged exchange rate will tend to achieve price stability provided South Africa maintains low-inflation monetary targeting. Such arrangement will tend to promote contractionary monetary and fiscal policies as well as transmit reliable economic signals with regard to inflation prospects (Bank of Namibia, 2001) as cited in (RAVINDER & Teweldemedhin, 2010).

It is worth noting that the country's net international investment position (NIIP) has been weak since 2009, with the net foreign position standing at – 19.5 percent of GDP in 2018 (– 9.8 percent in 2017), despite previous years having net positive values. The decline was mostly as a result of the swift rise in external liabilities in the form of net FDIs (predominantly activities in the mining sector) and foreign debt (59 per cent of GDP) generated from the government and non-financial institutions following the issuance of the 2015 Euro-Bond. Moreover, foreign assets declined due to the higher domestic investment requirements in respect of pension funds and insurance companies declared in 2016-17. In the aftermath of an era characterized by

exceptional growth coupled with increased macroeconomic imbalances, Namibian national debt maintains an increasing trend, with stagnating growth and foreign reserves occurring below sufficient levels. The productivity level was contracting along with weak external viability, constraining prospects for growth with the resultant high state of income disparity and unemployment (International Monetary Fund, 2019b).

The Namibian economy recorded deficits in its current account over the period 2009 to 2015, traceable to net export deterioration alongside an increased outflow in investment income. However, the country had a surplus in its current account between 1990 and 2008, attributable to substantial inflows from SACU. It was observed that excluding current transfers, mostly receipts from SACU, current account deficits would have been the outcome over this time range (Mushendami *et al.*, 2017).

The foregoing is a clear indication of the need for macroeconomic remodeling of the Namibian economy that will be consistent with sustainable economic growth, a drastic fall in unemployment, and income disparity. There is a need for external sector viability, an improved standard of living for her citizens, and institutional quality that will stimulate net positive capital flows towards contributing to the resource and technology gap in the economy.

3.1.2. An Overview of Capital Flows in Namibia

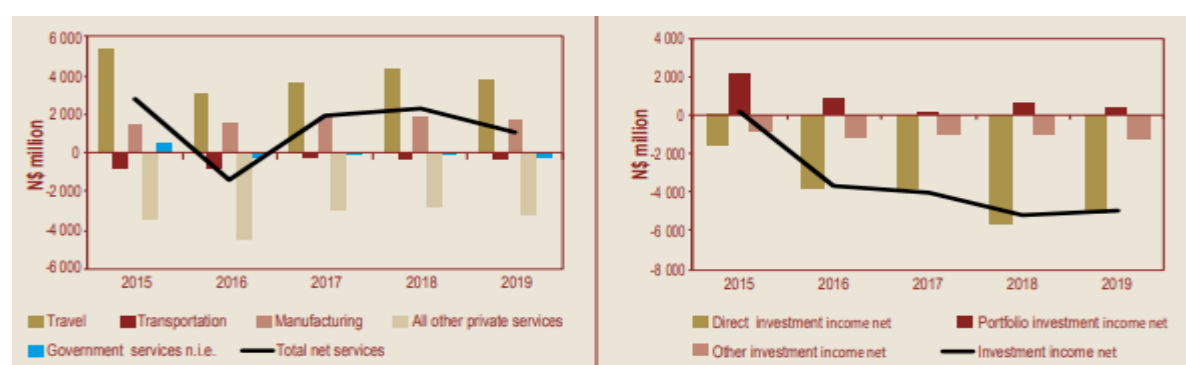
The concept of capital flows to the macroeconomic performance of an economy is a critical consideration that requires proper management for desirable outcomes.

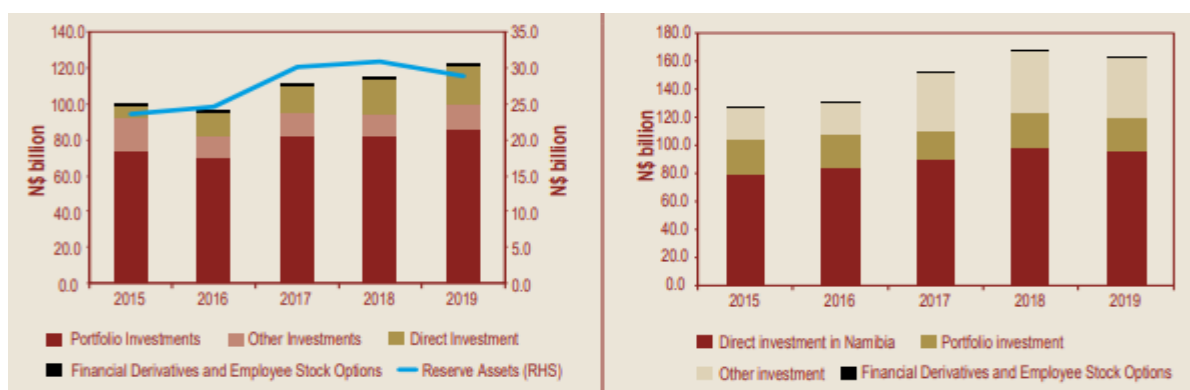
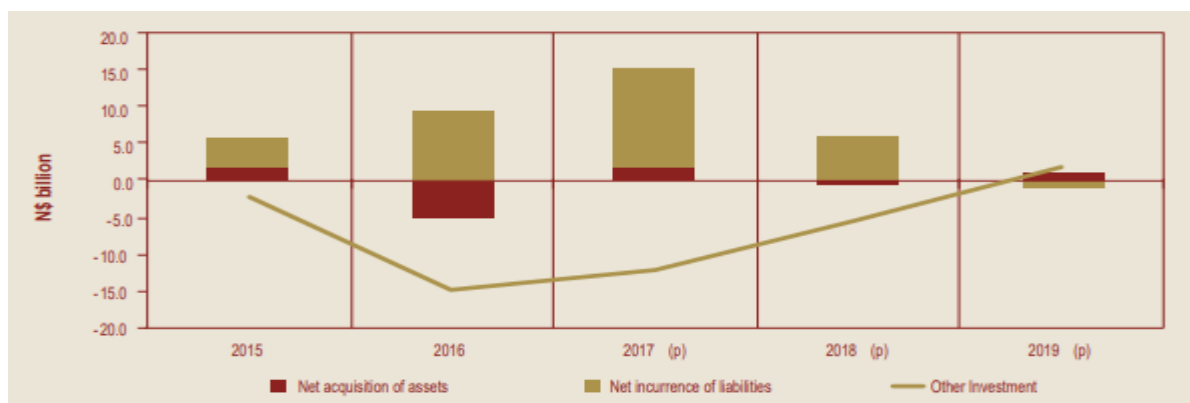
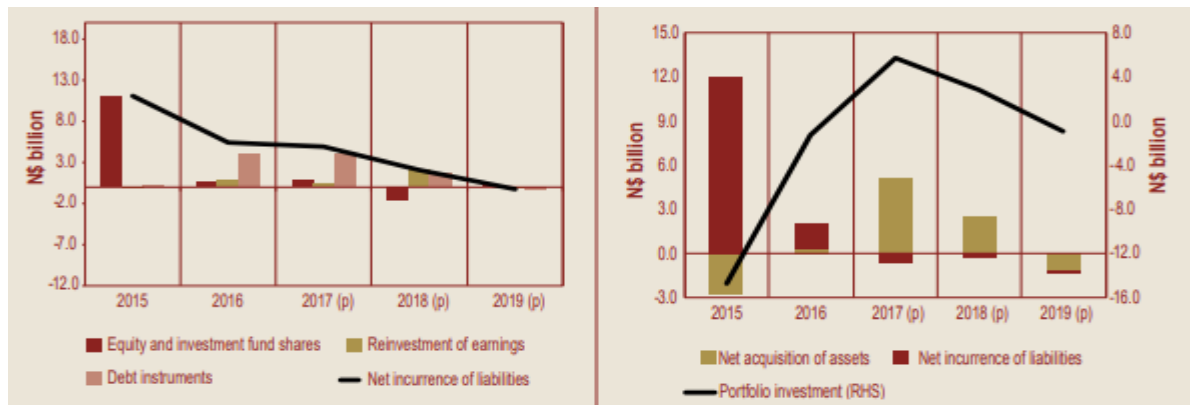
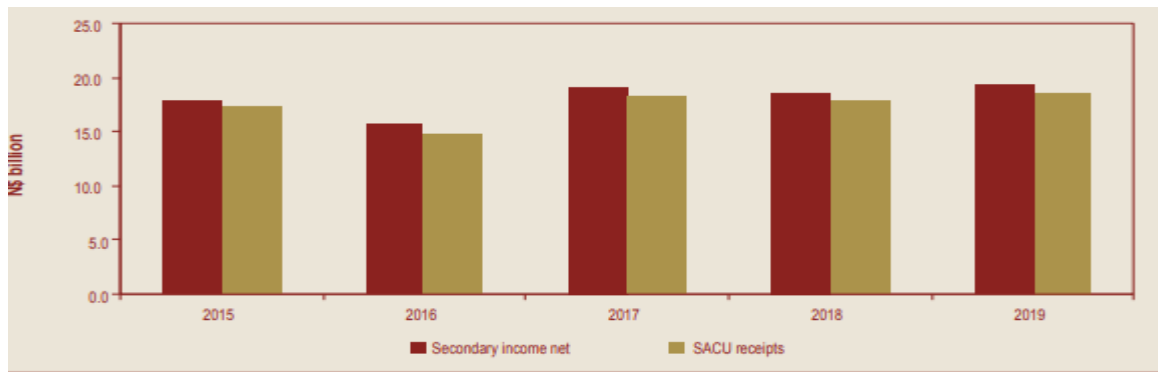
According to mainstream economic theories, capital inflows are an important, if not sufficient, determinant of economic growth and development. Direct spillover impacts and the contribution of capital inflows, mostly that of FDI, to the recipient economy have attained the state of axiomatic truth in economics. This has resulted in many developing economies striving for foreign investment to fix the economy on a trajectory of growth and finance the difference between local saving and investment (Hasanat Shah *et al.*, 2010).

In recent times, the services account had lower net inflows in 2019, majorly due to a decline in receipts in respect of travel and manufacturing services. The inflow in respect of net services was lower by N \$1.0 billion in 2019 when compared to an inflow of N \$2.3 billion in 2018. Net inflows in respect of travel and manufacturing services reduced by 13.8 percent and 5.1

percent which in monetary terms gives N\$3.7 billion and N\$1.7 billion accordingly. The primary income net outflows reduced by 8.2 percent to N\$5.0 billion as at 2019, basically as a result of decline in investment income payments extended to direct investors from abroad. However, inflows in respect of the secondary income account increased by 3.5 percent to N\$19.3 billion in 2019 majorly attributed to the moderately better SACU receipts that grew by 3.4 percent to N\$18.5 billion in the review period. On the capital account, the surplus had a drastic fall in 2019 with respect to 2018 by 4.8 percent to N\$1.6 billion. This was attributed to the decline in capital movements by foreign governments as well as private organizations. Net borrowing of Namibia from other countries reduced by 23.5 percent to N\$2.5 billion in 2019. The direct and other investment outflows were the key factors that led to the fall in Namibia's net borrowing from N\$2.5 billion accounted for in 2018 to N\$1.9 billion. However, the foreign direct investment liabilities had an outflow of N\$251 million, following the influx of N\$2.1 billion accounted for in 2018. In terms of portfolio investment, Namibia recorded an inflow in 2019 on the basis of reduced investment in foreign economies characterized by equity and debt. Other investments, international reserves, and international investment positions had their respective outcomes as well. For instance, in 2019, other investments resulted in a net capital outflow, while in the same year, international reserves at the whims and caprices of the Bank of Namibia declined. However, at year end 2019, the external balance sheet accounted for a lower net liability position when compared with 2018 as a result of a rise in foreign assets (Bank of Namibia, 2020).

The following graphs captures the financial variables as sourced from the Bank of Namibia (2020).





Bank of Namibia (2020)

3.1.3 Empirical Evidence of Capital Flows and Namibian Economic Growth

The subject of capital flows and its impact on host economies cannot be overemphasized. This section examines a few studies that relate to the economy of Namibia. For instance, Eita *et al.* (2018) examined for Namibia, the macroeconomic determinants of the current account balance. The authors established the case of the twin deficit hypothesis in the country. This implies that Namibia needs to ensure fiscal discipline so as to enhance its current account. A rise in capital flows, real GDP or per capita, generates a worsening of the current account. The current account balance improves due to a rise in interest rates, commodity prices, and population. The author concludes that monetary tightening contributed to the decline of unproductive imports and stimulated the current account balance.

Ogbokor and Ogbokor (2016) examined the nexus in respect of FDI and economic growth, using Namibia as the country of reference. The author employed co-integration procedures which include unit root tests, co-integration tests, ascertaining of the long-run equation, as well as diagnostic tests for autocorrelation, heteroskedasticity, normality, test for causality and forecast error variance decomposition analysis. By utilizing quarterly data that spanned 1990 to 2014, it was established that cointegrating relationships characterize the four variables that were considered for the study. Also, evidence of some level of positive association was found between FDI and growth. However, there was no causality between net foreign direct investment and growth. Moreover, it was found that the real exchange rate and net FDI accounted more in terms of innovations in economic growth over the forecast horizon compared to openness.

Muruko (2013) investigated the relationship that exists between FDI and economic growth as well as the determinants of FDI flows to Namibia. Econometric techniques on the basis of cointegration tests, Auto-Regressive Distributed Lag (ARDL), asymmetric (ARDL) model, dynamic ordinary least squares (DOLS) model, the standard co-integration tests, and mean-group were explored for the study. The author found that FDI has a significant impact in Namibia in enhancing economic growth; they were found to be positively related. The results also revealed that FDI has a consistent positive impact on growth when variables such as gross fixed capital formation, trade openness, and inflation are factored into the model. The study also showed the existence of bidirectional causality between FDI and economic growth, both in the short run and long run.

Dembo and Nyambe (2016) worked on the determinants of FDI in Namibia. They utilized econometric techniques such as the unit root, cointegration test, as well as bounds tests on the basis of the Autoregressive Distributed Lag model covering the period of 1984–2014 as well as analyzing the Error Correction Model. They found that in the short-run, depreciating the Namibian dollar had a direct effect on the receipts of FDI, while inflation and GDP growth had a direct effect on FDI both in the short and long-run. They also observed that, though insignificant, population growth shows a direct relationship, while the exchange rate exhibits an inverse relationship with respect to FDI in the short-run period. Other relevant findings show that all the variables have a long-run relationship with population growth in the long-run, showing a negative outcome in attracting FDI, while inflation has a direct effect on FDI in both the short and long-run. It is noteworthy, based on Haiyambo (2013), that most of the foreign direct investors in the country are motivated by the prospects of the availability of mineral resources existing in the economy.

Nghifwenwa (2009), using the OLS approach alongside the Error Correction Model, examined, in respect of Namibia, factors that have promoted or undermined investment. The author established an outcome of a direct relationship with real GDP, real domestic saving, and the investment incentives in the aftermath of independence. Nevertheless, only real GDP and real domestic saving were noted to have a significant influence on investment in the long run.

3.2. South Africa

3.2.1. Overview of the South African Economy

South Africa is one of the key economies in the SADC and SACU. The country's policy formulation and structure largely influence the influx of capital flows in the regions.

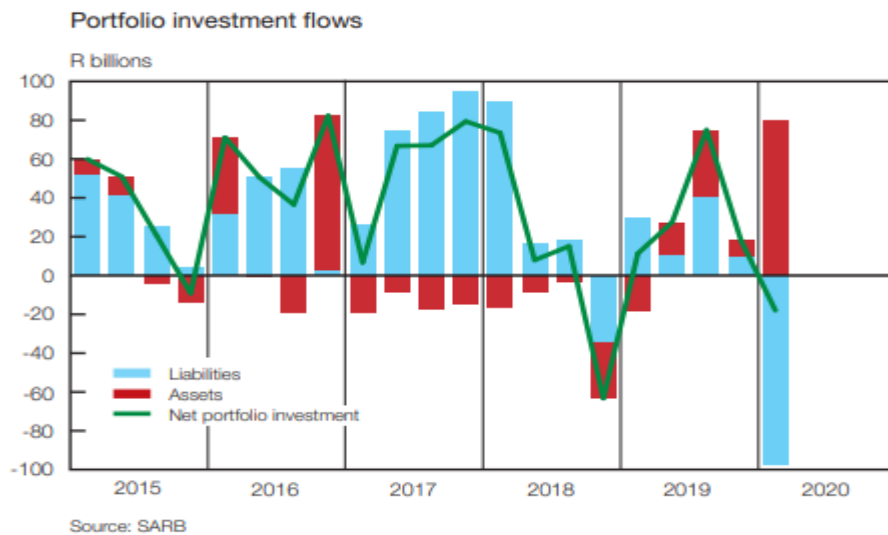
The economy was predominantly import substitution based in the 1970s and 1980s and progressively ascended to an export based free market economy post-1995 (Edwards & Lawrence, 2008; Flatters & Stern, 2007).

The South African economy's GDP, right from 1996, with the benefit of suspending the international sanctions that spanned at least twelve years, followed a strong upward trend, reaching \$416 billion as at 2011. However the foreign exchange reserves rose from US \$3 billion to the neighbourhood of \$50 billion.

The economy has transformed from the primary and secondary states that characterized the mid-twentieth century to an economy propelled by tertiary activities, accounting for \$230 billion in GDP at current prices (Wikipedia).

Based on the Quarterly Bulletin of the South African Reserve Bank, the economy experienced a second technical recession in the first quarter of 2018. This resulted in a contraction of an additional 1.4% of real gross domestic product occurring in the fourth quarter of 2019, which is an aftermath of the 0.8% recorded in the third quarter. It was reported that output declined across the primary, secondary, and tertiary sectors of the South African economy in the fourth quarter of 2019. The economy slid further, with yearly output growth ranging from 0.8% in 2018 to 0.2% in 2019. Real gross domestic expenditure was found to have declined by an additional 4.6% in the fourth quarter of 2019, which was comparable to the decline observed in the third quarter. The economy's official unemployment rate was constant at 29.1% as noted in the fourth quarter of 2019 (South African Reserve Bank, 2020a).

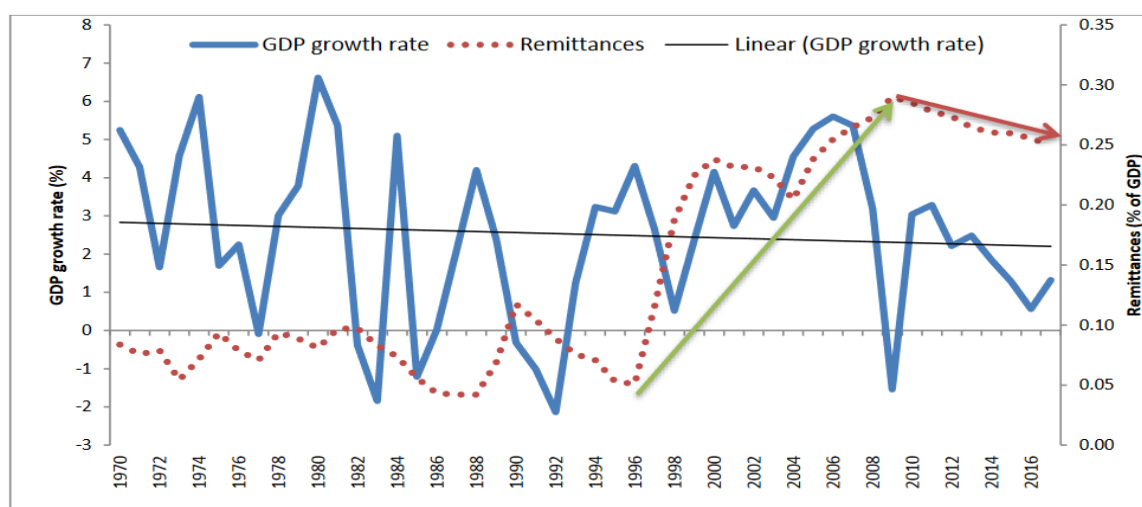
The quarterly bulletin also provided information with regard to the financial account of the South African economy. There was a drastic fall in the net inflow of capital from R73.9 billion recorded in the third quarter to R10.1 billion in the fourth quarter of 2019. The economy, on net, had inflows in respect of portfolio investment, financial derivatives, and reserve assets, but direct and other investment were characterized by outflows (South African Reserve Bank, 2020a). The net financial account inflows as a proportion of GDP experienced a rise from 0.8% in the fourth quarter of 2019 to 1.3% in the first quarter of 2020. The economy's direct investment liabilities rose by R 29.0 billion in the first quarter of 2020, which was in the aftermath of a R 10.5 billion inflow in 2019, fourth quarter. However, in the first quarter of 2020, there was a large outflow of R97.6 billion in respect of portfolio investment liability flows, which was in the previous quarter an inflow of R9.3 billion. Nevertheless, there was a shift in other investment liabilities, recording a R42.0 billion outflow in the 2019 fourth quarter to a large inflow of R52.0 billion in the 2020 first quarter (South African Reserve Bank, 2020b). The following diagram displays the portfolio investment flows in the recent period.



South African Reserve Bank (2020b)

With reference to 1998, South Africa experienced an upward trend in the influx of remittances due to the fact that an increasing number of South Africans travelled out of the country, having a value of US \$258.6 million, which is 0.2% of GDP, to a peak value of US \$1.2 billion, which is 3% of GDP, in 2011. It was later characterized by a steady decline to US \$755.4 million in 2016, with a slight recovery in 2017 to US \$873.20 million (World Bank, 2019b) as cited in (Nyasha & Odhiambo, 2020).

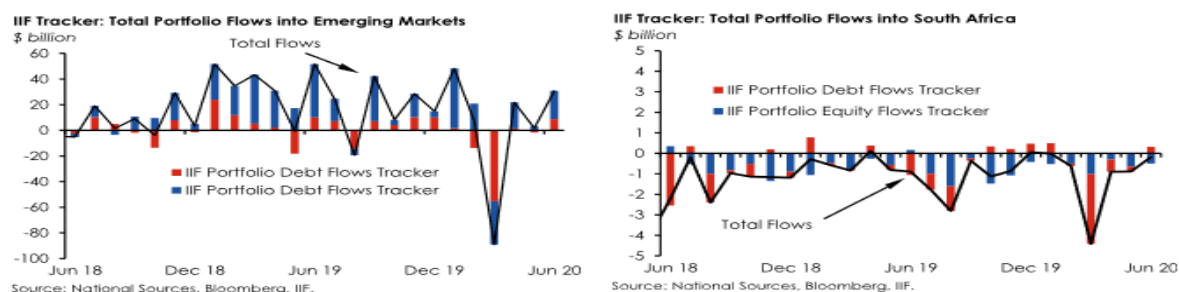
The diagram below shows the fluctuations in the GDP growth rate and the inflows of remittances as a proportion of GDP in South Africa spanning 1970–2017.



Source: World Bank (2019a)

3.2.2. Overview of Capital Flows in South Africa

South Africa was observed to be characterized by an impressive inflow of capital when it got re-integrated with world capital markets (Brafu-Insaidoo & Biekpe, 2014). The South African economy was ranked 19th by the Global Competitiveness Report based on its state of financial development. The rand has the 20th position of the most traded currency in the world, and South Africa has one of the highest market-capitalisation-to-GDP ratios. The intensity and liquidity of the financial markets encourage economic development and promote funding for private and public institutions (Makrelov *et al.*, 2021). The following figure describes portfolio flows into South Africa and Emerging Markets.



Source: Makrelov *et al.* (2021)

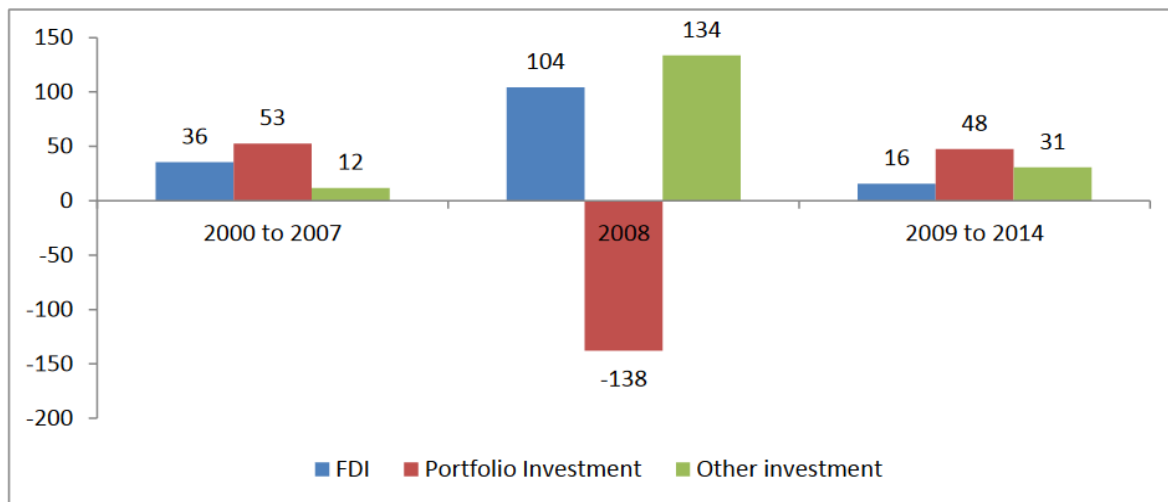
Total portfolio flows declined swiftly in March given the increase in global risk aversion arising from the COVID-19 issue, implying a sudden stop. Based on aggregation, portfolio flows to emerging markets somehow recovered. The economy of South Africa also experienced a massive retreat in March but could not recover. The implication is that local factors like a worsening fiscal scenario also contributed to the exit of non-resident investors from the country. Visualizing the movements of capital on a long-term indicates that the structurally low state of local savings in South Africa has resulted in the country's being highly dependent on savings from abroad. However, it has resulted in a rise in South Africa's vulnerability to the volatility of capital flows (Makrelov *et al.*, 2021). Increased short-term portfolio capital flows from abroad influenced the drive in the economic growth of South Africa. It has promoted the supply of credit and a higher level of liquidity to the private sector (Seeraj, 2008:13).

The South African economy experienced, some decades ago, a relatively low level of foreign direct investment (FDI), but a great deal of portfolio investment. FDI inflows between 1994 and 2002 were found to be 1.5 percent of GDP annually on average, while portfolio inflows

were more than twice this value (3.5 percent of GDP). This contrasts sharply with respect to countries characterized by similar risk, having FDI as the major inflow of capital. The South African economy tends to be skewed towards the influx of portfolio investment (Ahmed *et al.*, 2005). However, it was observed that promoting trade liberalization alongside a better state of growth, infrastructure, and law and order would stimulate the flow of FDI into the South African economy. It was also confirmed that FDI would be enhanced if the monetary authorities minimized the volatility in the rand (Ahmed *et al.*, 2005).

Hassan (2015) explains in his paper that the intensity of portfolio capital flows in South Africa is one of the key determinants of rand exchange rate movements. Hassan noted the continuous rise in the inflows of portfolio debt, which were considered to exhibit more volatility and were basically influenced by global factors (risk and liquidity) as well as long-term economic potential, which remain elusive.

Dated back to the period 2000 to 2007, portfolio investment had a share of 53 percent in respect of the entire net inflows for the period, while 36 percent was accounted for FDI, thus making it the second with other investment at 12 percent. However, the scenario was different in 2008 due to the financial crisis, which discouraged investors. Eventually, there was an outflow of 104 per cent of the portfolio investment in terms of the financial account balance. Conversely, the influx of other investment rose. This was likely attributed in part to the repatriation of some international funds in the era of the financial crisis by investors from South Africa. The South African economy was again fundamentally dependent on portfolio flows over the period 2009 and 2014 in the aftermath of a swift reversal in portfolio flows in 2008. This was reported to be approximately 50 per cent of the inflows accounted on the financial account. Notable is the increase in the proportion of other investment from 12% before the crisis to more than 30% after the crisis. However, during the same time period, the share of FDI decreased from 36% to 16% (de Beer, 2017). The following figure displays the net financial flows in South Africa on the basis of functional type.



Source: SARB

Source: de Beer (2017)

3.2.3. Empirical Evidence on Capital Flows and South African Economic Growth

Some studies have been conducted in respect of capital flows and economic growth in South Africa. Wesso (2001) investigated capital flows in either direction for South Africa, comprising common determinants of capital mobility in developing countries. Techniques such as error correction and unrestricted vector autoregression were used to examine the dynamics existing with respect to capital flows and other important economic variables. South African quarterly data ranging from 1991 to 2000 were used for the study, and the author found a negative relationship between net capital flows (R million) with respect to the relatively high inflation rates for the economy. However, there was a direct economic growth effect in the long run. It was also found in the study that higher exchange-rate-adjusted government bond rates with respect to those obtainable in the US in order to promote capital from abroad, while net capital flows are undermined by larger government deficits.

Adeola and Aziakpono (2017) used co-integration and error correction modelling as well as weak exogeneity tests to study the outcomes of four major components of capital flows to South Africa. Using data over the period of 1970 to 2012, it was found that FDI and remittances positively affect South Africa's economic growth significantly, while debt liabilities and portfolio equity do not contribute significantly to economic growth.

Fedderke and Romm (2006) analyzed a study in respect of South Africa covering the time frame 1956–2003 with a view to ascertaining FDI determinants and its economic growth effect.

The authors used a standard spillover model of investment as well as a new model of locational choice in FDI in respect of domestic and foreign possibilities. They established a long-run complementary relationship in respect of foreign and domestic capital. A situation of crowd-out of domestic investment by foreign direct investment was observed only in the short-run. It was also observed that FDI in South Africa moved in the direction of capital intensive. They further provided that the determinants of FDI in South Africa are a function of the net rate of return and the risk profile of the foreign direct investment liabilities.

Okeahalam and Dowdeswell (2008) examined, within the context of a municipality, the relationship that operates between South Africa's foreign direct investment in relation with economic fundamentals. The authors designed a set of data alongside an econometric model to investigate the flows of FDI within a municipality. They established the fact that jurisdictions characterized by high factor productivity attract the flows of FDI and that enhanced investment is a direct function of progress in higher labour productivity.

Gossel and Biekpe (2014) examined the causality that exists between trade, capital inflows, and economic growth spanning 1995–2011 in the context of post-liberalised South Africa. They found that trade and fixed investment are the key drivers of economic growth in the economy, not capital inflows. They established that economic growth is bidirectionally related to imports. They concluded that the export-led growth hypothesis exhibits more affinity with economic growth compared with the import-led growth hypothesis. On the basis of their results, the authors found that growth-led FDI prevails over FDI-led growth as well as the inflows of portfolio rather than FDI are consolidated in the dynamics of the economy's trade-led growth.

Nyasha and Odhiambo (2020) conducted an empirical study over 1970–2017 regarding the dynamic causal relationship in respect of remittances and economic growth in South Africa. They used the autoregressive distributed lag model in the context of a multivariate Granger-causality framework to analyse the remittance-growth causality. The authors found that there is no causality between remittances and economic growth, either in the short run or the long run.

Leshoro (2013) worked on the topic "Foreign aid and economic growth in South Africa: An empirical analysis using bounds testing". The econometric technique of co-integration analysis of the autoregressive distributed lag model was employed and considered the conditional

unrestricted error correction model over the period 1980–2009, having the benefit of taking care of small samples. The author came to the conclusion that, in the short and long run, foreign aid and growth are negatively related.

Masipa (2018) examined, over the period 1980–2014, the relationship that exists between the inflows of foreign direct investment and growth. The long-run association was estimated through the technique of a vector error correction model. The author concluded that there exists a direct relationship of economic growth with respect to FDIs as well as the real effective exchange rate. However, in the long run, it is inversely related to government expenditure.

3.3. Botswana

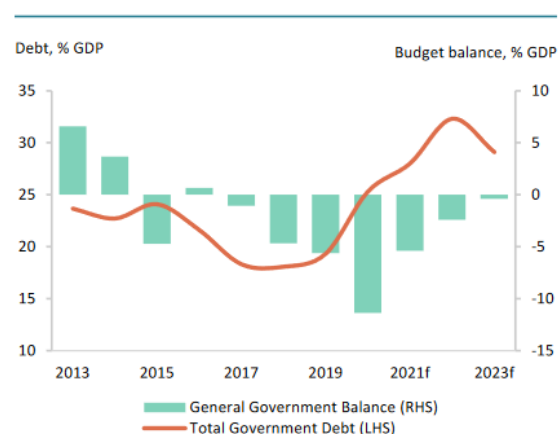
3.3.1. An Overview of Botswana's Economy

Botswana (from independence in 1966 to the late 1990s) was regarded as having one of the world's fastest-growing economies, comparable only to China, with an average annual GDP growth rate exceeding 10%. The country's economic growth dragged in the 2000s. Nevertheless, sustainable macroeconomic and fiscal policies contributed to the attainment of stability. The economy has a high reliance on diamonds in spite of the historical attainment of strong growth. Botswana has a strong dependence on minerals and the public sector, which makes it vulnerable to external shocks. However, the country has achieved considerable progress in reducing the level of poverty over the last decade. Between 2002/3 and 2009/10, per capita real consumption increased 13.3 percent in the macroeconomy, with rural communities experiencing much greater gains. Moreover, there was an improvement in the standard of living and a decline in the poverty rate over the past decade. The performance of the economy can be ascribed to the sustainability of macroeconomic and social policies. For instance, the government has over time ensured prudent monetary policies. In the 2000s, the country operated fiscal and current account surpluses, majorly due to high revenues obtained from minerals and the Southern African Customs Union, as well as the prudent use of revenues obtained from minerals. Also, the country's external sector did well in recent times, characterized by a surplus in the current account, which reflected impressive transfers from SACU revenues as well as growth in services exports. Nevertheless, it is among the economies that exhibit a high level of inequality, characterized by an extreme level of poverty (World Bank, 2015).

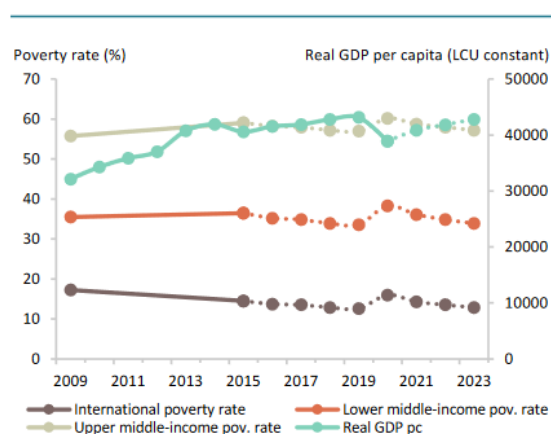
It was estimated that the economy contracted by 7.9 percent in 2020 as a result of the pandemic that undermined major sectors, such as diamonds and tourism. There was a rise in unemployment to 24.5 percent while the rate of poverty was estimated to be 60.2 percent in 2020, from 57.0 percent in 2019, on the basis of the upper-middle-income economy threshold. Though, 2021 was expected to show growth recovery, the sustenance of the momentum over the medium-term will necessitate transformation in order to neutralize the structural constraints of the current growth model. Botswana was estimated to have shrunk by 7.9 percent in 2020. There was an estimated decline in diamond production by 29 percent due to weak global demand. Consequently, merchandise exports declined in 2020, by an estimated 26 percent, weighed down by a 77 percent decline (y/y) during second quarter. The private sector was adversely affected by travel restrictions. Significant losses were recorded in tourism and hospitality. The rate of unemployment rose minimally from 23.2 percent during the first quarter of 2020 to 24.5 percent during the last quarter. Also, more individuals (103, 000) were estimated to have fallen beneath the upper-middle income poverty line in 2020, resulting in a total of 1.4 million individuals (World Bank, 2021).

The following figure gives a visual state of the economy of Botswana

Botswana/Evolution of Public Debt and Fiscal Balance



Botswana/ Actual and projected poverty rates and real GDP per capita



Source: World Bank staff estimates

Source: World Bank (2021)

The country's currency, Pula, from previous studies is overvalued (Limi, 2006; Njindan Iyke & Odhiambo, 2017; Pegg, 2010; Taye, 2012), while the high growth in mining revenue contributes to the overvaluation of the currency (Limi, 2006; Pegg, 2010).

Having an overview of the economy of Botswana also necessitates examining the status of the inflation rate in the country, considering its pricing effects across the various sectors of the economy, which, aside from the exchange rate, may also influence the competitiveness of the economy. According to International Monetary Fund (2021), inflation rate declined in 2020 to 1.9 percent, from the 2.8 rate in 2019, given minimal prices of import, mostly oil prices, that highly neutralize higher prices for locally made goods and services. The increase in local prices reflects the impact of the rise in prices of food, electricity tariffs and domestic wages. The inflation rate was maintained at the Bank of Botswana's 3–6 percent target .

Given the resources existing in the economy and the maintenance of a sound macroeconomic environment through the use of appropriate fiscal and monetary policies, it is expected that it will enjoy inflows of capital, which will minimize the savings gap and spur growth.

3.3.2. An Overview of Capital Flows in Botswana

The Annual Report documentary of the Bank of Botswana provides relevant information with regard to the capital and financial accounts of Botswana. The financial account, which comprises direct investments, portfolios and other investments, was estimated to record a net outflow in 2019 of P4.5 billion, attributed to a rise in offshore investments by the pension funds, while the revised inflow stood at P3.1 billion as at 2018. However, in terms of direct investment, there was an estimated rise in foreign equity holdings in 2019 of P467 million, which had a revised rise in value in 2018 by P837 million. There was a P2.8 billion investment estimate stemming from non-residents in 2019, which in 2018 was P2.9. However, on account of portfolio investments, there was an estimated P10.8 billion increase in 2019, which was characterized by a P6.4 billion decrease in 2018, traceable to a rise in offshore activities in terms of equity and debt instruments by pension funds. On account of "other" investments, there was a net inflow of P4 billion in 2019, which was characterized in the preceding era by an outflow of P5.4 billion. On a gross basis, foreign financial assets declined by P5 billion in 2019, which in 2018 was a rise of P6.2 billion. The requirement to pay back long-term loans by the government and private units resulted in a further decline of P985 million in 2019 in the aftermath of a P780.3 billion rise in 2018 (Bank of Botswana, 2020).

3.3.3. Overview of Capital Flows and Economic Growth in Botswana

Selelo (2012) examined the topic, "Determinants of Fixed Foreign Direct Investment in Botswana". The study period covered 1980–2007 with a view to ascertaining the variables that play determining roles in FDI in Botswana. The authors found FDI to be functionally related to the explanatory variables of growth rates of GDP, human capital, terms of trade, domestic investment, and government expenditure. Using time series annual data, they utilized econometric techniques of co-integration and vector error correction model and found that the growth rates of Botswana's economy give credence to the flows of FDI.

Another study by Chiwira and Kambeu (2016) analyzed the relationship between FDI and growth with respect to Botswana. They employed annual time series data spanning the period 1980–2012 in a multi-model econometric context. The authors used Augmented Dickey-Fuller and the Phillips-Perron test to check for the unit root of the variables. The long-run relationship was examined through the Johansen and Juselius cointegration test, while the direction of causality between FDI and economic growth was achieved by the Granger causality test. From the cointegration test, the authors discovered the presence of a long-term relationship between FDI and economic growth in the country. Nevertheless, they could not establish the direction of causality between FDI and economic growth over the study period.

In their study, Bosupeng *et al.* (2019) were interested in the effect exchange rate misalignment has had on capital flight from Botswana spanning 1980–2015. The methods employed include the autoregressive distributed lag model cointegration approach used to examine the causality through Toda and Yamamoto (1995). They identified trade openness as the key variable in capital flight from Botswana. According to the authors, overvaluation of the currency in the long-run leads to a fall in the magnitude of capital flight as a result of trade misinvoicing, while the accumulation of foreign reserves does not result in a decline in outward capital flight. Nevertheless, in the event of a currency undervaluation, the magnitude of capital flight as a result of trade misinvoicing rises, while outward capital flight declines due to foreign reserves. According to the authors, overvaluation of the Pula beyond 5% generates a greater increase in capital flight.

Makoni (2015) examined the topic "Foreign Direct Investment—The case of Botswana" and concluded that there is an excessive reliance of Botswana on earnings from the export of diamonds. Mbulawa (2015) worked on the topic "Effect of Macroeconomic Variables on

Economic Growth in Botswana" using yearly macroeconomic data covering 1975–2012. Econometric methods of the Vector Error Correction Model as well as Vector Autoregression were utilized for the analysis. The author established that foreign direct investment and inflation exert on economic growth directly and that the erstwhile value of economic growth and the flows of FDI are stimulating factors of economic growth, accounting for 89% and 8% of the variations, respectively. Evidence of a unidirectional causality from economic growth to FDI as well as the one that runs from gross fixed capital formation to the growth of GDP were observed by the author.

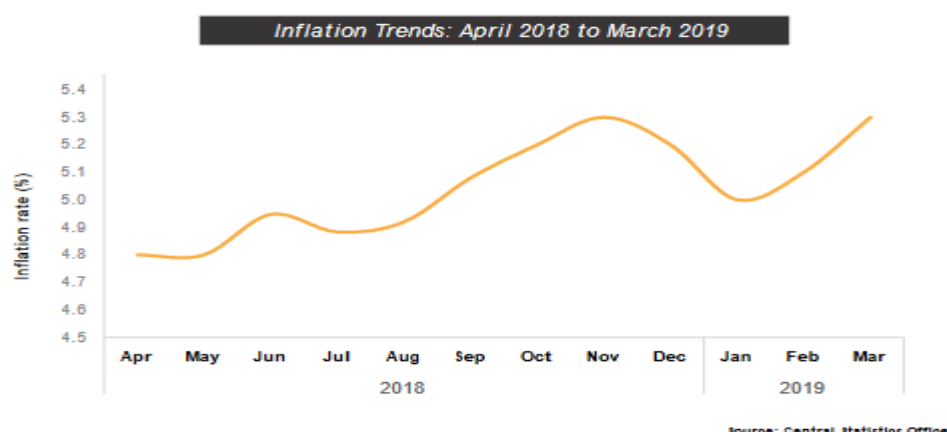
3.4. Eswatini

3.4.1. Overview of the Eswatini's Economy

The economy of Eswatini got trapped in low growth during the previous two decades and has incessantly had to cope with significant developmental challenges. Real GDP growth slowed from 4.9 percent per year on average from 1990 to 1999 to 3.4 percent from 2000 to 2009. However, it fell to 2.4 percent between 2010 and 2019. Since 2014, economic growth has been below 2%, and the economy has been marked by macroeconomic instabilities caused by the volatility of Southern African Customs Union revenues, the impact of prolonged drought, the weakness of the external sector, and a depressing business and investment climate. Capital formation has been negligible, private investment appears marginal and decreasing, while competitiveness exhibits stagnation, inhibited by, among other issues, archaic and insufficient infrastructure stock (African Development Bank, 2020).

On the basis of official provisional estimates from the Central Statistics Office, the GDP was estimated to have increased by 2.4% in 2018 compared to that of 2017, which stood at 2.0%. The expansion was predominantly accounted for by robust positive developments in the extractive and tertiary sectors. However, the country's external reserves continuously decline given the draw-downs by the government in respect of its deposits at the Bank to internalize the consistent cash shortfalls. It was observed, on the basis of estimated imports of goods and services, that the reserves could sufficiently take care of two months by the end of March 2019, below the 3-month-threshold and also less than the 3.2 months taken care of over the same period in the previous year. Yearly consumer inflation was contained in the 2018/19 financial year, showing an average of 5.0% relative to the 5.5% that characterized the previous financial year. The moderate state in consumer prices is attributable to favourable food prices, which

registered a deflation of 0.2% during the review period, down from 5.2% in the previous financial year. The following figure shows the inflation trends from April 2018 to March 2019 (Central Bank of Eswatini, 2021).

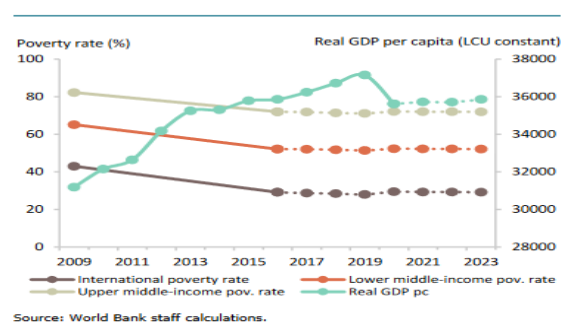
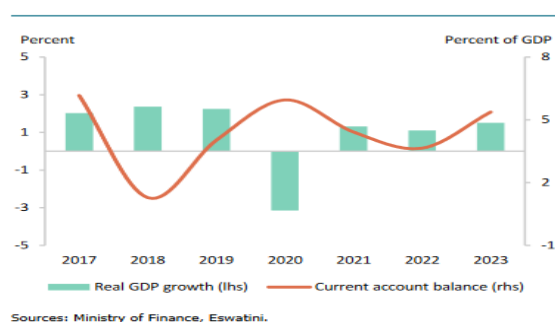


Source: Central Bank of Eswatini (2021)

The economic growth of the country was estimated to have shrunk by 3.1 percent in 2020, which is an upward revision from an earlier forecast of -3.5 percent, thus depicting some improvement in the second half of 2020. Nevertheless, the recovery is being undermined as a result of the second wave of COVID-19. Due to the weak recovery from the pandemic, it is forecast that about a third of the population will live in extreme poverty. The severity of poverty in the country over time is high, with around 30 percent of the population living below the international poverty line of US \$1.90/day (2011 PPP). The inflation rate on an annual basis rose to 3.9 percent in 2020 from 2.6 percent in 2019, attributable to COVID-19 induced supply chain problems. The graphs below describe the economy pictorially (World Bank, 2021).

Real GDP growth and Current account balance

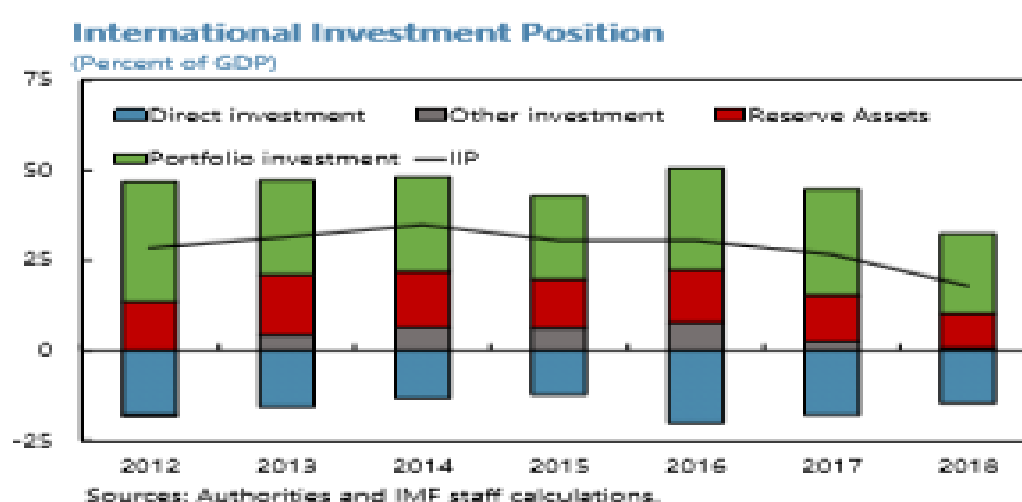
Actual and projected poverty rates
and real GDP per capita



Source: World Bank (2021)

3.4.2. Overview of Capital Flows and the Eswatini's Economy

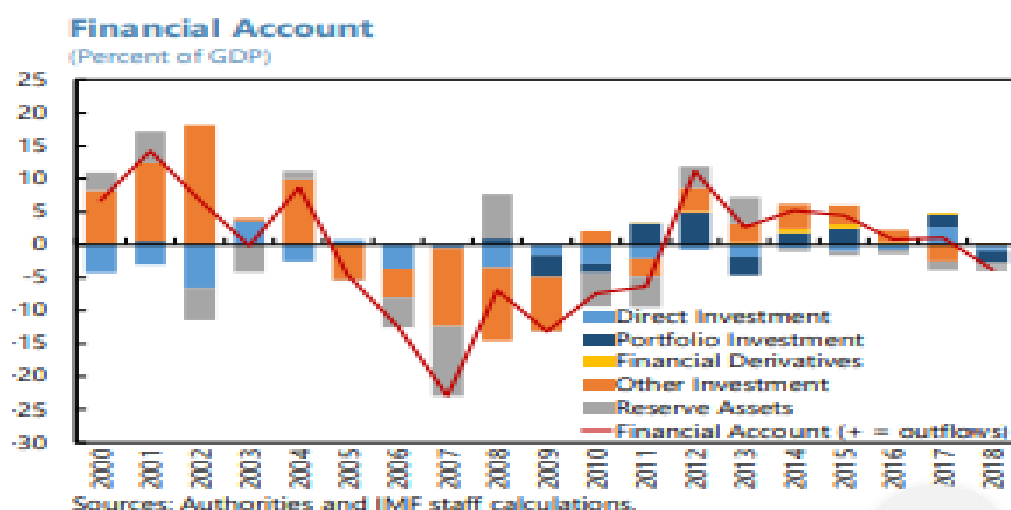
The external state of the Eswatini's economy was reported to be moderately weaker in 2018 compared to the macroeconomic indicators and relevant policies. Worsening SACU receipts and a deteriorating trade balance negatively affected the state of the current account surplus. The economy experienced a decline in its international reserves amidst a net inflow, especially from portfolio investments. The international reserves with reference to 2013 have been on a downward trend and were less than the IMF's reserve adequacy metric lower bound. The economy as at 2018 had Net International Investment Position of 17.9 percent of GDP and thus a net creditor to the world. However, the Net International Investment Position has been unfavourable since a few years ago due to worsening international reserves, portfolio assets and other investments. Portfolio and other investment assets account for 77 percent of external assets, basically in the whims and caprice of non-bank financial and corporate sectors (International Monetary Fund, 2020a).



Source: International Monetary Fund (2020a)

Eswatini had unusual outflows of FDI in 2017, while the inflows of FDI in 2018 became normalized. Conversely, there were significant inflows of portfolio investment, mainly attributed to reversals of equity investments from foreign economies by non-bank financial institutions. There was an ephemeral repatriation of assets on the premise that the domestic asset conditions in respect of institutional investors would rise. Other investment was characterized by a reversal of flows due to less accretion of deposits in the foreign economies on the ground of corporates in respect of slack exports over the years. For some couple of years

ago, the country had financial account outflows (which was around 3 percent of GDP on the average), majorly caused by portfolio investments stemming from the wide-ranging non-bank financial sector of the economy with total assets around 110 percent of GDP. Other attribution factors for the financial account outflows include a completely funded pension fund as well as other investments, which show significant savings by big-time exporters (International Monetary Fund, 2020a).



Source: International Monetary Fund (2020a)

3.4.3. Empirical Evidence on Capital Flows and Economic Growth in Eswatini

Masuku and Dlamini (2009) considered the topic "Determinants of foreign direct investment inflows in Swaziland". The analysis covered the period from 1980 to 2001 and utilized the cointegration and error correction model to ascertain the factors that determine the inflows of FDI. It was found from the research that 76% of the change in FDI is determined by economic openness to trade from abroad, infrastructure, the size and prospect of the local market with respect to the previous year, alongside domestic and external stability. A direct relationship was found between FDI inflows and economic stability, infrastructure, the stability of the domestic economy and openness, while inversely related to the attractiveness and the size of the local market.

Ntshakala (2015) analyzed the impact public external and domestic debt has on Swaziland's economic growth. In order to avoid spurious results, the author included variables like inflation and government expenditure in the analysis. Time series data covering 1988–2013 was analyzed

through advanced econometric methods. Specifically, the nature and depth of each relationship were observed by the technique of Ordinary Least Square (OLS) on the ground that all the variables exhibit normality as well as stationarity at level. The author found evidence of a non-significant relationship for Swaziland in respect of external debt and economic growth. However, domestic debt was at 5% and significantly positively related to economic growth. It was proffered from the study that Swaziland's government promotes sustainability of domestic and external borrowing and ensures its usage in productive economic projects.

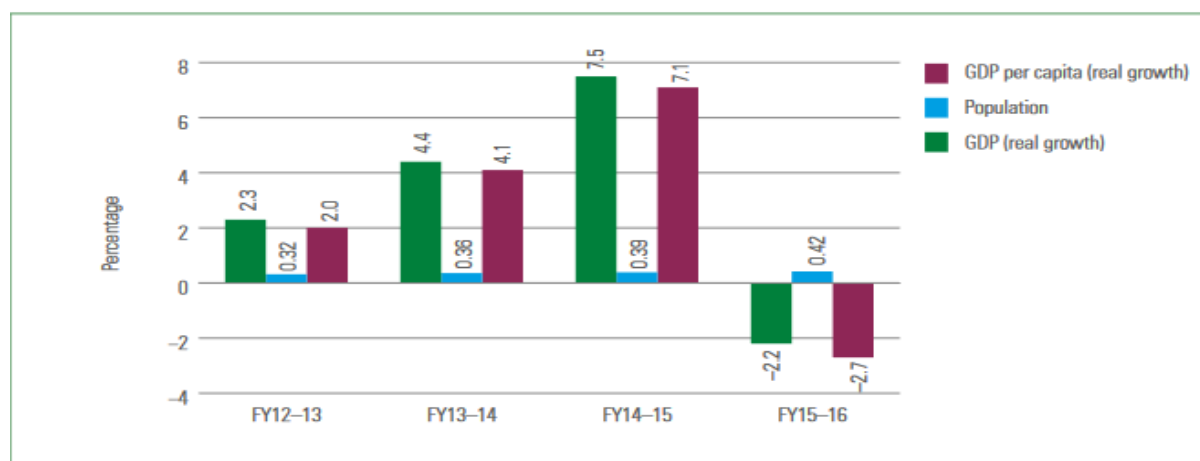
3.5. Lesotho

3.5.1. Overview of the Economy of Lesotho

The economy was estimated to experience a contraction by -6.1% in 2020. The contraction in the macroeconomy, accompanied by a swift fall in the secondary sector, is attributed to a mix of negative local and external shocks. Some of the factors encompasses disruptions in domestic supply due to the lock down measures of the country and restrictions on travel alongside weak external demand, minimal remittances and capital inflows. The economy, in the medium term, is forecasted to recover steadily, experiencing 4.3 percent growth in 2021 and being characterized over the period of 2022-2023 by an average growth of 5.2 percent. Moreover, the inflation rate for the economy is set to rise from 5.0 percent (2020) to 5.5 percent on average during 2022–2023.(Central Bank of Lesotho, 2021).

The economic outcome in Lesotho depends on South Africa. It therefore implies that the poor economic outlook in South Africa, the high rate of interest, continued volatility of exports, and decreasing local and foreign investment suggest that the trajectory of growth in Lesotho will, in the medium term, experience constraints. The following figure provides some information about the economy's output and population. It can be observed that the economy of Lesotho consistently expanded over the periods FY11/12 and FY14/15. Moreover, the growth in real GDP exceeded that of the population during the period, resulting in a consistent growth in per capita GDP. The main driving forces are the mining and construction sectors' productivity, which account for about 15% and 7% of GDP, respectively. FY15/16 was characterized by negative economic growth in real terms, which indicates that the foregoing sectors find it difficult to expand output. Some of the constraints include a higher level of uncertainty about accessing the U.S. market by Lesotho, a higher state of global competitiveness, and a decrease in public and private investment, majorly in the construction sector. Furthermore, the

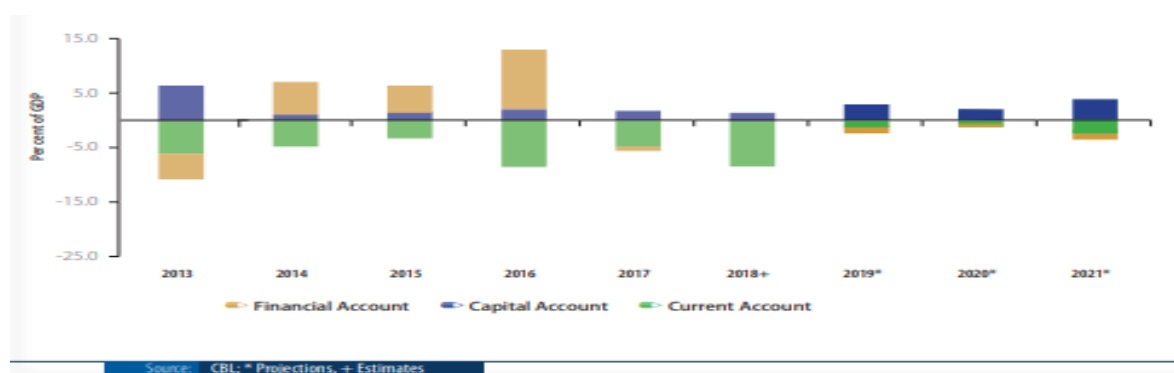
agricultural sector was undermined between 2015 and 2016 due to drought in the Southern African region, which subsequently constrained economic growth. Aside from the foregoing domestic issues, the economy of Lesotho is vulnerable to global and regional economic situations, mostly the economic situation in South Africa. (UNICEF, 2017).



Source: (Ministry of Finance, 2017)

Source: UNICEF (2017)

In the external sector, the economy in 2018 recorded a positive balance of 3.7 percent of GDP, which occurred in the aftermath of a deficit outcome of 5.9 percent of GDP in 2017. The economy was forecasted to exhibit a widening in its current account deficit by an estimated value to 2.5 per cent in 2021 in comparative with 0.3 per cent of 2018 GDP. This reflected that the country's imports consistently exceed exports as well as the shortfall in the services account. Similarly, it was expected that the trade account would maintain a deficit within the forecast horizon on the basis of expanding imports over exports. The following diagram describes the outlook of the balance of payments for the economy (Central Bank of Lesotho, 2019b).

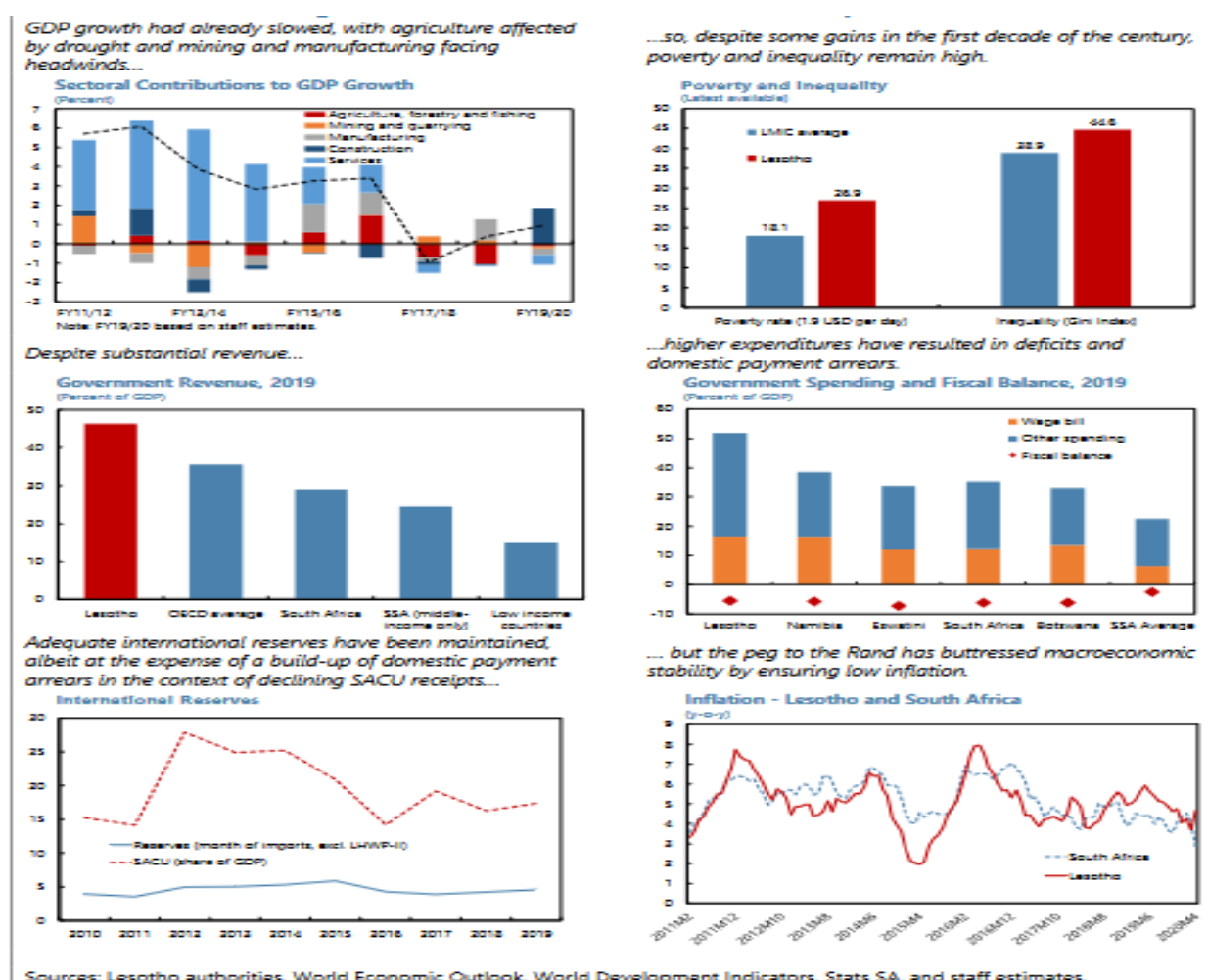


Source: Central Bank of Lesotho (2019b)

The recent COVID-19 pandemic, as contained in the Staff Appraisal of the IMF country evaluation of Lesotho, showed that it has a destabilizing impact on the economy and, therefore, dire external and fiscal financing needs. It was reported that the short-term state of the economy has been substantially adversely affected, given policy measures to neutralize the virus as well as the challenge of a worsening external sector taking its toll. It was noted that the external financing needs covered around 6.75 per cent of 2020 GDP. However, a reprioritization of expected spending, alongside supplementary financing emanating from development partners, will address the fiscal needs of the economy of Lesotho (International Monetary Fund, 2020b).

The following figure shows the behavioural pattern of economic development in Lesotho as obtained from the International Monetary Fund (2020b).

Lesotho: Recent Economic Developments



Source: International Monetary Fund (2020b)

3.5.2. Overview of Capital Flows in Lesotho

This section takes inventory of the previous state of capital flows in Lesotho. For instance, at the end of the third quarter of 2019, a net outflow of M410.24 was registered in the financial account, which exceeded a revised net outflow of M270.36 million in quarter two of 2019. The description as a fraction of GDP shows that net outflows constituted 4.4 percent of GDP in quarter three, up from 2.9 percent in the previous quarter. The rise in foreign assets by commercial banks constituted the main basis for the observed state of the financial account. In another development, the third quarter of 2019 experienced the robustness of capital account inflows. It rose moderately to 4.2% of GDP from 3.1% in the previous quarter. (Central Bank of Lesotho, 2019a). In another development, within the first quarter of 2019, the capital account surplus increased beyond two-fold, registering the inflows of capital at a value of M252.30 million, up from M119.80 million. It was observed that the increased inflows were connected to the massive increase in the inflows of capital towards construction works (Central Bank of Lesotho, 2019a).

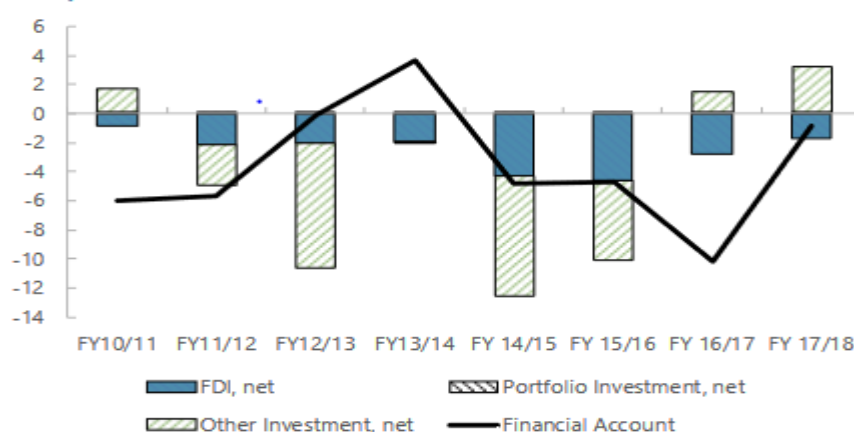
Historically, the economy of Lesotho has been dependent on foreign aid. It encountered substantial variability in foreign aid flows over the period of 1960–2010, having a rising trend towards the mid-1980s and a declining trend subsequently. The proportion of foreign aid as a fraction of GDP stood at an approximate rate of 16% between 1960 and 1969. It increased to 26% over the period 1980-1989 and swiftly declined to 8% during 2000-2010 (Thamane & Kolobe, 2016). Moreover, another source of information has it that the economy of Lesotho has over time relied on remittances emanating from mining jobs in South Africa. However, there has been a recent decline in employment in the industry. Factors attributed to the declining remittances involve mechanization and the stagnant situation of South Africa's gold mining industry, as well as the country's shift in the utilization of domestic labour. Nevertheless, about 15% of the population of Lesotho still works in South Africa, such that their remittances are essential to the economy, constituting 15% of GDP (World Bank, 2019c).

Lesotho operates a free-market economy characterized by relatively open capital markets and an enhanced business climate. In recent times, the inflows of FDI have been driven majorly in terms of mining investments, manufacturing, textiles and apparel, water, and construction. (U.S Department of State, 2019).

In recent times, the economy experienced, in the first quarter of 2019, a lower surplus in the capital account of M116.82 million, relative to the previous quarter's value of M163.01 million, which was attributed to capital inflows in respect of construction works in the phase II of LHWP (Central Bank of Lesotho, 2019a).

As regard the inflows of FDI, it stood at 4.6 percent of GDP in FY 2015/16, which was attributed to diamond mines investments. It was however reported to have fallen below 2 percent subsequently. Other investments accounted for 8.2 percent of GDP in terms of inflows in FY 2014/15 and an outflow that stood at 3.2 in FY 2017/18 premised on the significant rise in the net foreign assets by commercial banks (International Monetary Fund, 2019a). The following figure describes the situation of external finance in the country.

External Financing (In percent of GDP)



Source: Country authorities.

Source: International Monetary Fund (2019a)

3.5.3. Empirical Evidence of Capital flows and Economic Growth in Lesotho

Makhetha and Rantaoleng (2017) investigated the long-run relationship of FDI, trade openness, and growth in Lesotho from 1980 to 2011. It was established that a long-run relationship existed among the variables. The authors found, from VAR Granger causality, a unidirectional relationship from trade openness as well as FDI to output, also from output, FDI to trade openness. They concluded that in both the short-run and the long-run, the role FDI plays in terms of output growth is not significant. However, the effect of trade openness on output growth is negatively significant in the long run, but not significant in the short-run.

Fowowe and Ibrahim (2016) examined the effect of remittances on economic development in Lesotho. Focus was directed at the influence financial development has on the relationship between remittances and economic development. They employed the technique of fully-modified OLS (FMOLS) to analyze the long-run relationship between remittances and development, thus addressing potential endogeneity bias. The authors found that remittances exert a significant positive effect on economic development. Other findings revealed that financial development proxied by broad money generates a positive influence on Lesotho's economic development. Interacting remittances with financial development resulted in a significant coefficient. It was, therefore, concluded from the study that remittances are like a buffer to allay credit restrictions on households as well as improve the shortcomings of the financial system on poor households.

Sibindi (2014) analysed the causal relationship that exists in respect of the remittances, financial development and economic growth in Lesotho spanning 1975 to 2010. They utilized per capita remittances, real per capita broad money supply, as well as real per capita growth domestic product to measure remittances, financial development, and growth accordingly. The authors employed the Johansen procedure in order to analyze the possibility of cointegration among the variables, as well as the use of a vector error correction model (VECM) to analyse the Granger causality. Their results reveal at least one cointegrating relationship, while causality only runs from remittances to the economy. It was also found that financial development exhibits a unidirectional causality to economic growth, which is in line with the "supply-leading" growth hypothesis. Other findings show that financial development granger causes remittances unidirectionally. Remittances were observed from the results to complement, but not substitute for financial development in promoting economic growth.

Malefane (2021) analyzed the causal nexus between foreign direct investment, exports, and economic growth in Lesotho over the span of 1980–2019. The author employed the technique of the vector error correction model as well as the Toda-Yamamoto (1995). It was observed based on Toda-Yamamoto that a unidirectional causality occurs from FDI to exports while no significant causality runs from exports to FDI nor exports and growth. Based on the perspective of sustainability, the non-existence of a significant causal impact from FDI to growth as well as that of exports to growth implies that economic policy in Lesotho, which is centered on private-sector-led and export-led growth, has not resulted in a significant transformation of the economy to generate significant economic growth-stimulating impacts. The author, on the basis

of the empirical results, suggested that policymakers in the country could spot and execute measures geared at promoting the competitiveness of exports concurrently with a systematic promotion of investment that has the prospective of assuring a more comprehensive avenue of the economy's exports to foreign markets.

3.6. Conclusion

This chapter presented an overview of the respective economies that constitute SACU. It described capital flows over time into the region as well as its macroeconomic environment. As it has been shown in the discussion, the citizens of these economies have not significantly enjoyed the sustainability of enhanced living standards.

CHAPTER FOUR

Research Methodology

4.1. Introduction

This chapter focuses on the presentation and the explanation of the appropriate techniques employed in the study. It comprises the theoretical framework, model specification, and the respective econometric procedure as well as data sources. It is classified into four major sections with 4.1 as the introduction while 4.2 is a display of the theoretical framework. The various econometric procedures and conclusion are respectively expressed in 4.3 and 4.4.

4.2. Theoretical Framework

This study rests on the Endogenous growth theory to examine the capital flows, monetary policy and economic growth in the Southern African Customs Union. Going by Pagano (1993) as expressed in the work of Nathaniel and Oladiran (2018), the financial market market equilibrium is given below:

$$\vartheta S_t = I_t \quad \dots\dots\dots [\text{Eq. 1}]$$

The corresponding growth rate of output at the steady state follows the equation below.

$$g = A\left(\frac{I}{Y}\right) - \delta = \vartheta S - \delta \quad \dots\dots\dots [\text{Eq. 2}]$$

In equation 2, the growth rate of output is denoted by g , while δ is the depreciation rate. ϑ is the fraction of savings transferred to investment, S is the gross savings rate, while I and Y are the respective changes in capital and output. Parameter A captures the change in technology.

With sound development in the financial market promoting financial intermediation, it enhances the competence of financial institutions in analyzing and selecting alternative investments that have prospects of high returns. Similarly, because of their ability to provide risk share, financial intermediaries can direct a higher proportion of funds to projects with a higher marginal product of capital. This will motivate individuals to divert resources to more risky and productive investments (Pagano, 1993). The present study becomes very crucial given the peculiarity of variables that constitute the focus of the study. The capital flows will augment the domestic savings of the respective countries that constitute the Southern African

Customs Union, which will invariably stimulate a larger pool of savings. The monetary policy structure will, therefore, be formulated towards harnessing capital flows for sustainable economic growth and development. The market equilibrium is therefore re-specified below:

$$\mathcal{G}^*(DS_t + CF_t) = I_t^* \dots\dots\dots [\text{Eq. 3}]$$

where CF_t captures the net capital flows which augments equation (1). Consequently, the steady state growth rate is:

$$g^* = A^* \frac{I^*}{Y} - \delta = A^* \mathcal{G}^* \left(\frac{DS + CF}{Y} \right) - \delta = A^* \mathcal{G}^* S^* - \delta \dots\dots \dots [\text{Eq. 4}]$$

A comparison of the steady states of equations (2) and (4) reveals the channels through which capital flows can affect economic growth in the endogenous growth model. In the first consideration, capital flows have the potential to promote economic growth provided they stimulate the investment rate. By implication, g^* would exceed g on the ground that S^* is larger than S . The sustainability of the savings rate given the capital flows to the Southern African Customs Union entails that the capital flows stimulate investment and must not have the tendency to crowd out domestic investment.

In another respect, capital flows will promote economic growth provided the monetary authority through an appropriate monetary policy framework enhances financial intermediation activities in the domestic economy, either in the money or capital market. Increasing financial intermediation in a closed economy case has the tendency to promote growth provided it enhances the effectiveness of domestic financial institutions in translating savings, capital flows inclusive to investment (i.e., decline in the spread) or results in the allocation of savings to the most economically viable projects. It will promote economic growth by enhancing the effectiveness of the financial sector in the domestic economy, thus implying that $\mathcal{G}^* > \mathcal{G}$. It could also be observed in their better capacity to make choices on productive investment projects (i.e., $A^* > A$) (Agbeluyi, 2010; Bailliu, 2000b).

Capital flows, monetary policy, and economic growth for the Southern African Customs Union are examined in light of the endogenous growth theory's relevance and applicability. The specific form of the AK model production function shows a linear functional relationship between aggregate output and total capital stock in an economy as expressed below:

$$Y = AK \dots\dots\dots [\text{Eq. 5}]$$

Aggregate output is represented by Y_t , K is the size of capital stock operating in the domestic economy at a particular time t , while A is the efficiency parameter. The output per capita of effective labour from the immediate equation above is:

$$\frac{Y}{L} = A \frac{K}{L} \dots\dots\dots [\text{Eq. 6}]$$

The intensive form specification of equation (6) is given as:

$$y_t = AK_t \dots\dots\dots [\text{Eq. 7}]$$

At $A > 0$, the average and marginal productivity of the intensive form remain constant. K_t in a general sense can be categorised into physical (k_p^θ) and human capital (k_H^α) (Lucas,1988).

$$\text{Therefore, } k_t = (k_p^\theta, k_H^\alpha) \dots\dots\dots [\text{Eq. 8}]$$

The physical capital is further re-specified into domestic investment and net capital flows as contained below:

$$k_p^\theta = f(\text{DI}, \text{CF})^\theta \dots\dots\dots [\text{Eq. 9}]$$

The current study focuses on the impact capital flows have on economic growth by considering monetary policy. The use of capital is, therefore, exclusive of human capital.

θ is the power of physical capital and let λ and β be the elasticities of DI, CF respectively. It implies that $\lambda, \beta \in \theta$; it is therefore respecified as:

$$k_p^\theta = f(\text{DI}^\lambda, \text{CF}^\beta) \dots\dots\dots [\text{Eq. 10}]$$

Substituting equation (8) and (9) into the intensive output function as well as k_p^θ of equation (10) gives :

$$y_t = A k_p^\theta \dots\dots\dots [\text{Eq. 11}]$$

$$y_t = A \text{DI}_p^\lambda \text{CF}_p^\beta \dots\dots\dots [\text{Eq. 12}]$$

where λ and β are the elasticities of domestic capital formation and capital flows respectively.

A logarithmic transformation of equation 12 results in the dynamic production function below:

$$\ln y_t = \ln A + \lambda \ln DI_p + \beta \ln CF_p \quad \dots\dots\dots [\text{Eq. 13}]$$

The basic equation to be estimated for the purpose of examining the economic growth impact of capital flows is expressed below:

$$\ln y_t = \alpha_0 + \alpha_1 \ln DI_p + \alpha_2 \ln CF_p + Z_i + \varepsilon_t \quad \dots\dots\dots [\text{Eq. 14}]$$

Variable y_t is the gross domestic product per capita (GDPC), (Islam *et al.*) is the domestic capital formation which is represented by gross capital formation growth rate (GCFG), while CF_p is the capital flows. Z_i is a composite of explanatory variables comprising of central bank policy rate differential, broad money growth rate, inflation rate, real exchange rate, and globalization index, while the stochastic white noise error term is captured by ε_t .

Therefore, equation 14 is re-specified as:

$$\ln LGDPC_{it} = \alpha_0 + \alpha_1 GCFG_{it} + \alpha_2 FDI_{it} + \alpha_3 FPI_{it} + \alpha_4 \ln FDA_{it} + \alpha_5 \ln INR_{it} + \alpha_6 CBPD_{it} + \alpha_7 BMG_{it} + \alpha_8 \ln F_{it} + \alpha_9 \ln REER_{it} + \alpha_{10} \ln MSCP_{it} + \varepsilon_{it} \quad \dots\dots\dots [\text{Eq. 15}]$$

CBPD is the central bank policy rate differential, calculated as the difference between the policy rates in the respective countries that constitute SACU and the world interest rate. The prevailing policy rate in the United States is taken as the world interest rate. This is in line with the work of Makhetha-Kosi *et al.* (2016) that studied "The Response of Capital Flows to Interest Rate Differentials: The Case of South Africa." The authors determined the interest rate differential as the difference between the interest rate in South Africa and the rate in the United States. Mundell (1963b) also noted that a positive difference between domestic and global interest rates will encourage capital inflows.

FPI is foreign portfolio investment (net) as a percentage of GDP. FDI is foreign direct investment (net inflow) as a percentage of GDP. Broad money growth (bmg) and the central bank policy rate differential (cbpd) are the monetary policy indicators. The inflation rate is measured by the consumer price index (annual average growth rate). LMSCP is the log of monetary sector credit to the private sector, which is a financial development indicator. LREER is the log of the real exchange rate. LFDA is the log of official aid and development assistance, while LINR is the log of inward remittances.

The data sets on gross domestic product per capita, foreign portfolio investment, foreign direct investment, monetary sector credit to the private sector, gross capital formation growth rate, official aid and development assistance, inward remittances, and broad money growth were sourced from the World Development Indicators (WDI). Inflation rate data and that of the real exchange rate were obtained from UNCTADSTAT and Bruegel data respectively. The policy rates for South Africa (Repo Rate) were obtained from the South African Reserve Bank (SARB), while the policy rates for the remaining four countries in the Union as well as for the United States of America (to calculate the central bank policy rate differential) were sourced from the International Monetary Fund (IMF).

Observing equation 15, α_0 is the intercept while α_1 to α_{10} are the coefficients of the exogenous variables. The apriori expectation requires that $\alpha_1 > 0$, $\alpha_2 > 0$, $\alpha_3 > 0$, $\alpha_4 > 0$, $\alpha_5 > 0$, $0 < \alpha_6 < 0$, $\alpha_7 > 0$, $0 < \alpha_8 < 0$, $0 < \alpha_9 < 0$, $\alpha_{10} > 0$.

The implication of the apriori expectations is that gross capital formation growth rate, foreign direct investment, foreign portfolio investment, official aid and development assistance, remittances, and monetary sector credit to the private sector are expected to have a positive impact on economic growth as they tend to make more resources available in the respective domestic economies and consequently stimulate economic activities and living standards. It is expected that an expansionary monetary policy that generates more liquidity in an economy, thus lubricating economic activities, will tend to spur growth. However, the expected coefficient of the inflation rate is indeterminate on the basis that the corresponding effect on economic growth depends on the nature of the inflation rate. A steady and mild inflation of final goods and services, as well as if the prices of some raw materials are relatively stable, will encourage entrepreneurs to be involved in increased investments, which invariably have a positive impact on economic growth. Conversely, during a rapid and destabilizing increase in prices, foreign and domestic investment could be adversely affected, consequently affecting economic growth negatively. Also, the impact of the central bank's policy rate differential and the log of the real exchange rate may not be conclusive enough. For instance, it is expected that a positive central bank policy rate differential promotes the inflows of capital, which is expected to generate growth. However, a negative differential in the monetary policy rate that results in the outward flows of capital may reduce the level of investment activities and consequently retard growth. Moreover, the impact of the real exchange rate will, to a large extent, depend on whether an economy is experiencing real currency appreciation or

depreciation. Real appreciation will tend to undermine exports of goods and services, which may negatively affect growth, while real depreciation may stimulate exports of goods and services, which may consequently generate economic growth and improve living standards.

4.3. The Econometric Procedures

The study is grossly within the frame of an econometric approach, encompassing the respective techniques towards arriving at the research objectives. Following Bildirici (2014), the methodology proceeds as follows:

4.3.1. Panel Unit Root Test to Determine the Stationarity of the Variables

The panel unit root test will be analysed to examine the stationarity of the variables. In panel studies, the approaches of Levin *et al.* (2002) as well as Im *et al.* (2003) proved valuable. In conducting their test, Levin, Lin, and Chu (LLC) focused on pooled data. However, Im, Pesaran, and Shin (IPS) use the mean of ADF statistics. The specification of the LLC panel unit root test is expressed below:

$$y_{it} = \rho_i y_{i,t-1} + z'_{it} \gamma + u_{it} \quad i = 1, \dots, N; t = 1, T \dots \dots \dots [\text{Eq. 1}]$$

The assumptions of the LLC test include identical and independently distributed residuals with a mean zero and σ_u^2 and $\rho_i = \rho$ with respect to all i values. The deterministic component is z_{it} , while the stationary process is u_{it} . The hypothesis is presented below:

$$H_0: \rho = 1 \text{ (presence of unit root)} \dots \dots \dots [\text{Eq. 2}]$$

$$H_1: \rho < 1 \text{ (presence of stationarity)} \dots \dots \dots [\text{Eq. 3}]$$

The IPS differs from the LLC because heterogeneity is permitted both in intercept and slope terms with respect to the cross-section units, while LLC considers heterogeneity in intercept only. The equation below specifies the IPS unit root test:

$$y_{it} = \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \phi_{ij} \Delta y_{i,t-j} + z'_{it} \gamma + \varepsilon_{it} \dots \dots \dots [\text{Eq. 4}]$$

$$H_0: \rho_i = 1 \text{ (All series in the panel exhibit unit root)} \dots \dots \dots [\text{Eq. 5}]$$

$$H_1: \rho_i < 1 \text{ (A fraction of the series stationary)} \dots \dots \dots [\text{Eq. 6}]$$

$$\text{However, if } N \rightarrow \infty, \text{ and } T \rightarrow \infty, \text{ the IPS becomes} \dots \dots \dots [\text{Eq. 7}]$$

$$t_{IPS} = \frac{\sqrt{N} (\bar{t} - \frac{1}{N} E[t_{iT} | \rho_i = 1])}{\sqrt{\frac{1}{N} \text{var}[t_{iT} | \rho_i = 1]}} \Rightarrow N(0, 1)$$

The IPS exhibits the weakness of not accounting for certain macroeconomic linkages. The Pesaran (2007) Cross Sectional Augmented IPS test (CIPS) was therefore also employed to examine the macroeconomic variables. Cross sectional Augmented Dickey –Fuller regression was utilized by Pesaran in which he analysed the equation below to estimate cross-section units in panel OLS:

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + c_i \bar{y}_{t-1} + \sum_{j=0}^k d_{ij} \Delta \bar{y}_{t-j} + \sum_{j=1}^k \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \dots\dots\dots [\text{Eq. 8}]$$

Given the mean of individual CADF statistics, we have the following equation

$$\text{CIPS} = \frac{1}{N} \sum_{i=1}^N t_i(N, T) \dots\dots\dots [\text{Eq. 9}]$$

The $t_i(N, T)$ describes the t-statistic of ρ_i estimate.

Bildirici (2014)

4.3.2. Panel Autoregressive Distributed Lag Model for Estimating the Dynamic Effects of Foreign Portfolio Investment, Foreign Direct Investment, and Monetary Policy on Economic Growth in the Southern African Customs Union

For example, Pesaran *et al.* (1997) as well as Pesaran *et al.* (2004) recommended the ARDL approach for the analysis of co-integration for the case of single equation models. Binder and Offermanns (2007) examined purchasing power parity in Europe using the panel ARDL. Bildirici and Kayıkçı (2012a); Bildirici and Kayıkçı (2012b) used it to examine the nexus between electricity consumption and economic growth. Furthermore, Bildirici and Kayıkçı (2013) utilised it to examine the association existing between oil production and economic growth in Eurasian countries that capitalize on the exportation of oil: Azerbaijan, Kazakhstan, the Russian Federation, and Turkmenistan for the period 1993–2010.

Following Alimi and Adediran (2020)'s empirical work on the topic "ICT diffusion and the finance-growth nexus: a panel analysis on ECOWAS countries", the empirical model runs as follows:

$$LGDP_{it} = \alpha_i + \beta FPI_{it} + \phi FDI + \varphi MP_{it} + \gamma INF + \varepsilon_{it}; \dots\dots\dots[\text{Eq. 1}]$$

where LGDPC is the log of gross domestic product per capita, α captures country – specific intercept, FPI is foreign portfolio investment (net) as percentage of GDP, FDI is foreign direct investment (net inflow) as percentage of GDP, MP is monetary policy indicator measured by broad money growth (bmg) and the central bank policy rate differential (cbpd). The central bank policy rate differential is obtained by the difference between the world monetary policy rate (United States of America) and the rate prevailing in the respective countries in the Southern African Customs Union. The inflation rate is measured by the consumer price index (annual average growth rate), while ε_{it} is the time-varying error term.

The panel ARDL technique takes into cognizance the heterogeneity of the dynamic panel setting, the short run and the long-run equilibrium of the model (Ahmed *et al.*, 2016; Demetriades & Law, 2006; Samargandi *et al.*, 2015). The panel ARDL approach is consistent with the I(0) and I(1) variables as well as its capacity to produce consistent estimates in the presence of endogeneity (Pesaran *et al.*, 1999). Also, it can estimate simultaneously the short and long-run effects (Pesaran *et al.*, 1999).

The Panel ARDL technique relies on three approaches: the mean group (MG), the pooled mean group (PMG), and the dynamic fixed effect (DFE). The mean group was introduced by Pesaran and Smith (1995), while the pooled mean group of Pesaran *et al.* (1999) estimates between DFE and MG. The general autoregressive distributed lag model is expressed below:

$$LGDP_{i,t} = \mu_i + \sum_{j=1}^p \psi_{ij} GDP_{i,t-j} + \sum_{j=0}^q \vartheta'_{ij} k_{i,t-j} + \varepsilon_{it}; K_{i,t} = (FPI_{i,t}, FDI_{i,t}, MP_{i,t}, INF_{i,t}). \dots\dots\dots[\text{Eq. 2}]$$

$i = 1, 2, \dots, N$ for the cross section while $t = 1, 2, \dots, T$ captures time (yearly). j denotes the time lags. In the general ARDL equation above, $GDP_{i,t}$ represents gross domestic product per capita for country i , at t period. GDP is the dependent variable while the vector $K_{i,t}$ constitutes the explanatory variables of foreign portfolio investment (FPI), foreign direct investment (FDI), monetary policy (MP) and inflation rates. μ_i measures the fixed effects of each country. Re-parameterizing the general ARDL above, it becomes

$$\Delta GDP_{i,t} = \mu_i + \omega_i y_{i,t-j} + \vartheta'_{i,t} k_{i,t} + \sum_{j=1}^p \psi_{i,r} GDP_{i,t-j} + \sum_{j=0}^q \gamma'_{i,r} k_{i,t-j} + \varepsilon_{i,t} \dots\dots\dots[\text{Eq. 3}]$$

$$\omega_i = -1(1 - \sum_{j=1}^{\rho} \psi_{ij}) \quad \dots\dots\dots[\text{Eq. 4}]$$

$$\theta_i = \frac{\sum_{j=0}^q \vartheta_{i,j}}{(1 - \sum_{j=1}^{\rho} \psi_{ij})} \quad \dots\dots\dots\text{Eq. 5}]$$

$$\psi_{i,j}^* = -\sum_{m=j+1}^{\rho} \psi_{ij} \text{ while } \vartheta_{i,j}^* = -\sum_{m=j+1}^q \vartheta_{i,j} \cdot \quad \dots\dots\dots[\text{Eq. 6}]$$

Therefore, the expression in level forms of the error correction model of equation 3 gives the following:

$$\Delta GDP_{i,t} = \mu_i + \omega_i(y_{i,t-j} - \vartheta'_i k_{i,t}) + \sum_{j=1}^p \psi_{ij} GDP_{i,t-j} + \sum_{j=0}^q \gamma'_{ij} k_{i,t-j} + \varepsilon_{i,t} \dots\dots\dots[\text{Eq. 7}]$$

$\omega_i(y_{i,t-j} - \vartheta'_i k_{i,t})$ is the adjustment in GDP with respect to the deviation of the explanatory variables in the long run. Moreover, $\psi_{i,j}^*$ and $\vartheta_{i,j}^*$ represent the short-run coefficients that link its lag as well as the determinants $K_{i,t}$ vectors. A negative and significant value of the speed of adjustment coefficient ω_i , provides the evidence of cointegration existing between GDP and the explanatory variables of FPI, FDI and MP.

Pesaran and Smith (1995) described that the Mean Group estimator generates consistent estimates in respect of the average of the parameters. Nevertheless, this estimator does not utilize the dimension of the panel data in order to account for the situation in which some parameters are likely to be the same amidst groups. Furthermore, the parameters, intercepts, long-run coefficients, short-run coefficients, as well as error variances are permitted to vary over groups. At the extreme, the traditional pooled estimators, comprised of fixed and random effect estimators, provide an avenue for intercepts to vary across groups, but the other parameters are restrained to be equal.

4.3.3. Test of Cross-Sectional Dependence to Account for Robustness

This test is very crucial in panel data analysis given the increasing convergence of the world economy as well as the various levels of integration among countries, such as the present study, SACU. The increasing inter-connectivity of countries demonstrates the high probability of the transmission of shocks among them.

Breusch and Pagan (1980) LM test is empirically proven relevant in examining cross-sectional dependency. It therefore follows the following specification:

$$y_{it} = \phi_i + \phi'_i x_{it} + \varepsilon_{it} \quad i = 1, 2, 3, \dots, N; t = 1, 2, \dots, T \quad \dots\dots\dots[\text{Eq. 1}]$$

The cross section dimension in respect of the countries is represented by i , while the time dimension is t . The vector of exogeneous variables in the order $m \times 1$ is X_{it} , while ϕ_i and $\boldsymbol{\varphi}_i$ are respectively the intercepts and slope coefficients which exhibit variations.

The following is the hypothesis for the LM test:

$$H_0 : \text{Cov}(\boldsymbol{\varepsilon}_{it}, \boldsymbol{\varepsilon}_{ij}) = 0 \quad [\text{In respect of all } t \text{ provided } i \neq j] \quad \dots\dots\dots [\text{Eq. 2}]$$

$$H_1 : \text{Cov}(\boldsymbol{\varepsilon}_{it}, \boldsymbol{\varepsilon}_{ij}) \neq 0 \quad [\text{On the minimum, a pair of } i \neq j] \quad \dots\dots\dots [\text{Eq. 3}]$$

The null hypothesis implies no cross-sectional dependence when tested against H_1 , which shows cross-sectional dependence.

The LM test specification, in line with Breusch and Pagan (1980), is expressed below:

$$LM_{BP} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \quad \dots\dots\dots [\text{Eq. 4}]$$

The respective OLS is estimated from $\hat{\rho}_{ij}^2$ which is a measure of correlation coefficient across the residuals is computed. The LM statistic is characterized with $N(N-1)/2$ degrees of freedom having a Chi-square distribution that spreads asymptotically. Pesaran (2004b) re-expressed the LM test known as the CD test to account for cross-section dependence on the ground that N has to be comparatively small while T is adequately wide-reaching. It is noteworthy that the CD test is void of power in scenarios characterized by population mean pair-wise correlations of zero while the underlying repective population pair-wise correlations exhibit non-zero (Pesaran *et al.*, 2008:106). The following equation expresses Pesaran (2004b) cross-sectional dependence test:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \sim N(0,1) \quad \dots\dots\dots [\text{Eq. 5}]$$

while the bias-adjusted LM test which utilizes the actual average and variance of the LM statistic is expressed below:

$$CD_{adj} = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \frac{(T-K)\hat{\rho}_{ij}^2 - u_{Tij}}{\sqrt{v_{Tij}^2}} \sim N(0,1) \quad \dots\dots\dots [\text{Eq. 6}]$$

The actual mean and variance of $(T-K)\hat{\rho}_{ij}^2$ are respectively u_{Tij} and v_{Tij}^2 available in (Pesaran *et al.*, 2008:108). The null hypothesis states that there is no cross-sectional dependence. The bias-adjusted LM statistic shows an asymptotically standard normal distribution on the condition that $T \rightarrow \infty$, initially followed by $N \rightarrow \infty$.

4.3.4. Panel Granger Causality Test for the determination of the direction of causality among capital flows, monetary policy, and economic growth in the Southern African Customs Union

The panel causality test will be used to examine the direction of influence of any of the macroeconomic variables relevant to the study. The present research work concentrates on five countries which belong to the same union, with another greater level of dependence between Lesotho, Namibia, and Swaziland on South Africa, whose economic policies to a large extent have a defining impact on the economies of the small-sized economies. It becomes relevant, therefore, to follow the bootstrap causality in line with the Dumitrescu-Hurlin test as expressed in the work of Lopez and Weber (2017), who examined the topic "Testing for Granger causality in panel data". Referring to the work of Granger (1969), in which a methodology that shows the causal relationships between stationary time series was developed, consequently, the equation below that examines the causality of x to y is expressed:

$$y_t = \alpha + \sum_{m=1}^M \varphi_k y_{t-m} + \sum_{m=1}^M \gamma_m x_{t-m} + \epsilon_t \text{ with } t=1, \dots, T \dots \dots \dots [\text{Eq. 1}]$$

The central focus here is that x causes y provided the previous values of x significantly predict y despite the inclusion of the past values of y. The testing of the null hypothesis below on the basis of the F-test therefore holds:

$$H_0 : \gamma_1 = \dots = \gamma_m = 0 \dots \dots \dots [\text{Eq. 2}]$$

The implication of the foregoing equation conveys that the rejection of H_0 provides that x causes y. The possibility of a bidirectional relationship can also be ascertained from the model. However, Dumitrescu and Hurlin expand the causal relationship between y and x for the case of panel data, which results in the following expression:

$$y_{1,t} = \alpha_i + \sum_{m=1}^M \varphi_{im} y_{i,t-m} + \sum_{m=1}^M \gamma_{im} x_{i,t-m} + \epsilon_{i,t} \dots \dots \dots [\text{Eq.3}]$$

The variables $x_{i,t}$ and $y_{i,t}$ are expected to be stationary for the respective unit at time t. The DH model permits the coefficients to vary among the units on the ground of being time-invariant. The model requires a panel balanced data set, while the lag order M is on the basis that it is similar in respects of the units that constitute the panel data. The null hypothesis to test the causality of the previous values of x on y is therefore expressed below, based on the idea of Granger:

$$H_0 : \gamma_{i1} = \dots = \gamma_{im} = 0 \quad \forall_i = 1, \dots, N \dots\dots\dots[\text{Eq. 4}]$$

The equation above implies the absence of causality among the constituent units. The alternative hypothesis is contained below on the basis that some of the units may be characterized by causality:

$$H_0 : \gamma_{i1} = \dots = \gamma_{im} = 0 \quad \forall_i = 1, \dots, N_1 \dots\dots\dots[\text{Eq. 5}]$$

$$\gamma_{i1} \neq 0 \text{ or } \dots \gamma_{im} \neq 0 \quad \forall_i = N_1 + 1, \dots, N \dots\dots\dots[\text{Eq. 6}]$$

Equating $N_1 = 0$ provides the prescence of causality in respect of all the units that constitute the panel, and N_1 must be of a lower size compared to N without which causality will be nil for all the units. Thus, H_1 falls to H_0 .

while $N_1 \in [0, N - 1]$ is not known.

Given the following, Dumitrescu-Hurlin provides that N individual regressions be implicitly analyzed after the F-tests of the M linear hypothesis $\gamma_{i1} = \dots = \gamma_{im} = 0$ to obtain W_i . Haven't done the foregoing, the mean ($\bar{w}$) of the N individual Wald statistics is expressed below:

$$\bar{w} = \frac{1}{N} \sum_{i=1}^N w_i \quad \dots\dots\dots[\text{Eq. 7}]$$

The foregoing test provides information as regards the causality in the panel, while the rejection of H_0 has no negating effect on the presence of causality among some units.

Dumitrescu-Hurlin, on the basis of the Monte Carlo simulations, provides that $\bar{w}$ is asymptotic; therefore, it can effectively examine causality in a panel data set.

Given that w_i is characterized by independent and identical distribution among the units in the panel, it follows that $\bar{Z}$ which is standardized, provided $T \rightarrow \infty$ and $N \rightarrow \infty$, then the standard normal equation below holds:

$$\bar{Z} = \sqrt{\frac{N}{2M}} \cdot (\bar{w} - M) \xrightarrow{d} N(0, 1) \text{ as } T, N \rightarrow \infty \dots\dots\dots[\text{Eq. 8}]$$

$$N(0, 1)$$

However, if T is fixed, having $T > 5 + 3M$, the following standard normal distribution in respect

$$\text{of } \tilde{Z} \text{ is obtained: } \tilde{Z} = \sqrt{\frac{N}{2M}} \cdot \frac{T-3M-5}{T-2M-3} \cdot \left[\frac{T-3M-3}{T-3M-1} \cdot \bar{w} - M \right] \xrightarrow{d} N(0, 1), \text{ as } N \rightarrow \infty \dots\dots[\text{Eq. 9}]$$

In conclusion, the null hypothesis is examined based on $\bar{Z}$ and $\tilde{Z}$. H_0 is rejected provided the two statistics exceed the normal critical values which implies the presence of granger causality. Given a panel data set with large N and T , $\bar{Z}$ are appropriate while if N is large alongside a small T , then $\tilde{Z}$ is more appropriate. However, Dumitrescu-Hurlin, by utilizing Monte Carlo simulations, shows that though T and N may be small, it conveys very good finite sample properties. (Lopez & Weber, 2017)

The study, therefore, employed the Dumitrescu-Hurlin panel granger causality test to examine the causality among the variables in respect of the Southern African Customs Union.

4.3.5. Fixed-effect panel threshold models to determine the threshold level of capital flows and monetary policy that will result in the optimal levels of economic growth in SACU

Fixed-effect Panel threshold models were used to address objective three in order to ascertain the level of capital flows and monetary policy measures that would be optimal for the Southern African Customs Union. This study followed the work of Wang (2015) in expressing the following fixed-effect panel threshold model and used the developed stata command for the estimation of the threshold level of capital flows, monetary policy, and economic growth in the Southern African Customs Union.

4.3.5.1. Single-threshold model

Expressing the single-threshold model as contained below:

$$y_{it} = \alpha + X_{it}(q_{it} < \gamma)\beta_1 + X_{it}(q_{it} \geq \gamma)\beta_2 + u_i + \varepsilon_{it} \dots\dots\dots[\text{Eq. 1}]$$

where the threshold variable is q_{it} while the threshold parameter (γ), splitting the equation into two regimes characterized by the coefficients of β_1 and β_2 . The respective effect is captured by u_i , while the stochastic is measured by ε_{it} .

Alternatively; the equation can be expressed as:

$$y_{it} = \alpha + X_{it}(q_{it}, \gamma)\beta + u_i + \varepsilon_{it} \dots\dots\dots[\text{Eq. 2}]$$

Having

$$X_{it}(q_{it}, \gamma) = \begin{matrix} X_{it}I(q_{it} < \gamma) & \dots\dots\dots[\text{Eq. 3}] \\ X_{it}I(q_{it} \geq \gamma) \end{matrix}$$

With the value of γ , β estimated as;

$$\hat{\beta} = \{X^*(\gamma)'X^*(\gamma)\}^{-1} \{X^*(\gamma)'y^*\} \dots\dots\dots[\text{Eq. 4}]$$

The $\hat{\epsilon}'\hat{\epsilon}$ measures the residual sum of squares, while the value of γ can be searched through the subset of q_{it} , but y^* and x^* are amidst group deviations. The author restricted the range within the interval of $(\gamma, \bar{\gamma})$ quantiles of q_{it} . The estimate of γ minimizes the RSS, consequently, the following expression holds:

$$\hat{\gamma} = \arg \min_{\gamma} S_1(\gamma) \dots\dots\dots[\text{Eq. 5}]$$

Hansen (1999) claimed that testing $\gamma = \gamma_0$ requires the formulation of a confidence interval through the “no-rejection region” approach with a likelihood-ratio (LR) statistic by the following:

$$LR_1(\gamma) = \frac{LR_1(\gamma) - LR_1(\hat{\gamma})}{\hat{\sigma}^2} \xrightarrow{PR} \omega \dots\dots\dots[\text{Eq. 6}]$$

$$\Pr(x < \omega) = (1 - e^{\frac{-x}{\omega}})^2 \dots\dots\dots[\text{Eq. 7}]$$

If α is the level of significance, the maximum value in the LR series, therefore, correlates with the smaller limit while the higher limit correlates with the minimum LR series. The α quantile, based on the inverse function of equation 2 is expressed below:

$$c(\alpha) = -2\log(1 - \sqrt{1 - \alpha}) \dots\dots\dots[\text{Eq. 8}]$$

H_0 is rejected provided $LR_1(\gamma_0)$ is greater than $c(\alpha)$. The following equation computes the F statistic:

$$F_1 = \frac{S_0 - S_1}{\hat{\sigma}^2} \dots\dots\dots[\text{Eq. 9}]$$

Given the null hypothesis (H_0), γ is not ascertained and F_1 is not characterized by standard asymptotic distribution.

The bootstrap concept is employed on the critical values of the F statistic in order to examine the significance of the impact of the threshold.

4.3.5.2. Multiple-thresholds model

The case of multiple thresholds requires fixing the model sequentially. Given the expression below:

$$y_{it} = \alpha + X_{it}(q_{it} < \gamma_1)\beta_1 + X_{it}(\gamma_1 \leq q_{it} < \gamma_2)\beta_2 + X_{it}(q_{it} \geq \gamma_2)\beta_3 + u_i + \varepsilon_{it} \dots [\text{Eq. 10}]$$

The two thresholds (double-threshold model) split the equation into three regimes, having the coefficients $\beta_1, \beta_2, \beta_3$. $(N \times T)^2$ times is thus obtained by the use of the grid search approach.

Estimating the threshold sequentially, the author proceeded as follows:

Step 1 : The single threshold is first ascertained in order to determine the estimator γ_1 as well as the RSS $S_1(\hat{\gamma}_1)$

Step2: Having ascertained $\hat{\gamma}_1$ the next threshold alongside its confidence interval, is expressed below :

$$\hat{\gamma}_2^T = \arg \min \{S_2^T(\gamma_2)\} \dots [\text{Eq. 11}]$$

$$S_2^T = S \{ \min ((\hat{\gamma}_1, \gamma_2) \max (\hat{\gamma}_1, \gamma_2)) \} \dots [\text{Eq. 12}]$$

$$LR_2^T(\gamma_2) = \frac{S_2^T(\gamma_2) - S_2^T(\hat{\gamma}_2^T)}{\hat{\sigma}_{22}^2} \dots [\text{Eq. 13}]$$

Step 3: Considering that $\hat{\gamma}_2^T$ exhibits efficiency while $\hat{\gamma}_1^T$ does not, it follows that the first threshold is re-estimated as expressed below:

$$\hat{\gamma}_1^T = \arg \min \{S_1^T(\gamma_1)\} \dots [\text{Eq. 14}]$$

$$S_1^T = S \{ \min (\gamma_1, \hat{\gamma}_2^T) \max (\gamma_1, \hat{\gamma}_2^T) \} \dots [\text{Eq. 15}]$$

$$LR_1^T(\gamma_1) = \frac{S_1^T(\gamma_1) - S_1^T(\hat{\gamma}_1^T)}{\hat{\sigma}_{21}^2} \dots [\text{Eq. 16}]$$

The test for double threshold becomes imperative provided the null hypothesis in a single-threshold model is rejected. While the H_0 is a single threshold-model, the H_1 is double-treshold. The F-statistic is therefore contained below.

$$F_2 = \left\{ \frac{S_1((\hat{\gamma}_1) - S_2^T(\hat{\gamma}_2^T))}{\hat{\sigma}_{22}^2} \right\} \dots [\text{Eq. 17}]$$

It is also to be noted that the bootstrapping method in this instance is identical to that in the case of a single-threshold model (Wang, 2015).

4.3.6. Panel Structural Vector Autoregression to Determine the Economic Growth Effects of Capital Flows and Monetary Policy in SACU

This method follows the modelling by Pedroni (2013) in order to account for the shock dynamics among the respective variables within the context of the Southern African Customs Union. The following derivation and exposition of the Panel Structural VAR are therefore the intellectual work of Pedroni (2013). The uniqueness of this approach lies in its consideration of a completely structural approach characterized by impulse responses based on orthogonalized structural shocks as well as structural identifying restrictions on the dynamics. Adapting this method to a heterogenous panel system results in the estimation of the loading vectors and the separation of the structural shocks into common and idiosyncratic shocks (Pedroni, 2013).

4.3.6.1 Description of the model

The model relies on the premise that it is built on structural shocks that can be dissolved into common and idiosyncratic structural shocks and are deemed to be mutually orthogonal. In furthering the analysis, Pedroni (2013) assumed a panel, having $i = \dots, N$ individual units respectively comprising of $M \times 1$ vector of observed endogenous variables, y_{it} , for y_m , it , $m = 1, \dots, M$. Given that a panel may be unbalanced, the data set is assumed to be considered over the time $t = 1, \dots, T_i$. The author used $M \times 1$ vector of demeaned data, $z_{it} = (z_{1,it}, \dots, z_{M,it})'$, having $z_{it} = y_{it} - \bar{y}_i$, with $\bar{y}_{m,it} = T_i^{-1} \sum_{t=1}^{T_i} y_{m,it} \forall_{im}$ in order to allow fixed effects as well as simplifying the use of notation. The temporal variations are due to unobserved structural shocks with a specific consideration of $M \times 1$ vector of composite white noise shocks (which are assumed to be distributed independently over time as well as admitting that it may be cross sectionally dependent), $\epsilon_{m,it}$, $m = 1, \dots, M$, $\epsilon_{it} = (\epsilon_{1,it}, \dots, \epsilon_{M,it})'$ with respect to the individual unit, i , of the panel. Subsequently, $\epsilon_{m,it} = \lambda_{m,i} \bar{\epsilon}_{m,t} + \bar{\epsilon}_{m,it} \forall i, t, m$. $\bar{\epsilon}_{m,it}$ and $\bar{\epsilon}_{m,t}$, for $m = 1, \dots, M$ are respectively the member-specific idiosyncratic white noise structural shocks as well as the common white noise structural shocks shared among all the individual units that constitute the panel, while $\lambda_{m,i}$ captures the respective member loading coefficients with respect to the common shocks. The model assumed structural shocks to be orthogonal to each other for the respective type. Also, normality is assumed to characterize the variances of the unobserved shocks (Pedroni, 2013).

4.3.6.2 The structural shock

The $M \times 1$ vector of demeaned panel data, z_{it} , if $\mu_{it} = (\bar{\epsilon}_t' \bar{\epsilon}_{it}')'$ with $\bar{\epsilon}_t$ and $\bar{\epsilon}_{it}$ defined respectively as $M \times 1$ vectors of common and idiosyncratic white noise shocks. Setting Λ_i as $M \times M$ diagonal matrix, having the loading coefficients $\lambda_{i,m}$, $m = 1, \dots, M$ from the diagonal elements. Consequently, the following expression holds:

$$\epsilon_{it} = \Lambda_i \bar{\epsilon}_t + \bar{\epsilon}_{it}, \text{ having } E[\mu_{it} \mu_{it}'] = \begin{bmatrix} \Omega_{i,\bar{\epsilon}} & 0 \\ 0 & \Omega_{i,\bar{\epsilon}} \end{bmatrix} \quad \forall i, t, \quad E[\mu_{it}] = 0 \quad \forall i, t \dots \dots \dots [\text{Eq. 1}]$$

$$E[\mu_{is} \mu_{it}'] = 0 \quad \forall i, s \neq t, \quad E[\bar{\epsilon}_{it} \bar{\epsilon}_{it}'] = 0 \quad \forall t, i \neq j$$

The foregoing conditions show that the covariance matrix for the composite white noise errors, ϵ_{it} , implies that $E[\epsilon_{it} \epsilon_{it}'] = \Omega_{i,\epsilon}$, result in diagonal covariance matrix characterized by arbitrarily normalizable variances based on the summation constraint from equation 1.

The model dynamics in response to shocks is therefore examined as well as using stationary form in terms of the differences of the demeaned variables; Δz_{it} . Going by the Wold representation theorem, it therefore follows that:

$$\Delta z_{it} = A_i(L) \epsilon_{it}, \text{ having } A_i(L) = \sum_{s=0}^{Q_i} A_{i,s} L^s \text{ subject to } \sum_{s=0}^{Q_i} \|A_{i,s}\| < \infty \text{ as } Q_i \rightarrow \infty.$$

Moreover, the components of Δz_{it} which characterize all the units of a panel can be illustrated by utilizing time effects and the use of a moving average to explain the response to the common shocks. The author, therefore, equated $\Delta \bar{Z}_t = N_t^{-1} \sum_{i=1}^{N_t} \Delta z_{it}$ as the $M \times 1$ vector of common time effects. The idea of the subscript 't' on N_t is to convey the information that the relationship between $\Delta \bar{Z}_t$ with respect to structural shocks on the basis of equation 1 is therefore expressed below:

$$\Delta \bar{Z}_t = N_t^{-1} \sum_{i=1}^{N_t} A_i(L) (\Lambda_i \bar{\epsilon}_t + \bar{\epsilon}_{it}) = [N_t^{-1} \sum_{i=1}^{N_t} A_i(L) \Lambda_i] \bar{\epsilon}_t + N_t^{-1} \sum_{i=1}^{N_t} A_i(L) \bar{\epsilon}_{it}$$

Given the case of finite lengths T_i , $N_t^{-1} \sum_{i=1}^{N_t} \bar{\epsilon}_{it} \rightarrow 0$ as $N_t \rightarrow \infty$ with the view that the idiosyncratic shocks $\bar{\epsilon}_{it}$ have the property of zero mean i. i.d. processes having cross sectional independence. $N_t^{-1} \sum_{i=1}^{N_t} A_i(L) \bar{\epsilon}_{it} \rightarrow E[A_i(L) \bar{\epsilon}_{it}] = A_i(L) E[\bar{\epsilon}_{it}] = 0$ on the condition that the moving average coefficients are fixed. The value of $A_i(L) \Lambda_i$ is the member-specific response to $\bar{\epsilon}_t$, which is represented by $\bar{A}_i = A_i(L) \Lambda_i$. With a growth in N_t , $\Delta \bar{Z}_t = \bar{A} (L) \bar{\epsilon}_t$, having $\bar{A} (L) = N_t^{-1} \sum_{i=1}^{N_t} \bar{A}_i(L)$.

Describing the composite vector autoregressive reduced form by $R_i(L) \Delta z_{it} = \mu_{it}$, having $R_i(L) = I - \sum_{j=1}^{P_i} R_{ij} L^j$, while that of the common autoregressive reduced form is $\bar{R}(L) \Delta \bar{z}_t = \bar{\mu}_t$, having $\bar{R}(L) = I - \sum_{j=1}^{\bar{p}} \bar{R}_j L^j$.

Capitalizing on the composite form and re-presenting the reduced form VMA as $\Delta z_{it} = F_i(L) \mu_{it}$, where $F_i(L) = R_i(L)^{-1}$, thus, the structural and reduced form become $\Delta z_{it} = F_i(L) \mu_{it} = A_i(L) \epsilon_{it}$. Given that $F_i(0) = R_i(0)^{-1} = I$, it therefore produces the relationship between the reduced form and the structural form shocks which is $\mu_{it} = A_i(0) \epsilon_{it}$, while $F_i(L) A_i(0) = A_i(L)$ is obtained by substituting μ_{it} into Δz_{it} which specifies the relationship between the reduced form responses and the structural form responses. However, the foregoing immediate expression at $L = 1$ produces the relationship between the reduced and structural form steady state responses of the levels because $F_i(1) A_i(0) = A_i(1)$.

Moreover, the following expressions, provided there is no identifying restrictions, link the reduced form to the structural form:

$$\text{Shocks : } \mu_{it} = A_i(0) \epsilon_{it} \forall i, \bar{\mu}_t = \bar{A}(0) \bar{\epsilon}_t \dots\dots\dots [\text{Eq. 2}]$$

$$\text{responses : } F_i(L) A_i(0) = A_i(L) \forall i, \bar{F}(L) \bar{A}(0) = \bar{A}(L) \dots\dots\dots [\text{Eq. 3}]$$

$$\text{steady state : } F_i(1) A_i(0) = A_i(1) \forall i, \bar{F}(1) \bar{A}(0) = \bar{A}(1) \dots\dots\dots [\text{Eq. 4}]$$

By specifying the contemporaneous covariance of the reduced form residuals as $\Omega_{\mu,i} = E[\mu_{it} \mu'_{it}]$, it is implied by equation 2 that $\Omega_{\mu,i} = A_i(0) \Omega_{\epsilon,i} A_i(0)'$. Also, describing the long run covariance of a data set on the basis of the reduced form residuals as $\Omega_{\mu,i}(1) = E[F_i(1) \mu_{it} \mu'_{it} F_i(1)']$, it follows that the combination of equations 2 and 4 implies that $\Omega_{\mu,i}(1) = A_i(1) \Omega_{\epsilon,i} A_i(1)'$. Given that $\Omega_{\epsilon,i}$ is a diagonal covariance matrix characterized by arbitrarily normalizable variances as well as having unit variances, it implies that the foregoing two relationships become $\Omega_{\mu,i} = A_i(0) A_i(0)'$ and $\Omega_{\mu,i}(1) = A_i(1) A_i(1)'$ accordingly. The restrictions on the polynomial, $A_i(L)$ which comprises of the short run impact matrix derived by analyzing the polynomial at $L = 0$, noting that $A_i(0) = A_{0,i}$ while the long run impact matrix with respect to the levels, z_{it} derivable by analyzing the polynomial at $L = 1$, implies that $A_i(1) = \lim_{Q_i \rightarrow \infty} \sum_{s=0}^{Q_i} A_{i,s}$. Moreover, if z_{it} are unit root processes, then z_{it} is characterized by long run identifying restrictions through the restrictions on the $A_i(1)$ matrix, while irrespective of the unit root properties, the short run restrictions can be exerted on the

$A_i(0)$ matrix. However, expressing the structural autoregressive form as $B_i(L) \Delta z_{it} = \epsilon_{it}$, having $B_i(L) = A_i(L)^{-1}$, it follows that the short run timing restrictions in respect of the response functions of the variables can be taken as restrictions on the $B_i(0)$ matrix.

(Pedroni, 2013)

4.3.6.3 The structural identifying restrictions

Given that $\Delta z_{it} = A_i(L)\epsilon_{it}$, $B_i(L) \Delta z_{it} = \epsilon_{it}$, while $\Delta \bar{Z}_t = \bar{A}(L)\bar{\epsilon}_t$, $\bar{B}(L) \Delta \bar{Z}_t = \bar{\epsilon}_t$ capture respectively, the structural specifications in respect of the composite and common shocks, the following equations encompasses the structural identifying restrictions on the dynamics:

(i) A (0) decompositions

$$\Omega_{\mu,i} = A_i(0)A_i(0)', \quad \Omega_{\bar{\mu}} = \bar{A}(0)\bar{A}(0)' \quad \dots\dots\dots [\text{Eq. 5}]$$

(ii) Short run timing restrictions on B (0) decompositions

$$\Omega_{\mu,i} = B_i(0)^{-1}B_i(0)^{-1'}, \quad \Omega_{\bar{\mu}} = \bar{B}(0)^{-1}\bar{B}(0)^{-1'} \quad \dots\dots\dots [\text{Eq. 6}]$$

(iii) Long run response restrictions on the decompositions of A(1)

$$\Omega_{\mu,i}(1) = A_i(1)A_i(1)', \quad \Omega_{\bar{\mu}}(1) = \bar{A}(1)\bar{A}(1)' \quad \dots\dots\dots [\text{Eq. 7}]$$

Given a panel VAR, comprising of M variables per member, it requires that an aggregate of $\frac{1}{2}(M^2 - M)$ of non-redundant restrictions are needed on some mix of (i) to (iii) in respect of the composite and the common responses. Estimating $R_i(L) \Delta z_{it} = \mu_{it}$ and $\bar{R}(L) \Delta \bar{Z}_t = \bar{\mu}_t$, the residual covariance matrices estimates are utilized in relation to the restrictions expressed in equations (5) to (7) towards ascertaining the decompositions in respect of the $A(0)$ matrices (given that $B(0) = A(0)^{-1}$ or the $A(1)$ matrices. The structural form shocks ϵ_{it} , $\bar{\epsilon}_t$, as well as structural form responses of $A(L)$, $\bar{A}(L)$ on the premise of the expressions (2) to (4) are determined based on the characterized restrictions on the equations (5) to (7) alongside estimates of the reduced form shocks μ as well as the reduced form responses, $F(L)$.

Having ascertained ϵ_{it} and $\bar{\epsilon}_t$, it becomes necessary to determine the idiosyncratic shocks, $\tilde{\epsilon}_{it}$ and the loading matrices, Λ_i , in respect of the individual member of the panel. To this end, all the structural shocks are expected to be *i.i.d* white noise with the fact that the covariances between $\bar{\epsilon}_t$ and $\tilde{\epsilon}_{it}$ result in zero as requirements for the estimation of Λ_i through OLS on the basis of equation 1. Therefore, respective member i , produces $\hat{\Lambda}_i$ as an $M \times M$ diagonal matrix given sample estimates of $E[\epsilon_{it,m} \bar{\epsilon}_{t,m}]/E[\bar{\epsilon}_{t,m}^2]$, provided that $m = 1, \dots, M$ over the

diagonals. Also, the normalization of the variances of both $\bar{\epsilon}_t$ and ϵ_{it} to one, makes the expression to be the same as the simple correlation between $\epsilon_{it,m}$ and $\bar{\epsilon}_{t,m}$ which is equivalent to the diagonals of Λ_i , providing that $|\Lambda_i(m, m)| \leq 1 \forall i, m$.

Moreover, given the estimates of Λ_i as well as the respective structural shock types, therefore, for each member, i , $A_i(L)\epsilon_{it} = A_i(L)(\Lambda_i\bar{\epsilon}_t + \tilde{\epsilon}_{it})$ provides the decomposition into the response emanating from the common shock in contrast with the idiosyncratic shock as well as respectively provide the impulse responses.

The expression $\Omega_{i,\epsilon} = \Lambda_i\Omega_{i,\bar{\epsilon}}\Lambda_i' + \Omega_{i,\tilde{\epsilon}}$, implying that $\Omega_{i,\tilde{\epsilon}} = I - \Lambda_i\Lambda_i'$ is derivable provided the variances $E[\epsilon_{it}\epsilon_{it}'] = E[(\Lambda_i\bar{\epsilon}_t + \tilde{\epsilon}_{it})(\Lambda_i\bar{\epsilon}_t + \tilde{\epsilon}_{it})']$ from equation 1 as well as the consideration of the orthogonality conditions. It therefore follows that the member-specific responses with respect to the common shocks imply the responses to common shock having size one while that stemming from the idiosyncratic shocks imply responses to idiosyncratic shocks having size equal to $(1 - \Lambda(m, m)^2)$. However, the re-scaling of the responses to the idiosyncratic shocks was prescribed in order to depict responses to unity sized shocks implying that $\Omega_{i,\tilde{\epsilon}^*} = I$. Equation 1 can be re expressed on the basis of the re-normalization as:

$$\epsilon_{it} = \Lambda_i\bar{\epsilon}_t + (I - \Lambda_i\Lambda_i')^{1/2}\tilde{\epsilon}_{it}^*, \text{ given that } \Omega_{i,\bar{\epsilon}} = I, \Omega_{i,\tilde{\epsilon}^*} = I \dots\dots\dots [\text{Eq. 8}]$$

The foregoing equation requires the analogous orthogonality conditions. Therefore, the decomposition of the impulse responses can be expressed as :

$A_i(L)\epsilon_{it} = A_i(L)(\Lambda_i\bar{\epsilon}_t + (I - \Lambda_i\Lambda_i')^{1/2}\tilde{\epsilon}_{it}^*)$. Invariably, the decomposition in respect of the member-specific composite impulse responses to the member-specific responses to common and idiosyncratic shocks is expressed below:

$$A_i(L) = \bar{A}_i(L) + \tilde{A}_i(L), \text{ given that } \bar{A}_i(L) = A_i(L)\Lambda_i, \tilde{A}_i(L) = A_i(L)(I - \Lambda_i\Lambda_i')^{1/2} \dots [\text{Eq. 9}]$$

In a nutshell, $\bar{A}_i(L)$ represents the member-specific response to the common shocks, while that of the idiosyncratic shocks is $\tilde{A}_i(L)$. However, the two culminate in the aggregate member-specific response to the composite shocks.

The current study, therefore, employed the Pedroni (2013) Panel Structural Var in the exemplification of the three categories of shocks in respect of the variables that constitute capital flows, monetary policy, and economic growth in the Southern African Customs Union.

(Pedroni, 2013)

4.4 Conclusion

The foregoing methods show that the present study, analyzing capital flows, monetary policy, and economic growth in the Southern African Customs Union, is majorly situated within the ambit of econometric procedures.

CHAPTER FIVE

Empirical Analysis and Interpretation of Results

5.1. Introduction

This chapter encompasses the empirical analysis of capital flows, monetary policy, and economic growth for the Southern African Customs Union. It includes the respective econometric methods, the interpretation and discussion of results, and the conclusion.

The study utilized the analytical software Stata 14 and Eviews 12. The Stata version is the one that is licensed to North-West University, South Africa, while the E-view 12, which was only used to examine panel structural vector autoregression, is the student version lite.

5.2. Descriptive statistics

Prior to the time series analysis, it is very important to examine the respective variables that constitute the panel study through descriptive statistics. The table below shows that the data set maintains internal consistency given that the values of the means lie between the minimum and maximum values. The symmetric nature of the distribution is explained by the skewness and the kurtosis.

Table 5.1: Descriptive Statistics

Variable	Observation	Mean	Std. dev	Minimum	Maximum	p1	p99	Skew.	Kurt
LGDPC	150	3.419	.351	2.544	3.918	2.582	3.903	-.811	2.844
FPI	150	.01	.044	-.097	.169	-.094	.147	1.371	5.868
FDI	150	2.702	2.572	-6.898	10.912	-2.739	9.685	.486	4.421
LGIN	150	1.693	.078	1.545	1.851	1.55	1.85	.345	2.269
LREER	150	1.993	.052	1.784	2.124	1.829	2.12	-.527	4.66
LINR	150	2.055	.621	.878	3.064	.927	3.054	.068	1.886
LFDA	150	8.152	.433	7.118	9.152	7.341	9.145	.403	2.847
LMSCP	150	1.425	.287	.721	1.894	.728	1.885	-.053	1.996
INF	150	7.725	4.329	-9.616	33.813	-.692	21.553	1.493	12.462
CBPD	150	8.07	3.438	1.42	15.44	1.71	15	.139	2.128

BMG	150	13.348	11.286	-14.436	72.393	-13.986	59.594	1.585	9.116
GCFG	150	5.201	14.869	-29.685	71.042	-26.841	51.839	1.066	5.492

Source: Author's computation from Stata 14, 2021

Table 5.1 shows that lgdp, which is the dependent variable, has a standard deviation of 0.351, which is close to zero. Other variables such as Foreign Portfolio Investment (fpi), the log of globalization index (lgin), log of real exchange rate (lreer), log of inward remittance (linr), log of Foreign Development Assistance (lfda), and the log of credit to the domestic private sector (lmscp) all exhibit low variations as the values of their standard deviation are close to zero. However, gcfg and bmg show the highest variations among the variables, with values of 14.869 and 11.286, respectively. The variations in cbpd, inf, and fdi are relatively moderate. The skewness statistic reveals that lgdp, lreer, and lmscp are the only negatively skewed variables having values close to zero, while other variables are positively skewed. None of the variables exhibit skewness. Nevertheless, some of the variables are close to zero, such as foreign direct investment, globalization index, lreer, lgdp, linr, lfda, lmscp, and cbpd. The results of the kurtosis show that the inflation rate (inf) with a kurtosis value of 12.462 is the farthest from the normal kurtosis value of 3. Some other variables are relatively close to 3. This includes lgdp, lgin, lfda, and cbpd having values of 2.844, 2.269, 2.847, and 2.128, respectively. Assymetrism seems to characterize the data set, which lends credence to the heterogenous and cross-sectional state of the distribution. However, these shortcomings are internalized in the panel study, which is the center of gravity of this study.

5.3. Diagnostics Testing

5.3.1 Serial correlation

Serial correlation becomes very crucial for the panel study in order to examine if there is serial autocorrelation within the data set. If it exists, it therefore weakens the effectiveness of the estimates. This study utilized the Wooldridge test for autocorrelation in panel data as expressed in Table 5.2.

Table 5.2: Test for serial correlation

Linear regression				Number of obs = 145	
				F(4, 4) = .	
				Prob > F = .	
				R-squared = 0.5633	
				Root MSE = .03538	
				(Std. Err. adjusted for 5 clusters in country)	
D.lgdpc	Coef.	Robust Std. Err	t	P>t	[95% Conf. Interval]
D1.Fpi	-.015842	.1139116	-0.14	0.896	-.3321114 .3004274
D1.Fdi	-.0013124	.0006708	-1.96	0.122	-.0031748 .00055
D1.Lgin	.2345852	.2994131	0.78	0.477	-.5967188 1.065889
D1.Lreer	1.019052	.1305212	7.81	0.001	.6566674 1.381437
D1.Linr	.0663931	.0522668	1.27	0.273	-.0787227 .2115089
D1.Lfda	.0053678	.0206183	0.26	0.807	-.0518777 .0626132
D1.Lmscp	.0002419	.0554504	0.00	0.997	-.1537131 .1541969
D1.INF	.0001535	.0002541	0.60	0.578	-.0005519 .000859
D1.Gcfg	.0000506	.0001862	0.27	0.799	-.0004665 .0005676
D1.Cbpd	-.0018642	.0004027	-4.63	0.010	-.0029824 -.000746
D1.Bmg	-.0001104	.0001239	-0.89	0.423	-.0004544 .0002335

Wooldridge test for autocorrelation in panel data H0: no first order autocorrelation $F(1, 4) = 75.764$ Prob > F = 0.0010

Source: Author's computation from Stata 14, 2021

Table 5.2 above shows the result of the serial correlation of the macroeconomic variables using the Woolodridge test for autocorrelation. The f-statistics is 75.764 with a p-value of 0.0010, which is less than the critical value of 5 per cent. Therefore, it follows that the null hypothesis of no serial autocorrelation is rejected.

The previous estimate of panel least squares is characterized by the problems of heteroscedasticity and serial autocorrelation, which undermine the dependability of the estimates. Consequently, the study estimated the feasible generalized least squares which accounted for these weaknesses.

5.3.2. Test of cross-sectional dependence

The cross sectional dependence among all the variables used for the panel least squares was examined by using the three statistics of Breusch and Pagan, Pesaran, as well as Pesaran, Ullah, and Yamagata. As cited in Burdisso and Sangiácomo (2016), according to Zellner (1962), Breusch and Pagan (1980) take into consideration the average of the squared pairwise correlation coefficients in respect of the residuals and capture nonrelated equations, or seemingly unrelated regression having a fixed N as well as $T \rightarrow \infty$ implying a small N relative to T . This is applicable to the current study as it contains a few countries (5) that constitute SACU over T period of 30 observations per variable. However, the LM statistic is characterized by serious size distortions in the instances of large N relative to T (Pesaran, 2004a).

Internalizing the problem of the bias in the LM test, Pesaran (2004a) provides a CD that takes into consideration the averaging of the pairwise correlations of the residuals. The CD converges in distribution to $N(0,1)$ with $N \rightarrow \infty$ provided T is adequately large. Nevertheless, according to Pesaran (2004a), the CD test may be characterized by inconsistency in other several instances.

However, Pesaran *et al.* (2008), provide another LM test that corrects the case of biasness in the previous Breusch–Pagan’s LM test in panels characterized by strictly exogenous regressors as well as normal errors. The three statistics depend on the Monte Carlo simulations to examine the power as well as the size. According to the authors, the bias adjusted LM test effectively controls in respect of the size of the test as well as ensures reasonable power. The following table displays the three test statistics with their respective probability values.

Table 5.3: Bias-adjusted LM test of error cross-section independence

H0: $\text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	16.04	0.0985
LM adj*	1.839	0.0660
LM CD*	3.223	0.0013

Source: Author's computation from Stata 14, 2021

From table 5.3, it can be observed that the null hypothesis of no serial correlation among the countries cannot be rejected by using the LM and the adjusted LM statistics. However, the LM CD of Pesaran rejects it. Nevertheless, the LM CD* test may not be efficient in this instance as the current study does not have a large N relative to T .

5.3.3. Correlation matrix of residuals

The Breusch-Pagan LM test below shows a p value of 0.0000, which is highly statistically significant. By implication, the null hypothesis that the residuals are cross sectionally independent is rejected. There is, therefore, the problem of cross-sectional dependence.

Table 5.4: Correlation matrix of residuals:

	__e1	__e2	__e3	__e4	__e5
__e1	1.0000				
__e2	0.1320	1.0000			
__e3	-0.5640	0.3375	1.0000		
__e4	0.1774	0.3024	-0.0851	1.0000	
__e5	-0.1199	0.4000	0.0969	0.7251	1.0000

Source: Authors computation from Stata 14, 2021

Breusch-Pagan LM test of independence: $\chi^2(10) = 38.673$, $\text{Pr} = 0.0000$

Based on 30 complete observations over panel units

Table 5.5: Cross sectional dependence test

Variable	CD-test	p-value	average joint T	mean ρ	mean $\text{abs}(\rho)$
lgdpc	16.886	0.000	30.00	0.97	0.97
fpi	.883	0.377	30.00	0.05	0.20
fdi	-.05	0.960	30.00	0.00	0.21

inf	10.333	0.000	30.00	0.60	0.60
cbpd	11	0.000	30.00	0.64	0.64
bmg	3.282	0.001	30.00	0.19	0.24
lgin	15.898	0.000	30.00	0.92	0.92
lreer	4.621	0.000	30.00	0.27	0.50
linr	1.186	0.236	30.00	0.07	0.42
lfda	7.838	0.000	30.00	0.45	0.45
lmscp	4.868	0.000	30.00	0.28	0.35
gcfg	-.014	0.989	30.00	0.00	0.13

Notes: Under the null hypothesis of cross-section independence, $CD \sim N(0,1)$

P-values close to zero indicate data are correlated across panel groups.

Source: Author's computation from Stata 14, 2021

The foregoing table shows that fpi, fdi, linr, and gcfg do not exhibit the problem of cross-sectional dependence while other variables do. This warrants the need to estimate the fgls regression estimates.

5.3.4. Matrix of Correlations

Table 5.6 below expresses the correlations among the macroeconomic variables. This becomes crucial in order to examine if there is a linear dependence between them. The results of the correlation matrix reveal that no two combinations of explanatory variables exhibit a correlation value of at least 0.80. This evidence implies that there is no problem of multicollinearity among the data set.

Table 5.6: Matrix of Correlations

Variables	lgdpc	fpi	fdi	lgin	lreer	linr	lfda	lmscp	inf	cbpd	bmg	gcfg
lgdpc	1.0000											
fpi	0.0485	1.0000										
fdi	-0.1624*	0.3780*	1.0000									
lgin	0.6301*	0.0241	0.0338	1.0000								
lreer	0.4603*	0.0217	-0.2867*	0.0301	1.0000							
linr	-0.3542*	-0.4522*	-0.1379	0.1595	-0.1214	1.0000						
lfda	0.3775*	-0.2154*	-0.1660*	0.6424*	0.1605*	0.3751*	1.0000					
lmscp	0.6024*	0.0114	-0.0213	0.6464*	0.3002*	-0.0351	0.7366*	1.0000				
inf	-0.2769*	0.0310	-0.0109	-0.4511*	-0.1288	-0.1367	-0.1257	-0.1857*	1.0000			
cbpd	-0.5051*	-0.0402	0.0891	-0.4288*	-0.2410*	-0.0248	-0.1652*	-0.2593*	0.5214*	1.0000		
bmg	-0.0049	0.0685	0.1106	-0.0814	0.0012	-0.1833*	-0.0419	-0.0208	0.0785	0.1893*	1.0000	
gcfg	-0.0906	0.0393	0.0785	-0.0060	0.0892	0.0230	0.0859	0.0026	0.0609	0.0814	0.0979	1.0000

Source: Author's computation from Stata 14, 2021. * Indicate significance@5%

5.3.5. Heteroskedasticity, Skewness and Kurtosis

The study further examined other relevant diagnostics in order to avoid spurious regressions and enhance the reliability of estimates. The multicollinearity test is in line with the matrix of correlations. The mean of variance inflation factor (Vif) is 2.05, which is less than the rule of thumb of 10. This further supports the matrix of correlations and concludes that there is no problem of multicollinearity.

Table 5.7: Diagnostic Tests

Source	chi2	Df	p
Heteroskedasticity	110.08	77	0.0080
Skewness	15.80	11	0.1489
Kurtosis	2.61	1	0.1064
Total	128.48	89	0.0039

Source: Author's computation from Stata 14, 2021

The test for heteroscedasticity ascertains whether the variance of the residuals of a given distribution exhibits a constant variance. The Breusch-Pagan/Cook-Weisberg test and the White tests were examined. The probability of chi square is 0.1074 at $\chi^2(1) = 2.59$ in the context of the Breusch-Pagan/Cook-Weisberg test, which exceeds the critical value of 5%. By implication, the null hypothesis of constant variance cannot be rejected. However, a further test was examined in respect of the White test. The probability value of the chi square is 0.0080, which is less than the critical value of 5%. The null hypothesis of homoscedasticity is therefore rejected. The inconsistency in the two estimators of heteroscedasticity above can be linked to the fact that it is panel data pooled from five different countries.

Considering the disparity above, it therefore implies that the panel least squares will not produce efficient estimates. The study therefore ensures the use of the feasible generalized least squares and the panel corrected least squares, which have the capacity to produce more efficient estimates.

5.4. Static effect of the macroeconomic variabes on gdp per capita

The major focus of this study is on dynamics among the macroeconomic variables. Nevertheless, this section takes static effects into consideration through the Panel Least Square, Panel Corrected Least Squares, and the Feasible Generalized Least Squares.

5.4.1. Panel least square

The panel least squares is a regression estimate that pools all the variables together in order to estimate the coefficients of all the variables in the model. However, a drawback of the panel least squares is that it cannot account for instances when there are certain problems in a distribution, such as the problem of cross-sectional dependence, serial correlation, and the problem of heteroscedasticity. The following table 5.8 displays the results of the panel least squares.

Table 5.8: Panel least square

Dependent Variable : lgdpc

Variable	Coefficient	Std. Dev.	t	P > t
fpi	-1.463465	.3398862	-4.31	0.000
fdi	-.0083464	.0055608	-1.50	0.136
lgin	2.858566	.2673308	10.69	0.000
lreer	2.187672	.2776562	7.88	0.000
linr	-.2820984	.0268974	-10.49	0.000
lfda	.0182455	.0571598	0.32	0.750
lmscp	.0339151	.080352	0.42	0.674
inf	.0089102	.0036045	2.47	0.015
gcfg	-.0020178	.0008407	-2.40	0.018
cbpd	-.0215882	.0044986	-4.80	0.000
bmg	.0004747	.0011235	0.42	0.673
Constant	-5.251593	.7834685	-6.70	0.000

Source : Author's computation from Stata 14, 2021

Table 5.8 displays the result of the panel least squares. It can be observed from the results that fpi is statistically significant at the one percent level. A unit increase in fpi results in a 1.46 decrease in lgdpc. Fdi also affects lgdpc negatively, but not statistically significant. The globalization index (lgin), lreer, and linr are all statistically significant. A unit increase in the

globalization index generates a 2.85 increase in lgdpc, while that of lreer exerts a 2.18 increase in lgdpc. However, a one percent rise in linr depresses lgdpc by 0.28 per cent. The variables comprising gcfg and cbpd exert a negative impact on lgdpc. A unit increase in gcfg and cbpd respectively, decreases lgdpc by 0.002 and 0.02. However, lgdpc increases by 0.008 per cent as a result of a one per cent increase in inf.

5.4.2. The Feasible Generalized Least Squares Regression

The Parks' 1967 Feasible Generalized Least Squares is robust in its capacity to internalize the problem of serial correlation and cross-sectional dependence conditioned on the requirement that the time periods (T) at least equate to the number of cross-sections (N) (Reed & Ye, 2011).

Table 5.9: Cross-sectional time-series FGLS regression

Dependent Variable : lgdpc

Cross-sectional time-series FGLS regression			Number of obs = 150	
Coefficients: generalized least squares			Number of groups = 5	
Panels : heteroskedastic			Time periods = 30	
Correlation: common AR(1) coefficient for all panels (0.6762)				
Estimated covariances = 5				
Estimated autocorrelations = 1				
Estimated coefficients = 12				
Wald chi2(11) = 269.70				
Prob >chi2 = 0.0000				
Variables	Coefficient	Standard Error	z	P > z
fpi	-.1385876	.1948141	-0.71	0.477
fdi	-.002416	.0025696	-0.94	0.347
lgin	1.889675	.2557479	7.39	0.000
lreer	1.569329	.2187723	7.17	0.000
linr	-.1550145	.0289051	-5.36	0.000
lfda	.037107	.0430661	0.86	0.389
lmscp	.1849452	.0750946	2.46	0.014
inf	.001148	.0016122	0.71	0.476
gcfg	-.0001462	.0003495	-0.42	0.676
cbpd	-.0060009	.0028453	-2.11	0.035
bmng	.0002619	.0005036	0.52	0.603

Constant	-3.08757	.6610246	-4.67	0.000

Source: Author's computation from Stata 14, 2021

The estimate in table 5.9 displays the results of the feasible generalized least squares (fgls). The *fgls* produced different results compared to the panel least squares. The estimates of *fpi* and *fdi*, *lfda*, *inf*, *gcfg*, and *bmg* are not statistically significant. The log of the globalization index, real exchange rate, and inward remittances were found to be statistically significant at the one percent level. A rise in *lgin* by one per cent stimulates *lgdpc* by 1.88%, while that of *lreer* generates 1.56 % in *lgdpc*. Conversely, *linr* results in a negative relationship with respect to *lgdpc*. If *linr* rises by a unit, *lgdpc* decreases by 0.15. In another vein, *lmscp*, which is monetary sector credit to the private sector, promotes *lgdpc*. A one per cent rise in *lmscp* stimulates the *lgdpc* by 0.18. The central bank policy rate differential, which is one of the core focus of this study, negatively relates to *lgdpc* and was found to be statistically significant. A one per cent increase in the policy rate differential dampens the *lgdpc* by 0.006 per cent.

5.4.3. The Panel Corrected Standard Error (PCSE)

The Parks' FGLS estimator has the constraint of undervaluing the standard error in the case of finite samples (Reed & Ye, 2011). According to Beck and Katz (1995), a two-step re-specified case of inefficient Ordinary Least Squares (OLS), i.e., Panel Corrected Standard Error (PCSE), does more efficiently compared to the asymptotically efficient FGLS.

Table 5.10: Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)

Dependent Variable : *lgdpc*

Group variable: Country	Number of obs = 150
Time variable: year	Number of groups = 5
Panels: correlated (balanced)	Obs per group :
Autocorrelation: common AR(1)	min = 30
avg = 30	max = 30
Estimated covariances = 15	R-squared = 0.9128
Estimated autocorrelations = 1	Wald chi2(11) = 267.74
Estimated coefficients = 12	Prob > chi2 = 0.0000

Variables	Coefficient	Std. Error	z	P > z
fpi	-.2184329	.1997311	-1.09	0.274
fdi	-.0018577	.0027906	-0.67	0.506
lgin	2.09736	.290866	7.21	0.000
lreer	1.600588	.2454942	6.52	0.000
linr	-.20452	.0283901	-7.20	0.000
lfda	.0332542	.0462847	0.72	0.472
lmscp	.1684685	.0767665	2.19	0.028
inf	.0013515	.0017066	0.79	0.428
gcfg	-.0001981	.0003985	-0.50	0.619
cbpd	-.0079954	.0030529	-2.62	0.009
bmg	.0004188	.0005398	0.78	0.438
Constant	-3.350482	.7343721	-4.56	0.000

rho .6762236

Source: Author's computation from Stata 14, 2021

Table 5.10 above is the regression estimates that is robust in correcting the problem of serial correlation that arises as a result of the cross-sectional dependence of the units that constitute a panel data set. It is therefore panel corrected. The estimates show that fpi and fdi both exert negative effects on lgdp, but the effect is found to be statistically insignificant. However, lgin, lreer, linr, and cbpd are statistically significant at the one per cent level. A one per cent rise in lgin is found to increase lgdp by 2.09 per cent, while if lreer rises by one per cent, lgdp rises by 1.6 per cent. The log of inward remittances is found to decrease lgdp by 0.2 per cent due to a one per cent rise in its value. The log of monetary sector credit to the private sector is found to be statistically significant. The result shows that a unit increase in lmscp increases lgdp by 0.16. The differential in the policy rate exerts a negative effect, having a one percent increase, decreasing the lgdp by 0.007 percent. Other variables, inclusive of bmg, gcfg, inf, and lfda, are statistically insignificant.

5.5. The analysis of the trends and patterns of the macroeconomic variables



Source: Author's computation from Stata 14, 2021

Figure 5.1. The log of gross domestic product per capita

5.5.1. The trend and pattern of the log of gross domestic product per capita

The behavioural patterns of lgdpc across the countries that constitute SACU are captured in Figure 1. Lgdpc follows a similar pattern across the countries. However, it is only Botswana and South Africa that exhibit a greater level of living standards. While South Africa runs from 3.5 on the graph, Botswana was almost close to 3.5. The next country that performed better was Namibia, followed by Eswatini, while Lesotho performed the poorest as it commenced from the first sub-division of the graph. All the countries produced lgdpc that were found not to be stable over the study period. Ldgpc is the log of gross domestic product per capita, which is an index to measure the standard of living on average for the citizens that constitute the respective countries. It implies that living standards have not been stable over time.

The behavioural display of the respective economies above similarly follows the description of Ginindza *et al.* (2017) in a discussion paper on "The Trade Reform of SACU: Country Case Studies on Regional Integration." According to the authors, which also relates to the current graphical display based on per capita, Botswana and South Africa exhibit more development, while Lesotho and Eswatini show a lower level of living standards. Namibia lies between Botswana and Eswatini, while Lesotho, according to the UN, is the least-developed economy in SACU.

The value of lgdpc for Botswana in 2005 was 374%, but increased to 380% and 383% in 2010 and 2015, respectively. That of South Africa was 373% in 2005, and it increased to 386% in 2010, but later decreased to 375% in 2015. Over the same range, Namibia exhibits a similar pattern to that of South Africa. LGDPC was 356% in 2005. It increased to 372% in 2010, but

later decreased to 368% in 2015. Lesotho, on the other hand, had a lgdp of 292% in 2005, which later rose to 305% and 306% in 2010 and 2015, respectively. Eswatini had a value of 348% in 2005, which later increased in 2010 to 361%, but later declined to 356% in 2015. According to the International Monetary Fund (2020a), it was reported that over the period 2000 to 2007, there was an average growth in GDP of around 4 percent, enhanced by substantial growth in the region. It was also reported that right from the global financial crisis as well as Eswatini's 2010 fiscal crisis, the average growth in Eswatini was around 2.5%, given significant fiscal stimulus right from 2015. The decline in growth was a reflection of a protracted and unpalatable trend in the growth process of the economy. It was observed that investment has been on a falling trend, such that private investment declined from around 17% of GDP in the early 2000s to 4% in 2018. The foregoing description by the International Monetary Fund (2020a) falls within the time frame of this current study, which is expected to invariably influence the living standards of the citizens. It therefore requires that the authorities in Eswatini need to design a sound macroeconomic blueprint towards the productive stability of the economy.

Following the report of the World Bank (2018b), it was observed that the primary sectors within the South African economy in 2017 constitute the major units that drive growth, especially the agricultural and mining areas of the economy. Also, it was reported that the development in other sectors has not been strong, suggesting that South Africa is sliding from world growth because the country is predominantly concentrated on the export of commodities, which are raw materials that are not largely desired in the international community.

The foregoing description of South Africa above, despite being a dominant economy in the region followed by Botswana, is a reflection of the expected low per capita income across the countries that constitute the union considering their low level of industrialization. A significant improvement in the unstable and fluctuating pattern of the per capita income above will largely depend on a shift from being predominantly agrarian to more tertiary activities.

However, Botswana, as reported by ADB (2012a), experienced considerable weak economic growth over the period 2005 and 2009 which was attributed to the instability in the diamond-mining sector. Such a weak performance that slows down economic growth is thus expected to result in a decline in the per capita GDP of the economy over the period. Observing Botswana's graph above, it can be seen that between the early 2000s to 2010, lgdp moved in the upward direction, though less slopy, which later moderately turned slightly negative.

Some characteristics of Lesotho's economy can be attributed to valuable reports provided by UNICEF (2017). According to the report, the economy of Lesotho incessantly grew over the periods FY11/12 and FY14/15, where FY represents the financial year. It was observed that over this period, real GDP growth exceeded that of population growth, which resulted in continual GDP per capita growth. This trend was primarily influenced by the performance of the construction and mining sectors, which accounted for approximately 15% and 7% of GDP, respectively. Moreover, the economy experienced negative growth in real terms in FY15/16, which signals that the foregoing sectors are grappling to expand productivity. Some of the major constraints include heightened uncertainty about Lesotho's ability to access the U.S. market, heightened global competitiveness, and declining public and private investment, particularly in the construction sector. Furthermore, the Southern African region experienced drought over the period 2015 and 2016, which affected productivity in the agricultural sector and consequently undermined economic growth. The behavioural outcome of GDP per capita in Lesotho in Figure 1 over the periods reported by UNICEF (2017) can thus be approximated to have influenced GDP per capita in the country.

Furthermore, the weak economic outlook in South Africa, inflexible and high interest rates, uncertainty in exports (mostly in relation to the United States), and decreased local and foreign private and public investment all imply that Lesotho's growth trajectory will be subdued in the medium term (UNICEF, 2017). GDP per Capita of Lesotho in Figure 1 above corroborates this information as the economy appeared to be the least performed economy in the Southern African Customs Union.

The per capita GDP of Namibia in Figure 1 above seems to be characterized by some fluctuations, yet exhibits some improvements over time. Such a level of performance in per capita GDP over time can be ascribed to certain developments in the economy. For instance, Ecorys (2018) reports for Namibia show that real GDP growth on average stood at 3.5 percent in the first 5 years post-independence, which subsequently decreased during the period 1996-2000, with an average of 3.2 percent. This trend was attributed to Namibia's structural constitution as an economy driven by commodity exports. It was further reported that the weakness in world growth, alongside a reduced commodity price cycle, significantly influenced growth performance.

A look at the GDP per capita of Namibia in Figure 1 above confirms the foregoing report. It can be observed that around 1996-2000, GDP per capita followed a declining path. This could

be as a result of the sluggish economic performance due to poor global growth and the issue of a declining commodity price cycle.

According to Ecorys (2018), Namibia's economy accelerated growth by an average of 5% between 2001 and 2005. Such a development had contribution, attributable to the swift growth of the mining sector, including higher diamond production as well as the volumes of copper production, improvement in commodity prices, and persistent investment into new mining projects, such as Anglo American's investment in the Skorpion Zinc mine and refinery. The subsequent period was marked by an increase in growth of up to 6% on average, owing to the continued expansion of mining activity and the vigour of manufacturing and agricultural activities. The growth in this era was specifically spectacular because it was realized during a period when the global economy had significant constraint due to the impacts of the world economic crisis in 2008. Real GDP growth in the Namibian economy had a high value of 5.3% between 2011-2015 (Ecorys, 2018).

Observing figure 1 above, it can be observed that GDP per capita increased over the period 2001–2005, which could be as a result of the accelerated growth it had during the period and the contributory factors. Furthermore, GDP per capita improved in the subsequent period, which could be attributed to the 6 percent average growth resulting from the continuous scale-up of mining activity, as well as improvements in manufacturing and agricultural activities.



Source: Author's computation from Stata 14, 2021

Figure 5.2. Foreign Portfolio Investment

5.5.2 The trend and pattern of foreign portfolio investment

Foreign portfolio investment in South Africa, Namibia, Botswana, and Eswatini appeared to be more volatile. However, it is linearly stable in most parts of the study period for Lesotho,

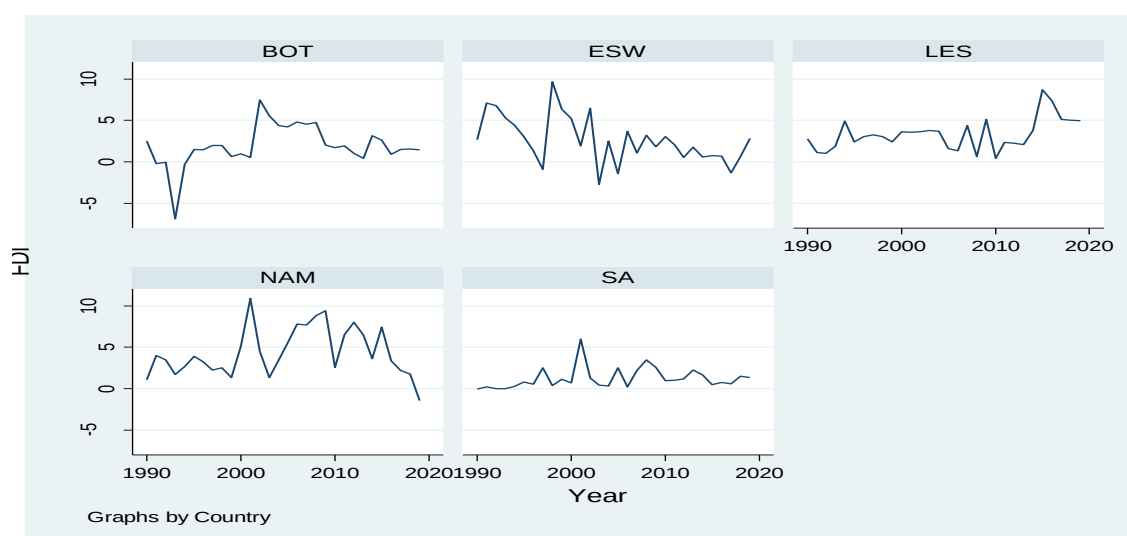
with a little parabolic shape somewhere around 2005. The country had a fpi of 0.008% in 2005, while it was 0 in 2010, but later became negative in 2015 with a per centage of 0.0001%. Portfolio movement was very erratic for South Africa. It can be observed from the graph that it maintained a downward movement to the neighbourhood of 2000, which thereafter followed an upward trend and got to the pick some few years after 2000. It later fell from this peak and later still fluctuated similarly. The value of fpi was -0.01% in 2005, which later decreased to -0.02% and -0.03% in 2010 and 2015, respectively. Botswana initially had stability in fpi over the period 1990 to around 2000 but later turned volatile. Fpi in 2005 was 10%, and it decreased to 2% in 2010 but later rose to 7%. Eswatini's fpi was relatively stable up to a few years before 2010, but later turned erratic. The country had a value of -0.00141 of fpi in 2005, which later decreased to -0.01225 in 2010 and had a value of 0.024151 in 2015. Namibia had the highest values of fpi as observed from the graph. Starting from around zero value, it steadily declined, but subsequently became an upward trend, which later declined sharply. It maintained some downward trend for a few years after 2010, with a later smooth upward trend followed by another decline towards the end of the study period. In 2005, FPI had a value of 14%, which later declined to 5% in 2010, but became worse in 2015 with a value of -9%.

The following table examines FPI in the Southern African Customs Union with regard to trend. The coefficient of the trend shows that FPI is negative over time but statistically insignificant given the p-value of 0.128, which exceeds the critical value of 5%. This could be likened to the volatile nature of FPI in the region as well as the nature of the dominated sectors that characterized the union.

Table 5.11: The trend of foreign portfolio investment

fpi	Coef.	Std. Err.	P> t
Trend	-.0001251	.0000817	0.128
_cons	.0191071	.0071141	0.008

Source : Author's Computation from Stata 14, 2021



Source: Author's computation from Stata 14, 2021

Figure 5.3: Foreign direct investment

5.5.3: The trend and pattern of foreign direct investment

All the countries had swift fluctuations in foreign direct investment over the study period. However, the examinations over the periods 2005, 2010 and 2015 reveal that Botswana was characterized by a fdi of 424% in 2005, but later followed a decline to 170% in 2010 with a later increase of 262% in 2015. On the contrary, Eswatini had a -144% fdi in 2005, but later increased drastically to 305%, followed by a decline of 77% in 2015. Lesotho behaved contrary to Eswatini over the period. The value was 163% in 2005, but declined to 41% in 2010, while it had a value of 870% in 2015. Following a similar pattern as that of Lesotho, Namibia's fdi was 548% in 2005, which declined to 255% in 2010, but later increased to 744% in 2015. South Africa, despite being a dominant country in the region, only had a fdi of 253% in 2005, but declined to 98% and 47% in 2010 and 2015, respectively.

According to the World Bank (2018b), the fall in South Africa's natural real rate of interest relative to global trends has been constrained, as the gap in respect of savings and investment has expanded since the early 2000s. Based on the report, foreign direct investments cascaded with the boom in commodities while local savings stayed minimal.

The behavioural state of FDI in Eswatini has not been stable over time, characterized by some periods of increase and decrease. According to ADB (2012), as cited in Mahembe (2014), the

fall in the inflows of FDI can be attributed to the economy's limited access to land, weak competitiveness in the external environment, overvaluation of the exchange rates, telecommunication infrastructure that is monopolized, high wage levels, overregulation, and the unavailability of properly working "one-stop-shop" for investors, as well as the observation that the economy exhibits weakness in marketing as a destination for investment.

The table below shows the relationship between FDI and trend, which provides evidence that FDI, though exerting a positive effect over time, is not statistically significant given its p-value of 0.723, which exceeds the critical value of 5%. The insignificance of FDI over time in the region could be largely as a result of the fact that the union is mostly extractive sectors dominated. It was observed by UNCTAD (2003) that a stream of investment in 1994 resulted in yearly inflows of US \$43 million in Lesotho, which was attributed partly to privatization sales, but majorly as a result of investment in the manufacturing of garments. This period relatively compares with the FDI graph of Lesotho above.

Table 5.12: The trend of foreign direct investment

fdi	Coef.	Std. Err.	P> t
Trend	.001725	.0048649	0.723
_cons	2.571977	.423419	0.000

Source : Authors computation from Stata 14, 2021

The fluctuations in foreign portfolio and foreign direct investment above among the countries in the region could be partly due to changes in economic situations. For instance, according to World Bank (2011), net inflows of portfolio equity has been on the rise over time from around 0.303% of GDP in 1993 to around 2.766% of GDP in 1999 which signals the culmination of portfolio equity flow thus far in sub-Saharan Africa, having South Africa as the far-reaching recipient in the region.

Sub-Sahara Africa experienced a swift reversal of portfolio equity inflows in the aftermath of the USA, 2007 financial crisis, resulting in a loss of around US\$5.69 billion in 2008. There was a remarkable recovery of portfolio equity in the SSA in the concluding part of 2008 reaching to the middle of 2010, such that there was a rebound of portfolio equity from a minus of US\$4.706 billion in 2008 to a negative of US\$0.679 billion in 2012. Africa was described to be experiencing a descending trend as a result of the impact of the sovereign debt crises in the Eurozone (IMF, 2012). South Africa received the largest portfolio equity in SSA and was

generally influenced in the region by the variation in the level of portfolio equity (Adeola, 2017).

In another development, the flows of FDI to South Africa in 2012 rose to an estimated US\$4.643 billion in the aftermath of falling swiftly in 2010 from an estimated US\$9.885 billion in 2009 to US\$3.693 billion in the post global financial crisis. The 2008 decline in portfolio equity occurred during the global financial crisis. It thus, spotlights the volatility related to the flows of equity in the era of economic shock (World Bank, 2014).

The erratic movements in foreign portfolio investment (net) as a percentage of GDP and foreign direct investment net inflows as a percentage of GDP in the respective countries that constitute SACU above in figure two and three is thus connected to the transmission effect of economic shocks that affected the entire Sub-Saharan Africa.



Source: Author's computation from Stata 14, 2021

Figure 5.4. Inflation rate

5.5.4 The trend and pattern of the inflation rate

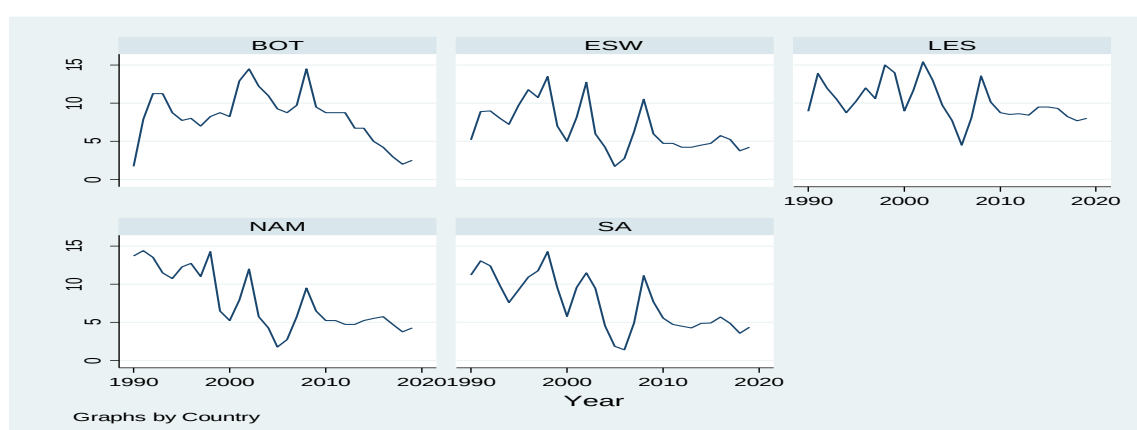
Figure 4 displays the inflation rate across the respective countries in the Southern African Customs Union. Obviously, they are all characterized by instability in inflation rates. The instability in the inflation rate appears to have negatively trended in SACU over the study period. Botswana, Lesotho, Namibia, and South Africa initially had a rise in inflation rate from the reference period of 1990. It thereafter fluctuated downward, while Eswatini declined initially and later followed a fluctuating pattern. Bank of Namibia (1999) , reported that the consumer inflation rate in 1999 for Namibia was 8.7% though at a variance with the consumer price index figure of 9.380156% obtained from UNCTADSTAT, used for this study.

Nevertheless, the situational description of the economy as reported by the Bank for the period explained inflation rate in Namibia. The Bank of Namibia, stressed that the 1999 inflation rate occurred as a result of favourable economy-wide conditions, stability of the local currency and declining interest rates. The inflation rates in Namibia within the study period stood at 6.147401% in 2017 but declined to 4.29361% in 2018. The lower inflation rate in 2018 is substantiated by the Bank of Namibia (2018) report. According to the report, the Bank of Namibia's Monetary Policy Committee persistently sustained a stance of accommodative monetary policy in 2018 with the aim of bolstering the local economy alongside keeping up the one-to-one link to the rand. The monetary policy stance was triggered due to the weak domestic economy in 2018 which majorly characterized wholesale and retail trade, hotels and restaurants, real estate and business services, taxes on products and Government services. The yearly inflation levels reduced and remained contained, recording 4.3% on the average relative to 6.2% registered in 2017.

However, Lesotho experienced a sharp upward trend in the neighbourhood of 2000, followed by a sharp downward trend after which it maintained some steady fluctuations. Based on the SACU (2016), Lesotho's consumer prices rose by 3.2% in 2015 compared to 5.4% in 2014. The decline in the inflation rate was majorly attributed to the fall in housing and utility prices, which fell by 6.8% from 7.7% in 2014. The decline was subsequently observed in transport, which increased by 0.3% in 2015 compared to 10.5% in 2014. The inflation rate was 8.6% for Botswana in 2005 and has consecutively declined to 6.9 and 3.06 in 2010 and 2015, respectively. The inflation rate in Botswana, which followed a downward trend over time, similarly relates to the observation in the Southern African Customs Union (2013) report. Based on the reports, inflation in Botswana moved in a descending trajectory from the yearly mean of 8.5 percent that characterized 2011 to 5.9 percent in 2013 and declined over the objective span. The declining trend was attributed to the depression in local demand and the adjustment in regulated prices, inclusive of the government levies, which were characterized by mutation, resulting in less pressure. That of Eswatini was 4.7% in 2005, which later declined to 4.5% in 2010, and thereafter increased to 4.9% in 2015. Furthermore, the relatively downward trend of inflation rate, albeit with some fluctuations, can be implied by the documentary of the Southern African Customs Union (2013), which is of the observation that inflation in Eswatini trended in the downward direction from a peak of 9% in 2012 to 5.6 % in 2013, which was attributed primarily to a decline in food inflation. Following a similar vein, in 2005, the inflation rate was 3.43% in Lesotho and later increased to 3.46%, after which it

fell to 3.21% in 2015. Namibia had it at 2.28% in 2005. It increased to 4.87% in 2010 and later declined to 3.39% in 2015. South Africa's inflation rate has also not been stable, despite being a key player in the region and operating discretionary monetary policy within the CMA. It had a rate of 2.06% in 2005, which rose to 4.06% in 2010, but then fell to 4.5% in 2015. A comparable description of the inflation rate is that provided by the SACU (2016). According to the report, the inflation rate improved to 4.6% in 2015 in South Africa from its 6.1% rate in 2014, falling within the target bound of 3–6% set by the Reserve Bank (SARB). The fall in inflation rate based on the SACU report was majorly observed in transport inflation, which declined by 1.2% relative to a rise of 6.2% in 2014. Moreover, the decline was subsequently observed in food prices, which only rose by 5.1% in comparison to 7.6% in 2014.

Also, the World Bank (2018a), observed in respect of South Africa that there was a decline in consumer price inflation from 6.6% in January 2017 to a rate of 4.4 in January 2018, which subsequently declined in February to 4%. A number of factors were accounted for the fall, such as minimal food and fuel price inflation, which constituted the main factors, mostly as the economy began to revamp from the drought in 2015, whose effects were continuously felt in 2016. Moreover, based on the report, it was observed that the improvement in inflation rate was because the rand experienced appreciation due to the impressive commodity prices as well as the improvement in investor confidence alongside the inflows of capital since the elective conference of the ANC in December 2017. The foregoing situational report, though on monthly terms, may also be attributed to the behaviour of the graph above for South Africa over the reported period by the World Bank.



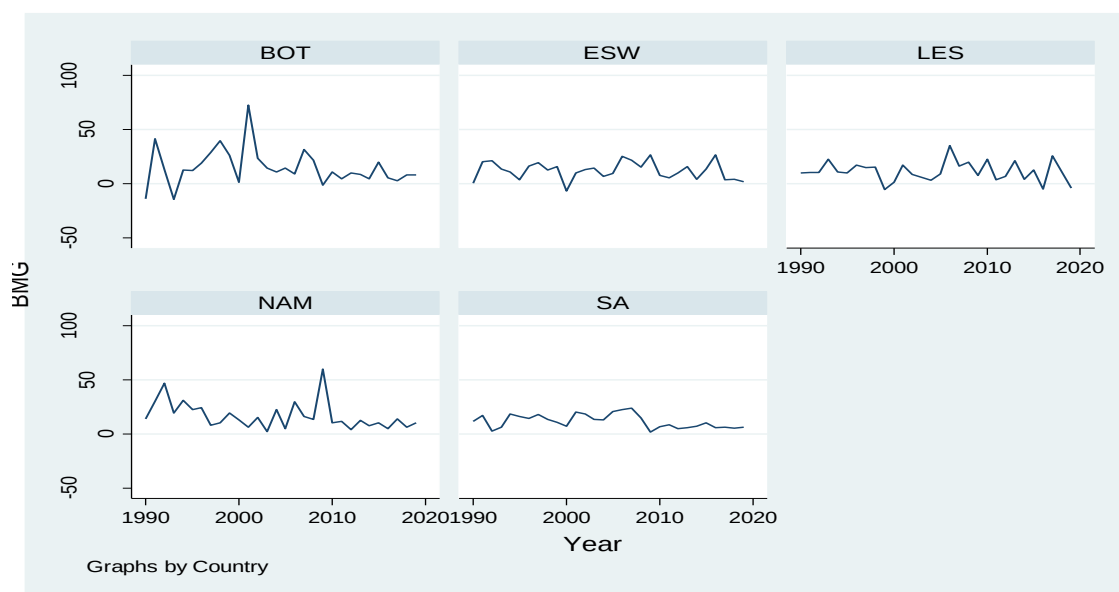
Source: Author's computation from Stata 14, 2021

Figure 5.5. Central Bank Policy Rate Differential (CBPD)

5.5.5. The trend and pattern of the central Bank policy rate differential

Figure 5 captures the central banks' monetary policy rate differential. Considering the United States as one of the key trading partners of SACU as well as a dominant world economy, a difference was found between the rate that prevailed in the USA and the respective countries in SACU. This will, on average, influence investors' decisions on the viability of prospective investments. A positive difference will tend to drive capital flows into the region, while a negative difference will dampen investment and tend to promote capital outflows. The policy rate differential across the countries fluctuated widely. It was 9.25% in 2005 in Botswana but later declined to 8.75% and 5.0% in 2010 and 2015, respectively. The value in 2005 stood at 1.75% in Eswatini, which later had a constancy of 4.75% in both 2010 and 2015. Lesotho, on the other hand, in 2005 had a policy rate differential of 7.75%, which later increased to 8.77% and 9.49% in 2010 and 2015, respectively. Namibia had the same value as Eswatini in 2005. It later increased to 5.25% and 5.50% in 2010 and 2015, respectively. South Africa had a low policy rate differential of 1.88% in 2005, which later rose to 5.58% in 2010, followed by a decline to 4.92% in 2015.

The countries that constitute the CMA exhibit a similar pattern of policy rate differentials in the region, which can largely be a result of the monetary policy coordination that exists among them. The differential fluctuated downward, which has the implication that the policy rate has been falling over time relative to the rate prevailing in the United States of America. Also, the declining policy rate in the CMA may be partly attributed to the World Bank (2018b) report of the SARB, which aims to ensure a minimal inflation rate. For instance, the World Bank (2018b) reported that decreased pressures on inflation resulted in a decline in policy rates. The report provided some information on the fall in inflation rate between 2017 and 2018, as well as average 2019 inflation expectations and five-year inflation expectations that are limited to the target range. By implication, the era of low policy rates has a high tendency to produce minimal central bank policy rate differentials.



Source: Author's computation from Stata 14, 2021

Figure 5.6. Broad money growth

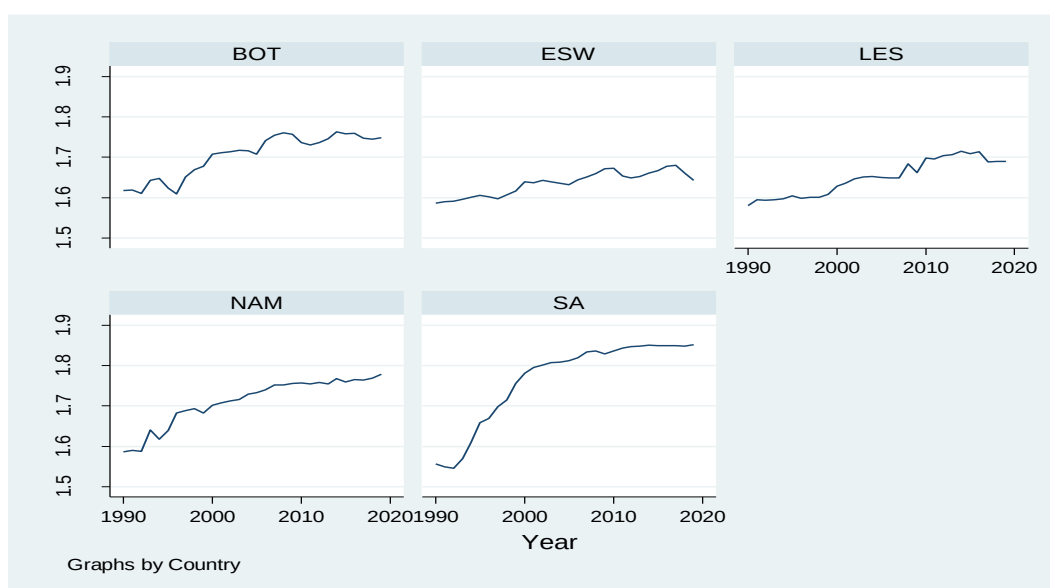
5.5.6. The trend and pattern of broad money growth

Broad money growth is a core monetary policy variable that affects the level of liquidity in an economy. All the countries are characterized by erratic fluctuations in broad money growth over the study period. The fluctuations seem to follow a similar trend across the economies. The BMG for Eswatini, Lesotho, and South Africa is roughly approximate, while Botswana and Namibia had episodes of sharp upward and downward growth in broad money growth.

The value of BMG stood at 14.40% in 2005 in Botswana, but later fell to 10.7% in 2010, accompanied by an increase to 19.87% in 2015. Within this time band, it was observed by Southern African Customs Union (2013) that broad money supply (M2) in Botswana increased by 9.0% in December 2012 compared to 4.4% growth in December 2011, majorly influenced by falling government deposits alongside the expansion in credit growth. The rate in 2005 with respect to Eswatini was 9.71%. It later declined to 7.9% in 2010, followed by a rise to 13.57% in 2015. Lesotho, on the other hand, had a bmg of 9.13% in 2005, which drastically increased to 22.36% in 2010, but stood at 12.55% in 2015. Considering the information from the Southern African Customs Union (2013), which also falls within the time period covered in this study, real growth in money supply was reported to have rapidly increased by 16.1% in December 2013 relative to the 2.8% growth documented in December 2012. It was observed that the rapid

rise in money supply outpaced the inflation rate and was influenced by a fall in local credit, inclusive of claims on the government, while there was a rise in credit to the private sector. It was 5.11% in 2005 with respect to Namibia, which increased to 10.52% in 2010, but declined to 10.17% in 2015. The bmg growth in 2005 was 20.69% for South Africa. It later declined to 6.93% in 2010 and stood at 10.32% in 2015.

A publication by the Central Bank of Lesotho (2015), stated that in 2014, given the 2013 strong growth, money supply rose slightly by 4.0 per cent. The downshift in the growth of money supply was majorly attributed to the deceleration in net foreign assets as well as private sector credit. The rise in net foreign assets declined in 2013 from 25.7% to an estimated 8.8% in 2014, majorly as a result of a decline in commercial banks' net foreign assets. Moreover, based on the outlook, the supply of money was forecasted to increase in the medium term by 6.9% on average, while rising by 9.2% in 2015 but declining to 8.3% in 2017. It was also observed that the rise in money supply was predominantly influenced by private sector credit (Central Bank of Lesotho, 2015).



Source: Author's computation from Stata 14, 2021

Figure 5.7. Log of the globalization index

5.5.7 The trend and pattern of the log of globalization index

Figure 7 relays the trend and pattern of the log of the globalization index over the study period. The swings in the index appeared minimal and showed a relatively upward trending shape. A

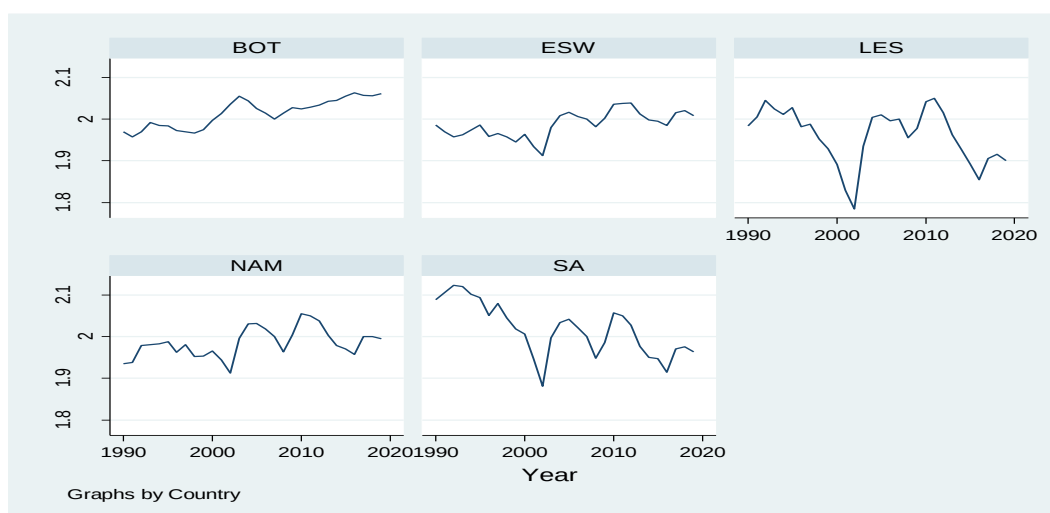
close observation of the lgin graph shows that among all the countries, South Africa has the highest upward trend in the globalization index. By implication, there are higher levels of economic, social, and political development in South Africa compared to the other countries in the region. A further comparative outlook on the graph shows that Eswatini and Lesotho are very close in terms of the globalization index. While Eswatini was a bit away from 1.7 on the graph, Lesotho was only slightly above 1.7. Botswana and Namibia also exhibit roughly similar outcomes. The index was more unstable in Botswana than in Namibia. However, the graphs show that both were close to 1.8, with more proximity in Namibia.

Certain developments in the economy can be attributed to certain developments in the globalization graphic outlook of Botswana. For instance, in order to stimulate FDI, the government designed measures that encourage investment (Government of Botswana, 2003, 2007, 2009). Such FDI-attracting measures encompass a politically stable environment as well as good governance, credible labour relations, macroeconomic policies, stability in the exchange rate, a reduction in the levels of criminality, reduced rates of tax as well as corruption, and an easy avenue to produced goods in Botswana as a result of the trade agreements with a number of economies (Government of Botswana, 1997).

Botswana had a lgin of 1.70 in 2005. It increased to 1.73 in 2010 and had a further rise to 1.75 in 2015. It was 1.63 in 2005 in Eswatini. It later increased to 1.67 in 2010 and stood at 1.66 in 2015. The figures in Lesotho were 1.65, 1.69, and 1.70 in 2005, 2010, and 2015, respectively. Namibia had 1.73 in 2005. It increased to 1.75 in both 2010 and 2015. Lgin for South Africa was 1.81 in 2005, which later increased to 1.83 and 1.84 in 2010 and 2015, respectively.

The South African economy exhibited the highest level of globalization index in the Union. This may be connected to the positive development in certain areas of the economy. For instance, the South Africa Investment Conference (2019) reported that the economy of South Africa shows a high level of diversification in respect of sectoral composition. The economy, within the context of the African continent, is the most developed and high-tech advanced economy. It has the status of the continent's main manufacturing hub as well as a foremost destination for services. The country is further described as being endowed with a plenitude of natural resources as well as being characterized by a considerable and modern network of infrastructure. In terms of the banking sector, the economy is observed as the financial hub on the continent of Africa and is also described as a hub for innovation, technology, and fintech. The foregoing description of the South African economy, coupled with its democratic and

politically stable atmosphere, will invariably positively affect the globalization index of the country.



Source: Author's computation from Stata 14, 2021

Figure 5.8: Log of the real exchange rate

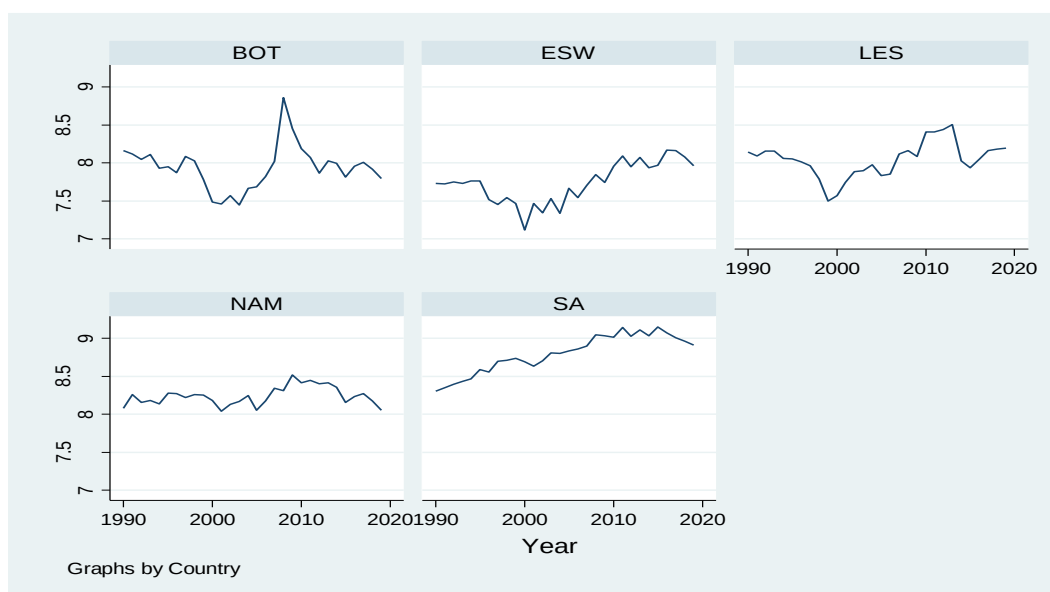
5.5.8. The trend and pattern of the log of real exchange rate.

The real exchange rate is very crucial for the inter-country movement of resources. The inflows and outflows of capital influence the real exchange rate. From the early 2000s until the end of the study period, the behavior of the CMA countries' real exchange rates was similar. This is unconnected to the arrangement within the CMA, which requires the pegging of the respective countries' currencies to the rand on a one-to-one basis. However, Botswana, which pooled out of the monetary area, is characterized by different movements in the exchange rate. Despite the monetary arrangement in the CMA, there are fluctuations over time in the real exchange rate. The log of the real exchange rate was 2.02 in both 2005 and 2010, but later increased to 2.05 in 2015 in Botswana. Eswatini had 2.01 in 2005 and later increased to 2.03 in 2010, but decreased to 1.99 in 2015. Following a similar pattern, the Irer was 2.01 in 2005 in Lesotho, which increased to 2.04 in 2010, but stood at 1.89 in 2015. In a similar vein, it was 2.03 in 2005 in Namibia, but advanced to 2.05 in 2010, while it stood at 1.97 in 2015. South Africa had a level of 2.04 in 2005, but increased to 2.05 in 2010, which later declined to 1.94 in 2015.

On the general outlook, the CMA and Botswana need to adopt policy measures that will minimize the swings in the real exchange rate to sustain investors confidence in the region.

The observation in figure 8 above shows that Lesotho, Namibia, Eswatini, and South Africa that operate a common monetary area exhibit some close similarity in the behavioural pattern of the real exchange rate, which is largely because the currencies of the other three countries are pegged to the rand. This outcome is in consonance with Frankel (1999), who provided that the implementation of monetary policy be characterized by coordination among the economies that opted for the common use of a currency on the basis that the effect of their policies on the exchange rate would be alike, while the pursuit of dissimilar monetary policies would generate varying effects on the real exchange rate. It was observed that countries in SACU have been characterized by severe volatility in exchange rates and the fact that their abilities to successfully hedge against volatility risk in exchange rates proved abortive. Firms were reported to be constrained in exportation to the extent they would be such that reduced volatility in the exchange rate, generating deficits in the current account, resulting in a negative outcome regarding the growth rates of the economies (Ajao & Igbekoyi, 2013).

The real exchange rate in Botswana, though with some moderate fluctuations, appeared relatively more stable than the CMA economies. Masalila and Motshidisi (2003) observed in their study that, since mid 2000, more attention has been paid to the stability of the real exchange rate in respect of the basket and the elimination of the band encircling the rand, which implies that the pula nominal exchange rate against the rand experienced appreciation beyond previously observed instances. Moreover, the authors reported that authorities in Botswana have largely prevented the overvaluation of the pula by ensuring that the exchange rate exhibits some flexibility given the differential in inflation or not permitting too much upward movement of the currency, which may undermine export competitiveness. Therefore, the pattern of movement of the real exchange rate in Figure 5.8 above for Botswana (which is relatively stable compared to other economies in SACU) may be partly attributed to its effective management by the authorities in Botswana.



Source: Author's computation from Stata 14, 2021

Figure 5.9: Official Aid and Development Assistance

5.5.9. The trend and pattern of official aid and development assistance

The log of official aid and development assistance of the respective countries is characterized in Figure 9 and reflects that it has been unstable over time in the region. Observing the graphs, South Africa had the highest recipient of development assistance, followed by Botswana. Lesotho and Namibia were roughly around 8.5 on the y-axis, while Eswatini had some values above 8. South Africa and Botswana had 8.83 and 7.68 in 2005, respectively. The value increased to 9.01 and 9.15 for South Africa in 2010 and 2015, respectively. LFDA stood at 8.18 for Botswana in 2010, but later declined to 7.81 in 2015. It was 7.66 for Eswatini in 2005 and later increased to 7.95 in 2010, but had a value of 7.96 in 2015. The value of the lfda for Lesotho increased in 2005 from 7.83 to 8.40 in 2010, but eventually declined to 7.93 in 2015. For Namibia, lfda stood at 8.05 in 2005, but increased to 8.41 in 2010, which later declined to 8.15 in 2015.

As an apartheid country, South Africa was described as lacking foreign aid and having increased low levels of foreign direct investment due to global sanctions. However, the scenario changed with the inception of democracy, while the World Bank reported that the net official development assistance and the receipt of official aid by the South African economy rose consistently from the value of US \$386.17 million in 1995 to US \$1.42 billion in 2015. Moreover, the DAC economies (67.2%) and multilateral agencies (32.7%) accounted for most

of the aid received in 2015. They were largely disbursed as grants (US \$808.6 million) and gross loans (US \$736.69 million) (World Bank, 2017) as cited in Jing *et al.* (2019).

The relatively upward trend of official aid and development assistance in South Africa shown in Figure 9 above can be attributed to the absence of apartheid and the enthronement of a democratic political environment.

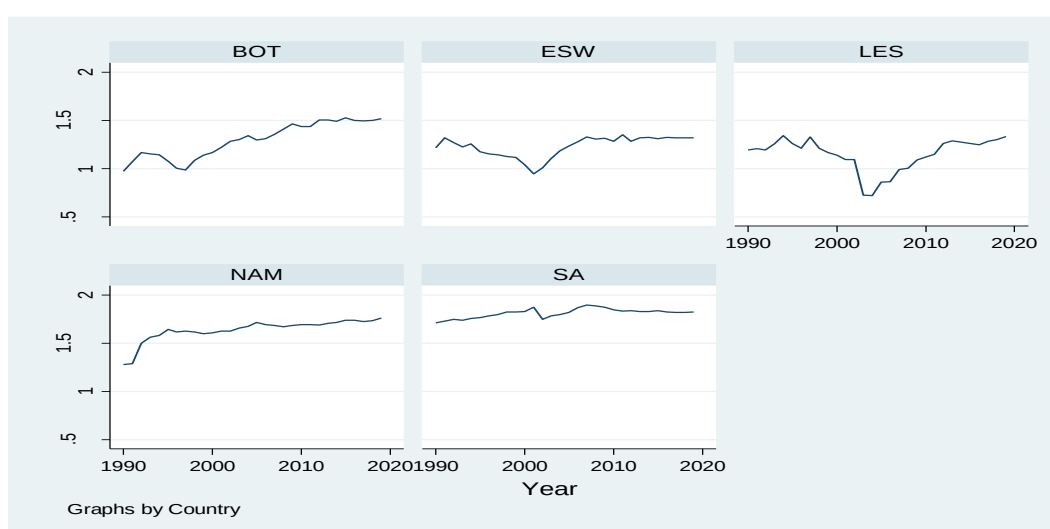
Observing Botswana shows that, though official aid and development assistance approached a peak around 2010, they declined and subsequently fluctuated downward. Such an outcome is connected to the view of Ohno (2006) as cited in Wada and Togo (2008). The author described that in Sub-Saharan Africa, Botswana is among the few "successful examples" that do not depend heavily on foreign aid and have enjoyed the sustainability of economic development in the post-political independence period.

Moreover, Namibia's official aid and development assistance, mentioned above, have not really been sustainable over time. This can be comparably related to the information from Rena (2013). The information provides that aid flows showed a steady and continued decline on a per capita basis from US \$110 in the 1990s to US \$60 in 2005. Moreover, the active number of Namibia's bilateral donors was reduced from 22 in the 1990s to 17 in 2006. It was also observed that donor assistance, such as technical assistance as well as other areas, has not been effectively impressive.

Figure 9 also shows that official aid and development assistance have not been sustainable over time in Lesotho. The extension of development assistance and its effective utilization is expected to promote the economic development of small economies, as in the case of Lesotho. Official aid and development assistance moved in the downward direction in the early 1990s to late 1990s but later increased. This somewhat corroborates the study of Thamae and Kolobe (2016), who reported that the inflows of foreign aid were adversely affected due to the inability to fulfill the standard aid conditions of political pluralism and economic liberalization due to the replacement of the civilian government by the military coup of 1986–1993. Specifically, there was a swift decline in aid from 26% to around 15% over the period between 1980 and 1999. Moreover, some donors withheld aid and shut their offices in the country due to the political instability that characterized 1994 and 1998, which subsequently decreased the inflows of foreign aid, which has stayed at around 8% over the period 2000–2010.

From the 1990s to 2000 in Eswatini, official aid and development assistance fluctuated in the downward direction. Subsequently, they fluctuated in the upward direction. Swaziland's report

by UNDP (2015), revealed that Eswatini experienced a significant reduction of 35% in ODA between the 2009/10 and 2010/11 fiscal years relative to the growth of 89% that characterized the fiscal year previously. The fall was majorly ascribed to the global financial and economic crisis that commenced in 2009 in the United States of America and spread throughout the developed and developing economies. Subsequently, ODA improved moderately to 5% in the 2011/12 fiscal year. Nonetheless, aid is expected to fall by 14% in FY2014/15, owing to a drop in funding obtained by PEPFAR, World Vision, and MSF, which account for 39% of total ODA. However, FY2015/16 was estimated to be characterized by a budgeted rise in overall aid of 27% on the basis of a rise in World Bank funding. Such a description of the economy of Eswatini may likely contribute to the movement of ODA over the reported period by the UNDP.



Source: Author's computation from Stata 14, 2021

Figure 5.10: Log of Monetary Credit to the Private Sector

5.5.10. The trend and pattern of the log of monetary credit to the private sector

In Figure 10, the log of monetary sector credit to the private sector is expressed with minimal fluctuations in Namibia and South Africa. Among the five countries, South Africa seems to have the highest level of monetary sector credit to the private sector. In logged values, *lmscp* was 1.81 for South Africa in 2005, which increased to 1.84 in 2010, followed by a decrease to 1.83 in 2015. *Lmscp* in 2005 for Namibia was 1.71, but declined to 1.69 in 2010, which was later accompanied by 1.73 in 2015. It was 1.29, 1.23, and 0.85 in 2005 for Botswana, Eswatini, and Lesotho. While Botswana increased to 1.43 in 2010, it increased to 1.28 and 1.12 in

Eswatini and Lesotho in 2010. The values in 2015, respectively, for Botswana, Eswatini, and Lesotho, stood at 1.52, 1.31, and 1.25.

Evaluating the foregoing in the light of previous studies, Molapo and Damane (2017), on the basis of the World Bank's Doing Business reports over the period 2007–2013, found that Lesotho, among the countries in SACU, exhibits the worst performance in terms of the ease of accessing credit indicator. This compareably supports the behavioural pattern of monetary sector credit to the private sector in Figure 10 in terms of Lesotho over time. However, Molapo and Damane (2017), using information from the Central Bank of Lesotho and the Cooperatives Department under the Ministry of Trade and Industry, reported that, on average, 39% of total credit was extended in 2013 to private enterprises while households received the remaining proportion, characterized by the greater part of it being personal loans. The author therefore observed the need for institutional reforms in the country in order to enhance the ease of access to credit by private enterprises towards promoting productive investments and subsequently stimulating growth.

Examining the graph above shows that Lesotho and Eswatini are the least performing economies in terms of financial sector development as proxied by monetary sector credit to the private sector. According to the AfDB *et al.* (2012b), with respect to the report on Swaziland, the stock of private sector credit accounted for 23% of GDP in 2010, indicating that the depth of financial markets in Swaziland is constrained compared to middle and low-income economies worldwide. In addition, the growth of private sector credit has been low in 2011, which averages around 13% from September 2010 to August 2011 in spite of accommodative monetary policy. Moreover, the weak financial sector depth is a reflection of financial exclusion, which implies that most people in Swaziland do not have access to formal credit based on the 2011 FinScope survey, in another development, the central bank is constrained in effectively transmitting policy from the policy rate as well as from lending rates to actual loans given by commercial banks. This signals structural constraints constituting the lack of collateral securities, an inability to organize bankable proposals by borrowers, as well as the unavailability of credit history. The situation of the Eswatini's economy as described in the foregoing can be inferred to have impacted on the state of monetary sector credit in the country.

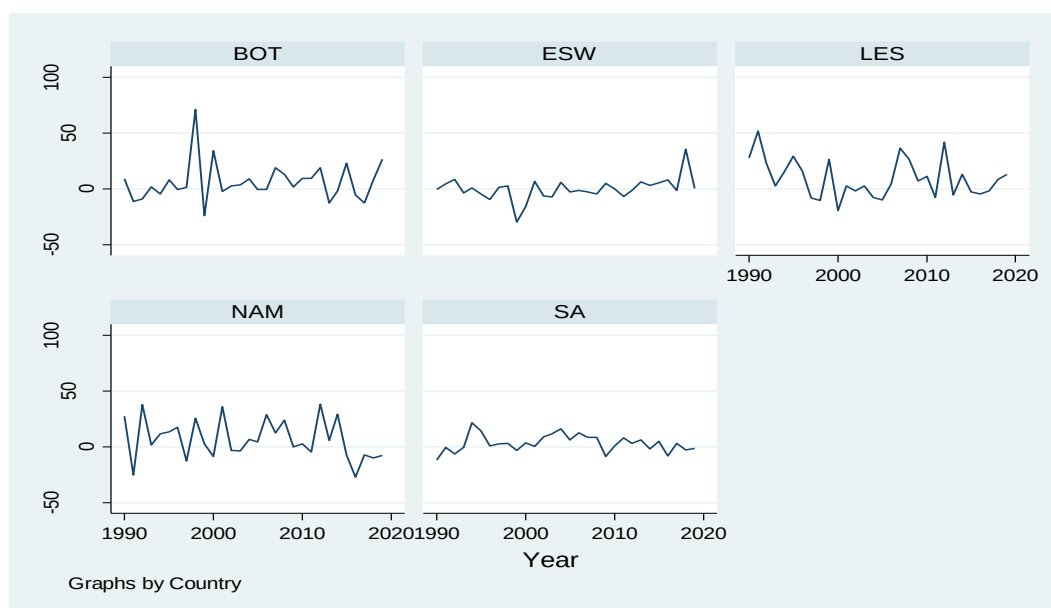
Namibia's graph above shows that monetary sector credit to the private sector tends to have an upward trajectory. This relates comparably to the information by Ikhide (2003) that the extension of commercial bank credit to the private sector has improved dramatically since

1990, which coincides with the reference period in this current study. Nevertheless, it was observed by the author that since 1996, the rate of growth has slowed down greatly. Over the period 1991–1995, the extension of real credit to the private sector increased at a yearly average of 17.8%, while it declined to 3.14% over 1996–2000. The decline in the domestic credit growth rate in the second half is mostly ascribed to the contractionary monetary policy embraced by several monetary authorities in the emerging markets, mostly in the aftermath of the Asian financial crisis of 1997/98, as well as the increase in the size of the financial markets. Furthermore, banks were found to have increased risk aversion primarily since mid-1998), as evidenced by a drop in risk-weighted assets to aggregate assets from 76 percent to 66 percent between 1998 and 2001. Also, there was a fall in the proportion of overdrafts in aggregate lending by banks from 42 per cent to around 30 per cent within the time showing that banks moved to put their lending under control.

The next country for explanation is Botswana. A look at Figure 12, which displays the respective economies' policy rates over time, shows that in the early 1990s, the policy rate in Botswana maintained an upward movement. Thereafter, it declined and was subsequently characterized by some fluctuations that eventually moved in the downward direction. The downward movement in the policy rate is an indication of the need to pursue an expansionary monetary policy stance. Observing Figure 10 above, it shows that monetary sector credit trended upward in the early 1990s, after which it declined towards the late 1990s, but has subsequently moved less sloply in the upward direction with some mild fluctuations. A report by AfDB *et al.* (2012a) found that an adequately established borrower information process in Botswana backed the private sector's access to credit, inclusive of borrowing by households. Private bureau coverage, in particular, stood at 57 percent of adults, promoting credit extension to the private sector. Private sector credit was reported to constitute around 50% of the total supply of money and about 20% of GDP. Such a well organized borrower information system in Botswana might have significantly contributed to the upward trend of monetary sector credit to the private sector as contained in Figure 10.

Among the economies in SACU, South Africa, as observed in Figure 10 above, appeared to be the most highly performing in terms of monetary sector credit to the private sector. This is unconnected to its well-developed financial architecture among its peers. Also, based on comparing South Africa's policy rate in Figure 12 with the private sector credit in Figure 10, it clearly shows that while the monetary policy rate as proxied by the repo rate fluctuated

downward, monetary sector credit to the private sector remained high. This signals that the Reserve Bank mostly pursued an expansionary monetary policy over time.



Source: Author's computation from Stata 14, 2021

Figure 5.11: Growth rate of gross capital formation

5.5.11 The trend and pattern of gross capital formation growth rate

The gross capital formation growth rate, which is an index of the extent of investment activities in an economy, is characterized by Figure 11. The appearance of the graphs conveys swings across the countries. It was negative for Botswana in 2005 at the value of 0.52, but increased to 9.58 and 22.76 in 2010 and 2015, respectively. The growth rate was -2.67 in Eswatini as at 2005, but experienced increased growth to 0.02 in 2010 and later increased to 5.57 in 2015. Lesotho also had a negative growth rate of 9.86 in 2005, which increased to 11.09 in 2010, and stood at a negative growth rate of 2.65 in 2015. The growth rate for Namibia in 2005 was 4.34, but declined to 2.90 in 2010, which later stood at a negative growth rate of 6.96 in 2015. South Africa had a growth rate of 6.29 in 2005, which declined to 1.12 in 2010 but later increased to 4.87 in 2015.

The Gross Capital Formation growth rate had its highest in the region, specifically in Botswana, around the late 2000s, which could be attributed to the stable macroeconomic environment of the economy that promoted investment activities. Nevertheless, capital formation over time, as

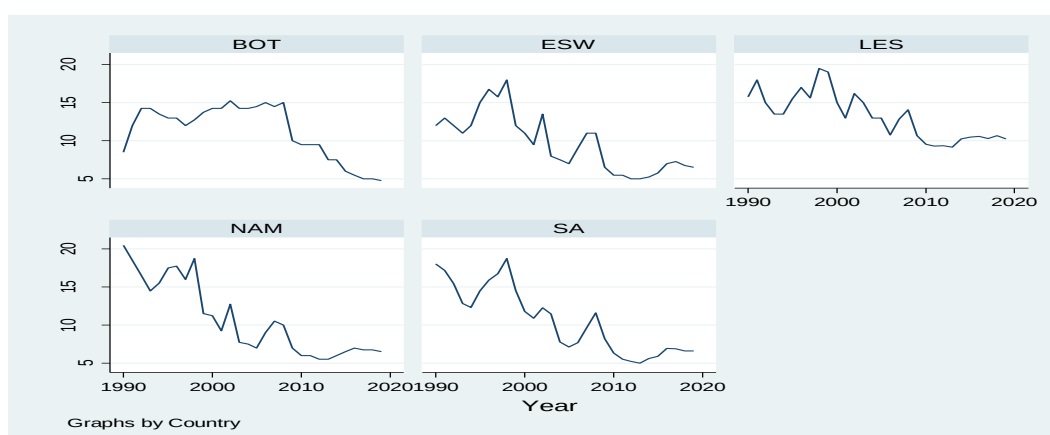
in other economies in the union, was not sustainable. Botswana's economy, according to AfDB *et al.* (2012a) African Economic Outlook (2012), is fraught with the problems of a high unemployment rate of 17.6%, a high level of income inequality, and a poverty level of 20.7%. The foregoing challenges that confront the economy are expected to undermine the rate of capital formation in the economy as they are invariably expected to negatively affect savings, which is very crucial in the process of capital formation. Also, the South African economy has not fared well in terms of the high level of unemployment rate, which is invariably expected to undermine capital formation and may trigger the incidence of a vicious cycle. High unemployment has a high tendency to reduce output, which lowers incomes in the economy. A low income level will reduce savings, which subsequently reduces capital formation. It therefore becomes crucial at this point to admit that the high incidence of unemployment indirectly influences the prospects of capital formation in the South African economy. For instance, based on Statistics South Africa (2018) and the study of Kimberly (2019) as cited in Pasara and Garidzirai (2020), the South African economy has experienced consistent economic challenges in terms of unemployment and the stagnation of economic growth, which is implied by a 29% unemployment rate that exceeds the 5% acceptable level. Also, according to Statistics South Africa (2019) as cited in Pasara and Garidzirai (2020), the South African economy has undergone three technical recessions from 2008. This, of course, would negatively impact the process of capital formation.

The state of gross capital formation in respect of Eswatini in figure 11 above shows that it fluctuated over time during the study period. The performance of gross fixed capital formation, which is the capital-intensive component to a large extent, will influence the behavioural performance of the entire capital formation. A study by Hamid (2012) observed that, over the period 1991–2010, gross fixed capital formation declined in Swaziland's economy. Gross fixed capital formation was reported by the author to decline by -2.7% per year during the period 1991–2010, when fixed investments in other economies in Southern Africa had an average growth rate of 6.3%. Also, over the period 2003–2004, private gross fixed capital formation fell from 14.8% to 7.2% of GDP. The author attributed the swift fall in private fixed capital formation in the economy as being partly due to declining domestic savings. Specifically, Swaziland's gross domestic savings as a proportion of GDP, reduced from a high rate of 19.6% in 2003 to -2.3% in 2010.

The foregoing description of fixed capital formation in Swaziland gives a rough reflection of the overall likely behavioural performance of gross capital formation, and it can therefore be concluded that the weak gross savings in the economy partly influenced the unstable situation of capital formation in the economy.

The economy of Namibia, among its peers, also shows instability in gross capital formation during the study period. This could also be partly influenced by the state of savings in the economy. According to Zaaruka (2012), the government of Namibia embarked on a number of policies in order to motivate domestic and investment from abroad during independence, which among others, included, the establishment of an Investment Centre under the Ministry of Trade and Industry by the use of the Foreign Investment Act of 1990. Other measures include business-tax and special-investment inducements and the establishment of an export-processing zone on the basis of the Export Processing Zone Act of 1995. Despite the inducements as well as the condition of secure property rights in the country, there was a swift fall in the investment rate over the first ten years of the post-independence era. Gross capital formation was reported to be around 15.8% of GDP on average over the period 1990-1999. However, a moderate improvement in the rate of investment was observed during the period 2000–2009, at 21.7% of GDP on average.

The authorities in Namibia therefore need to identify the major constraints to capital formation in the economy with the aim of improving the state of investment and the overall development of the economy.



Source: Author's computation from Stata 14, 2021

Figure 5.12: Central Bank Policy Rate

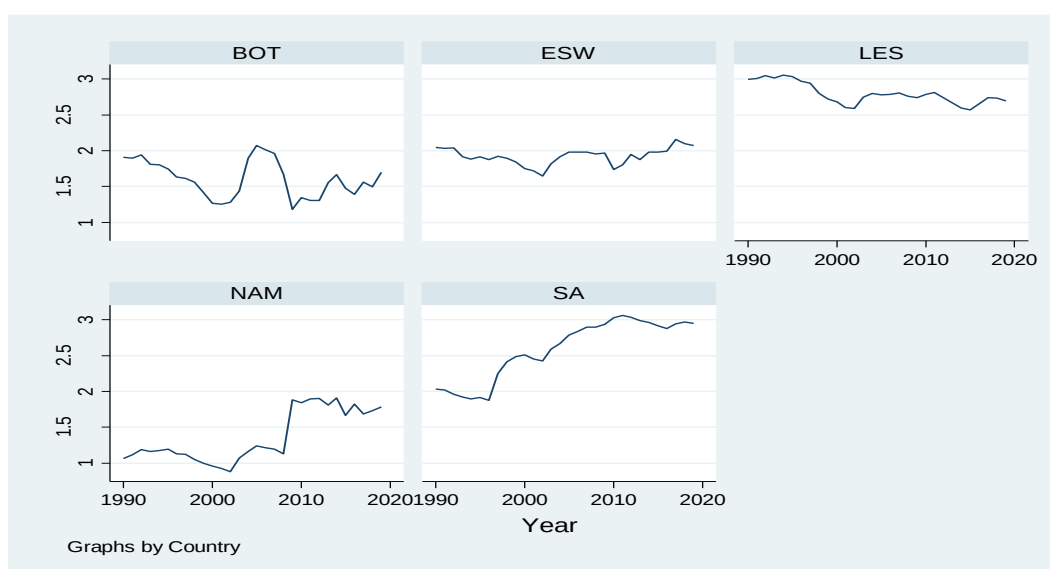
5.5.12. The trend and pattern of the central banks' policy rates

The policy rates for the respective countries are expressed in Figure 12. A proper observation of the countries that constitute the common monetary area (CMA) revealed a relatively similar pattern over the study period. This can be traced to the monetary arrangement between South Africa and the LNS economies that requires the pegging of the respective currency of the LNS on a one-to-one basis to the rand as well as the responsibility of a discretionary monetary policy by South Africa. The CMA showed fluctuations in the central banks' policy rates over time, which indicates a downward trend. The fluctuation of the policy rate in the downward direction is an indication of the intention of the South African Reserve Bank to pursue monetary easing in order to stimulate economic activities. The policy rate in Botswana also exhibits some swings that are downward trending. The policy rates in 2005 for South Africa, Namibia, Lesotho, and Eswatini were, respectively, 7.12, 7.00, 13.00, and 7.00. It decreased in 2010 to 6.33 in South Africa and had a rate of 5.91 in 2015. However, in Namibia, it decreased to 6.00 in 2010, but stood at 6.50 in 2015. The policy rate in Lesotho decreased to 9.52 in 2010, but was 10.49 in 2015. The policy rate in Eswatini decreased to 5.50 in 2010, but stood at 5.75 in 2015. Botswana had a policy rate of 14.50 in 2005, but declined to 9.50 and 6.00 in 2010 and 2015, respectively.

The general downward like shape of the policy rate above, somehow, appears comparable to the description of the respective economies in SACU by the SACU (2013) report. According to the report, interest rates are crucial in containing pressure on inflation rates. It was noted in the report that the monetary authorities in SACU ensured the provision of monetary stimuli via minimal interest rates in order to enhance economic activity. For example, Botswana's bank rate was cut by 200 basis points from 9.5 percent (which had remained constant since December 2010) to 7.5 percent due to benign global minimal inflationary pressures, weak local demand, and a favourable view of inflation. However, the Lesotho reports have it that the 91-day Treasury Bill rate was reduced slightly from 5.4 per cent in December 2012 to 5.2 per cent in December 2013, in accordance with the Lombard Rate, which fell from 9.4% to 9.2% within the same time frame. It was also provided that the Monetary Policy Committee in South Africa adopted an accommodative stance on monetary policy in order to enhance output. Specifically, it was noted that from November 2010 to May 2012, the repo rate remained constant at 5.5%, mostly as a result of the volatile and unpredictable view of the economy alongside the upside risks. It was also reported that the repo rate in July 2012 declined by 50 basis points to 5.0%

and remained constant in order to improve the sectors that were strained and promote growth until it rose in January 2014 by 50 basis points to 5.5%. It was emphasized by the report that the rise in the repo rate was due to the worsening outlook of inflation in the scenario of rand depreciation, outflows of capital, deficit in the current account, and overall worsening of the macroeconomy in the emerging markets alongside the instability in currencies.

According to the World Bank (2018a) report, the decline in inflation pressures resulted in the reduction of the policy rates given that the inflation rate is now confined within the target band of the South African Reserve Bank. The policy rates, therefore, of the other economies, comprising of Lesotho, Namibia, and Eswatini, automatically followed the directional movement of the repo rate as shown in figure 12 above, due to the fact that their respective currencies are pegged to the SARB policy rate.



Source: Author's computation from Stata 14, 2021

Figure 5.13: The log of inward remittances

5.5.13. The trend and pattern of the log of inward remittances

The log of inward remittances across the economies are displayed in figure 13. Remittances are in the category of unilateral transfers whose effect on the welfare of the recipients largely depends on the direction of their use. Relative to other member countries, Lesotho appears to be the biggest recipient of remittances over the study period. The inflows of remittances into the respective countries exhibit some fluctuations. Remittances to Botswana were 2.07 in 2005,

which decreased to 1.34 in 2010, but later increased to 1.47 in 2015. The value in 2005 for Eswatini was 1.97, but declined to 1.73 in 2010, which later stood at 1.98 in 2015. While remittances were 2.77 for Lesotho in 2005, they increased to 2.78 in 2010, but later decreased to 2.56 in 2015. It was 1.24 for Namibia in 2005, but stood at 1.84 and 1.66 in 2010 and 2015, respectively. South Africa had a value of 2.78 in 2005, which increased to 3.02 in 2010, but decreased to 2.91 in 2015.

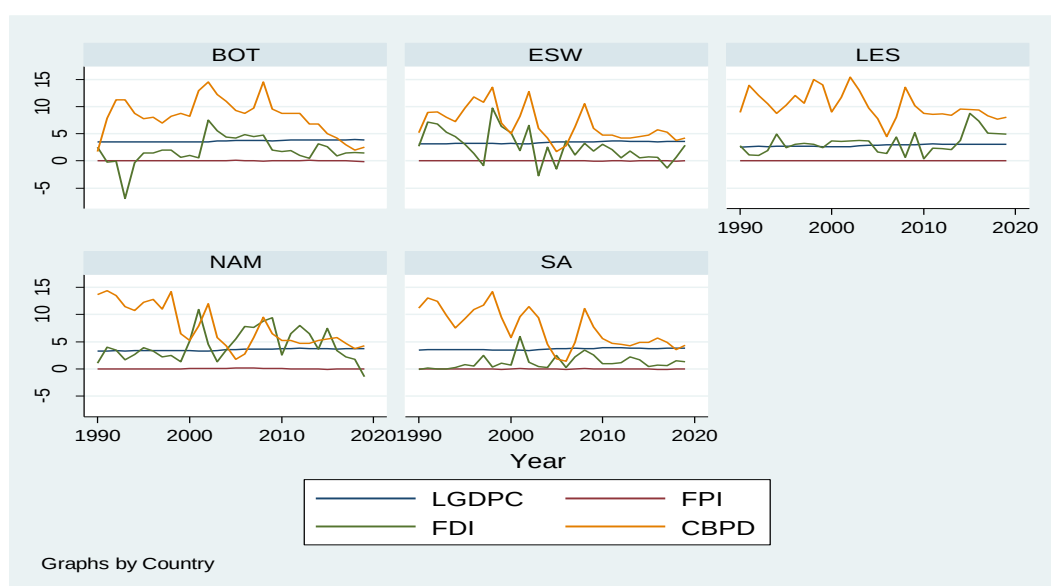
Figure 13 above, in respect of South Africa, shows some increases in remittances. One part of the reason could be likened to the report of the World Bank (2019a) as cited in Nyasha and Odhiambo (2020). According to the World Bank (2019), from 1998, there was a rise in remittances to South Africa attributed to the observation that there was increased emigration of South Africans, which resulted in remittances rising from US \$258.6 million, representing 0.2% of GDP (in 1998), to a peak of US \$1.2 billion, representing 3% of GDP in 2011. However, the inflows of remittances were reported to fall steadily to US \$755.4 million in 2016, followed by an improvement to US \$873.2 million in 2017.

Furthermore, remittance inflows to Lesotho declined moderately over the period between 2007 and 2008. Sibindi (2014) observed that the fall in remittances over this period corresponds to the era of financial crisis. It therefore implies that the financial crisis could have contributed to the decline in the inflows of remittances to the country. The economy of Botswana, while experiencing some fluctuations in remittance inflow over time, experienced some steady declines in the early part of this study period in the 1990s. During the post-independence period in 1966, Botswana was described as a marginalized economy, and some Batswana largely moved out of the country to South Africa in order to work in gold and diamond mines (Migration Policy Institute, 2004). The foregoing development significantly resulted in high remittance inflows in the 1980s at an average of 4.2%, till the 1990s having a decrease in the average to 1.2%, while the proportion of remittances to GDP stayed below 1% up to 2017 (UNCTAD, 2019b). Such a decline in the current study after previously registering at a high rate in the 1980s could be as a result of prospects in the macroeconomic environment and encouraging government policy by the government of Botswana that motivate a return to the country. This is corroborated by the Migration Policy Institute (2004), that described that the uncovering of diamonds in Orapa positively affected the economy and the country was observed to exhibit a high level of stability and prosperity in the class of middle-income, which produced the desire in the majority of Batswana to be domiciled and work in their country.

A further look at figure 13 above shows that in the 1990s, Namibia exhibited the lowest inward remittances. This could be attributed to the report provided by National Planning Commission (2021). According to the report, Namibia's low level of population relative to many other countries in Africa and the limited number of citizens abroad resulted in a comparatively low volume of remittances relative to other international private flows like FDI.

Finally, the inward remittances in Eswatini have also not been stable over time. AFFORD (2020) reported that most of the Eswatini citizens in diaspora are domiciled in South Africa or the UK. Workers' remittances were observed to play an important role in extended family incomes, mostly for seasonal workers. In another development, Ayoki (2011) reported that national saving decreased from 18% of GDP over the period 1997–99 to 16% in 2000 and 14% in 2001 (IMF, 2003), which was specifically attributed to the decline in remittances from Eswatini citizens working in the mining sector in South Africa. Figure 13 compares Eswatini inward remittances, which shows that remittances decreased between 1997 and 1999. This could partly be due to the fall in remittances from migrant mining workers in South Africa.

On the whole, the influx of inward remittances is not sufficient in itself, but its effective utilization promotes growth and living standards.

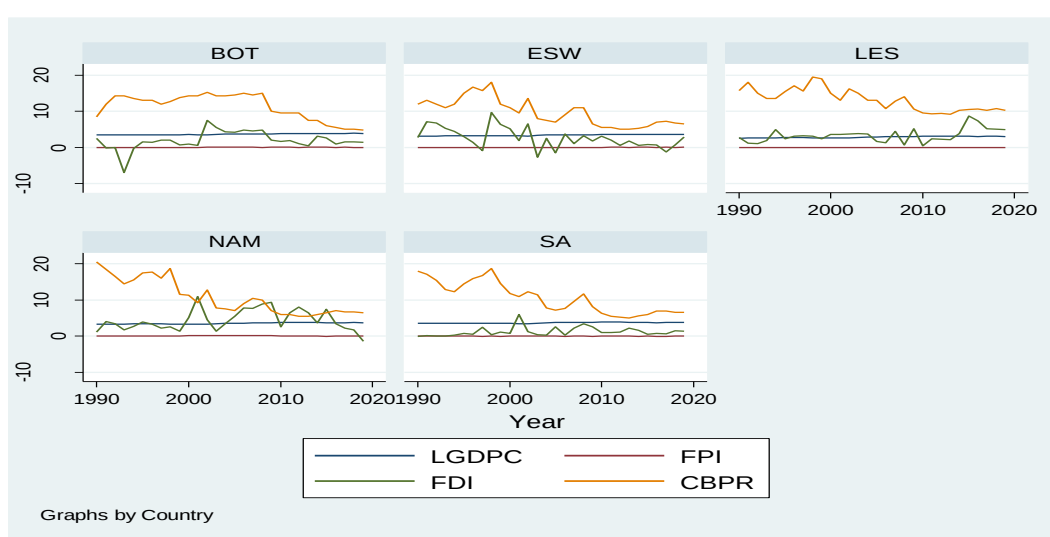


Source: Author's computation from Stata 14, 2021

Figure 5.14: Economic growth, capital flows, and the central bank policy rate differential

5.5.14 The comparative trend and pattern of economic growth, capital flows, and the difference in central bank policy rates

Figure 14 is a synthesis of the log of gross domestic product (lgdpc), foreign portfolio investment (fpi), foreign direct investment (fdi), and the central bank policy rate differential (cbpd). The policy rate differential runs above fpi, fdi and lgdpc in most parts of the study period for Botswana, Eswatini, Lesotho and South Africa, while for Namibia it oscillates around fdi in some parts of the study period as well as runs above lgdpc in most parts of the study period, while fpi runs completely below it all through the periods.

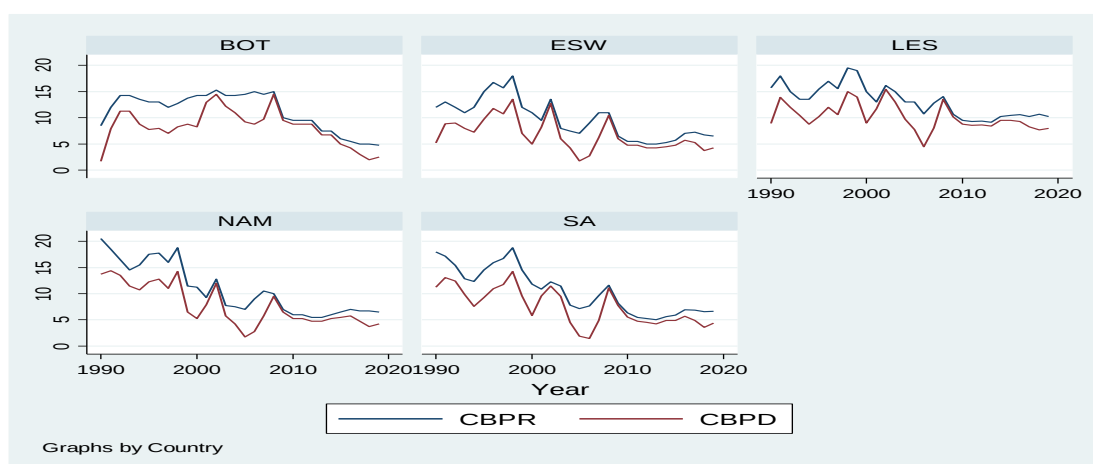


Source: Author's computation from Stata 14, 2021

Figure 5.15: Economic growth, capital flows, and the central bank policy rate

5.5.15 The comparative trend and pattern of economic growth, capital flows, and central bank policy rate

The use of cbpr along with lgdpc fdi and fpi is contained above. The level of relationship of cbpr is similar to that of the central bank policy rate differential. It runs above all the variables on the graph for Botswana, Eswatini, Lesotho, and South Africa, but shows some oscillations around a little part of fdi, which is above lgdpc and fpi in Namibia.



Source: Author's computation from Stata 14, 2021

Figure 5.16: Policy rate and differential of the central bank

5.5.16. The comparative trend and pattern of the central bank's policy rate and the central bank's policy rate differential

Figure 16 shows the central bank policy rate (cbpr) and the central bank policy rate differential. The two graphs fluctuated downward across all the economies that comprised the Southern African Customs Union. Such a similar pattern, most especially among South Africa, Lesotho, Namibia, and Eswatini, is largely attributed to the strong monetary coordination by the South African Reserve Bank, while that of Botswana is indirectly influenced on the basis of cross rates. It therefore suffices that capital flows into the region, mostly in terms of portfolio assets, would be largely influenced by the monetary policy direction of the SARB. The implication of the downward fluctuating trend implies a decrease in the expected returns on financial assets on average, *ceteris paribus*.

The following table displays the lag length of the macroeconomic variables on the basis of the *Forval* approach, given the default lag selection criterion of BIC. The lag length selection for economic variables is very crucial in empirical research as it uncovers the relative period it takes a policy action to reflect on the dependent variable.

Table 5.13: Lag length criteria for all the variables

Variables	Country 1	Country 2	Country 3	Country 4	Country 5	Selected
lgdpc	1	1	1	1	1	1
fpi	1	0	0	1	1	1
fdi	1	1	0	0	0	0
lgin	0	0	0	1	0	0
lreer	0	0	1	1	1	1
linr	1	1	0	1	1	1
lfda	0	0	1	0	0	0
lmscp	1	0	0	1	1	1
inf	0	0	1	1	0	0
gcfg	0	1	1	0	0	0
cbpd	0	0	0	0	0	0
bmng	0	1	0	1	1	1

Source: Author's computation from Stata 14, 2021

5.6. Stationarity test

The test for stationarity becomes imperative in order to ascertain the state of the panel data set that constitutes the study, thus preventing the spuriousity of regression results. The study employs the Levin-Lin-Chu (LLC) test as well as the Im-Pesaran-Shin (IPS) test. Considering Pesaran (2007), the study incorporates the Cross Sectional Augmented IPS test (CIPS) in order to contain the weaknesses of IM-Pesaran-Shin (IPS), which does not account for macroeconomic linkages.

The IPS test has the benefit of analyzing the heterogeneity across the sections as well as neutralizing the existence of serial correlation. As a result, it produces an efficient test in small samples. Although the LLC considers the heterogeneity across the sections that constitute the panel, it cannot completely neutralize the presence of serial correlation in small samples (Wang *et al.*, 2011). It, therefore, becomes relevant to conduct the IPS test as a robustness check given the small sample for this study, which contains only five countries. Table 5.14 shows the results of the panel unit root test of the variables.

Table 5.14: Panel unit root test results

Series	Levin, Lin and Chu Test [A]				Im, Pesaran and Shim Test [B]				Result [A]	Result [B]
	Level		First Difference		Level		First Difference			
	T -Test	Prob. Value	T -Test	Prob. Value	T -Test	Prob. Value	T -Test	Prob. Value		
Lgdpc										
Constant			-5.6887	0.0000			-6.0409	0.0000	I(1)	I(1)
Constant and trend			-4.3541	0.0000			-4.5224	0.0000	I(1)	I(1)
Fpi										
Constant	-2.4608	0.0069			-4.4382	0.0000			I(0)	I(0)
Constant and trend	-1.7804	0.0375			-2.9271	0.0017			I (0)	I(0)
Fdi										
Constant	-5.6356	0.0000			-5.4644	0.0000			I(0)	I(0)
Constant and trend	-5.5841	0.0000			-5.2235	0.0000			I(0)	I(0)
Lgin										
Constant	-3.4713	0.0003					-9.1321	0.0000	I(0)	I(1)
Constant and trend			-8.7246	0.0000			-9.3085	0.0000	I(1)	I(1)
Lreer										
Constant	-2.9755	0.0015			-2.2629	0.0118			I(0)	I(0)
Constant and trend	-3.3190	0.0005			-2.7015	0.0035			I(0)	I(0)
Linr										
Constant			-4.5164	0.0000			-4.7706	0.0000	I(1)	I(1)
Constant and trend			-3.5288	0.0002			-3.6353	0.0001	I(1)	I(1)
Lfda										
Constant	-1.8611	0.0314					-12.0095	0.0000	I(0)	I(1)
Constant and trend			-11.7148	0.0000			-11.5580	0.0000	I(1)	I(1)
Lmscp										

Constant	-3.5404	0.0002			-2.5243	0.0058			I(0)	I(0)
Constant					-4.9128	0.0000				
and trend	-7.2046	0.0000							I(0)	I(0)
Inf										
Constant	-4.8681	0.0000			-4.5556	0.0000			I(0)	I(0)
Constant					-6.1786	0.0000				I(0)
and trend	-6.4043	0.0000							I(0)	
Gcfg										
Constant	-10.2337	0.0000			-	0.0000			I(0)	I(0)
Constant	-9.4138	0.0000			10.1431	0.0000			I(0)	I(0)
and trend					-9.4527					
Cbpd										
Constant	-3.0212	0.0013			-2.3393	0.0097			I(0)	I(0)
Constant	-4.6686	0.0000			-3.5086	0.0002			I(0)	I(0)
and trend										
Bmg										
Constant	-3.8048	0.0001			-4.6199	0.0000			I(0)	I(0)
Constant	-3.3056	0.0005			-3.6962	0.0001			I(0)	I(0)
and trend										

Source: Author's computation from Stata 14, 2021

Table 5.14 displays the results of the panel unit root test based on the LLC and IPS. The conduct of the panel unit root shows that all the variables fall within the I (1) and I(0) series. By implication, the stationarity of the variables is appropriate for the analysis of capital flows, monetary policy, and economic growth in SACU.

Table 5.15: The second generation CIPS test

Variables	Level		First Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
lgdpc	-2.718*	-3.406*		
FPI	-4.330*	-4.079*		
FDI	-3.900*	-4.263*		
CBPD	-2.783*			-5.634*
BMG	-4.620*	-4.703*		
INF	-4.161*	-4.260*		
LINR			-4.598*	-3.984*

LFDA			-5.627*	-5.784*
LMSCP			-4.572*	-4.727*
LREER		-2.935**	-4.158*	
gcfg	-5.299*	-5.364*		
lgin			-4.827*	-5.018*
cbpr	-3.203*	-3.227*		

Source: Author's computation from Stata 14, 2021

where *, ** and *** are respectively critical values at 1%, 5% and 10%

The CIPS test on table 5.15 further enhances the appropriateness of the variables used for the empirical research as no variables were differenced twice for the attainment of stationarity.

The forval approach was used to ascertain the lag length given the default lag selection process of the Bayesian Information Criterion (BIC). The various lag lengths for the macroeconomic variables necessary to examine the dynamics of capital flows, monetary policy, and economic growth in the Southern African Customs Union are displayed in table 5.16. The most frequent lag for each variable is contained in the seventh column.

Table 5.16: Lag length criteria

Variable	Country 1	Country 2	Country 3	Country 4	Country 5	Selected
lgdpc	1	1	1	1	1	1
fpi	0	0	0	0	0	0
fdi	1	0	0	0	0	0
inf	1	0	1	0	1	1
cbpd	0	0	0	0	0	0
bmng	1	1	0	0	1	1

Source: Author's computation from Stata 14, 2021

Table 5.16 shows that the lag length for the log of GDP per capita, inflation rate, and broad money growth is 1, while that of foreign portfolio investment, foreign direct investment, and central bank policy rate differential are respectively zero. The variables are therefore re-examined on the basis of the currently determined lag lengths.

Table 5.17: Re-examined Panel Unit Root Test

Series	Levin, Lin and Chu Test [A]				Im, Pesaran and Shim Test [B]				Result [A]	
	Level		First Difference		Level		First Difference			Result [B]
	T –Test	Prob. Value	T -Test	Prob. Value	T -Test	Prob. Value	T -Test	Prob. Value		
LGDP										
Constant			-5.6887	0.0000			-6.0409	0.0000	I(1)	I(1)
Constant and trend			-4.3541	0.0000			-4.5224	0.0000	I(1)	I(1)
FPI										
Constant	-4.6585	0.0000			-5.8721	0.0000			I(0)	I(0)
Constant and trend	-3.9866	0.0000			-4.4005	0.0000			I(0)	I(0)
FDI										
Constant	-5.6356	0.0000			-5.4644	0.0000			I(0)	I(0)
Constant and trend	-5.5841	0.0000			-5.2235	0.0000			I(0)	I(0)
BMG										
Constant	-3.8048	0.0001			-4.6199	0.0000			I(0)	I(0)
Constant and trend	-3.3056	0.0005			-3.6962	0.0001			I(0)	I(0)
CBPD										
Constant	-3.0212	0.0013			-2.3393	0.0097			I(0)	I(0)
Constant and trend	-4.6686	0.0000			-3.5086	0.0002			I(0)	I(0)
INF										
Constant	-3.1206	0.0009			-2.7812	0.0027			I(0)	I(0)
Constant and trend	-3.8252	0.0001			-4.0914	0.0000			I(0)	I(0)

Source: Author's computation from Stata 14, 2021

5.7. The dynamic interaction of capital flows, monetary policy and economic growth in the Southern African Customs Union

This section analyzes the dynamics among capital flows, monetary policy, and economic growth. For the purpose of the analysis, foreign portfolio investment and foreign direct investment are used to measure capital flows into the region on the premise that monetary

policy can significantly influence them. However, macroeconomic variables within the confines of the monetary authorities are the monetary policy rate, the growth rate of money supply (BMG), and the inflation rate (INF). The study uses the monetary policy rate differential (CBPD) and the actual monetary policy rate. The essence of the differential in the policy rate is that investors are more motivated to invest in an economy that generates higher returns on investment. The examination of this dynamics, therefore, requires the formulation of the Panel Auto Regressive Distributed Lag Model (PARDL). The study considers the Pool Mean Group, the Mean Group and the Dynamic Fixed Effects. It also conducts the hausman test in order to decide on the appropriate model that best explains the dynamics of the aforementioned variables in the Southern African Customs Union. The estimated results of the PMG are expressed in Table 5.18.

Table 5.18: Capital flows, monetary policy, and economic growth: a dynamic relationship (A)

	PMG				MG				DFE			
	LR		SR		LR		SR		LR		SR	
d.lgdp _{it}	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
FPI	2.542373	0.088			189.8302	0.319			4.198341	0.108		
FDI	-.0496381	0.000			.0012365	0.991			-.0342807	0.319		
BMG	.0142817	0.002			.0918534	0.227			.011128	0.208		
CBPD	-.0580289	0.000			-.1739738	0.108			-.0591396	0.036		
INF	.0218775	0.107			.2290489	0.155			.0206159	0.432		
ECT			-.0997449	0.002			-.0894981	0.110			-.0702646	0.018
FPI			.1403762	0.584			-.5007673	0.327			-.2206987	0.094
FDI			-.0006349	0.789			-.0008081	0.781			-.0016077	0.348
BMG			-.0000296	0.859			.0000117	0.984			.000069	0.843
CBPD			-.0052139	0.000			-.0047146	0.000			-.005143	0.003
INF			.0006046	0.775			-.001417	0.423			-.0002501	0.815
Constant			.3743602	0.001			.3390206	0.120			.2684092	0.018
Hausman Test	Prob>chi2 = 0.3422 (not positive definite)							chi2(5) = -4.31				

Source: Author's computation from Stata 14, 2021

Table 5.18.1: Short-run estimates of the respective countries

	Botswana		Eswatini		Lesotho		Namibia		South Africa	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
ECT	-.0137782	0.646	-.2023352	0.000	-.0714272	0.022	-.0822838	0.020	-.1288999	0.016
FPI	-.2707687	0.172	.056707	0.844	1.137665	0.731	-.2055827	0.337	-.0161394	0.952
FDI	-.0010404	0.703	.0048586	0.045	-.0092593	0.017	.000131	0.962	.0021356	0.707
BMG	.0003596	0.416	-.000494	0.491	-.0002213	0.731	.0003436	0.549	-.000136	0.923
CBPD	-.0095649	0.025	-.0028772	0.273	-.0060993	0.046	-.0042366	0.235	-.0032914	0.466
INF	.0076908	0.060	-.0011546	0.587	-.0005989	0.507	.0021795	0.417	-.0050939	0.251
Constant	.0686391	0.548	.7341659	0.000	.2503527	0.016	.3120095	0.022	.5066338	0.016

Source: Author's computation from Stata 14, 2021

5.7.1. Interpretation of the empirical results of the panel ARDL

The analysis of the dynamics of capital flows, monetary policy, and economic growth in the SACU shows the empirical relationship that exists among them. For instance, table 5.18 displays the results of the long run and short run of the explanatory variables with respect to the log of GDP per capita (lgdpc). The PMG holds the assumption that all the units that constitute the panel study exhibit long-run homogeneity of coefficients, while their respective short-run and error variances may differ. This is because, despite being different from each other, there exists some level of uniformity among them. The results show that foreign portfolio investment (FPI) and inflation rate (INF) are not statistically significant both in the short run and the long run. However, foreign direct investment (FDI), broad money growth (BMG) and the central bank policy rate differential are statistically significant in the long run. A unit increase in foreign direct investment results in a 0.04 decline in lgdpc in the long run, while a one percent rise in BMG by the monetary authorities will stimulate lgdpc by 0.01 percent in the long run. The central bank policy rate differential, which is very central to this study, shows that if it increases by one percent in the long run, it will result in a 0.05 decrease in lgdpc. It is noteworthy that cbpd is statistically significant at the one percent level both in the short run and the long run and exerts the same directional effect on lgdpc. It can be observed that lgdpc is reduced by 0.005 in the short run, arising from a unit increase in cbpd. However, the fpi, fdi, bmg, and inflation rate are not statistically significant in the short run. The coefficient of the error correction term reveals that a long run equilibrium exists among the variables on the ground that is found to be negative and statistically significant. Any short-run deviation is corrected at a yearly rate of 9.9 percent to bring the system back into long-run equilibrium. The significance of the error correction term, therefore, gives credence to the fact that there is a joint causality of all the variables with respect to lgdpc in the long run. However, fdi, bmg, and cbpd, respectively, have a causal impact on lgdpc in the long run.

The respective short coefficients of the countries that make up the Southern African Customs Union are expressed in table 5.18.1. All the macroeconomic variables, except cbpd, are not statistically significant in the short run in Botswana. It shows that if the differential in the policy rate rises by one percent, the lgdpc will decrease by 0.009 percent. Botswana's estimates also result in the conclusion that it does not converge to the long run equilibrium as the error correction term is statistically insignificant. While Botswana does not converge to the long run, the short run estimates of Eswatini, Namibia, Lesotho, and South Africa, which constitute the

common monetary area, do converge to the long run, having error correction terms that are statistically significant. All the short-run estimates for Namibia and South Africa are not statistically significant, though they are jointly significant in the long run, while foreign direct investment is statistically significant in Eswatini and Lesotho. GDP per capita rises by 0.004 percent, emanating from a unit per cent increase in Eswatini's FDI, while the reverse holds for Lesotho. $\lgdpc$ decreases by 0.009 as a result of a unit increase in fdi . The policy rate differential in Lesotho was found to be statistically significant. If the differential increases by one percent, per capita GDP falls by 0.006 percent. The rate of adjustment to long-run equilibrium in Eswatini is 20%, while it is 12%, 7%, and 8% in South Africa, Lesotho, and Namibia, respectively. The Mean Group (MG) produced estimates showing that all the respective variables are not statistically significant in the long run, while only $cbpd$ is statistically significant in the short run. In the short run, $\lgdpc$ falls by 0.004 percent due to a 1% increase in $cbpd$. The results also show that there is no long-run relationship among the variables as the error correction term is statistically insignificant. The Hausman test was factored in order to select the best and most efficient estimator. The probability of chi square is 0.3422, which exceeds the critical value of 5 per cent. Therefore, the null hypothesis that the PMG is a better estimator cannot be rejected.

The study also examines the PMG in relation to the Dynamic Fixed Effect (DFE). The long run and short run estimates in the DFE only show that the differential in the policy rate is the only statistically significant variable. The direction of influence is negative, as in previous estimates. A 1% increase in CBPD reduces LGDPC by 0.05% in the long run and 0.005% in the short run, respectively. The chi-square statistic in the hausman test is negative, and, therefore, the probability of choosing between PMG and DFE could not be generated.

Section 5.7 examined the dynamic relationship between capital flows, monetary policy, and economic growth in the Southern African Customs Union. However, the hausman test, testing the appropriate model, resulted in the issue of the rank of the differenced variance matrix not being equal to the number of variables tested. This section re-estimates the model by utilizing GDP per capita growth rate as well as gross capital formation growth rate in order to align with the functional forms of the other variables. Consequently, the following results are obtained given the re-examined lag lengths:

Table 5.19: Lag length

Variable	C1	C2	C3	C4	C5	Selected
gdpcr	1	1	1	1	1	1
fpi	1	0	0	0	0	0
fdi	0	1	0	0	0	0
bmg	0	0	0	0	0	0
cbpd	0	0	0	0	0	0
inf	0	0	0	0	1	0
gcfg	0	0	0	0	0	0

Source: Author's computation from Stata 14, 2021

Table 5.20: Dynamic relationships between capital flows, monetary policy, and economic growth (B)

	PMG				MG				DFE			
	LR		SR		LR		SR		LR		SR	
D.gdpcr	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
fpi	22.2895	0.008			91.23656	0.234			19.40655	0.010		
fdi	-.3099822	0.007			-.1882526	0.328			-.2176587	0.116		
bmg	.0023477	0.945			-.0175297	0.712			.0312966	0.331		
cbpd	-.0866664	0.414			-.205893	0.118			-.1113488	0.326		
inf	.0434742	0.632			.0196674	0.892			-.0549356	0.572		

gcfg	.0063397	0.801			.0377964	0.291			.027381	0.286		
ECT			-.7935757	0.000			-.9970764	0.000			-.9861273	0.000
D.fpi			-21.67731	0.072			-71.59681	0.221			-17.39184	0.039
D.fdi			.0514391	0.761			.1480694	0.293			.1332554	0.220
D.bmg			.0357505	0.309			.0158158	0.133			-.0106733	0.626
D.cbpd			-.0248351	0.777			.2364587	0.263			.0837091	0.445
D.inf			.1171008	0.079			.0444673	0.714			.0455057	0.489
D.gcfg			-.0248296	0.021			-.0394319	0.039			-.0293411	0.074
Constant			2.329883	0.000			3.685308	0.005			2.924872	0.000
Hausman Test	Prob>chi2 = 0.0824 (not positive definite)							Prob>chi2 = 0.8798				

Source: Author's computation from Stata 14, 2021

The table above displays the empirical findings. It can be observed in the PMG that, while only gcfg is statistically significant in the short-run, fpi and fdi are the only statistically significant variables in the long-run. A 1% increase in gcfg is found to reduce gdpcr by 0.0248 percent. However, the capital flows variables do not similarly influence gdpcr. It shows that gdpcr falls by 0.3099 but increases by 22.2895 due to a unit increase in FDI and FPI, respectively. The error correction term provide evidence that though most of the variables are not respectively significant in the short-run, they nevertheless jointly cause gdpcr in the long-run. The speed of adjustment, which was 79.3 percent, indicates that the model is internally stable, as the variables return to equilibrium after any deviation from it.

The MG shows that gcfg is the only statistically significant variable. In the short run, a unit increase in GCFG reduces GDPCR by 0.0394 percent. The ECT also provides evidence that all the variables are jointly significant in influencing gdpcr in the long run and the model exhibits a speed of adjustment of 99.7 percent. However, following the hausman test below, having $\text{Prob} > \chi^2 = 0.0824$, the null hypothesis that the PMG model is the most efficient estimator cannot be rejected. The Dynamic Fixed Effect shows that FPI is the only statistically significant variable in the short-run and long-run. A one-percentage-point increase in FPI boosts gdpcr by 19.4065 percent in the long run but reduces it by 17.3918 percent in the short run. Also, the hausman test has a $\text{Prob} > \chi^2 = 0.8798$, which exceeds the critical limit of 5 per cent and further confirms the PMG as the most efficient estimator.

The foregoing macroeconomic dynamics necessitate a re-estimation based on the outcomes of the LM test of error cross-section independence below:

Table 5.21: Bias-adjusted LM test of error cross-section independence

$H_0: \text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	17.32	0.0676
LM adj*	3.418	0.0006
LM CD*	3.277	0.0011

Source: Author's computation from Stata 14, 2021

Observing the table shows that the null hypothesis that there is no serial correlation among the constituent units on the basis of the LM test cannot be rejected. However, the LM adj* and

Pesaran LM CD* fail to reject the null hypothesis. The following table therefore re-estimates the model through the xtdccet-cce (common correlated effect) in order to internalize the incidence of cross-sectional dependence among the countries.

Table 5.22: Accounting for cross-sectional dependence

EC	1	2	3	4
Dep :gdpcr				
Variable	xtpmg - mg	xtdcce2 - mg	xtdcce2 - mg	xtdcce2 - cce
fpi	22.29** (8.385)	22.20 (53.69)	20.37 (48.05)	23.21 (253.9)
fdi	-0.310** (0.115)	-0.305*** (0.0865)	-0.280** (0.0834)	-0.565 (0.380)
bmg	0.00235 (0.0342)	0.00287 (0.0369)	0.00263 (0.0429)	-0.0162 (0.0711)
cbpd	-0.0867 (0.106)	-0.0517 (0.254)	-0.0475 (0.233)	0.0841 (1.214)
inf	0.0435 (0.0908)	-0.0377 (0.138)	-0.0346 (0.119)	-0.0598 (0.601)
gcfg	0.00634 (0.0251)	0.0416* (0.0199)	0.0382 (0.0212)	0.0616 (0.0394)
SR				
ec	-0.794*** (0.155)	-0.918*** (0.0624)	-0.918*** (0.0601)	-0.451 (0.283)
D.fpi	-21.68 (12.07)	-21.48* (9.226)	-21.48* (9.226)	50.67 (74.66)
D.fdi	0.0514 (0.169)	0.0807 (0.136)	0.0807 (0.136)	0.0292 (0.190)
D.bmg	0.0358 (0.0351)	0.0311 (0.0333)	0.0311 (0.0333)	0.0797* (0.0342)
D.cbpd	-0.0248 (0.0877)	-0.0478 (0.0656)	-0.0478 (0.0656)	-0.0440 (0.195)
D.inf	0.117 (0.0666)	0.207** (0.0711)	0.207** (0.0711)	0.0287 (0.103)
D.gcfg	-0.0248* (0.0108)	-0.0491*** (0.0141)	-0.0491*** (0.0141)	-0.0752*** (0.0175)
_cons	2.330*** (0.506)			

N	145	145	145	145
cd		5.225	5.225	0.553
cdp		0.000000174	0.000000174	0.580

Standard errors in parentheses * p<0.05, ** p<0.01, * p<0.001**

Source: Author's computation from Stata 14, 2021

The fifth column of (xtdcce2-cce) shows that broad money growth (bmg) and gross capital formation growth rate (gcfg) are the only statistically significant variables. In the short run, a one percent increase in BMG increases GDPCR by 0.0797 percent, while a unit increase in GCFG decreases GDPCR by 0.0752. Evidence of internalizing the cross-sectional-dependence is confirmed by the cd of 0.553 at a cdp of 0.580, which is greater than the critical limit of five percent.

5.8. Diagnostics testing 2

The section re-examined the diagnostics on the basis of the set of variables cbpd, inf, fdi, fpi, bmg, and lgdpc. The multicollinearity test in respect of the variables comprised of cbpd, inf, fdi, fpi, and bmg exhibits a mean variance inflation factor of 1.26.

The result of the multicollinearity problem shows that none of the variables has a variance inflation factor of five, which implies that there is no multicollinearity problem.

The table below shows the heteroskedasticity test in respect of the variables used for the panel ARDL regression by the use of the white test. The p-value is 0.0762, which exceeds the critical level of 5 per cent. The null hypothesis of homoscedasticity can, therefore, not be rejected.

Table 5.23: Diagnostics

Source	chi2	Df	p
Heteroskedasticity	29.62	20	0.0762
Skewness	11.13	5	0.0489
Kurtosis	0.51	1	0.4756
Total	41.26	26	0.0292

Source: Author's computation from Stata 14, 2021

The table below examines the possibility of serial autocorrelation among the set of variables that constitute the panel ARDL estimates above. The results show that the null hypothesis of no serial correlation is rejected by the LM, LM adj, and LM CD of Pesaran. They all show that

there is a problem of cross-sectional dependence. This necessitated the re-specification of the model to internalize the problem of cross-sectional dependence among the constituent units.

Table : 5.24 : Bias-adjusted LM test of error cross-section independence

H0: $Cov(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	131.9	0.0000
LM adj*	67.83	0.0000
LM CD*	11.25	0.0000

*two-sided test

Source: Authors computation from Stata 14, 2021

5.9: Robustness test to account for the presence of cross-sectional dependence among the countries

The Pooled Mean Group estimation only accounts for long-run homogeneity and short-run heterogeneity, but does not address the issue of cross-sectional dependence among countries. As a result, the analysis is re-examined by the `xtdccee2` of Ditzén (2016).

Re-estimating the model in order to account for the presence of cross-sectional dependence led to the inclusion of additional monetary variables as well as the necessity to re-examine the lag lengths. Consequently, the table below presents the respective lag length of the macroeconomic variables.

Table 5.25 Lag length Criteria

Variable	Country 1	Country 2	Country 3	Country 4	Country 5	Selected
lgdpc	1	1	1	1	1	1
fpi	1	0	0	0	0	0
fdi	1	0	0	0	1	0
cbpd	0	0	0	0	0	0
bmg	1	0	0	0	1	0
inf	1	0	0	1	0	0
lmscp	1	0	0	0	1	0
lreer	0	1	1	1	1	1

Source: Author's computation from Stata 14, 2021

Table 5.26: Bias-adjusted LM test of error cross-section independence

$H_0: \text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	41.94	0.0000
LM adj*	15.59	0.0000
LM CD*	6.238	0.0000

*two-sided test

Source: Author's computation from Stata 14, 2021

Re-examining the model with the inclusion of *lmscp*, a financial indicator variable, and *lreer* while testing for the cross-sectional dependence within this context produced the LM test of the table above. It still produced the problem of cross-sectional dependence. Table 5.27, therefore, is a robust estimate internalizing the problem of cross-sectional dependence.

The following table relays the compared output of the respective estimations.

Table 5.27 : Accounting for cross-sectional dependence

EC	1	2	3	4
Variable	xtpmg - mg	xtdcce2 - mg	xtdcce2 - mg	xtdcce2 - cce
Fpi	0.652 (1.037)	1.922 (10.90)	0.137 (0.187)	-1.732 (630.5)
Fdi	0.00242 (0.0159)	0.00386 (0.0850)	0.000275 (0.00242)	0.00713 (1.092)
Inf	-0.0291** (0.0112)	-0.0473 (0.0556)	-0.00337*** (0.000952)	-0.0269 (0.568)
Cbpd	-0.0563*** (0.0118)	-0.0110 (0.0606)	-0.000785 (0.00323)	-0.0423 (4.111)
bmg	0.0123* (0.00553)	0.00371 (0.0123)	0.000264 (0.000803)	0.00845 (0.195)
Lmscp	-0.501 (0.334)	-0.338 (1.434)	-0.0241 (0.0852)	0.662 (16.73)
L.lreer	2.166*** (0.585)	3.015 (2.605)	0.215 (0.128)	1.356 (12.87)

SR

Ec	-0.0723*** (0.0201)	-0.0713 (0.669)	-0.0713 (0.0815)	-0.0420 (47.60)
D.fpi	0.473 (0.543)	0.294 (0.414)	0.294 (0.414)	0.863 (0.840)
D.fdi	-0.00111 (0.00101)	-0.00196*** (0.000487)	-0.00196*** (0.000487)	-0.00114*** (0.000227)
D.inf	0.00169 (0.00131)	0.00330** (0.00113)	0.00330** (0.00113)	0.000575 (0.000470)
D.cbpd	0.00196 (0.00234)	0.000363 (0.00147)	0.000363 (0.00147)	0.00172*** (0.000422)
D.bmg	-0.000900* (0.000432)	-0.000360** (0.000119)	-0.000360** (0.000119)	0.0000833 (0.000153)
D.lmscp	-0.167 (0.108)	-0.0803 (0.0627)	-0.0803 (0.0627)	-0.142*** (0.0334)
D.lreer	1.128** (0.431)	1.176** (0.439)	1.176** (0.439)	0.0863 (0.454)
_cons	0.0442* (0.0174)			
N	145	145	145	145
Cd		5.842	5.842	-1.580
cdp		5.16e-09	5.16e-09	0.114

Standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Source: Author's computation from Stata 14, 2021

The estimates in the table above deviate from the previous panel ARDL estimates as they incorporate the macroeconomic variables of the log of monetary sector credit to the private sector (lmscp) and the log of real exchange rate. It can be observed from the estimates that the two major components of capital flows, consisting of foreign direct investment and foreign portfolio investments, are not statistically significant in the long run across all the models. However, while the two flows remain insignificant in the short-run on the basis of the PMG, foreign direct investment becomes statistically significant in the xtdcce2-cce estimator. The empirical results show that while the inflation rate, central bank policy rate differential, broad money growth, and real exchange rate are statistically significant in the context of the PMG in the long-run, no variable exhibits long-run statistical significance in the xtdcce2-cce. A 1%

increase in the inflation rate, the central bank policy rate differential, and monetary sector credit to the private sector all reduce GDP per capita (lgdpc) by 0.0291, 0.0563, and 0.501 percent, respectively. However, broad money growth (bmg) is statistically significant in both periods, having a long-run positive effect while negatively impacting on lgdpc in the short-run. A 1% increase in BMG increases lgdpc by 0.0123 percent in the long run but decreases it by 0.0009 percent in the short run. Moreover, real exchange rate (lreer) significantly promotes lgdpc in either the short run or the long run. A unit rise in lreer increases lgdpc by 2.166 in the long run, while it increases it by 1.128 in the short-run. Generally, the PMG model exhibits a long-run equilibrium convergence on the ground that the error correction term is negative and statistically significant. There exists an average speed of 7% correction of any distortion from equilibrium, which also implies that all the variables jointly cause lgdpc in the long run. However, in the xtdcce2-cce, foreign direct investment (FDI), the central bank policy rate differential (cbpd), and monetary sector credit to the private sector are statistically significant. A 1% increase in fdi reduces lgdpc by 0.0011 percent, while a unit increase in lmscp reduces lgdpc by 0.142. A crucial observation is that while cbpd negatively affects lgdpc in the long-run within the pmg, it positively influences lgdpc in the short-run in the xtdcce2-cce model, such that a unit rise in cbpd promotes lgdpc by 0.0017. Nevertheless, the xtdcce2-cce, though characterized by a negative error correction term, is found to be statistically insignificant.

The lower part of the table shows the statistic of the cross sectional dependence (CD) along with the p-values. The xtdcce2-cce has a CD of -1.580 with a p-value of 0.114. The implication is that the null hypothesis of weak cross-sectional dependence cannot be rejected on the ground that the p-value exceeds the critical value of 5 percent.

5.10 The threshold level of capital flows and monetary policy in the Southern African Customs Union for the optimal level of economic growth

The concept of threshold analysis is relevant for the current study on the ground that it will aid policy formulation as regards the optimal level of capital flows and monetary policy that will be consistent with sustainable economic growth in the Southern African Customs Union. The study employed the fixed-effect panel threshold of Wang (2015) in estimating the respective threshold levels.

5.10.1 The foreign portfolio investment threshold in relation to the log of GDP per capita

A double threshold was established for foreign portfolio investment, as expressed below:

Table 5.28: The threshold of fpi with respect to lgdpc

5.28.1 Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	0.1077	0.0878	0.1189
Th-21	0.0576	0.0419	0.0669
Th-22	0.0087	-0.0128	0.0096
Th-3	-0.0552	-0.0789	-0.0488

Source: Author's computation from Stata 14, 2021

5.28.2 : Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	2.5141	0.0210	6.80	0.0433	5.7783	6.6455	8.6061
Double	2.2394	0.0187	14.72	0.0000	9.1364	10.5121	12.6111
Triple	2.0649	0.0172	10.14	0.9833	46.1052	47.9424	54.3391

Source: Author's computation from Stata 14, 2021

5.28.3 : Fixed-effects (within) regression

Dependent variable: lgdpc

Group variable: country			Number of obs = 150		
R-sq: within = 0.5483			Number of groups = 5		
between = 0.7406			Obs per group: min = 30		
overall = 0.4017			avg = 30.0		
F(8,137) = 20.78			max = 30		
corr(u_i, Xb) = 0.3131			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	-.0003467	.0009452	-0.37	0.714	-.0022157 .0015223
inf	-.0084062	.0028601	-2.94	0.004	-.014062 -.0027505
cbpd	-.0235482	.0039577	-5.95	0.000	-.0313744 -.015722
fdi	.0024813	.0047315	0.52	0.601	-.0068749 .0118375
_cat#c.fpi					

0	-.7373899	.8142311	-0.91	0.367	-2.347476	.8726962
1	-4.635233	1.088989	-4.26	0.000	-6.788634	-2.481833
2	5.337773	1.079576	4.94	0.000	3.202986	7.47256
3	.0416837	.3648465	0.11	0.909	-.6797751	.7631426
_cons.	3.622731	.0354701	102.13	0.000	3.552591	3.69287
sigma_u	.28664201					
sigma_e	.12360781					
rho	.84320101	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 137) = 108.43

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The null hypothesis of a linear relationship between *fpi* and *lgdpc* is rejected due to the probability of bootstrap of 0.0433, which is less than the critical value of 5 percent. The threshold level for the single model is 0.1077 at a 95% confidence interval (0.0878, 0.1189). The relationship between *fpi* and *lgdpc* is therefore non-linear. The number of thresholds was determined by re-estimating the direct option of the *xtreg* command as well as allocating an equal number of bootstrap. The threshold effects are contained in the table above. The single threshold is 0.1077 with H_0 : linear model and H_1 : single threshold model, with a significant F-statistic of 6.80, which is greater than the critical value at 5 and 10%.

The F-statistic for the double is 14.72, with a highly significant p-value of bootstrap. The F-stat exceeded its critical values at 1, 5, and 10 per cent. Nevertheless, the triple threshold has an F-stat of 10.14, which is less than its critical values of 1, 5, and 10% with a bootstrap p-value of 0.9833, which is not statistically significant. The fixed regression estimates are expressed in the table above. Observable from the results is that below the single threshold of 0.1077, a unit increase in *fpi* depresses *lgdpc* by 0.73, but is not statistically significant. At $0.0576 < fpi < 0.1077$, *fpi* has a negative impact on *lgdpc* at 1% level. A unit increase in its value decreases the *lgdpc* by 4.63. However, at $0.0087 < fpi < 0.0576$, the effect of *fpi* on *lgdpc* changes from negative to positive and is found to be highly statistically significant. A 1% increase in *FPI* raises the *lgdpc* by 5.33 percent. At $fpi > -0.0552$, though producing a little positive effect compared to before, it is no longer statistically significant. The results, therefore, show that the optimum threshold of *fpi* generates a more significant increase in *lgdpc* provided the threshold of *fpi* falls within the range of $0.0087 < fpi < 0.0576$. The other variables in the regression estimates show that a one percent rise in inflation rate decreases *lgdpc* by 0.008 percent, which is

statistically significant at one percent, while the change in cbpd decreases lgdpc by 0.02 percent, also at a one percent significant level.

In general, the fixed regression estimates are reliable given the $\text{Prob} > F = 0.0000$ for the F test that all $u_i=0$: $F(4, 137) = 108.43$, which was found to be highly significant.

5.10.2. The threshold of foreign direct investment in relation to the log of GDP per capita

The second category of capital flows is foreign direct investment inflows as a percentage of GDP.

Table 5.29: The threshold of fdi with respect to lgdpc

5.29.1 : Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	5.1176	4.9962	5.1213

Source: Author's computation from Stata 14, 2021

5.29.2 Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	2.6223	0.0219	1.57	0.7800	4.8587	5.3827	7.0074

Source: Author's computation from Stata 14, 2021

Table 5.29.3 : Fixed-effects (within) regression

Dependent variable: lgdpc

Group variable: country			Number of obs = 150		
R-sq: within = 0.4315			Number of groups = 5		
between = 0.3745			Obs per group: min = 30		
overall = 0.1991			avg = 30.0		
F (6,139) = 17.58			max = 30		
corr(u_i, Xb) = 0.1302			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	-.000837	.0010474	-0.80	0.426	-.0029078 .0012339
inf	-.0103715	.0031552	-3.29	0.001	-.0166099 -.0041331
cbpd	-.0256791	.0043043	-5.97	0.000	-.0341895 -.0171687
fpi	-.2666878	.3128188	-0.85	0.395	-.8851861 .3518105

_ cat#c.fdi					
0	.0096396	.0078369	1.23	0.221	-.0058553 .0251345
1	.0019051	.0052358	0.36	0.717	-.008447 .0122572
_cons.	3.703546	.0345188	107.29	0.000	3.635297 3.771796
sigma_u	.31988357				
sigma_e	.13766792				
rho	.84372711	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 139) = 136.40

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The table shows the threshold effect of foreign direct investment on gross domestic product per capita alongside other macroeconomic variables. The study utilized Hansen (1999) fixed effect threshold model. The threshold effect was established at the 95% confidence interval, with a corresponding value of 5.1176 (4.9962 , 5.1213). A bootstrap of 300 replications was used, resulting in a p-value of 0.7800 having an F-stat of 1.57, which is less than the value of 7.0074 at the one percent level of significance. Therefore, the null hypothesis of a linear model cannot be rejected. It implies that the relationship between Fdi and lgdpc is linear. The results of the fixed regression estimates are expressed in table 5.29.3. It can be observed that fdi that falls below or above the threshold level exerts a positive impact on lgdpc. If fdi falls below the threshold level of 5.1176, a unit increase in fdi will increase lgdpc by .0096396, while if it falls above the threshold, it results in a .0019051 increase in lgdpc. However, in either case, fdi was not statistically significant. Among other variables, inflation (inf) and policy rate differential (cbpd) are statistically significant. A one-percentage-point increase in the inflation rate has a negative effect of 0.01 percent on lgdpc, which is found to be significant at the one-percentage-point level. Cbpd also impacts lgdpc negatively at a one per cent level of significance. If it rises by one percent, the lgdpc falls by 0.02 percent. BMG and FPI are not statistically significant. The fixed effect model is relevant given the F-value of 136.40, which is statistically significant under the null hypothesis that all u_i = 0.

5.10.3. The threshold of central bank policy rate differential in relation the log of GDP per capita

Table 5.30: The threshold of central bank policy rate differential in relation to lgdpc

Table 5.30.1: Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	6.7500	5.5200	7.0000

Source: Author's computation from Stata 14, 2021**Table 5.30.2: Threshold effect test (bootstrap = 300):**

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	2.4420	0.0203	10.55	0.1367	11.3414	15.0479	17.9254

Source: Author's computation from Stata 14, 2021**Table 5.30.3: Fixed-effects (within) regression****Dependent variable: lgdp**

Group variable: country			Number of obs = 150		
R-sq: within = 0.4730			Number of groups = 5		
between = 0.3204			Obs per group: min = 30		
overall = 0.2387			avg = 30.0		
F (6,139) = 20.79			max = 30		
corr(u_i, Xb) = 0.1524			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	-.0008504	.0010083	-0.84	0.400	-.002844 .0011432
inf	-.0101966	.0030378	-3.36	0.001	-.0162028 -.0041904
fpi	-.3606598	.3003606	-1.20	0.232	-.9545261 .2332066
fdi	.0059009	.00497	1.19	0.237	-.0039257 .0157274
_cat#c. cbpd					
0	.0091067	.0107525	0.85	0.398	-.012153 .0303663
1	-.0150819	.0051168	-2.95	0.004	-.0251986 -.0049651
_cons.	3.574662	.0507877	70.38	0.000	3.474246 3.675079
sigma_u	.31372275				
sigma_e	.13254449				
rho	.84853831	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 139) = 145.32

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

Following a similar line of explanation, the threshold test results at the 95 percent confidence interval in respect of the central bank policy rate differential are contained above. A bootstrap of 300 was equally used. The results relayed the evidence of a single threshold at the bootstrap p-value of 0.1367, having an f–stat of 10.55. The threshold level is 6.7500 (5.5200 , 7.0000). The results established the evidence of a linear relationship between cbpd and lgdpc.

At cbpd that falls below the threshold level of 6.7500, cbpd exerts a positive impact on lgdpc. A unit increase in its value increases lgdpc by 0.009, but is not statistically significant, while a unit increase in cbpd above the threshold level dampens lgdpc by 0.01 and is found to be statistically significant at one per cent. Within the class of the other explanatory variables, only the inflation rate (INF) is statistically significant at one percent. If it increases by one percent, lgdpc decreases by 0.01 percent. The null hypothesis that all $u_i = 0$ cannot be rejected because the F–statistic of 145.32 is statistically significant at the one percent level.

5.10.4. The Threshold of the central bank's policy rate differential in relation to foreign Portfolio Investment

Table 5.31: The Threshold of the Central Bank's Policy Rate Differential with Respect to foreign portfolio investment

Table 5.31.1 : Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	2.5000	2.0000	2.7500

Source: Author's computation from Stata 14, 2021

Table 5.31.2 : Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	0.2062	0.0017	4.07	0.6267	12.4153	14.1432	18.9278

Source: Author's computation from Stata 14, 2021

Table 5.31.3: Fixed-effects (within) regression

Dependent variable:fpi

Group variable: country	Number of obs = 150
R-sq: within = 0.0346	Number of groups = 5
between = 0.0015	Obs per group: min = 30

overall = 0.0230			avg = 30.0		
F (4,141) = 1.26			max = 30		
corr(u_i, Xb) = -0.0315			Prob > F = 0.2869		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	-.000046	.0002903	-0.16	0.874	-.0006198 .0005279
inf	.0001671	.0008727	0.19	0.848	-.0015581 .0018922
_cat#c.cbpd					
0	-.020598	.0092566	-2.23	0.028	-.0388977 -.0022984
1	-.001511	.0012707	-1.19	0.236	-.0040231 .0010011
_cons.	.0228355	.0097961	2.33	0.021	.0034693 .0422018
sigma_u	.02413458				
sigma_e	.03823841				
rho	.28487858	(fraction of variance due to u_i			

F test that all u_i=0: F(4, 141) = 11.45

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

Examining the panel threshold of cbpd with respect to fpi shows that a linear relationship exists between cbpd and fpi. The single threshold is set at 2.5000 at a bootstrap p-value of 0.6267, which is not statistically significant. A one percent increase in cbpd below the threshold level reduces fpi by 0.02 percent and is found to be statistically significant, whereas a unit increase in cbpd above the threshold level decreases fpi by 0.001, but is not statistically significant.

5.10.5. The Threshold of the central banks' policy rate differential with respect to Foreign direct investment

Table 5.32: Central bank policy rate differential and foreign direct investment

Table 5.32.1 : Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	10.1600	9.4150	10.2500

Source: Author's computation from Stata 14, 2021

Table 5.32.2 :Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	743.6067	6.1967	8.32	0.2233	12.3416	15.3750	22.6491

Source: Author's computation from Stata 14, 2021

Table 5.32.3: Fixed-effects (within) regression

Dependent Variable: fdi

Group variable: country			Number of obs = 150		
R-sq: within = 0.0731			Number of groups = 5		
between = 0.0112			Obs per group: min =30		
overall = 0.0478			avg = 30.0		
F (4,141) = 2.78			max = 30		
corr(u_i, Xb) = -0.0893			Prob > F = 0.0292		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	.0139101	.0175092	0.79	0.428	-.0207044 .0485245
inf	-.0533957	.0526595	-1.01	0.312	-.1574998 .0507085
_cat#c.cbpd					
0	.3202283	.1089642	2.94	0.004	.1048135 .5356431
1	.1464941	.0750103	1.95	0.053	-.001796 .2947843
_cons.	.9602062	.7142311	1.34	0.181	-.4517797 2.372192
sigma_u	1.2583039				
sigma_e	2.3068291				
rho	.22930875	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 141) = 8.69

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The results show that the null hypothesis of a linear relationship between cbpd and fdi cannot be rejected given the bootstrap p-value of 0.2233, which is not statistically significant. The threshold level of cbpd in this instance is 10.1600 at the 95% confidence interval. The regression estimates reveal that cbpd is only statistically significant below the threshold level, but becomes insignificant at cbpd above the threshold. If cbpd rises by one percent, it generates an increase in fdi of 0.32 percent, while above the threshold, it increases fdi by 0.14 percent.

The optimal level of cbpd that promotes foreign direct investment, therefore, occurs below the threshold of 10.1600.

5.10.6. The Broad Money Growth Threshold in Relation to Foreign Direct Investment

Table 5.33: The Threshold of Broad Money Growth with Regard to Foreign Direct Investment

Table 5.33.1 :Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	-14.4359		
Th-21	-14.4359		
Th-22	10.5848	10.5497	10.6941
Th-3	13.5643	13.3506	13.5792

Source: Author's computation from Stata 14, 2021

Table 5.33.2:Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	718.0720	5.9839	12.88	0.0000	5.4382	7.1507	9.1723
Double	681.4822	5.6790	6.44	0.0867	6.0577	7.6168	9.2478
Triple	657.4958	5.4791	4.38	0.6233	13.0478	15.6976	24.2155

Source: Author's computation from Stata 14, 2021

Table 5.33.3: Fixed-effects (within) regression

Dependent Variable: fdi

Group variable: country			Number of obs = 150		
R-sq: within = 0.1774			Number of groups = 5		
between = 0.0315			Obs per group: min = 30		
overall = 0.1506			avg = 30.0		
F (6,139) = 5.00			max = 30		
corr(u_i, Xb) = 0.0080			Prob > F = 0.0001		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
cbpd	.0733599	.0686499	1.07	0.287	-.0623732 .209093
inf	-.0533029	.0501452	-1.06	0.290	-.1524488 .045843
_cat#c.bmg					

0	.6317	.1573729	4.01	0.000	.3205459 .9428541
1	-.1053841	.0547483	-1.92	0.056	-.2136312 .0028629
2	.082324	.049403	1.67	0.098	-.0153544 .1800025
3	-.0073863	.0175831	-0.42	0.675	-.0421513 .0273787
_cons.	2.756702	.5616893	4.91	0.000	1.646142 3.867261
sigma_u	1.1958352				
sigma_e	2.1886846				
rho	.22989367	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 139) = 8.77 Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The threshold level of broad money growth with respect to fdi was examined and found to exhibit a non-linear relationship. By implication, the evidence of multiple thresholds exists between them. At bmg less than the threshold of -14.4359, a one percent rise in bmg increases fdi by 0.63 and was found to be statistically significant at the one percent level. However, at

-14.4359 < bmg < 10.5848 , a one per cent rise in bmg decreases fdi by 0.10 per cent, but not statistically significant, while the positive effect of bmg returns back at 10.5848 < bmg < 13.5643 increasing fdi by 0.08 per cent but not statistically significant. The effect of bmg on fdi turned negative above the threshold of 13.5643, with its unit rise decreasing fdi by 0.007, but not statistically significant. As a result, the broad money growth effect becomes optimal in terms of FDI if it falls below the threshold of -14.4359, which is not only statistically significant but also positively affects FDI.

5.10.7. The Broad Money Growth Threshold in Relation to Foreign Portfolio Investment

Table 5.34: The Broad Money Growth Threshold in Relation to Foreign Portfolio Investment.

Table 5.34.1 : Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	22.5159	22.3672	22.5890

Source: Author's computation from Stata 14, 2021

Table 5.34.2 : Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F stat	Prob	Crit10	Crit5	Crit1
Single	0.2087	0.0017	2.57	0.6033	6.3417	7.9276	10.5180

Source: Author's computation from Stata 14, 2021

Table 5.34.3: Fixed-effects (within) regression

Dependent Variable: fpi

Group variable: country			Number of obs = 150		
R-sq: within = 0.0112			Number of groups = 5		
between = 0.1870			Obs per group: min = 30		
overall = 0.0004			avg = 30.0		
F (4,141) = 0.40			max = 30		
corr(u_i, Xb) = -0.1533			Prob > F = 0.8090		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
cbpd	-.0008773	.0012407	-0.71	0.481	-.0033302 .0015755
inf	.0002476	.0008938	0.28	0.782	-.0015195 .0020146
_cat#c.bmg					
0	.0004573	.0005167	0.89	0.378	-.0005642 .0014788
1	-.0000782	.0002964	-0.26	0.792	-.0006641 .0005076
_cons.	.0112791	.0091987	1.23	0.222	-.0069062 .0294643
sigma_u	.02465197				
sigma_e	.03869967				
rho	.28865022	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 141) = 11.36

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

Previous results show that bmg has a non-linear relationship with respect to Fdi. However, the current regression estimates display a linear relationship between bmg and fpi. The bootstrap p-value is 0.6033, which is not statistically significant with a threshold level of 22.5159 at the 95 per cent confidence interval. It follows that the null hypothesis of a linear relationship cannot be rejected. The regression estimates show that at bmg that falls below the threshold level, a one percent rise increases fpi by 0.0004 percent, while above the threshold level it turns

negative with a decreasing effect on fpi of 0.00007 percent, but not statistically significant in either case.

5.11. Panel Causality Test

The respective causalities across the variables are expressed in table 5.35 below.

Table 5.35 : Dumitrescu and Hurlin (2012) Granger non-causality test results

Direction of causality	W-bar	Z-bar	Z-bar tilde
A. lgdpc fdi	7.2863	5.9103 (0.0000) (2.4144)	4.7280 (0.0000) (1.8269)
Fdi lgdpc	1.8508	1.3452 (0.1800) (2.8851)	1.0507 (0.2100) (2.3842)
B. lgdpc fpi	2.7800	2.8144 (0.0300) (2.6325)	2.3230 (0.0300) (2.1655)
Fpi lgdpc	1.2720	0.4300 (0.6200) (3.6610)	0.2582 (0.7400) (3.0560)
C. lgdpc cbpd	0.6263	-0.5909 (0.6200) (5.7488)	-0.6258 (0.5700) (4.8639)
Cbpd lgdpc	4.7549	5.9371 (0.0200) (4.7417)	5.0270 (0.0200) (3.9919)
D. Lgdpc lreer	5.8453	4.2991 (0.0400) (3.8266)	3.3910 (0.0400) (2.9988)
Lreer lgdpc	3.3510	1.5105 (0.3500) 5.8022	1.0767 0.4100 4.6383
E. Lgdpc inf	2.0864	1.7177 (0.2200) (5.3261)	1.3733 (0.2200) (4.4979)
Inf lgdpc	5.5134	3.9281 (0.0700)	3.0831 (0.0700)

		(4.5208)	(3.5749)
F. Lgdpc lfda	0.6475	-0.5573 (0.6700) (4.6060)	-0.5967 (0.6300) (3.8744)
Lfda lgdpc	1.8262	1.3063 (0.4800) (5.8577)	1.0170 (0.5100) (4.9582)
G. Lgdpc linr	1.2903	0.4590 (0.7000) (4.5487)	0.2834 (0.7400) (3.8248)
Linr lgdpc	17.8257	5.4927 (0.4100) (14.9264)	0.4543 (0.5000) (2.1609)
H. Fpi cbpd	2.3816	2.1845 (0.1100) (3.4305)	1.7775 (0.1100) (2.8564)
Cbpd fpi	1.8991	1.4217 (0.2300) (3.0476)	1.1170 (0.2600) (2.5249)
I. fdi cbpd	1.4935	0.7803 (0.4900) (2.3587)	0.5616 (0.6000) (1.9283)
Cbpd fdi	0.4543	-0.8628 (0.4400) (3.3525)	-0.8612 (0.3700) (2.7889)
Lgdpc lgin	35.7193	15.4956 (0.0700) (19.2123)	2.2639 (0.0700) (2.9363)
Lgin lgdpc	19.0912	6.2002 (0.2400) (14.5198)	0.5823 (0.3400) (2.0874)
CBPD INF	24.1704	9.0395 (0.1300) (12.4105)	1.0960 (0.1300) (1.7058)
INF CBPD	2.4344	2.2679 (0.1400) (3.5605)	1.8498 (0.1400) (2.9690)
INF BMG	2.8753	2.9652 (0.0400)	2.4535 (0.0400)

		(2.4811)	(2.0343)
BMG INF	1.2189	0.3461 (0.6600) (2.2017)	0.1856 (0.8400) (1.7924)
FPI BMG	0.8784	-0.1923 (0.8300) (2.3800)	-0.2806 (0.7300) (1.9468)
Bmg fpi	2.0637	1.6818 (0.0900) (2.5361)	1.3422 (0.1100) (2.0820)
FDI BMG	1.2283	0.3610 (0.7500) (2.4847)	0.1985 (0.8500) (2.0375)
Bmg fdi	0.3700	-0.9961 (0.3500) (2.8663)	-0.9767 (0.2900) (2.3679)
LGDPC LMSCP	34.0476	14.5611 (0.1400) (23.1948)	2.0948 (0.1400) (3.6567)
Lmscp lgdpc	2.7176	2.7158 (0.3400) (5.8759)	2.2375 (0.3400) (4.9740)
Lgdpc gcfg	0.9582	-0.0661 (0.9400) (1.9811)	-0.1713 (0.8300) (1.6014)
Gcfg lgdpc	0.8527	-0.2329 (0.9000) (1.9730)	-0.3158 (0.7800) (1.5944)
Lgdpc bmg	0.8982	-0.1610 (0.9100) (2.8674)	-0.2535 (0.8400) (2.3689)
Bmg lgdpc	28.8510	11.6561 (0.0500) (13.7848)	1.5693 (0.0500) (1.9544)
fpi lreer	0.6626	-0.5335 (0.5700) (3.4283)	-0.5761 (0.4800) (2.8545)
lreer fpi	4.3608	2.6394 (0.0600)	2.0136 (0.0600)

		(2.7861)	(2.1353)
fdi lreer	2.1878	1.8781 (0.1000) (3.1164)	1.5122 (0.1000) (2.5844)
lreer fdi	4.0342	2.2743 (0.0200) (1.9783)	1.7106 (0.0200) (1.5530)
inf fpi	0.2869	-1.1275 (0.2700) (2.7787)	-1.0904 (0.2600) (2.2921)
fpi inf	60.6383	29.4257 (0.0100) (20.4230)	4.7840 (0.0100) (3.1553)
inf fdi	0.9556	-0.0702 (0.9500) (3.2957)	-0.1749 (0.8700) (2.7397)
fdi inf	1.7129	1.1272 (0.2500) (2.4586)	0.8619 (0.3300) (2.0149)
lgin fpi	25.1456	9.5847 (0.1100) (13.0733)	1.1946 (0.1100) (1.8257)
fpi lgin	0.1646	-1.3210 (0.1800) (3.0894)	-1.2579 (0.1600) (2.5610)
Lgin fdi	15.2653	4.0614 (0.2500) (12.1390)	0.1954 (0.7200) (1.6567)
fdi lgin	4.6780	5.8154 (0.0000) (2.7545)	4.9216 (0.0000) (2.2711)
linr lreer	2.0603	1.6764 (0.2400) (3.5031)	1.3375 (0.2600) (2.9193)
lreer linr	2.8248	2.8853 (0.1200) (3.7096)	2.3843 (0.1200) (3.0981)
lreer lfda	8.4083	4.9371 (0.0000)	3.6394 (0.0000)

		(3.5560)	(2.5545)
lfda lreer	0.8391	-0.2544 (0.7700) (3.6190)	-0.3344 (0.7400) (3.0197)
lreer cbpd	18.3009	11.3059 (0.0000) (4.7427)	7.9439 (0.0000) (3.1537)
cbpd lreer	2.3587	2.1483 (0.1400) (4.0111)	1.7462 (0.1400) (3.3592)
gcfg fpi	1.1919	0.3035 (0.8200) (2.8566)	0.1487 (0.9200) (2.3595)
fpi gcfg	0.4499	-0.8698 (0.4300) (2.2671)	-0.8672 (0.3600) (1.8490)
fdi gcfg	0.6512	-0.5515 (0.5300) (3.1820)	-0.5917 (0.4600) (2.6413)
gcfg fdi	2.9847	3.1381 (0.0200) (2.2508)	2.6032 (0.0200) (1.8350)
inf lreer	3.2867	3.6156 (0.0500) (3.4771)	3.0167 (0.0500) (2.8968)
lreer inf	53.0930	25.2077 (0.0100) (11.7295)	4.0209 (0.0100) (1.5826)
lreer lmscp	8.3315	7.0788 (0.0000) (3.4441)	5.6977 (0.0000) (2.6814)
lmscp lreer	2.6419	2.5961 (0.1100) (3.7700)	2.1340 (0.1100) (3.1504)
gcfg linr	2.4399	2.2766 0.0500 2.3308)	1.8573 0.0500, 1.9042)
linr gcfg	21.6587	8.7603 0.0100, 5.3734)	3.0644 0.0100, 1.7287)

bmg lreer	1.7044	1.1138 0.3300, 3.7828)	0.8504 0.4000, 3.1615)
lreer bmg	4.5645	2.8672 0.0400, 2.5956)	2.2026 0.0400, 1.9773)
inf lmscp	6.1576	8.1548 0.0100, 4.7358)	6.9473 0.0100, 3.9867)
lmscp inf	3.0519	3.2443 0.0200, 2.4308)	2.6952 0.0200, 1.9908)

Source: Author's Computation from stata 14, 2021

5.11.1. Interpretation of the panel causality results

The causality test was examined using the Dumitrescu and Hurlin (2012) Granger non-causality test. The results are expressed in table 5.35 by utilizing the bootstrap approach. In all cases, the null hypothesis is rejected provided the bootstrap p-value is statistically significant. Observing "lgdpc fdi", evidence from the p-values at the one percent level of significance implies that FDI granger cause lgdpc while "fdi lgdpc" at non-statistically significant p-values provides that the null hypothesis that lgdpc does not granger cause FDI cannot be rejected. A uni-directional causality from FDI to lgdpc characterizes the two variables. Similarly, the null hypothesis that "FPI" does not granger cause lgdpc is rejected at the 5% level of significance, while the outcome that lgdpc does not cause FPI cannot be rejected. A one-way causality does hold from FPI to lgdpc. The results also show that cbpd does not cause lgdpc, while on the basis of the statistical significance of the p-value, the null hypothesis that lgdpc does not cause cbpd is rejected. The field day from lreer to lgdpc is also a uni-directional causation, while lgdpc demonstrates that it does not cause lreer in the Southern African Customs Union during the study period. Moreover, examining the causality between "inf" and "bmg" shows causation from bmg to inflation, but inflation does not cause bmg. It was also observed from the study that while the null hypothesis that lreer does not cause FDI cannot be rejected, FDI is found to granger cause lreer given the statistical significance of the bootstrap p-value. Another one-way causation is the one between the inflation rate and foreign portfolio investment. Evidence shows that while there is no causality running between foreign direct investment and inflation, that of foreign portfolio investment and inflation is different. The inflation rate only causes

foreign portfolio investment. A crucial outcome is the relationship between the globalization index (lgin) and foreign direct investment (FDI). While FDI does not granger cause globalization index, the globalization index was found to granger cause foreign direct investment at the one percent level of significance. The nexus between official aid and development assistance (lfda) and the real exchange rate (lreer) provides information that lreer does not cause lfda in the Southern African Customs Union, but lfda causes lreer at the one percent level of significance. Furthermore, at the one percent level, the monetary policy rate differential (cbpd) causes lreer, whereas lreer does not cause cbpd. One-way causation is also the characteristic between FDI and gcfg, such that while gcfg does not cause FDI, FDI, on the other hand, granger cause gcfg. A similar trend of one-way causality also characterizes the inflation rate and the real exchange rate in the region, with the inflation rate granger cause lreer. "lmscp", which is monetary sector credit to the private sector, is a measure of financial sector development, producing a causal impact on the real exchange rate (lreer), but lreer does not cause "lmscp." At the five per cent level of significance, gross capital formation (gcfg) was found to granger cause inward remittance (linr), but the null hypothesis that linr does not cause gcfg cannot be rejected. Furthermore, within the context of one-way causation is the relationship between broad money growth (bmg) and the real exchange rate. The region is characterized by lreer having no causal impact on BMGS and BMGS granger causing lreer at a 5% level. Though, most of the outcomes exhibit one-way causation, the relationship between inflation rate (inf) and the monetary sector's credit to the private sector is bidirectional at the five percent level of significance in either direction.

Moreover, the bootstrap p-value is found to be statistically insignificant in either direction for "lgdpc inf," which implies no evidence of causality. The same conclusion characterizes "lgdpc lfda", "lgdpc linr", "fpi cbpd", "fdi cbpd", "lgdpc lgin", "cbpd inf", "fpi Bmg", "fdi Bmg", "lgdpc lmscp", "lgdpc gcfg", and "lgdpc bmg", "fpi lreer", "fpi lgin", "linr lreer", "gcfg fpi", "lgin" "linr, lreer" "gcfg" .

The foregoing causality test results among the macroeconomic variables provide information on the nature of the directional influence that characterizes the Southern African Customs Union and thus provide insights for policymakers.

5.12. The dynamic responses of capital flows, monetary policy and economic growth due to shocks in the southern african customs union.

This section investigates the Southern African Customs Union's various behavioral responses to economic growth, capital flows, and monetary policy. The specific approach of Pedroni (2013) on panel structural VAR was implemented for the analysis.

5.12.1. Impulse responses due to idiosyncratic shocks

Figure 5.17 displays the impulse response of the respective variables due to idiosyncratic shocks in the panel structural VAR model.

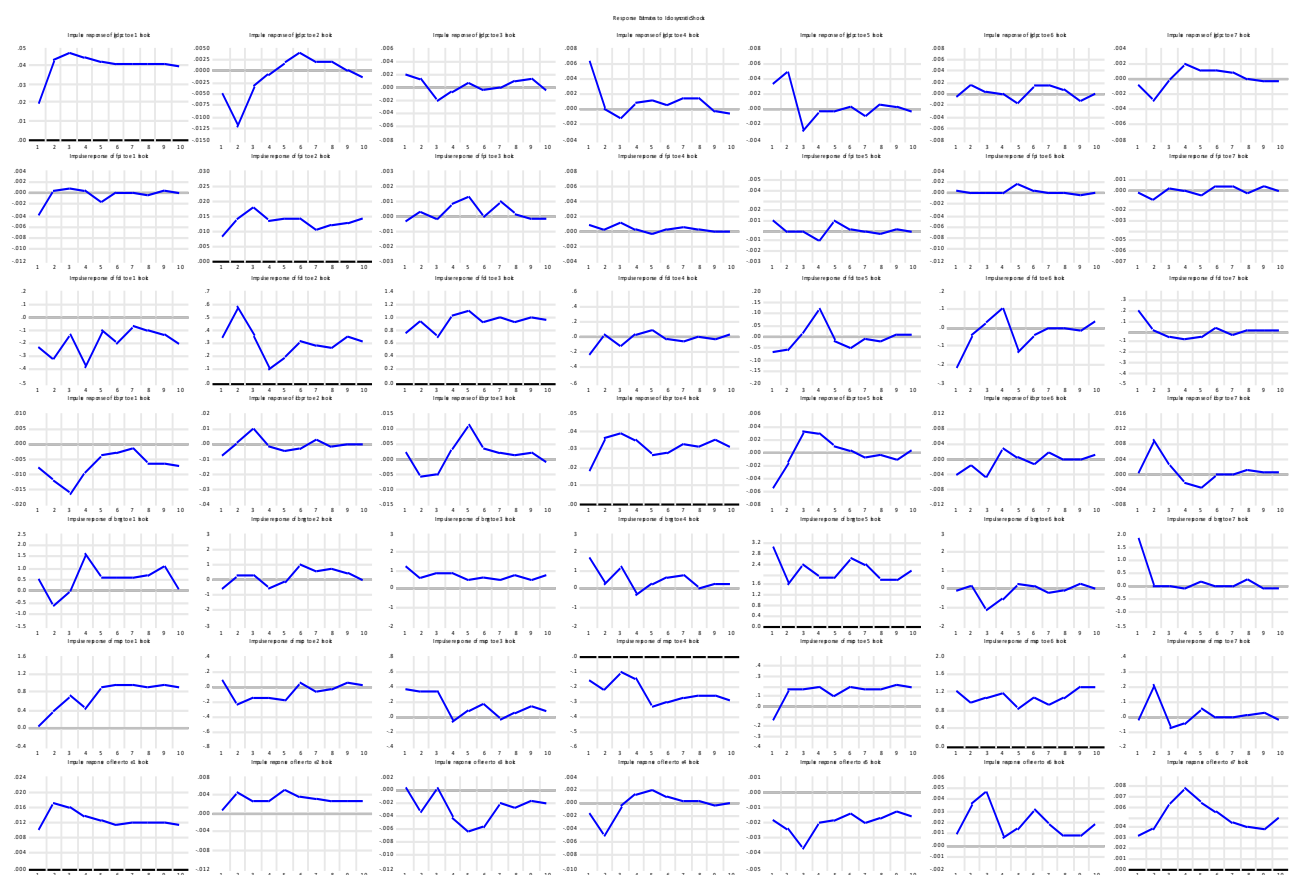


Figure 5.17: Impulse Responses Due to Idiosyncratic Shocks

Source: Author's Computation from Eviews 12

As can be observed from the graphs, lgdp responds to its own idiosyncratic shocks with an immediate value of 0.02, but maintains a steady upward and highly slopy trend. It thereafter becomes less slopy, after which it declines towards a previous value of 0.4 and maintains movement around it. The next graph captures the effect on lgdp arising from idiosyncratic shocks to the fpi error term (e2). A one-unit shock to e2 instantaneously produces a negative

effect on lgdpc at a value of -0.0050, which later deteriorates sharply to around -0.0125. However, the idiosyncratic shocks to the fpi error term later result in an upward trend of lgdpc, but it still maintains a negative range over some periods of time. It got to a steady state, but was not sustained. Arriving at a pick of $0.0025 < \text{value} < 0.0050$, it later declined towards the steady state and thereafter turned negative.

The behavioural response of lgdpc to idiosyncratic shocks in the error term of fdi produced a different outcome compared to the idiosyncratic shocks to the fpi error term. While fpi shocks produced an instantaneous negative response, that of fdi shocks resulted in a 0.002 lgdpc response. Nevertheless, it was not sustainable as it later declined to -0.002, after which the idiosyncratic shocks to the fdi error term led to an upward trend in lgdpc, which later declined towards the steady state and was characterized by some oscillations around the steady state.

The idiosyncratic shocks to the error term of the log of cbpr instantaneously produced a positive response of lgdpc at a value of 0.006, which was later characterized by a highly slopy downward trend towards the steady state and eventually turned negative. It turned upward thereafter and maintained some values above the steady state, but later had a downward trend and eventually settled at a negative value. The fifth graph on the first row is the impulse response of lgdpc to idiosyncratic shocks in the error term of broad money growth (bmg). It also exerts an immediate positive response of lgdpc followed by a brief stable increase, getting to a pick value in the interval of $0.004 < \text{lgdpc} < 0.006$. Then, lgdpc responded sharply in a downward trend to a point at which $-0.004 < \text{lgdpc} < -0.002$. Subsequently, it responded upward and eventually was characterized by some oscillations around a steady state.

The error term e6 is for the monetary sector's credit to the private sector (mscp), which is a measure of financial development. lgdpc initially started with a negative response briefly below the steady state and increased towards 0.002, after which it declined steadily and maintained some movements around the steady state which could not be sustained because the response turned negative, but later increased again towards 0.002. It maintained some stable values and eventually declined below the steady state, subsequently followed by a stable upward trend that rests at the steady state.

The concluding graph in the first row, last column is the response of lgdpc to a one-unit idiosyncratic shock to the error term of the log of real exchange rate (lreer). lgdpc had an initial negative response and trended downward, after which it maintained a stable upward trend, arriving at a peak of around 0.002, but declined from the peak towards the steady state and later

turned negative. The second row of Figure B commenced with the response of fpi to the idiosyncratic shocks to the error term of lgdpc. FPI initially responded negatively, around -0.004, but maintained an upward trend towards a steady state. The response stayed positive over some range above the steady state, followed by a decline below the steady state, and later increased back to the steady state with some oscillations around the steady state thereafter.

A unit idiosyncratic shock to the error term of fpi, which is e2, produced an instantaneous positive effect slightly below 0.010, which later maintained a stable upward trend and peaked at $0.015 < fpi < 0.020$. The response declined from the pick and maintained some fluctuations within the range $0.010 < fpi < 0.015$. In a nutshell, fpi maintained the positive quadrant to the idiosyncratic shocks in its own error term.

FPI to e3 is the impulse response of fpi to the idiosyncratic shocks in the error term of fdi. It had an immediate negative response, slightly below the steady state, and followed a brief upward trend, but later declined. However, fpi fluctuated above the steady state over time and returned back to it with a little deviation below it. The instantaneous response of fpi to the idiosyncratic shocks in the error term of the log of the central bank policy rate (e4) is positive, subsequently characterized by fluctuations around the steady state and rests on it eventually. The immediate response of fpi to the idiosyncratic shocks to e5 (error term of bmg) was 0.001, from which it declined sharply to the steady state. It had stability along it after which it declined below it. The response turned sharply upward trending, but descended back to the steady state having a slight fluctuation around it. The idiosyncratic shocks to the error term of monetary sector credit to the private sector had an immediate positive effect response in fpi which is slightly above the steady state. However, fpi was stable over time in the steady state, after which it increased, followed by a decline back to the steady state and slight movement around it. Observing the response of fpi to idiosyncratic shocks to the error term (e7) in lreer shows that fpi had an immediate negative response slightly below the steady state and was subsequently characterized by oscillations around the steady state.

The idiosyncratic shocks to the error term of lgdpc had an instantaneous negative response in fdi and subsequently fluctuated negatively over time. However, the response of fdi to idiosyncratic shocks in the error term of fpi (e2) had an immediate positive effect on fdi, which steadily increased to a picked value around 0.6. Thereafter, there was a sharp and stable decline to 1, which later increased to around 0.3 and had fluctuations in the neighborhood of 0.3. Unlike the response of fdi to the idiosyncratic shocks in lgdpc, that of shocks to fpi produced fdi that

responded in the positive quadrant. However, the idiosyncratic shocks to the error term of fdi had a positive quadrant response in fdi. The immediate response was around 0.8, which slightly increased and fluctuated thereafter over time. The response of fdi to the idiosyncratic shocks in the error term of lcbpr was instantaneously negative, around -0.2, which later increased steadily to around the steady state. It thereafter oscillated around a steady state over time. The next graph captures the behavioural response of fdi to the idiosyncratic shocks to the error term e5 (bmg). The immediate response was negative, with a further stable increase to 0.10. It, however, declined back to the steady state and fluctuated upward in the neighbourhood of it. The idiosyncratic shocks to the error term of (e6) of monetary sector credit show a negative response of fdi of around -2 but followed an upward trend to 0.1. It was subsequently downward trended and later increased towards the steady state at which it maintained a brief stability and further approached an upward trend. While the shocks to e6 had around -0.2 instantaneous response of fdi, the shocks to lreer (e7) had a fdi response of 0.2 from which it declined to the steady state and eventually turned negative with a later upward movement and subsequently a downward movement that stabilized at the steady state.

Lcbpr had an initial negative response arising from the idiosyncratic shocks to the error term of lgdpc, followed by a downward trend that later rose in the direction of the steady state, but was not sustainable as it further declined. The idiosyncratic shocks to the error term of fpi (e2) result in an immediate negative response of lcbpr of close to -0.01, which increased to 0.01. It later declined to a steady state and maintained some fluctuations around it, with a slight stability towards the end. However, the shocks to e3 (fdi) had an initial positive response in lcbpr, which declined to the negative quadrant, maintained a brief negative stability after which it increased sharply to a little above 0.010, from which it declined to the steady state and fell slightly below it. The idiosyncratic shocks to its own error term produced a positive response of 0.02 in lcbpr, which increased towards the neighbourhood of 0.04 followed by a steady decline which later fluctuated slightly upward. The instantaneous response of lcbpr to the idiosyncratic shocks in e5 (bmg) was around -0.005, which sharply had a rise to around 0.004, from which it declined towards the steady state and below it, but had a slight fluctuation from which it increased a little above the steady state. The shocks to the error term (e6) of monetary sector credit initially resulted in a -0.004 response in lcbpr, from which it rose and returned back to around -0.004, from which it maintained some stable upward trend towards 0.004, but was not sustained as it declined back to the steady state and below it. Later, it briefly increased above it and subsequently declined back to the steady state at which it was stabilized over a short period of

time, and thereafter had a slight increase. The concluding response of lcbpr arose from the idiosyncratic shocks to the error term of lreer (e7). The response graph shows an immediate positive response very close to the steady state from which it was characterized by a sharp increase to a little above 0.008. However, the peak response was not sustainable as it declined towards and below the steady state. It thereafter increased to the steady state at which it maintained some stability, but had been a little above the zero line at a particular short interval.

The idiosyncratic shocks to the error term of lgdpc resulted in a 0.5 bmg response from which it declined slightly below -0.5. The response from the previous point had improved by a rise to around 1.5, but was not sustainable as it declined back to around 0.5 and maintained a stable movement over some period of time, from which it ascended to around 1.0 and experienced a steep decline to the steady state. While bmg had an instantaneous positive response to the shocks in e1, that of e2 (fpi) generated an immediate negative response which increased to an area slightly above the steady state and maintained some stability over a brief period of time, but later declined below the steady state. The response later turned in the upward direction and maintained some fluctuations that eventually returned back to around the steady state. E3 is the error term of fdi that produced an immediate positive response in bmg slightly above 1, from which it declined below 1, but above the steady state. It later increased slightly to the neighbourhood of 1 and had a brief steady movement from which it declined back still within the 1 and 0 bounds and experienced continued fluctuations in the bounds. BMG responded within the range of 1 and 2 to the idiosyncratic shocks in the error term of the log of the central bank policy rate (lcbpr), but declined to below 1 and above the steady state. It later increased to slightly above 1 but later declined sharply to a little below the steady state from which it had increased back to the positive quadrant but below 1. It was not sustainable as it declined back to its steady state and later rose very slightly above it. The idiosyncratic shocks to e5 (the error term of bmg) generated a positive response over time in bmg. The response had its highest, close to 3.2, from which it sharply declined to 1.6, followed by a sharp rise to 2.4, from which it steeply declined to around 2.0, with a short stable movement around it, which later rose to around 2.8, but declined slightly below 2.0, with a further brief movement from which it rose to slightly above 2.0. In a nutshell, bmg had a little stability, but more fluctuations in the positive quadrant due to the idiosyncratic shocks to its own error term. However, a shock to the error term (e6) of mscpr resulted in the bmg response being slightly below the steady state from which it increased very briefly around the steady state, but was not sustainable as it declined steeply to around -1. It later rose back to the steady state and increased slightly above

it, but further declined back to it and eventually fell below it, followed by a rise to slightly above the steady state. It later declined and settled into a steady state. In the final analysis, bm_g responds to $1.5 < bm_g < 2.0$ as a result of the idiosyncratic shocks to the error term (e_7) of lr_{eer} . It declined from the preceeding interval to the steady state and had some slight movements on it and fluctuations.

The idiosyncratic shocks to the l_{gdpc} error term (e_1) resulted in an initial response of $mscp$ extremely close to the steady state (0.0). It then rose sharply to the neighbourhood of 0.8 followed by a steep decline close to 0.4 with a further brief rise to above 0.8 and subsequently characterized by a slightly stable movement followed by a very short weak fluctuations. However, the response of $mscp$ to the idiosyncratic shocks to (e_2 , fpi) commenced at the interval of $0.0 < mscp < 0.2$. It later declined to around -0.2 from where it briefly increased above -0.2. It had a stable movement for a short period, but thereafter declined briefly close to -0.2. It thereafter responded in an upward direction, slightly above 0.0, but later fluctuated over some time around it. $Mscp$ responded extremely close to 0.4 and minimally declined to a very short stable state arising from the idiosyncratic shocks to e_3 , fdi . It eventually declined sharply to a little below the steady state, after which it moved upward and maintained some fluctuations within 0.0 and 0.2. $Mscp$ responded throughout the study period in the negative quadrant arising from the idiosyncratic shocks to the error term e_4 of $lcbpr$, while the shocks to the error term e_5 of bm_g instantaneously produced a negative response in $mscp$ of around -0.1, from which it increased sharply to around 0.2 and was further characterized by some slight fluctuations over time. The idiosyncratic shocks to its own error term led to an immediate response of $mscp$ at 1.2 and was further characterized by fluctuations within the interval of 0.8 and 1.2, but slightly rose above 1.2 and was stable towards the end of the period. The concluding response of $mscp$ in this context is the effect the idiosyncratic shocks to the error term (e_7) of lr_{eer} exert. It commenced with an initial negative response that was slightly below 0, from which it had a steeply slopy rise to 0.2, but was not sustained as it steeply declined to below the zero line but above -0.1. It later responded towards and above the zero line but less than 0.1 from which it declined back to the steady state and maintained a brief steady state movement followed by a slight upward movement which returned back and briefly fell below the zero line.

The idiosyncratic shocks to the error term of l_{gdpc} resulted in the impulse response of lr_{eer} within the interval of 0.008 and 0.012, from which it maintained a rise to a little above 0.016. Thereafter, it declined somehow steadily towards 0.012 and maintained some movements

around and on 0.012. The next graph is the impulse response of *lreer* to the idiosyncratic shocks in the error term of *e2*, *fpi*. *Lreer* responded throughout the positive quadrant. It initially responded close to zero, after which it rose to 0.004, but declined to a short stable state from which it further increased and later declined steadily, staying within the range of 0.000 and 0.004 with some periods of stability. Observing the impulse response of *lreer* to the idiosyncratic shocks in the error term *fdi*, shows that *lreer* decreased sharply from the positive quadrant around the steady state to the neighbourhood of -0.004, which later appreciated to and slightly above the steady state. This was followed by depreciation as it declined to around -0.006 which later appreciated to -0.002 from which it had very brief fluctuations around it.

E4 is the error term of *lcbpr*, whose idiosyncratic shocks produced an initial negative response of around -0.002 in *lreer*. It declined to $-0.006 < \text{lreer} < -0.004$ from which it rose towards and above the steady state (0.002), after which it declined back to the steady state with very minimal fluctuations around the state. On the other hand, the idiosyncratic shocks to *e5*, *bmg* produced a negative response around -0.002, which declined towards -0.004 but later sharply rose to -0.002 with a further fluctuating pattern within the interval of -0.002 and -0.001. In a nutshell, *lreer* responded throughout the negative quadrant to shocks in *bmg*.

The next graph captures the response of *lreer* to the idiosyncratic shocks in *e6*, *mscp*. The graph shows that *lreer* initially responded at 0.001, characterized by a rise to the neighbourhood of 0.005. It, however, declined steeply and below 0.001 but above 0.000. The response later turned in the upward direction to slightly above 0.003, which later declined to 0.001 and had a stable movement around it from which it approached an upward direction to extremely close to 0.002. The *lreer* responds throughout the positive quadrant, arising from the idiosyncratic shocks to *e6*. The concluding response in this context is in terms of the response of *lreer* to the idiosyncratic shocks in its own error term (*e7*). It responded throughout the positive quadrant, having an initial response of around 0.003. The response increased to the neighbourhood of 0.008 after which it declined to slightly below 0.004 with a subsequent rise to a little above 0.005.

5.12.2 : Impulse responses due to common shocks

Figure 5.18 displays the impulse response function of the respective variables as a result of common shocks.

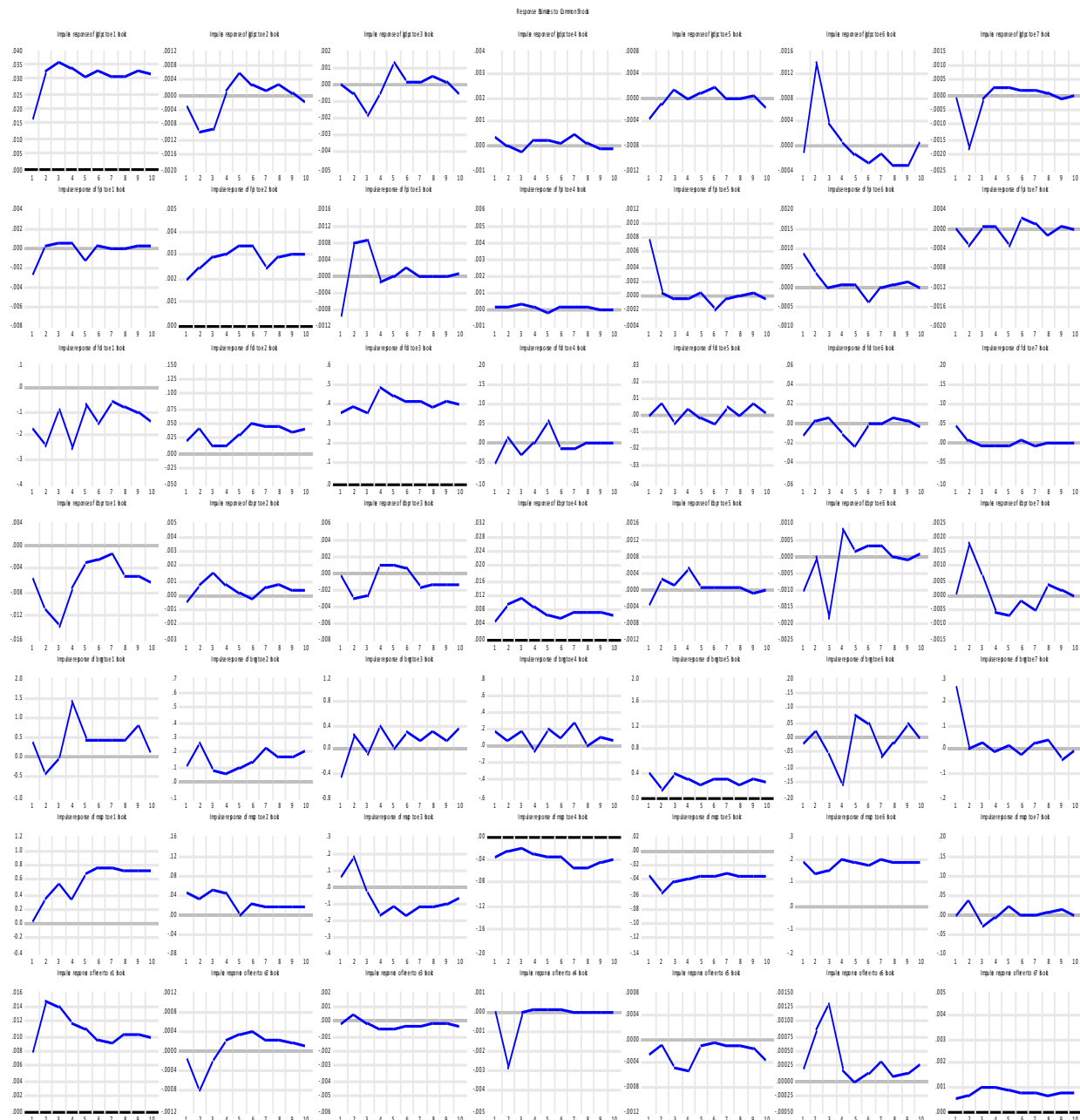


Figure 5.18 : Impulse responses Due to Common Shocks

Source : Author's computation from Eviews 12

It can be observed from the figure that a common shock to the lgdpc error term, e1 resulted in the response of lgdpc in the positive quadrant. Initially, it responded in the neighbourhood of 0.015 which increased to the pick of 0.035 and later declined steadily and characterized with

some fluctuations within the bound of 0.030 and 0.035. The next graph is the response of lgdpc to the common shocks in e2(fpi). The graph shows that the common shocks resulted in the response of lgdpc at slightly around -0.0004 from which it declined to around -0.0008. It then had a stable and very short, less slopy increase from which it turned sharply upward to a value in the neighbourhood of 0.0004 from which, with some fluctuations, it declined to the steady state and briefly below. Lgdpc responded initially at the steady state due to the common shocks to e3(fdi) from which it declined to extremely close to -0.002, but later turned in steepy movement in the upward direction to slightly above 0.001 and later fell in the direction of the steady state. The lgdpc response maintained a stable movement briefly close to the steady state. It later increased slightly followed by a decline back to the steady state and below it by a few distance. The behavioural response of lgdpc to the common shocks in e4(lcbpr) had a response slightly above 0.000 from which it declined to some measure below 0.000 from which it turned in the direction of the steady state and slightly above it. It maintained a short parallel stable movement and thereafter declined close to the steady state after which it increased and later declined to and slightly below the steady state. Lgdpc had an instantaneous negative response that is extremely in the neighbourhood of -0.0004 due to the common shocks to e5 (bmg) from which it rose sharply towards the zero line and by a few distance above it but later declined back to the steady state. It had a rise but returned to the steady state at which for some short periods maintained stability on the steady state which later rose and declined, falling by a few distance below the zero line. The response of lgdpc to the common shocks in e6(mscp) experienced some swift movements. It is negative briefly below the steady state from which it increased steeply to $0.0012 < \text{lgdpc} < 0.0016$. It then declined sharply to 0.0004 from which it further deteriorates to the steady state and eventually below it. It had a little fluctuation below it with a short stable movement from which it returned back to the steady state and rose briefly above it. The concluding graph in the response of lgdpc is the common shocks to e7 (lreer) exerts. Lgdpc is instantaneously negative close to the zero line. It then had a steep decline to $-0.0020 < \text{lgdpc} < -0.0015$ from which it moved upward to the steady state and above it but less than 0.0005 but declined back to the steady state and slightly fell below it.

The next variable is fpi, which immediately responded negatively, arising from the common shocks to the error term of lgdpc (e1), followed by an upward movement to the steady state and a slight rise above it, which later descended below the zero line slightly and subsequently increased back to the steady state, having some slight movement on the zero line and around it. The common shock to its own error term produced a response in the positive quadrant,

having an initial response of 0.002, which increased to a value above 0.003 but less than 0.004, at which it had a short and stable movement from which it declined towards 0.002 and turned in a less slopy upward direction towards 0.003.

FPI had an instantaneous negative response to the common shocks to e3, the error term of fdi around -0.0008 from which it rose to 0.0008 and increased very slightly above 0.0008, but declined slightly below the zero line from which it turned back to the steady state and rose above it by a few distance. It, however, descended to the zero line and maintained some stable movements on it, after which it increased very slightly. E4 is the error term of lcbpr. A common shock to it resulted in fpi that had some fluctuations around the steady state. However, the response of fpi to common shocks to e5 bmg was initially at around 0.0008, at which it declined to a steady state and had some movements around it, from which it had a minimal rise briefly above the zero line, but later declined to -0.0002. It eventually roots back to the zero line but is characterized by a slight decline thereafter from it.

FPI responded initially positively, arising from the common shocks to e6,mscp at around 0.0010. It declined to the steady state with a slight movement around it, then fell below it to around -0.0005, and later rose back to the steady state with a little rise above it, but eventually returned back to the steady state. The concluding response of fpi is the last graph on the second row of Figure c. The common shock in this instance occurred at the error term of lreer. Fpi immediately responded at the steady state but declined to around -0.0004 from which it rose back to the steady state having some slight stable movement around it which later declined towards - 0.0004. FPI later turned in the upward direction and got above the zero line by some distance, which eventually declined back to the zero line and slightly below it, then later rose back to the steady state with a slight growth above it, which returned and settled at the steady state.

The next graph for consideration is the impulse response of fdi to the common shocks in the respective error terms of the variables. The figure shows that a one unit common shock to the error term of lgdp resulted in an fdi response throughout the negative quadrant. It started with an initial negative response of around -0.2, which declined, but later rose to -0.1 and continued over time, unstably. However, the response of fdi to e2, fpi generated an fdi response in the positive quadrant. It started with an initial value of around 0.025, which increased to the neighbourhood of 0.050, but subsequently declined to a short stable state, after which it moved in the upward direction to 0.050, from which it descended and fluctuated a little bit. Fdi

responds to its own shocks. e_3 was around the neighbourhood of 0.4, but fluctuated over time within the interval of 0.3 and 0.5 and concluded at 0.4. A common shock to the error term of $lcbpr$ (e_4) generated an fdi response initially at -0.05 from which it increased slightly above the steady state. It, however, fell below the zero line but above -0.05, from which it moved in the upward direction to 0.05, but was not sustainable as it declined to a slight stable state, after which it increased slightly to the 0.00 line and maintained it over time. The Fdi response to the common shocks to e_5 , the error term of $bmng$, initially begins at the steady state and subsequently characterized by fluctuations around the steady state and within the bounds of 0.01 and -0.01, while the common shocks to e_6 , the error term of $mscp$, result in an Fdi response of around -0.01. This increased to slightly above the steady state, maintained a short stability, but declined to around -0.02. It later turned in the upward direction to the steady state at which it had some short stable movement, after which it increased slightly and subsequently declined back to the steady state with a very slight deviation below it. The next behavioural response of fdi is from the shocks to the error term e_7 of $lrer$. It initially had a response value of around 0.05 from which it declined to the steady state but fell extremely very slightly below it in a stabilized path and later had a triangular movement around the steady state, which was subsequently restored and stabilized over some time in the steady state.

The next variable is $lcbpr$ in response to the respective common shocks to the error terms. $Lcbpr$ responded throughout the negative quadrant, arising from common shocks to the error term of $lgdpc$. It was initially within the interval of -0.008 and -0.004, from which it declined to -0.012 and fell below it by a few distances. $Lcbpr$ thereafter responded upward to the interval of 0.000 and -0.004, from which it declined back to the previous range of -0.008 and -0.004 though having a section of a stable path in the range. $Lcbpr$ responded to the neighbourhood of the steady state arising from the common shocks to the error term e_2 of fpi . It increased upward to the interval of 0.001 and 0.002, but declined to the steady state and slightly below it, with a subsequent upward movement to the neighbourhood of 0.001, from which it had a short decline to a stable path towards the end. $Lcbpr$ had an instantaneous negative response very close to 0.000. It declined to a point within the interval of -0.004 and -0.002. It tended slightly upward and eventually moved steeply upward to a few distances above the steady state. The graph moved less slopy in the downward direction and eventually turned sharply downward to around -0.002, from which it had a very slight and less slopy upward movement to a stabilized path around -0.002. The response of $lcbpr$ to its own shocks responded all throughout the positive quadrant. Initially, it commenced around 0.004, after which it rose to around 0.012, from which

it declined to the interval of 0.004 and 0.008. It rose shortly within this interval to a stabilized path around 0.008 but later declined slightly shortly. The common shock to e5, the error term of bmg, exerts an immediate negative response in lcbpr of around -0.0004, from which it moved to the neighbourhood of 0.0004, after which it had a short decline and later rose to a point slightly above 0.0004. The lcbpr declined steeply to a stabilized path around the steady state but later declined shortly below the zero line with a subsequent short rise that concluded at the steady state. The penultimate response behavior of lcbpr refers to its response due to the common shocks to e6, the error term of mscp. It initially had an instantaneous negative response at -0.0010 after which it increased steeply to the steady state. The response then declined steeply to around -0.0020, from which it sharply rose to a point within the interval of 0.0005 and 0.0010. It then declined towards the steady state, but rose slightly and stabilized over a short path, from which it declined to the steady state and slightly below it, after which it rose back to the zero line and very slightly above it. The concluding behaviour of lcbpr relates to its response to the common shocks in respect of e7, the error term of lreer. As can be observed from the graph, it responded instantaneously around the steady state from which it was characterized by a steep upward movement to a point within the interval of 0.0015 and 0.0020. It declined from the previous point steeply downward to -0.0005, from which it had a further less slopy and short downward movement and subsequently fluctuated towards the steady state and eventually concluded around it.

The next response graph is that of bmg in respect of the common shocks to the respective error terms. It had an immediate positive response to the error term of lgdpc (e1) of around 0.5, from which it declined to around -0.5, which later rose to a steady state and subsequently increased to around 1.5. It declined from the foregoing peak to a stabilized path over some period of time around 0.5, but later rose above 0.5 but less than 1.0. Bmg then declined sharply to around the steady state. A common shock to e2, the error term of fpi, resulted in an immediate response of bmg of around 0.1, which increased to the neighbourhood of 0.3, but subsequently declined to below 0.1, which later rose steadily to a little above 0.2. It, however, declined slightly below 0.2 to a stabilized path over some periods, after which it moved in the upward direction to 0.2. Bmg responded with an immediate negative effect due to the common shocks to e3, the error term of fdi. It was initially around a little measure below -0.4, from which it had a very steep rise to the interval of 0.0 and 0.4. From the foregoing point, bmg declined slightly below the zero line but later rose to 0.4, and subsequently declined to a steady state, after which it maintained some fluctuating pattern within the interval of 0.0 and 0.4.

Furthermore, bmg responds to around 0.2 due to the common shocks to e4, the error term of lcbpr, and is subsequently characterized by a fluctuating pattern over time. However, there are three points at which it touches the steady state. Moreover, bmg responded over time in the positive quadrant, as evidenced by the common shocks to its own error term, e5. It had an immediate response at 0.4, from which it declined to a point above the steady state. It, however, increased back to 0.4 and subsequently continued in a fluctuating pattern within the range of 0.0 and 0.4, though with a stable state in the process. Bmg had an initial negative response to the common shocks to e6, the error term of mscp. It was initially around the zero line, from which it had a short increase above it. Subsequently, bmg responded sharply downward to a little below -0.15, after which it increased steeply to a point within the interval of 0.05 and 0.10. It thereafter declined to a little below -0.05, after which it rose to 0.05 but subsequently declined to slightly below the steady state. The final examination of the behavior of bmg within the current context is its response to e7, the error term of lreer. It initially peaked at a point within the interval of 0.2 and 0.3, from which it declined steeply to the steady state and subsequently fluctuated over time in the neighbourhood of the steady state.

Moreover, the behavioral response of mscp was examined with respect to the common shocks to the respective error terms of the macroeconomic variables. In the first instance, a common shock to e1, the error term of lgdp, produced a response in mscp that responded throughout the positive quadrant. It was initially around 0.0 and increased to around 0.6, from which it declined to slightly below 0.4. Also, mscp thereafter rose to around 0.8, around which it had some stable path over some time, but later declined slightly to another stabilized path covering some period of time. The immediate response of mscp to the common shocks to e2 was a little above 0.04 from which it had slight fluctuations around 0.04 which later declined to the steady state. It rose from the steady state over a few distances, then turned slightly and eventually got on a stabilized path. Moreover, the response of mscp to common shocks to e3 initially had it at around 0.1, followed by a rise to around 0.2, from which it fell to around -0.2. It thereafter fluctuated over time and got slightly above -0.1. Moreover, mscp responded completely in the negative quadrant arising from the common shocks to e4. It initially started at around -0.04 and fluctuated around it over time, having instances of some very short stabilized paths in the process. Moreover, a common shock to e5 resulted in a response of mscp at around -0.04, from which it declined to around -0.06. Mscp then maintained an upward movement towards and around -0.04. The next impulse response emanates from the effect that common shocks to e6, mscp has on itself. Firstly, it responded throughout the positive quadrant. It commenced

initially at around 0.2, which declined slightly and later turned upward until it arrived at the value of 0.2. It had a decline from the foregoing slightly, after which it rose back to 0.2, but descended extremely slightly and subsequently maintained a stabilized path around 0.2. Conclusively, mscp commenced at the steady state due to a common shock e_7 . It however, fluctuated around the steady state as well as having a stabilized path within the steady state. Notably, it commenced at the steady state and also concluded at the steady state.

Finally, regarding the impulse response functions in the context of common shocks, they are the behavioural responses of $lreer$ to the shocks in the respective error terms of the macroeconomic variables. $lreer$ instantaneously responded at 0.008 due to the common shocks to e_1 , the error term of $lgdpc$, which subsequently moved steeply to slightly above 0.014, from which it descended slightly below 0.010. After that, it turned and rose to around 0.010, at which it showed a stable path over a short period of time, from which it slightly descended to 0.010. $lreer$ therefore responded to common shocks in the error term of $lgdpc$ within the positive quadrant. The next response of $lreer$ is due to the common shock to e_2 , the error term of fpi . It initially had a negative response at a point in the interval of -0.0004 and 0.0000 from which it declined to -0.0008. The response turned upward from the foregoing to around 0.0004, from which it declined slightly to a short stabilized path and further declined slightly towards steady.

$lreer$ had an immediate negative response around the steady state due to the common shocks to e_3 , the error term of fdi . It increased slightly above the zero line, after which it declined below the steady line, though above -0.001 to a short stabilized path. It then continued with a slight fluctuation, though inclusive of two other short stabilized paths in the vicinity of the steady state. The error term of $lcbpr$ is e_4 . A common shock to its error term results in an instantaneous response of $lreer$ at the steady state. It fell sharply from this instance to the neighbourhood of -0.003, followed by a steep rise back to the steady state, and eventually rose slightly above the steady state to a stable path around the zero line, which subsequently declined shortly back to the steady state at which it maintained stability over some periods of time.

$lreer$ responded throughout the negative quadrant, arising from the common shocks to e_5 , the error term of bmg . It had an immediate effect on $lreer$ at a point in the interval of -0.0004 and 0.0000 from which it rose slightly in the direction of the zero line, but turned downward to slightly below -0.0004. It later had a very short downward movement, but subsequently turned upward towards the zero line and slightly fluctuated around the steady state from which it turned downward to a point around -0.0004. $lreer$ responded throughout in the positive

quadrant, arising from the common shocks to the error term e_6 of m_{scp} . It had an initial response of 0.00025, which rose to 0.00125, from which it descended to the steady state. It later rose to around 0.00025 but subsequently declined, though above the steady state, followed by an upward turn to 0.00025. The concluding response of $lrer$ relates to the common shock to its error term (e_7). Observing the graph shows that $lrer$ responded throughout the positive quadrant. It had an initial response of greater than 0.000 but below 0.001. It increased to 0.001, at which it had a short, stable movement. However, it mildly fluctuated downward in the neighbourhood of 0.001 though, with two short stabilized paths in the process.

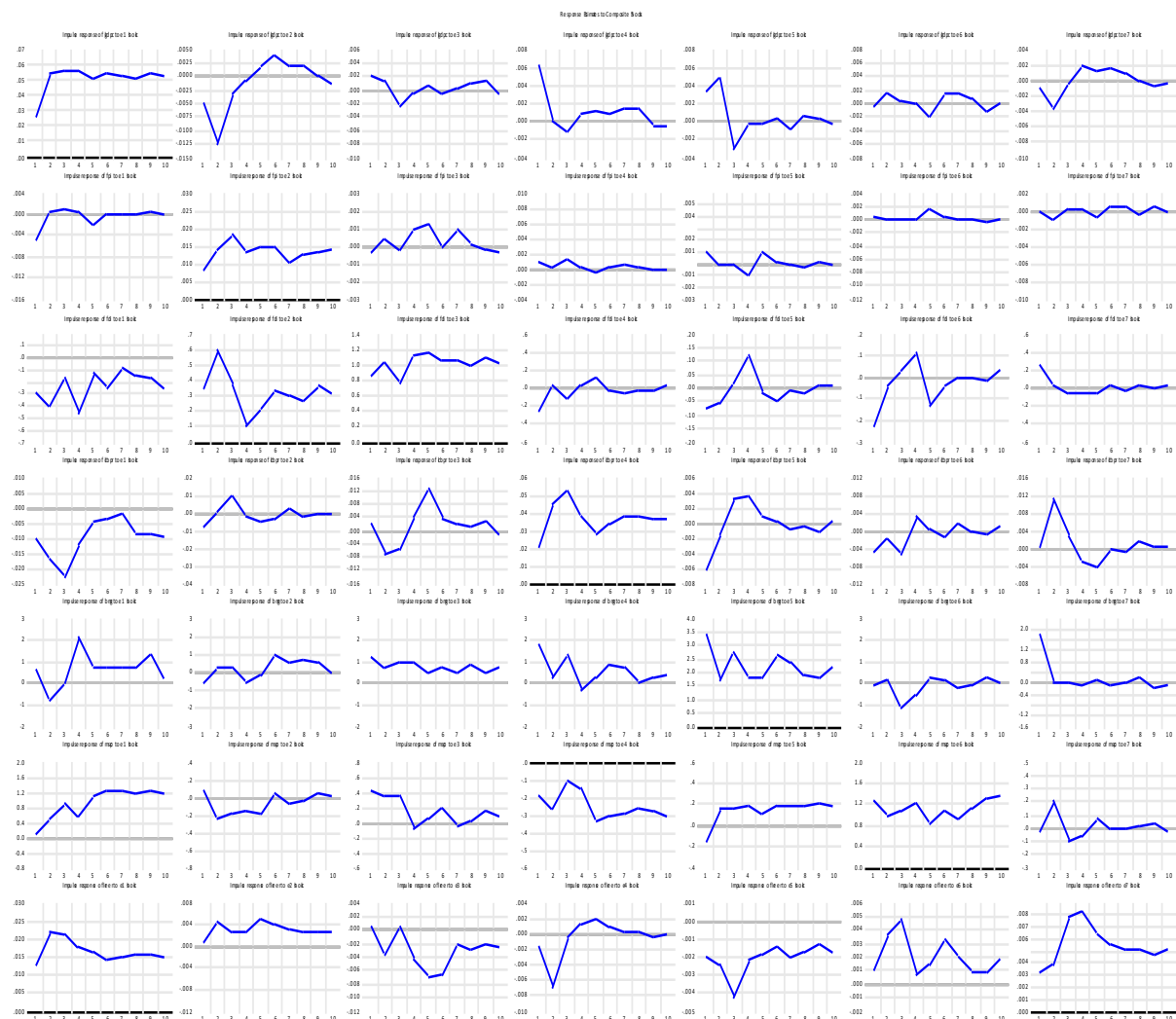


Figure 5.19 : Impulse response due to composite shocks

Source : Author's computation from Eviews 12

5.12.3. Impulse response due to composite shocks

Figure 5.19 displays the impulse response of the macroeconomic variables arising from the composite shocks to the respective error terms. The composite shocks are a synthesis of the idiosyncratic shocks and the common shocks. By implication, it exerts more shock effects on the error terms.

Firstly, the composite shocks to e1 resulted in the response of lgdpc in the first quadrant. It is at a point within the interval of 0.02 and 0.03. It increased from this instance to the interval of 0.05 and 0.06, and thereafter had fluctuations within the same interval over time. Furthermore, the composite shocks to e2, the error term of fpi, instantaneously had a negative response on lgdpc at -0.0050, from which it declined to -0.0125. It moves upward from this instance to a few distances above 0.0025, from which it declines to a stable path slightly below and around 0.0025. It thereafter declined from the stable path to a few distances below the steady state. Subsequently, the composite shocks to the error term (e3) of fdi led to the response of lgdpc at 0.002, from which it declined slightly below -0.002. It rose from this instance to a few distances above the steady state but later declined back slightly below the steady state, after which it rose to a point in the interval of 0.000 and 0.002. It declined, however, to a few distances below the steady state. Moreover, the composite shocks to e4, the error term of lcbpr, had an immediate positive effect on lgdpc at slightly above 0.006. It declined sharply to the steady state from which it fell further to a point in the interval of -0.002 and 0.000. It rose from the preceding point to a few distances above the steady state and was further characterized by some fluctuations within the interval of 0.000 and 0.002. It thereafter declined from a short stable path within the previous interval to a point slightly below the zero line, at which it extended briefly stabilized and was parallel to the steady state. The next lgdpc response relates to the composite shocks to the error term e5. It produced an immediate positive response on lgdpc at around 0.004, from which it slightly rose shortly above it. It thereafter declined steeply to a point slightly below -0.002, from which it increased steeply to around the steady state and fluctuated around it. Furthermore, lgdpc responded to shocks at around the steady state due to the composite shocks to e6. It rose slightly above it to a point around 0.002, from which it declined back to the steady state. It later became worse as it declined further to -0.002 and later rose to a short stable path around 0.002, from which it declined a few distances below the steady state but later increased and concluded at the steady state. Finally, lgdpc responded to a point of $-0.002 < \text{lgdpc} < 0.000$. It declined from the previous point to around -0.004, from which it increased to 0.002, but fell slightly with a later short increase back to around 0.002. It

subsequently declined steadily to a point slightly below the steady state, from which it turned back to around the steady state.

FPI responded to around -0.004 due to the composite shocks to e_1 . It increased from the previous instance to a range slightly above the steady state from which it turned downward to a point in the interval of -0.004 and 0.000. The variable, fpi , later increased back to the steady state and stabilized on it over some period of time, followed by a very short rise and declined back to the zero line. In another vein, fpi responded in the positive quadrant due to the composite shocks to its own error term. It had an immediate response of around 0.010, from which it increased to the neighbourhood of 0.020, after which it declined to slightly below 0.015. Subsequently, it rose briefly to the line 0.015 at which it maintained some short stable movement. Fpi then turned downward to around 0.010, from which it rose back to around 0.015. Another response behavior of fpi emanated from the composite shocks to the error term of fdi . It had an initial response at around the steady state from which it rose to a point in the interval of 0.000 and 0.001 from which it declined slightly below the zero line. It subsequently increased to 0.001 and further rose slightly above it. From the previous peak, fpi fell to a steady state, followed by a rise to 0.001. It thereafter followed a downward trend to slightly below the steady state. The response of fpi arising from the composite shocks to the error term (e_4) of $lcbpr$ initially commenced at a point within 0.000 and 0.002. It was characterized by oscillations around the steady state and subsequently concluded over a moderately stabilized path on the steady state. Moreover, the response behavior of fpi due to the composite shocks to e_5 , bmg was examined. The fpi variable responded to the shocks with an immediate value of 0.001. It thereafter declined to a steady state and maintained some moderate stable movements, which was later followed by a decline to -0.001. It then rose from the previous point back to 0.001, from which it declined moderately to the steady state as well as had a slight fluctuation around it, which concludes on the steady state.

The next examined response of fpi relates to the common shocks to e_6 , the error term of $mscp$. It was initially at a very slight value above the steady state, but declined marginally and maintained a stable movement on the zero line over some period of time. Subsequently, fpi responded in the upward direction to around 0.002, but later descended back to the steady state in which it had moderate stable movement. Subsequently, it fell slightly, but returned and concluded in a steady state. Finally, the response of fpi to the common shocks to the error term (e_7) of the $lrer$ occupies the last graph on the second row of Figure D. As can be observed, fpi responds immediately on the steady state and also ends in the steady state. In between the

beginning and the end, it was characterized by fluctuations around the steady state, though with instances of two moderate stable movements.

The next variable is the impulse response of fdi in relation to the common shocks to the respective error terms of the variables. As observed from the graph, a one-unit common shock to e1 resulted in the impulse response of fdi at -0.3. It declined to -0.4, from which it ascended slightly above -0.2, after which it declined to the neighbourhood of -0.5. The fdi variable maintained an upward trend from the foregoing point to around -0.1, but declined slightly below -0.2. It later moved upward a bit above -0.1, after which it descended mildly and moved a few distances below -0.2. Subsequently, the common shocks to e2 resulted in a response of fdi at the point $0.3 < \text{fdi} < 0.4$, from which it rose steeply to around 0.6, after which it had a sharp decline to 0.1. It later responded upward from the foregoing to around a few distances above 0.3, from which it fluctuated and concluded at around 0.3. The subsequent graph displays the response of fdi to the common shocks in its own error term (e3). Fdi commenced at around 0.8 and grew to around 1.0, from which it declined to mildly below 0.8, but subsequently rose to around 1.2. The response subsequently had some fluctuations within the bounds of 1.0 and 1.2. The effect of the common shocks on the error term (e4) of lcbpr in relation to fdi was also examined. It led to a negative response in fdi at mildly below -0.2, from which it rose to slightly above the zero line. Fdi hovered in the vicinity of the steady state subsequently. Moreover, the effect of the common shocks on e5, bmg was analyzed in respect of fdi. Fdi initially responded negatively, from which it tended upward to around 0.10 but later decreased to around -0.05. It rose from the previous point to the neighbourhood of the steady state from which it fluctuated around the zero line, though it had a short stable path towards the end of the period. In another vein, the fdi effect of the common shocks to e6 is contained in the graph above. It had an instantaneous negative effect on fdi in the neighbourhood of -0.2. It increased to around 0.1 but subsequently dropped to around -0.1. Thereafter, fdi moved to the steady state and had a moderately stable path on it, which later marginally declined and moved upward by a few distances above the steady state. However, the common shocks to e7, lreer had an immediate positive effect by a little measure above 0.2, from which it declined to and below the steady state. It descended into a stable path around the steady state, but subsequently fluctuated around the zero line and stabilized on it over some period of time.

The next variable of consideration is the lcbpr with respect to common shocks to the respective error terms. It had an instantaneous response of -0.010 due to the common shocks to e1 and subsequently declined to a point slightly below -0.020. It later rose to the neighbourhood of the

steady state, but declined close to -0.010, at which it had a short stable path but eventually declined marginally close to -0.010. A key observation from the responses is that lcbpr commenced at -0.010 and concludes very close to it. The next graph examines the responses in lcbpr arising from the common shocks to e2. Lcbpr resumed around -0.01 and later experienced growth to 0.01. The graph declined from the foregoing point to and marginally below the steady state from which it turned in the upward direction to a point slightly above the steady state. Subsequently, it fell to very slightly below the zero line, but marginally rose back to the zero line at which it maintained a short period stable state. Furthermore, the common shocks to e3 resulted in the response of lcbpr at a point within 0.000 and 0.004. It declined to around -0.008 from which it increased to around -0.004 at which it rose steeply to slightly above 0.012. Subsequently, lcbpr declined steeply and experienced some fluctuations, but concluded slightly below the zero line. In another vein, lcbpr responded all through the positive quadrant, arising from the common shocks to its error term (e4). It had an immediate response of around 0.02, from which it rose to slightly above 0.05. The lcbpr decreased from the foregoing peak to a point marginally below 0.03, after which it increased and arrived at a stable path, but moderately declined to another short stable path. Lcbpr instantaneously had -0.006 arising from the common shocks to e5, the error term of bmg. It increased steeply to around 0.004, which later experienced a further moderate upward movement, still in the neighbourhood of 0.004. It, however, declined and was characterized by some fluctuations, though it later rose from underneath the zero line to slightly above it. The next observation relates to the response pattern of lcbpr due to e6. It was initially at slightly below -0.004. It rose a few distances from the previous point, but subsequently characterized by fluctuations which concluded at a point moderately above the steady state. The concluding response behavior of lcbpr emanated from the common shocks to e7, the error term of lreer. lcbpr responded positively at a point extremely close to the steady state from which it had a steep rise to around 0.012. It subsequently had a sharp decline to the neighbourhood of -0.004, from which it slightly further declined to -0.004. lcbpr increased from the foregoing point to the steady state and fluctuated in its vicinity, which concluded with a moderate stable effect above and around the steady state.

Broad money growth (bmg) is the next variable whose response behavior was examined due to shocks to the respective error terms. A common shock to e1 exerts a response of bmg at a point closer to 1. It declined from the foregoing to a point around -1, which later turned and increased to 2. Bmg declined from the immediate previous point to a point slightly below 1, at which it moved in a stable path parallel to 1. Subsequently, bmg increased to a point a few

distances above 1, which later declined extremely close to the steady state. Bmg had a response at a point in the interval of -1 and 0 from which it rose moderately above the steady state into a short stable path around the steady state due to the common shocks to e_2 . It declined from the foregoing stable path to a point in the interval of -1 and 0. Thereafter, it rose to 1, but subsequently fluctuated downward and concluded at the steady state. The third graph in this context is the effect the common shocks to e_3 , the error term of fdi , exert on bmg . As can be observed from the graph, it commenced at a point slightly above 1, but declined from it to a point slightly below 1, from which it rose briefly to 1, at which it maintained a short, stable path. Bmg thereafter fluctuated below and in the neighbourhood of 1.

Common shocks to e_4 , the error term of $lcbpr$ had an initial positive effect on bmg . Bmg commenced at a point below and around 2, but subsequently was characterized by a fluctuating pattern over time, having a negative section as well as steady state points. The next graph relates to the response behavior of bmg to the common shocks of its error term (e_5). Bmg obviously responded throughout the positive quadrant, having an initial point at around 3.5, which declined to a point slightly below 2.0. It then increased to a point in the interval between 2.5 and 3.0, from which it declined slightly below 2.0 into a short stable path, after which it rose to a point slightly above 2.5. Bmg subsequently fell to below 2.0, but later rose above and around 2.0.

The effect of the common shocks on e_6 , the error term of $mscp$, was also examined. Bmg had an initial negative response at around the steady state in the first period, from which it had a rise to the second period, slightly above zero, but later declined to a bit below -1 in the third period. It rose to a few distances above the steady state and was subsequently characterized by some fluctuations of bmg around the zero line, which concluded on it in the tenth period. The final response behavior of bmg in this context relates to that which emanates from the common shocks to e_7 . Bmg initially responded at a few distances above 1.6 in the first period from which it experienced a very steep decline to the steady state and had a short stable path on it. It subsequently fluctuated around the steady state over time.

Due to the common shocks to e_1 , $Mscp$ responded entirely in the positive quadrant. The response was initially close to zero in the first period and then increased to the third period, at which it is slightly above 0.8. The variable, $mscp$, then declined to the fourth period, but above 0.4, from which it increased and subsequently was characterized by some fluctuations around 1.2. It concluded at 1.2 in the tenth period. Moreover, the common shocks to e_2 placed $mscp$

at a point in the interval between 0.0 and 0.2 in the first period. It was then characterized by a decline to a bit below -0.2 in the second period and thereafter had a moderate rise which later bent to around -0.2 in the fifth period. However, mscp responded upward, above and around the steady state and subsequently hovered around it. It had an immediate response of a bit above 0.4 in the first period due to the common shocks to e3. It descended shortly to a short stable path around 0.4, from which it had a steep decline to a point slightly below the zero line in the fourth period. Mscp responded from a negative point in period four to 0.2 in period six. It fell from the foregoing to a bit below the zero line, but eventually rose to around 0.2 in the ninth period, from which it had a short decline into the tenth period. The next impulse response of mscp stemmed from the common shocks to e4, which placed mscp at a bit above -0.2 in the first period, but declined from the foregoing point as well as fluctuated over time, eventually ending at -0.3 in the tenth period. Also, mscp had a response in the neighbourhood of -0.2 in the first period based on the common shocks to e5. It later had a steep rise to a point in the neighbourhood of 0.2, from which it subsequently had some fluctuations over time. The common shock to e6, the error term of the variable in question, resulted in an mscp response in the positive quadrant. It commenced at a bit above 1.2 in the first period, but declined to a point in the interval of 0.8 and 1.2 in the second period. Mscp then responded by increasing to 1.2 in the fourth period, but continued to fluctuate over time and eventually rose to 1.2 in the ninth period, running above 1.2 in some parts of the ninth period and concluding above 1.2 in the tenth period. Finally, the common shocks to e7 led to the response of mscp being slightly below 0.0 in the first period and increasing to a point very closely around 0.2 in the second period, from which it experienced a sharp decline to -0.1 in the third period. The variable, mscp, thereafter rose slightly and further increased to around 0.1 in the fifth period, from which it declined to the zero line and maintained a stable path on the zero line. Mscp subsequently rose moderately above the steady state, but declined slightly below 0.0 in the tenth period. In a nutshell, mscp begins at a negative point slightly below the steady state in the first period and also concludes at a point slightly below the steady state in the tenth period.

Furthermore, common shocks to e1 resulted in the response of lreer being at $0.010 < \text{lreer} < 0.015$, from which it rose to $0.020 < \text{lreer} < 0.025$. Thereafter, lreer moved down slightly and subsequently fluctuated to a point slightly below 0.015, but later rose from the foregoing point to moderately above the 0.015 line and eventually descended to conclude on it. Due to the common shocks to e2, Lreer responded with around 0.0001. It had an upward direction to a point slightly above 0.004, but declined to a moderately stable path that lay between 0.000 and

0.004. *lreer* then responded in the upward direction to a point above 0.004 and around it, from which it experienced a downward trend that fed into a stable path between 0.000 and 0.004. The next response of *lreer* is from the common shock to e_3 , the error term of *fdi*. Observing the graph, it shows that it had an initial positive response at a point moderately above the steady state in the first period, but declined from the foregoing point to around -0.004 in the second period. *lreer* then responded to slightly above the steady state in the third period, but later had some decline to a point in the interval of -0.008 and -0.006, from which it rose moderately and further increased more steeply to -0.002 in the seventh period. The graph then declined from -0.002 moderately to the eighth period, after which it rose moderately back to point -0.002 in the ninth period, from which it later had a short decline to the tenth period. The next graph shows that the common shocks to e_4 resulted in the response of *lreer* being at a point a bit above -0.002 in the first period, but subsequently declined steeply to a point within -0.008 and -0.006 in the second period. It had a steep rise to around the steady state in the third period, which continued, but at a lower rate of change, to 0.002 in the fifth period from which it declined to a point around the steady state and subsequently fed into a short stable path around the steady state. Thereafter, it declined to a point moderately below the steady state in the ninth period, which later rose slightly to the steady state in the tenth period.

Moreover, *lreer* responded at -0.002 due to the common shocks to e_5 , the error term of *bmg*. It declined to a point at which $-0.003 < \text{lreer} < -0.002$ from which it descended steeply to a point in the third period that is moderately below -0.004. *lreer* then increased from the previous point to around -0.002 in the fourth period, from which it subsequently rose to a point in the sixth period, having $-0.002 < \text{lreer} < -0.001$. It then responded by declining to -0.002 in the seventh period, but increased from the foregoing point to around -0.001 in the ninth period, from which it descended to around -0.002 in the tenth period.

The penultimate graph is the impulse response of *lreer* due to the common shocks to e_6 , the error term of *mscp*. It had an instantaneous response of 0.001 in the first period and increased to around 0.005 in the third period, but later experienced a decline to a point slightly below 0.001 in the fourth period. *lreer* then responded to a point a few distances above 0.001 in the fifth period and subsequently rose to a point moderately above 0.003 in the sixth period, from which it reduced to a point that feeds into a moderately stable path around 0.001. It, however, increased from the previous stable state to a point very close to 0.002 in the tenth period. In a nutshell, the common shocks to e_6 result in the response of *lreer* completely in the positive quadrant.

Finally, *lrer* responded in the first period to a point very close to 0.003, arising from the common shocks to its own error term, from which it rose to around 0.004 in the second period. It was later followed by a steep rise to around 0.008 in the third period, from which it rose moderately to a point slightly above 0.008 in the fourth period. Subsequently, *lrer* fell from the foregoing peak to a point around 0.005 that fed into a short, stable path, but later declined to a point slightly below 0.005 in the ninth period and eventually turned moderately upward to a point a bit above 0.005 in the tenth period.

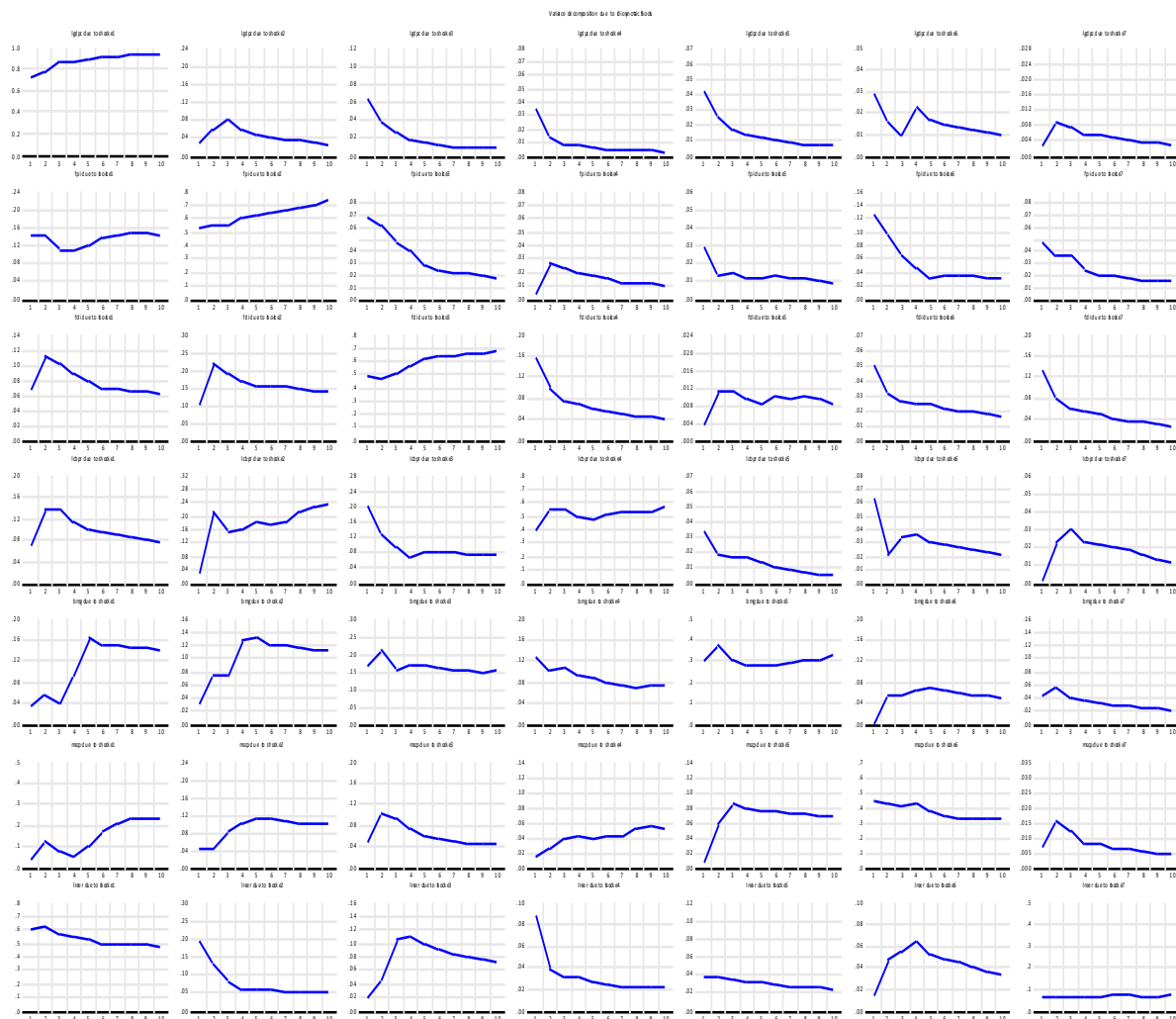


Figure 5.20: Variance decomposition due to idiosyncratic shocks.

Source: Author's computation from Eviews 12

5.12.4 -Variance decomposition caused by idiosyncratic shocks

The study also examined the variation in the macroeconomic variables due to the idiosyncratic shocks to the respective error terms. Figure 5.20 above captures the variance decomposition

due to idiosyncratic shocks. Observing the graph shows that the idiosyncratic shocks to the error term e_1 of $lgdpc$ caused a variation of around 0.8 in $lgdpc$, which then had some slight upward rise and was found to be more close to around 1.0 in periods six to ten. The next graph relates the forecast error in $lgdpc$ due to the idiosyncratic shocks to e_2 . It initially had a forecast error of around 0.04 in the first period, from which it increased to 0.08 in the third period, but later diminished to the tenth period, in which it falls slightly below 0.04. Subsequently, $lgdpc$ had a forecast error of a bit above 0.06 in the first period due to the idiosyncratic shocks to e_3 , but declined to a point within 0.00 and 0.02 in the seventh period, at which point it maintained a stable variation into the tenth period. Also, the common shocks to e_4 caused a bit more than 0.03 forecast error in $lgdpc$ in the first period and later declined to around the steady state in the tenth period. $lgdpc$ had a forecast error slightly above 0.04 due to the idiosyncratic shocks to e_5 in the first period and then declined steadily to a point around 0.01 at which it maintained some stable variation from the eighth to the tenth period. In another instance, $lgdpc$ had a forecast error of around 0.03 due to the idiosyncratic shocks to e_6 in the first period. It declined to 0.01 in the third period, from which it rose to a point slightly above 0.02 in the fourth period, but later declined to 0.01 in the tenth period. Finally, the forecast error in $lgdpc$ is around 0.004 in the first period arising from idiosyncratic shocks to e_7 . It increased to a bit above 0.008, but thereafter declined to a point slightly less than 0.004 in the tenth period.

Fpi is the next variable whose forecast error is examined. An idiosyncratic shock to e_1 caused around 0.16 variation in fpi over a short period which thereafter declined and subsequently rose to a point slightly less than 0.16 in the tenth period. Also, the variation in fpi is moderately above 0.5 due to the idiosyncratic shocks to e_2 , its error term. The forecast error, however, increased to a point slightly above 0.7 in the tenth period. An idiosyncratic shocks to e_3 caused almost 0.07 forecast error in fpi in the first period and it fell to a point slightly below 0.02 in the tenth period. Subsequently, fpi in the first period had forecast error within 0.00 and 0.01 due to the idiosyncratic shocks to e_4 . It increased to around 0.03 in the second period and thereafter declined and concluded at 0.01 in the tenth period. Another variation in fpi is from the idiosyncratic shocks to e_5 . Fpi had forecast error at around 0.03 in the first period, but declined to around 0.01 in the second period. It subsequently had some fluctuations and concluded in the tenth period at a point moderately below 0.01. The idiosyncratic shocks to e_6 caused a variation in fpi of a bit above 0.12 in the first period from which it declined to a point below and around 0.04 in the fifth period and the forecast error remained below and around the 0.04 line to the tenth period. The forecast error in fpi stood around 0.05 in the first period

due to the idiosyncratic shocks to e7. It then decreased to a point in the second period that is slightly below 0.04 at which it maintained some short stable forecast error to the third period. It thereafter declined to a short range on the 0.02 line with a further slight reduction to the seventh period as well as the eighth period and subsequently had a stable forecast error from the eighth period to the tenth period still below and around the 0.02 line.

The next variable encompasses the variations in fdi arising from the various idiosyncratic shocks. The idiosyncratic shocks to e1 caused the forecast error within 0.06 and 0.08 in the first period from which it increased to around 0.12 in the second period. It thereafter declined and concluded at around 0.06 in the tenth period. Subsequently, the forecast error behavioural shape of fdi due to the idiosyncratic shocks in e2 is somehow similar compared to the case of e1. Fdi immediately had a forecast error of around 0.10 in the first period, from which it rose a few distances above 0.20 in the second period. It, however, declined steadily to a point slightly below 0.15 in the tenth period. Also, fdi had a forecast error of about 0.5 in the first period due to the idiosyncratic shocks to e3 from which it descended very mildly then turned in the upward direction and concluded at about 0.7 in the tenth period. Subsequently, the idiosyncratic shocks to e4 exerted a variation of about 0.16 in fdi in the first period. It then declined over time and concluded at 0.04 in the tenth period. Observing the idiosyncratic shocks to e5 shows that fdi exhibits a forecast error of 0.004 in the first period. It thereafter increased to about 0.012 and remained stable for a short period between the second and the third period. It further fluctuated over time and stood at around 0.008 in the tenth period. In another respect, the forecast error in fdi was 0.05 in the first period due to the shocks to e6. The variation diminished over time and eventually ran slightly below 0.02 in the tenth period. The idiosyncratic shocks to e7 produced some slightly above 0.12 variation in fdi in the first period, but subsequently declined to a point below and around 0.04 in the tenth period. The geometrical shape of the forecast error of fdi arising from the idiosyncratic shocks to e4, e6 and e7 produced a close similarity, while the shocks to e1 and e2 were also similar.

The next variable for consideration is lcbpr, which has a forecast error moderately below 0.08 in the first period emanating from the idiosyncratic shocks to e1, the error term of lgdpc. It, however, increased to a point in the interval of 0.12 and 0.16 at which it maintained a short, stable variation. The forecast error then declined moderately to a little below 0.08 in the tenth period. The idiosyncratic shocks to e2, the error term of fpi, produced around a 0.04 variation in lcbpr in the first period, from which it rose sharply to a bit above 0.20 in the second period,

but declined thereafter and had some fluctuations in the upward direction. It eventually stood at around 0.24 in the tenth period. Also, for the shocks to e_3 , the error term of fdi had an instantaneous 0.20 forecast error in $lcbpr$ in the first period. The error diminished over time, falling moderately below 0.08 in the fourth period and thereafter rising very mildly, but slightly declining later to a stable variation around 0.08 in the eight to tenth period. Subsequently, the first period forecast error in $lcbpr$ due to the idiosyncratic shocks to e_4 , its error term, had an instantaneous variation of 0.4 in $lcbpr$ in the first period, from which it rose to a stable forecast error in the second to the third period, after which it declined to a point slightly below 0.5 in the fifth period. It then increased from the foregoing to a point of around 0.6 in the tenth period. The next forecast error in $lcbpr$ stemmed from the idiosyncratic shocks to e_5 , the error term of bmg . It was initially moderately above 0.03 in the first period and thereafter declined to a point within 0.00 and 0.01 in the tenth period. Subsequently, $lcbpr$ had a forecast error of very marginally above 0.06 in the first period on the ground of the idiosyncratic shocks to e_6 , the error term of $mscp$, and had a sharp decline to around 0.02 in the second period. It rose from the foregoing point to some points around and above 0.03, from which it declined to around 0.02 in the tenth period. The forecast error in $lcbpr$ stood at around 0.00 in the first period, emanating from the idiosyncratic shocks to e_7 , the error term of $lreer$. It then increased to 0.03 in the third period, from which it declined to around 0.01 in the tenth period.

Bmg is the next variable in the line whose variations were examined. The graph shows that the idiosyncratic shocks to e_1 exert a little below 0.04 forecast error in bmg in the first period, after which it increased moderately to a point within 0.04 and 0.08 in the second period. It later diminished to 0.04 in the third period, from which it had a sharp rise to a point slightly above 0.16 in the fifth period. The forecast error declined steadily to a point within 0.12 and 0.16 in the tenth period. The forecast error in bmg stood at around 0.04 in the first period due to the idiosyncratic shocks to e_2 . It then rose to around 0.08, at which it maintained some short and stable variations within the second and third periods. The forecast error increased with time to around 0.14 in the fifth period, which later diminished moderately to 0.12, at which point it had a short and stable forecast error, which eventually fell slightly below 0.12 in the tenth period. The idiosyncratic shocks to e_3 caused the next reactions in terms of forecast error in BMG . It was initially within 0.15 and 0.20 in the first period, but increased to a point slightly above 0.20 in the second period. The variation declined to around 0.15 in the third period, after which it rose less slopy and very moderately, but subsequently diminished to 0.15 in the ninth period and very slightly above 0.15 in the tenth period. Bmg had a variation of a bit above 0.12

in the first period stemmed from the idiosyncratic shocks to e4. It then had some downward and very mild fluctuations that concludes below and around 0.08 in the seventh to tenth period. Also, the forecast error in bmg stood at 0.3 in the first period on the basis of the idiosyncratic shocks to its error term, e5. It rose to around 0.4 in the second period, from which it fell to a range slightly below 0.3. It rose, however, to 0.3, at which point it maintained a short and stable forecast error and thereafter rose moderately above 0.3 in the tenth period. The forecast error is very close to 0.00 in the first period due to the idiosyncratic shocks to e6. It then increased a short distance above 0.04 at which it had a short and stable forecast error, which later increased to around 0.08 but eventually diminished to around 0.04 in the tenth period. Finally, the forecast error of bmg arising from the idiosyncratic shocks to e7 shows that it had a variation of around 0.04 in the first period, which increased moderately to about 0.06 in the second period. It thereafter declined to 0.02 in the tenth period.

The penultimate variable whose forecast error was examined is mscp. As a result of the idiosyncratic shocks to e1, Mscp had variation at a point between 0.0 and 0.1 in the first period. It increased to a point slightly above 0.1 in the second period, from which it diminished to a point still within 0.0 and 0.1 in the fourth period. The mscp variable then moves in the upward direction and feeds into a stable state of forecast error of around 0.2 covering the periods of eight to ten.

The next graph covers the variations in mscp due to the idiosyncratic shocks to e2. The variance had a short stability around 0.04 in the first and second periods but then increased to some periods around 0.12. In the eighth to tenth periods, it gradually decreased to a stable level near the 0.12 line. Subsequently, mscp had a variance of around 0.04 in the first period as a result of the idiosyncratic shocks to e3. It increased to a point between 0.08 and 0.12 in the second period, from which it declined steadily to a stable state around 0.04 in the eighth to tenth period. Also, the shocks to e4 produced variance of around 0.02 in mscp in the first period, but increased to 0.04 around which it had some mild fluctuations, which later rose to around 0.06 in the eighth to the tenth periods. In another respect, the variance in mscp as a result of the idiosyncratic shocks to e5 stood at around 0.00 in the first period, from which it moved in the upward direction to a bit above 0.08 in the third period. The variance thereafter diminished to the tenth period at slightly below 0.08. The idiosyncratic shocks to e6 exert the variance in mscp that falls between 0.4 and 0.5 in the first period. It decreased to a point around 0.4 in the third period but mildly rose to a bit above 0.4 in the fourth period. Mscp thereafter wore out to

a stable state of forecast error in the neighbourhood of 0.3 from the seventh period to the tenth period. Conclusively, the idiosyncratic shocks to e_7 produced variance within 0.005 and 0.10 in the first period but grew to a point very slightly above 0.015 in the second period. The variance in m_{scp} thereafter had some decline and concluded at a stable state on 0.005 in the ninth to the tenth periods.

Finally, l_{reer} occupies the remaining variable to be examined within the whims and caprices of idiosyncratic shocks. Observing the shocks to e_1 shows that it exerts the forecast error of 0.6 in l_{reer} in the first period, but rose very marginally around the 0.6 line from which it fluctuated mildly in a downward direction to 0.5. The forecast error maintained a stable state on the 0.5 line from the sixth period to the ninth period from which it fell very slightly below the 0.5 line into the tenth period. Also, l_{reer} had the forecast error at around 0.20 in the first period arising from the idiosyncratic shocks to e_2 . It declined from the previous peak of around 0.05 in the fourth to the sixth period. It then decreased slightly from the sixth period to the 0.05 line in the seventh period on which it was characterized by a stable variance to the tenth period. In another vein, the shocks to e_3 produced the variance of 0.02 in l_{reer} in the first period from which it increased to a short range, that is, moderately above 0.10 between the third and the fourth periods. Subsequently, it moved in the downward direction to a point slightly below the 0.08 line in the tenth period. The next variance decomposition in l_{reer} stemmed from the shocks to e_4 . l_{reer} initially had the variance at a point within 0.08 and 0.10 but declined steeply to a point slightly below 0.04. It then further wore out but was less slopy to around the 0.02 line and then maintained some stable state of variance around the 0.02 line from the seventh to the tenth period. Moreover, l_{reer} had forecast error around 0.04 in the first period on the basis of the idiosyncratic shocks to e_5 . It thereafter declined to around 0.02 in the tenth period. The penultimate forecast error in l_{reer} occurred from the shocks to e_6 . It was initially moderately below 0.02 in the first period from which it rose to a point in the interval of 0.04 and 0.06 in the second period. It then had a turn to increase to a point slightly above 0.06 in the fourth period. The variance in l_{reer} then wore out from the foregoing peak to a point in the tenth period that is slightly below 0.04. Finally, l_{reer} was characterized by a stable forecast error around 0.1 from the first period to the fifth period due to the idiosyncratic shocks to its error term, e_7 . It then had some mild fluctuations around the 0.1 line and concluded in the tenth period around it.

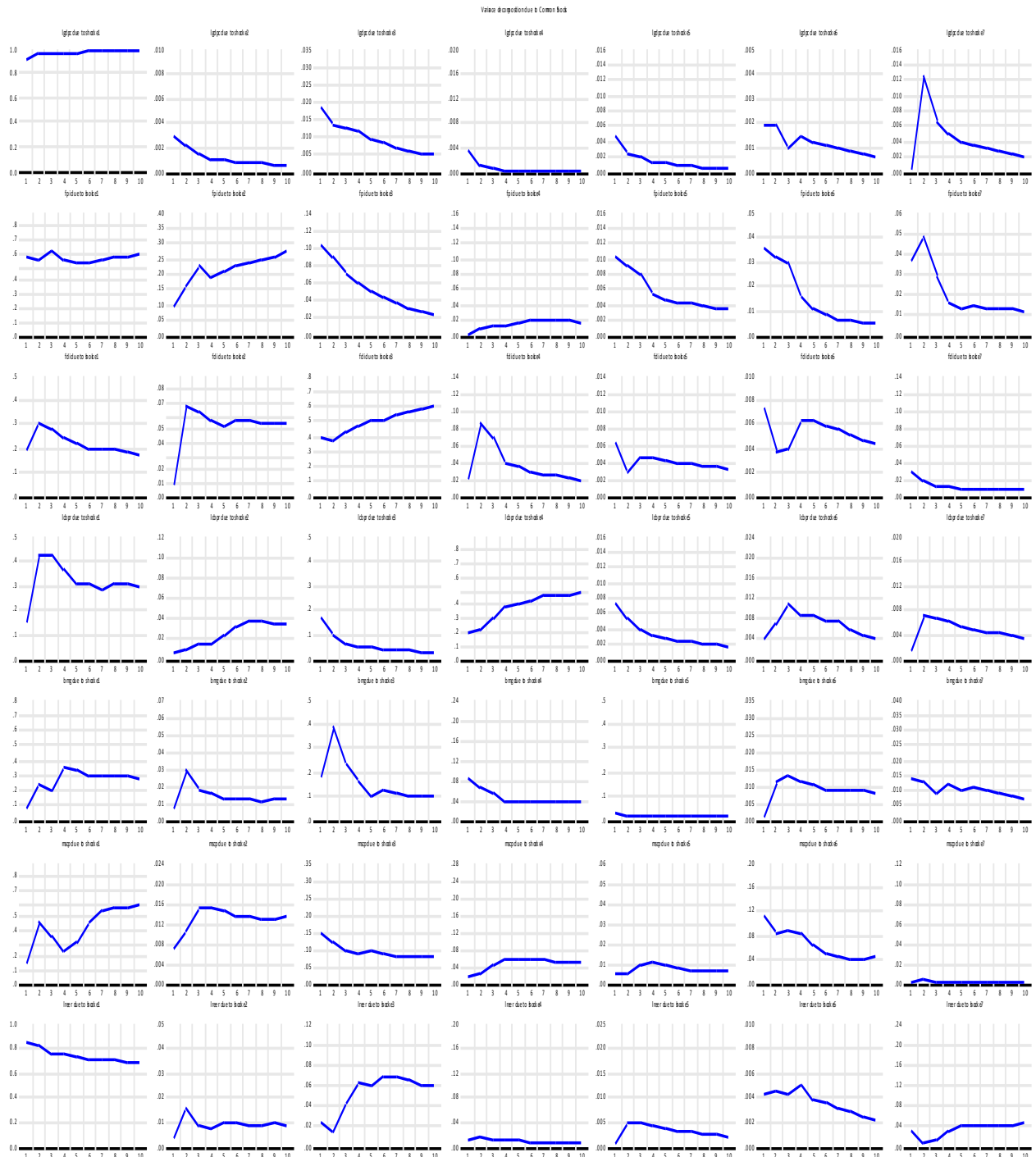


Figure 5.21: Variance Decomposition Due to common shocks

Source : Author's computation from Eviews 12

5.12.5. Variance Decomposition Due to common shocks

The table above is the variance decomposition arising from the common shocks to the respective error terms of the variables, which accounts for the amount of variability in the dependent variables. For instance, the common shocks to e1 produced a high variation in lgrdpc

considering that it is around 1.0, while the variability in lgdpc arising from the common shocks to e2, the error term of fpi, produced variations in lgdpc that were initially in the interval of 0.002 and 0.004. It steadily declined over time, in the vicinity of the steady state. Subsequently, the common shocks to e3 of fdi had a higher forecast error on lgdpc compared to that emanating from the common shocks to e2. It was initially at the interval of 0.015 and 0.020 from which the variability in lgdpc diminished over time and eventually maintained a short stable state towards periods 9 and 10. The forecast error in lgdpc was due to the common shocks to e4, the error term of lcbpr had a very minimal error effect on lgdpc. It commenced in the first period at around 0.004, from which the variations in lgdpc diminished over time towards and around the steady state. The graph shows that the forecast error in lgdpc was stable from around period 4 to period 10. Subsequently, the common shocks to e5 also produced forecast error in lgdpc that also steadily fell over time and were stable around periods 8 to 10. However, there was around 0.002 variability in lgdpc over periods 1 and 2 due to the common shocks to e6. The error declined to 0.001 in the third period, but later rose to the fourth period, having a value between 0.001 and 0.002. Thereafter, the impact of shocks to e6 on lgdpc followed a downward direction from the fourth period to the tenth period. Finally, common shocks to e7 of leer Irer initially had a very low forecast error on lgdpc, which is extremely close to the zero line in the first period. However, this variability in lgdpc was not sustained as it rose sharply to 0.012 in the second period. Thereafter, the forecast error fell much faster to around 0.006 in the third period, after which it fell steadily from the third period to 0.002 in the tenth period.

The next line of explanation relates to the variability in fpi due to the common shocks to the error terms. Fpi had a variation of around 0.6 in the first period, which was characterized by some slight fluctuations subsequently, but concluded at 0.6 in the tenth period. The common shocks to e1 did not really result in a much greater reduction in the forecast error of fpi. Furthermore, for the common shocks to e2, its own error term resulted in the variance decomposition of fpi at 0.10 in the first period, which increased to around 0.25 in the third period, but subsequently declined to a point slightly below 0.20 in the fourth period. It thereafter followed a steadily upward trend to the tenth period. This is an indication that shocks to the error term of fpi increase the error in fpi. Shocks to e3, the fdi error term, resulted in fpi variation slightly above 0.10. However, the forecast error declined steadily over time to around 0.02 in the tenth period. Shocks to e3 therefore result in the reduction of the error variance in fpi over time. Subsequently, the common shocks to e4, which is the error term of lcbpr, had a minimal effect on fpi. Fpi was initially at around 0.00 in the first period, from which the

variation increased slightly to 0.02 in the sixth, seventh, eighth, and ninth periods, but later declined slightly below 0.02 moderately in the tenth period. Furthermore, the common shocks to e5, the error term of bmg, produced variations in fpi that were slightly above 0.010 in the first period, declined to a point slightly below 0.006 in the fourth period, and subsequently decreased to a point slightly below 0.004 in the ninth and tenth periods. Another error variance in fpi emanated from common shocks to e6, the error term of mscp. The graph shows that it exerts variation in fpi in the interval of 0.03 and 0.04 in the first period, from which it declined to 0.03 in the third period. It declined further to points below 0.01, but above the zero line in the sixth to the tenth period. Finally, fpi had variation at around 0.04 in the first period, but experienced a rise in the error variance to around 0.05 in the second period. It later fell slightly to around 0.01 in the fifth period and continued around this subsequently as a result of the common shocks to e7, the error term of lreer.

Furthermore, the variation in fdi was examined. A common shock to e1 produced a 0.2 variation in fdi in the first period, but increased to 0.3 in the second period. It, however, declined from the foregoing peak to 0.2 in the sixth period and continued on this course to the eighth period, after which it had a moderate fall in the ninth and tenth periods. The error in fdi as a result of the common shocks to e2 commenced at 0.01 in the first period, but became worse as it increased to around 0.07 in the second period. It then declined steadily to around 0.05 in the fifth period. It thereafter had a moderately slight rise to around 0.06, which marginally declined and subsequently maintained a stable path. The next variation is from the shocks to e3, which placed fdi at 0.4 in the first period, which later had a slight reduction around 0.4 in the second period, from which the variation exploded to 0.6 in the tenth period. Another instance of error variance is due to the common shocks to e4. It initially caused a variation of around 0.02 in the first period, but the error steeply rose to slightly above 0.08, from which it declined to 0.04 in the fourth period and declined progressively over time to 0.02 in the tenth period. Fpi was a bit above 0.006 in the first period but declined to a point within 0.002 and 0.004 in the second period, which later rose to a point slightly above 0.004 in the third period, from which it experienced a very steady decline towards the tenth period, all due to the common shocks to e5. The forecast error of fdi as a result of the common shocks to e6 is at a point in the interval of 0.006 and 0.008 in the first period, from which it declined to a point very marginally below 0.004 in the second period. It had a somewhat short variation to the third period, but increased to a point very slightly above 0.006 and maintained a short stable variation from which it declined steadily to around 0.004 in the tenth period. Finally, the forecast error

in fdi, due to the common shocks to e7, declined from a point in the interval of 0.02 and 0.04 in the first period to slightly below 0.02 and was subsequently characterized by a stable variance around the steady state into the tenth period.

As a result of the common shocks to the respective error terms, Lcbpr is the next variable whose variance decomposition effect was examined. Lcbpr had variation at the interval of 0.1 and 0.2, from which it rose to a stable and moderate variation path a bit above 0.4. It declined from the foregoing to around 0.3, around which it had a short stable variation and subsequently had some mild fluctuations and concluded at 0.3 in the tenth period. The common shocks to e2 placed the variance in lcbpr at around 0.00 in the first period, which steadily increased to around 0.04 to the tenth period. Also, the error variance in lcbpr was around 0.2 in the first period due to the common shocks to e3. It then declined very less slopy towards the tenth period in the neighbourhood of 0.0. In another vein, the variation in lcbpr was at 0.2 in the first period, from which it rose less slopily to 0.5 in the tenth period. The next observed forecast error in lcbpr emanated from the common shocks to e5. It had an error variance of around 0.008 in the first period, from which it steadily declined to slightly below 0.002 in the tenth period. The common shocks to e5, which is the error term of bmg, therefore exerts a decreasing effect on the variation of lcbpr over time. The next error term (e6) stemmed from mscp, whose common shocks caused a variation of 0.004 in lcbpr in the first period, which increased to around 0.012 and then declined to 0.004 in the tenth period. The concluding graph of lcbpr had forecast error at around the zero line due to the common shocks to e7, but rose to around 0.008, which then declined steadily and less slopy to a bit below 0.004 in the tenth period.

Moreover, the error variation in bmg was also examined. Observing the graph shows that the common shock to e1 produced around a 0.1 variation in bmg in the first period from which the variations had some fluctuations to around 0.4 in the fourth period. Subsequently, the forecast error declined steadily to 0.3 and eventually ran a bit below 0.3 in the tenth period. Also, bmg had an error variance of 0.01 in the first period due to the common shocks to e2. The forecast error increased to 0.03 from which it diminished to around 0.01 and later had a mild increase around 0.01. In another development, bmg had a forecast error of around 0.2 in the first period due to the common shocks to e3, from which the error increased to around 0.4 in the second period. It then diminished to 0.1 in the fifth period, from which it had a minor rise but returned back to 0.1, at which point the variation became stabilized. From around the eighth period to the tenth period. The next variation in bmg emanated from the common shocks to e4. Bmg had

a forecast error of a bit above 0.08 in the first period and subsequently declined to 0.04 in the fourth period. It, however, maintained a constant variation of 0.04 over time from the fourth period to the tenth period. The variation in bmg was slightly above the zero line in the first period, arising from the common shocks to e5. It declined very slightly to a point very close to the zero line in the second period and was subsequently characterized by a constant and stable variation from the second period to the tenth period. The effect of common shocks to e6 on bmg was also investigated. BMG had a forecast error of around 0.000, in the first period, which increased to around 0.015 in the third period. Thereafter, the forecast error declined to a point slightly less than 0.010 in the tenth period. Finally, bmg had a variation of around 0.015 in the first period due to the common shocks to e7. It had some mild variations thereafter, but later showed a stable decline from the sixth period to the tenth period.

The variations in mscp were around 0.2 in the first period due to the common shocks to e1, from which the variation increased to a point in the interval of 0.4 and 0.5, after which it declined slightly below 0.3 in the fourth period. Mscp thereafter had increased variations and concluded at 0.6 in the tenth period. Subsequently, the forecast error in mscp was slightly below 0.008 in the first period due to the common shocks to e2, but increased to around 0.016 and declined steadily to around 0.012 in the tenth period. Also, mscp had a forecast error of 0.15 in the first period due to the common shocks to e3. It declined steadily, however, and later had a mild fluctuation, but concluded at a stable state of around 0.10 from the seventh to the tenth period.

Another instance relates to the forecast error in mscp arising from the common shocks to e4. It had an initial variation in the first period at a point between the steady state and 0.04 and later increased moderately but became stable around 0.04 from around the eighth period to the tenth period. Also, the common shocks to e5 caused some variations of around 0.01 in mscp in the first period, which moderately rose to very slightly above 0.01 in the fourth period, but later declined to a stable forecast error close to 0.01 covering around the seventh to the tenth period. In another vein, mscp had a forecast error of around 0.12 in the first period due to the common shocks to e6, but later showed a slight fluctuation which eventually descended moderately to 0.04 in the eighth and ninth periods. It, however, increased very moderately in the tenth period. Moreover, mscp had a minimal forecast error, extremely at the steady state in the first period arising from the common shocks to e7, but moderately increased and later descended to the third period, from which it had a stable forecast error, extremely around the zero line to the

tenth period. The concluding variable in this context of the variance decomposition as a result of common shocks is *lreer*. It initially had a forecast error slightly above 0.8 due to the common shocks to *e1*, from which it showed some declines and concluded at a short stable variation of around 0.6 in the ninth and tenth periods. Subsequently, *lreer* had some variations at a point in the interval of 0.00 and 0.01 arising from the common shocks to *e2*, but increased from the foregoing to a point in the interval of 0.01 and 0.02 from which it declined and later showed some very slight fluctuations, but stood at very slightly below 0.01 in the tenth period. Also, the common shocks to *e3* caused a variation of a bit above 0.02 in *lreer*, in the first period. It thereafter had some fluctuations which concluded in a stable path of 0.06 from around the ninth period to the tenth period. Subsequently, *lreer* had a forecast error of around 0.00 in the first period due to the common shocks to *e4* but was characterized from the foregoing point by a mild rise, which later slightly descended to a stable path closely around 0.00 from the sixth period to the tenth period. It therefore implies that the common shocks to the error term of *lcbpr* exerts a minimal forecast error in *lreer*. The forecast error in the *lreer* is also around 0.000, emanating from the common shocks to *e5*, the error term of *bmng*. It later rose to 0.005, at which point the variation became stabilized from around the second period to the third period, but declined steadily to a point in the interval of 0.000 and 0.005 in the tenth period. The penultimate forecast error in the *lreer* stemmed from the common shocks to *e6*, the error term of *mscp*. It had a forecast error of around 0.004 in the first period, but stood at a point in the interval of 0.004 and 0.006 in the fourth period. From the foregoing point, *lreer*'s had some declines to around 0.002 in the tenth period. In a nutshell, *lreer* concluded with a forecast error which is less compared to the variation in the first period. In the final analysis, *lreer* exhibited a variation of around 0.04 arising from the common shocks to its error term, from which it declined shortly to around the steady state. It then ran in the upward direction to a stable state from the fifth period to the ninth period, but subsequently had a rise of very moderately above 0.04 in the tenth period.

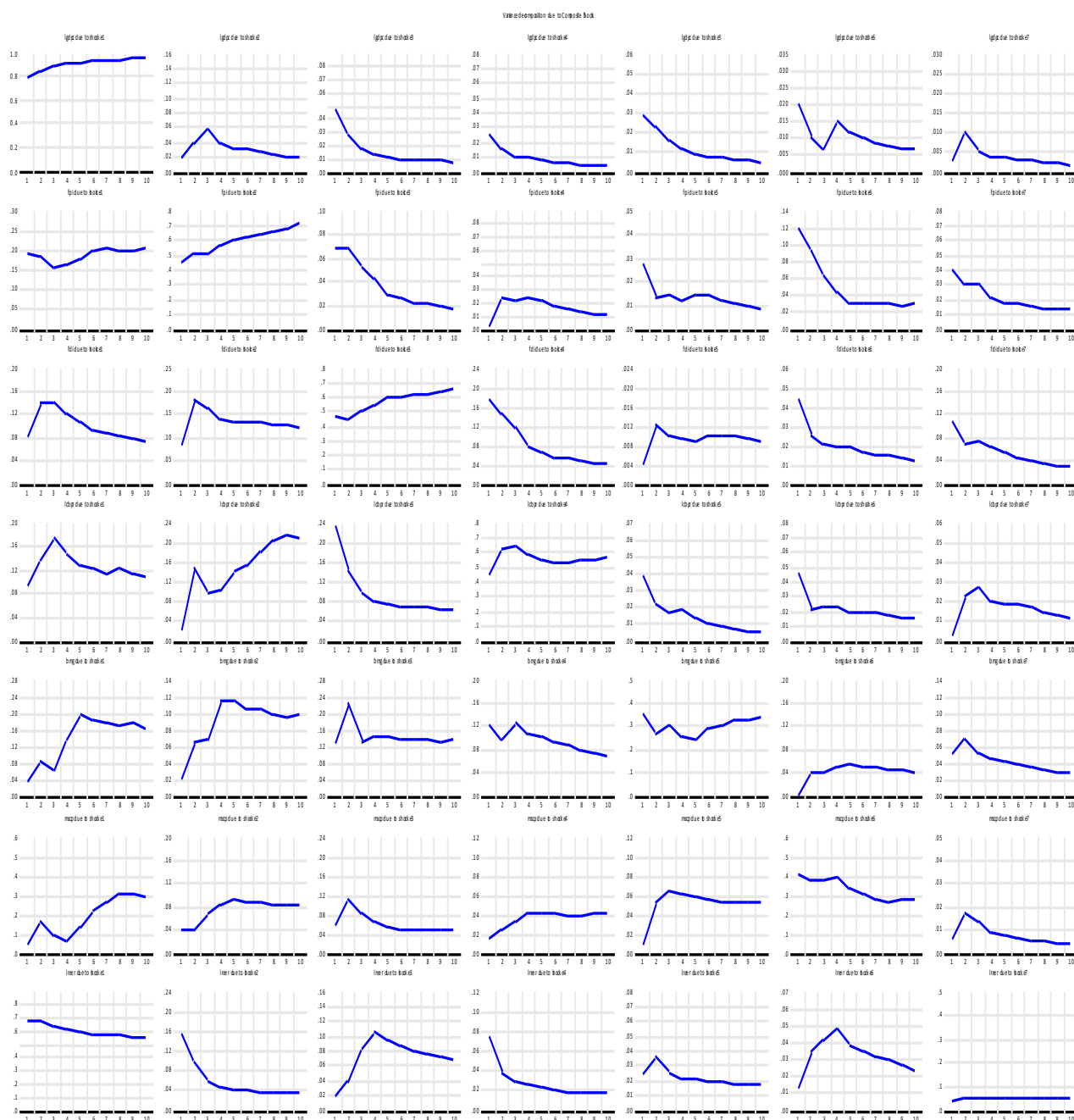


Figure 5.22: Variance decomposition due to composite shocks

Source: Author's computation from Eviews 12

5.12.6. Variance decomposition due to composite shocks

Figure 5.22 shows the display of the variance decomposition of the variables as a result of the composite shocks to the respective error terms. The composite shocks synthesize the common and the idiosyncratic shocks. An observation of the lqpc graph shows that the forecast error stood at 0.8 in the first period due to the composite shocks to its error term, e_1 . The variance then increased moderately over the periods to around 1.0. Subsequently, the composite shocks

to e2, the error term of fpi, caused a 0.02 variance in lgdpc in the first period. It increased to around 0.06 in the third period, but then declined from the foregoing peak to 0.02 in the ninth and tenth periods. Also, the composite shocks to e3, the error term of fdi, caused around 0.05 variance in lgdpc in the first period, from which it fell to 0.01 in the sixth to the ninth period, while it fell very slightly from 0.01 in the tenth period. The next variance in lgdpc occurred from the shocks to e4, the error term of lcbpr. Lgdpc had an instant variance at a point between 0.02 and 0.03 from which it fell to 0.01 in the third and fourth periods. It later fell slightly below the 0.01 line and eventually fed into a stable state of forecast error in some parts of both periods six, seven, and eight, while periods nine and ten are characterized by stabilized forecast error around the 0.01 line. Subsequently, lgdpc had a forecast error of around 0.03 in the first period due to the shocks to e5, the error term of bmg. It diminished over time to some points below and around the 0.01 line. The variance in lgdpc stood at 0.020 in the first period on the basis of the composite shocks to e6, the error term of mscp. The variance declined to a point of around 0.005 in the third period, but later increased to 0.015 in the fourth period. The error subsequently fell over time to around 0.005. The concluding forecast error in lgdpc stemmed from the composite shocks to e7. It was initially at a point between 0.000 and 0.005 in the first period, from which it increased to 0.010 in the second period. The variance fell over time towards a steady state.

The next variable is fpi, with a forecast error of around 0.20 in the first period due to the composite shocks to e1, the error term of lgdpc. It declined to around 0.15 in the third period, from which it rose to 0.20 and mildly ran above it, but subsequently fell back to the 0.20 line over a short range and later had a moderate rise from it in the tenth period. Also, the composite shocks to e2 exerted around 0.5 variance in fpi in the first period from which it had a very short, minimal fluctuation, but subsequently increased to a bit above 0.7 in the tenth period. Also, fpi had a stable forecast error in the first and second periods due to the composite shocks to e3, the error term of fdi. It declined from the foregoing state to a bit below 0.02 in the tenth period. The next forecast error in fpi emanated from the composite shocks to e4, the error term of lcbpr. Fpi had an immediate variance of around 0.00 in the first period but subsequently increased to a point that was moderately above 0.02 in the second period, around which it later showed some slight fluctuations and eventually declined to around 0.01, having a stable variance in the ninth and tenth periods. Subsequently, the forecast error in fpi stood at around 0.03 in the first period on the ground of the composite shocks to e5, the error term of bmg. It declined to around 0.01 in the second period, but later had some slight fluctuations. It concluded at a point that is

moderately below 0.01 in the tenth period. The composite shocks to e6, the error term of mscp, caused 0.12 variance in fpi in the first period, but declined to a stable range of variance within 0.02 and 0.04 from around some part of the fifth period to some part of the eighth period. It thereafter had a very moderate decline to the ninth period, with a subsequent very slight increase to the tenth period. Finally, the composite shocks to e7, the error term of lreer, produced a 0.04 variance in fpi in the first period. It declined to 0.03 and had a stable state at 0.03 for some parts of the second and third periods. Fpi, thereafter, declined and later had a stable variance of around 0.01 from a part of the eighth period to the tenth period.

Furthermore, the composite shocks to e1 produced a variance in fdi of around 0.08 in the first period, from which it increased to a stable range covering some parts of the second and third periods between 0.12 and 0.16. It then moved in the downward direction and concluded at a point slightly below 0.08 in the tenth period. The variance in fdi stood at about 0.10 in the first period due to the composite shocks to e2. The variance, however, increased to a point within 0.15 and 0.20 in the second period, from which it declined to a point within 0.10 and 0.15 in the tenth period. Subsequently, fdi had a forecast error of around 0.5 in the first period arising from the composite shocks to e3, its error term. It then had a very slight decline to a point between 0.4 and 0.5 in the second period, from which it showed a less slopy upward movement to a point between 0.6 and 0.7 in the tenth period. Also, fpi had forecast error at a point within 0.16 and 0.20 due to the composite shocks to e4, the error term of lcbpr. It declined from the foregoing peak to around 0.04, at which it had some stable variance from a part of the ninth period to the tenth period. The composite shocks to e5, the error term of bmg, placed the immediate variance in fdi at around 0.004 in the first period, from which it increased to a bit above 0.012 in the second period. It then decreased to around 0.008 in the fifth period, but later rose very slightly to a stable state of variance from a part of the sixth period to a part of the eighth period, which then declined to around 0.008 in the tenth period. In another respect, fdi had forecast error at a point within 0.04 and 0.05 in the first period due to the composite shocks to e6, the error term of mscp. It then declined sharply to a point within 0.02 and 0.03 in the second period. Fdi further declined, but less slopy compared to the earlier rate of decline, to a point around 0.01 in the tenth period. The conclusion with respect to fdi is its variance as a result of the composite shocks to e7, the error term of lreer. The variance in fdi stood at around 0.12 in the first period, from which it declined to a point slightly below 0.08 in the second period. It maintained some forecast error of around 0.08 within the second and third periods.

Then, it declined to the 0.04 line and slightly below it, having a short and stable variance from around the ninth period to the tenth period.

Moreover, the composite shocks to e_1 , the error term of $lgdpc$, produced variance in $lcbpr$ within 0.08 and 0.12 in the first period, but increased to a point slightly above 0.16 in the third period, from which it moved in the downward direction and concluded at a point moderately below 0.12 in the tenth period. Furthermore, the shocks to e_2 , the error term of fpi , exerted a variance of around 0.04 in $lcbpr$ in the first period but increased to around 0.16 in the second period. It thereafter declined to a point between 0.08 and 0.12 at which it maintained some forecast error in some of the third and fourth periods. Later, $Lcbpr$ turned in the upward direction and concluded at around 0.20 in the tenth period. In another instance, the shocks to e_3 , the error term of fdi , produced a forecast error of around 0.24 in $lcbpr$ in the first period, but declined to 0.08 in the fourth period, and subsequently ran slightly below the 0.08 line from around the fourth period to the tenth period. The next forecast error in $lcbpr$ stemmed from the composite shocks to its error term, e_4 . It initially resulted in a variance of around 0.5, from which it increased to a point slightly above 0.6 and maintained some variance in this instance from around the second to the third period. In the tenth period, $Lcbpr$ declined to around 0.5 and then increased to around 0.6. The forecast error in $lcbpr$ resulting from the composite shocks to e_5 , the error term of bmg , was around 0.04 in the first period, then declined and eventually fell below 0.01 from around the seventh to tenth periods. Furthermore, the composite shocks to e_6 , the error term of $mscp$, resulted in the variance in $lcbpr$ being around 0.05 in the first period, from which it declined sharply to around 0.02 in the second period. It had a moderate rise from the previous point and further slightly declined to the line of 0.02 from around the fifth period to the seventh period, from which it declined slightly below the 0.02 line. The concluding variance decomposition of $lcbpr$ stemmed from the composite shocks to e_7 , the error term of $lreer$. $lcbpr$ had an immediate forecast error of around 0.00 in the first period, from which it increased to a point slightly above 0.02 in the second period. It further rose to around 0.03 in the third period, from which it decreased to around 0.01 in the tenth period.

The next variable under consideration is bmg . An observation of the graph shows that the composite shocks to e_1 exert 0.04 variance in bmg in the first period. It increased to a bit above 0.08 in the second period, from which it declined shortly to around 0.08 in the third period. Subsequently, the forecast error increased to 0.20 in the fifth period, from which it declined to

around 0.16 in the tenth period. It was also established that the composite shocks to e2, the error term of fpi, produced a forecast error of around 0.02 in the first period, from which it increased to around 0.12 in respect of some parts of the fourth and fifth periods. It thereafter decreased from the foregoing to 0.10 in the tenth period. The next consideration of variance in bmg is from the shocks to e3, the error term of fdi. The forecast error was around 0.12 in the first period and increased to around 0.24 in the second period. It decreased from the previous point of around 0.12 in the third period. Subsequently, the variance moved roughly linear horizontally within 0.12 and 0.16 to the tenth period. In another vein, bmg had a forecast error of 0.12 in the first period due to the shocks to e4, the error term of lcbpr. The forecast error decreased from the first period to a point within 0.08 and 0.12 in the second period, from which it increased to a point slightly above 0.12 in the third period. The forecast error thereafter decreased over time to a point that is moderately below 0.08 in the tenth period. Also, the composite shocks to e5, its error term, initially resulted in a forecast error of between 0.3 and 0.4, but declined to a point around 0.3 in the second period, from which it increased to 0.3 in the third period. It then decreased from the foregoing point, but within the interval of 0.2 and 0.3, which later turned and moved in the upward direction and was eventually found to exceed 0.3 mildly from around the eighth period to the tenth period. Subsequently, the composite shocks to e6, the error term of mscp, generated variance in bmg of around 0.00 in the first period, from which it increased to 0.04, covering some parts of periods two and three. The variance then rose mildly, but later declined mildly back to the 0.04 line in the tenth period. The concluding forecast error in bmg is due to the composite shocks to e7, the error term of lreer. Bmg had a variance of around 0.06 in the first period, which increased to a point within 0.06 and 0.08 in the second period. It thereafter declined and eventually ran moderately below the 0.04 line over some periods.

The penultimate variable in this context is mscp, which had variance at a point around 0.1 in the first period on the basis of the composite shocks to e1. It increased from the initial forecast error to a point around 0.2 in the second period, from which it declined to a point around 0.1 in the fourth period. Variance in mscp then moved in the upward direction rising slightly above 0.3, but eventually returned to it in the tenth period. Subsequently, the observation of the variance in mscp arising from the composite shocks to e2 shows that mscp had a stable variance in the first and a part of the second period at 0.04. It then became worse as it increased slightly above 0.08 over some periods, but it eventually and moderately declined into a stable state of variance in the eight to tenth period around the 0.08 line. Moreover, the forecast error in mscp

stood at 0.04 and 0.08 due to the shocks to e3. The variance then increased to around 0.12 in the second period, from where it declined to a stable state of variance of around 0.04 in the sixth to tenth period. However, the forecast error in mscp due to the composite shocks to e4 stood at around 0.02 in the first period, but increased to a stable state of variance around and slightly above 0.04 covering around the fourth period to the sixth period. It thereafter maintained some variance, still around the 0.04 line for the remaining periods. The shocks to e5 exerted the variance in mscp within 0.00 and 0.02 in the first period, from which it increased to a point slightly above 0.06 in the third period. It later decreased over time from the foregoing point to a stable variance moderately below 0.06, covering around the seventh to the tenth period. In another respect, the composite shocks to e6 generated a forecast error in mscp of a bit above 0.4 in the first period from which it fell moderately below the 0.4 line. It, however, slightly increased to the 0.4 line and subsequently decreased moderately below 0.3, though it had some stability in the forecast error around the ninth and tenth periods. The concluding forecast variance in mscp was streamed from the composite shocks to e7. Mscp had a variance of around 0.01 in the first period, from which it increased to around 0.02 in the second period. The variance decreased to a point slightly below 0.01 in the fourth period and subsequently decreased over time within 0.00 and 0.01. It, however, had a short stable variance around the ninth and tenth periods.

In the final analysis, the variance decomposition of lreer was examined. It can be observed from the graph that the composite shocks to e1, the error term of lgdpc, caused a stable variance in lreer around 0.7 in the first and part of the second period. It, however, decreased to moderately below the 0.6 line over time. The next variance in lreer streamed from the composite shocks to e2, the error term of fpi. Lreer initially had a variance of around 0.16 in the first period, but thereafter decreased over time to the 0.04 line on which it maintained a short and stable variance, which later decreased slightly below the 0.04 line, as well as maintained stability in the forecast error from around the seventh period to the tenth period. Also, the composite shocks to e3, the error term of fdi, resulted in a variance of 0.02 in lreer in the first period, which increased to a point slightly above 0.10 in the fourth period. It, however, decreased over time to around 0.06 in the tenth period. Furthermore, the composite shocks to e4, the error term of lcbpr, initially resulted in around 0.08 variance in lreer in the first period. It then decreased over time to slightly below the 0.02 line, though characterized by some stability in the forecast error from around the seventh period to the tenth period. The next focus is on the effect of the composite shocks on e5, the error term of bmg on lreer. The lreer initially

had a forecast error of between 0.02 and 0.03 in the first period, but increased to around 0.04 in the second period. It thereafter decreased to some parts of the 0.02 line as well as slightly below it, showing some stable forecast error from around the eighth period to the tenth period. Moreover, the composite shocks to e_6 , the error term of m_{scp} , resulted in the variance of $lreer$ of around 0.01 in the first period, from which it increased to around 0.05 in the fourth period. However, the variance decreased to around 0.02 in the tenth period. In the final analysis, is the variance decomposition of $lreer$ streaming from the composite shocks to its error term, e_7 . Observing the graph shows that the composite shocks to e_7 resulted in a forecast error within 0.0 and 0.1 in the first period from which it fed into a stable variance within 0.0 and 0.1 from around the second period to the tenth period.

5.13. Re-examination of the dynamics on the basis of central bank policy rate , capital flows and economic growth in the Southern African Customs Union.

Previous analysis utilized central bank policy rate differentials and broad money growth along with other macroeconomic variables. This section introduces the central bank policy rate (CBPR) and examines its empirical effect on economic growth in the region. However, to examine the dynamic relationship between capital flows, monetary policy, and economic growth in this regard, the log of the globalization index as well as that of the real exchange rate were also introduced. The globalization index proves relevant because investors put other factors aside from interest rates that impact the viability of investment into consideration. This includes the political climate and socio-economic factors that are captured by the globalization index.

5.13.1. Lag length criteria

The empirical analysis thus requires the estimation of the lag length as contained in the table below by the forval approach, having as its default the Bayesian Information Criterion.

Table 5.36 : Lag length based on Bayesian Information Criterion

Variables	Country 1	Country 2	Country 3	Country 4	Country 5	Selected
Lgdpc	1	1	1	1	1	1
Fpi	1	0	1	0	0	0
Fdi	0	0	0	1	0	0
bm _g	0	1	0	1	1	1

cbpr	0	0	0	0	0	0
Lgin	1	0	0	0	0	0
lreer	0	0	1	1	1	1
Inf	0	0	0	0	0	0

Source: Author's computation from Stata 14, 2021

lgdpc, bmg, and lreer all have lag 1, while the remaining variables are at levels.

5.13.2. The Mean Group, Pooled Mean Group and the Dynamic Fixed Effect

The following table presents the results of the pooled mean group, mean group, and dynamic fixed-effect. The upper part captures the long run estimates, while the second part contains the short run estimates alongside the error correction term.

Table 5.37: Dynamic regression estimates

	PMG				MG				DFE			
	LR		SR		LR		SR		LR		SR	
D.lgdpc	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
FPI	.4942941	0.292			2.802759	0.452			1.282264	0.113		
FDI	-.0103062	0.021			-.0184688	0.092			-.0046664	0.702		
L1. bmg	.003366	0.005			.0088538	0.120			-.0010259	0.706		
cbpr	-.007454	0.036			-.0154459	0.047			-.0093927	0.329		
lgin	1.964694	0.000			4.202165	0.011			1.210013	0.044		
L1.lreer	3.174851	0.000			.0602518	0.975			2.107164	0.000		
inf	-.0042998	0.252			.0179571	0.234			-.0176984	0.069		
ECT			-.1931069	0.002			-.2652896	0.004			-.1283445	0.000
D.fpi			.1451339	0.531			-.7183142	0.227			-.1302964	0.159
D. fdi			-.0004531	0.550			-.0010932	0.552			-.0018018	0.145
D. bmg			.000075	0.442			-.0001082	0.818			-.0001363	0.567
D. cbpr			.0016955	0.060			.0010729	0.087			.0017496	0.262
D. lgin			-.2481154	0.350			-.2877338	0.136			-.263726	0.200
D. lreer			.9278557	0.093			1.077917	0.059			1.268534	0.000
D. inf			.0014702	0.003			.0011862	0.447			.0015492	0.050
Constant			-1.155236	0.002			-1.208764	0.038			-.3154169	0.175
Hausman Test	Prob>chi2 = 0.9345 (not positive definite)							chi2<0 (-54.96)				

Source: Authors computation from Stata 14, 2021

5.13.3 Interpretation of The Results

The results of the panel ARDL above, given the inclusion of cbpr, lreer, and the log of globalization index, indicate that, on the basis of the Mean Group, cbpr and lgin are the only statistically significant variables in the long run, with a unit increase in lgin stimulating lgdpc by 4.2, while that of cbpr depresses lgdpc by 0.01. However, all the macroeconomic variables are not statistically significant in the short run. Nevertheless, the error correction term of -0.2652896 having a p-value of 0.004 is statistically significant. This implies that any deviation from equilibrium in the short run is corrected at a yearly average speed of 26 per cent. The DFE regression shows that in the long run, only lgin and lreer are statistically significant. A one per cent increase in lgin raises lgdpc by 1.21 per cent, while the effect of a one per cent increase in the period lag of lreer stimulates lgdpc by 2.1 per cent. However, lreer is the only statistically significant variable in the short run that has a unit increase in it, raising lgdpc by 1.26. The error correction term is negative and statistically significant, which suggests that a long-run equilibrium exists among the variables.

The pooled mean group was also estimated. The hausman test between the pooled mean group and the mean group is 0.9345, which is greater than the critical value of 5 percent. The null hypothesis that the pooled mean group is a better estimator cannot be rejected. Also, the dynamic fixed effect was also examined with respect to the PMG. The hausman test generated a negative chi-square, which does not aid in the selection of the most efficient model between PMG and DFE.

While FDI is not statistically significant in the short run, it is significant in the long run. If fdi rises by one unit, lgdpc decreases by 0.01. A period lag of broad money growth, the central bank policy rate, the log of the globalization index, and a period lag of the real exchange rate are all statistically significant in the long run. However, the inflation rate is the only statistically significant variable in the short run. If the inflation rate rises by one percent, the lgdpc will increase by 0.001 percent in the short run. According to the long run results, a unit increase in the period lag of bmg stimulates lgdpc by 0.003, while a one percent increase in cbpr decreases lgdpc by 0.007 percent. The log of the globalization index was perfectly significant, with a unit rise in it stimulating a period lag of lgdpc by 1.96. The lreer is also perfectly significant and shows that a one percent increase in a period lag will increase the lgdpc by 3.17 percent. The error correction term shows that a long-run equilibrium exists among the variables. Any short-

run disequilibrium is corrected at an average speed of 19 per cent annually. The results of the cointegration test also imply the existence of a joint causality of the variables with respect to lgdpc in the long run, while a long-run causality occurs for the statistically significant variables.

Table 5.38: The bias-adjusted LM test of error cross-section independence

$H_0: \text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	32.88	0.0003
LM adj*	10.82	0.0000
LM CD*	5.092	0.0000

***two-sided test**

Source: Author's computation from Stata 14, 2021

The table above shows that there is a problem of cross-sectional dependence and therefore implies a re-estimated model that accounts for the presence of cross sectional dependence. Moreover, the multicollinearity test shows that the variance inflation factor for all the variables within this context is less than 5. The mean VIF is 1.38, which supports the decision that there is no multicollinearity problem. The dynamics is re-examined in order to account for the problem of cross-sectional dependence, thus strengthening the reliability of the estimates.

Table 5.39 : The lag length criteria

Variables	Country 1	Country 2	Country 3	Country 4	Country 5	Selected
Lgdpc	1	1	1	1	1	1
Fpi	0	0	0	0	0	0
Fdi	1	0	0	0	1	0
cbpr	1	0	0	0	0	0
bmng	1	1	0	0	1	1
inf	0	0	1	0	0	0
lmscp	1	1	1	0	1	1
lreer	0	1	1	1	1	1

Source : Author's computation through stata 14, 2021

Table 5.39 above shows the respective lag lengths of the variables in the context of the re-specified variables. Given the problem of cross-sectional dependence, the model with the central bank policy rate is re-estimated, excluding the log of the globalization index while

incorporating a financial development variable of the log of monetary sector credit to the private sector. Table 5.41 displays the empirical results.

Table 5.40: Bias-adjusted LM test of error cross-section independence

H0: $\text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	44.04	0.0000
LM adj*	16.48	0.0000
LM CD*	6.059	0.0000

*two-sided test

Source: Author's computation from Stata 14, 2021

Table 5.40 above shows the re-analysis of the cross-sectional dependence test by excluding $\ln g$ and incorporating $\ln msc$, which is a financial development indicator. It shows that the cross-sectional dependence test still produces the problem of cross-sectional dependence. Consequently, table 5.41 takes care of the cross-sectional dependence.

5.13.4 Accounting for cross-sectoral dependence in macroeconomic dynamics

The macroeconomic dynamics displaying the comparative estimates as well as internalizing the problem of cross-sectional dependence are contained in table 5.41 below.

Table 5.41: Accounting for cross-sectional dependence

ec	1	2	3	4
Variables	xtpmg - mg	xtdcce2 - mg	xtdcce2 - mg	xtdcce2 - cce
fpi	0.517 (0.881)	1.402 (0.993)	0.128 (0.180)	-0.0270 (54.62)
fdi	0.00417 (0.0161)	0.00800 (0.0261)	0.000729 (0.00207)	0.00215 (0.178)
inf	-0.0230** (0.00797)	-0.0326* (0.0133)	-0.00298*** (0.000711)	-0.0159 (0.103)
cbpr	-0.0475*** (0.00655)	-0.0208 (0.0241)	-0.00189 (0.00206)	-0.0372 (0.194)
L.bmg	0.0148** (0.00488)	0.00331 (0.00847)	0.000301 (0.000887)	0.00746 (0.0441)

L.lreer	2.178*** (0.456)	2.590 (2.501)	0.236 (0.122)	1.059 (3.180)
L.lmscp	-0.361 (0.223)	-0.258 (0.342)	-0.0235 (0.0931)	0.417 (1.758)

SR

ec	-0.0833*** (0.0240)	-0.0912 (0.544)	-0.0912 (0.101)	-0.0541 (3.936)
D.fpi	0.663 (0.664)	0.326 (0.417)	0.326 (0.417)	0.700 (0.723)
D.fdi	-0.00115 (0.000992)	-0.00196** (0.000616)	-0.00196** (0.000616)	-0.000766 (0.000477)
D.inf	0.00137 (0.000758)	0.00254** (0.000824)	0.00254** (0.000824)	0.000597 (0.000556)
D.cbpr	0.00275 (0.00161)	0.00202 (0.00124)	0.00202 (0.00124)	0.000768 (0.000835)
D.bmg	0.0000474 (0.000178)	-0.000175 (0.000112)	-0.000175 (0.000112)	0.000391* (0.000173)
D.lreer	1.041* (0.462)	1.094* (0.457)	1.094* (0.457)	0.286 (0.397)
D.lmscp	-0.203* (0.0802)	-0.124 (0.0652)	-0.124 (0.0652)	-0.119*** (0.0203)
_cons	0.0275 (0.0160)			
N	145	145	145	145
cd		5.540	5.540	-1.271
cdp		3.02e-08	3.02e-08	0.204

Standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Source: Authors computation from Stata 14, 2021

Table 5.41 above is a re-analysis of the nexus between capital flows, monetary policy, and economic growth in the Southern African Customs Union. The previous analysis utilized the central bank policy rate differential, while the current section used the central bank policy rate. The PMG and the xtdcce2-cce are used to explain the behavioral dynamics. Observing the table shows that while no variable exhibits a long-run statistical significance in the xtdcce2-cce model in column 5, inflation rate, central bank policy rate, a period lag of broad money growth

and that of real exchange rate are statistically significant in the long-run in the context of the PMG. The findings show, on the basis of the PMG, that a unit rise in *lreer* promotes *lgdpc* by 2.178 and 1.041 in the long-run and short-run, respectively, while a unit increase in *lmscp* decreases *lgdpc* by 0.203 in the short-run. Furthermore, a 1% increase in the inflation rate and the central bank policy rate reduces *lgdpc* by 0.023 and 0.0475, respectively. Also, a unit increase in a period lag of broad money growth significantly enhances *lgdpc* by 0.0148 in the long run. The error correction term shows that the system has the internal capacity to return to long-run equilibrium arising from any short-run disequilibrium. The speed of adjustment is 8.3 per cent and is found to be statistically significant.

Contrasting the foregoing with the *xtdcce2-cce*, broad money growth and monetary sector credit to the private sector are the only statistically significant variables. In the short run, a unit increase in *bm* increases *lgdpc* by 0.0003, whereas a one-percent increase in *lmscp* decreases *lgdpc* by 0.119 percent. However, the *xtdcce2-cce* models produced a negative error correction term, but it was found to be non-statistically significant. A concluding remark on the *xtdcee2-cce* estimates is in respect of the probability value of the cross-sectional dependence. The CD is -1.271 and has a p-value of 0.204, which exceeds the 5 percent critical value. This implies that the null hypothesis of weak cross-sectional dependence cannot be rejected. The *xtdcee2-cce* therefore internalized the problem of cross-sectional dependence among the countries that constitute the panel.

5.13.5 The dynamics of capital flows, monetary policy, and economic growth – a further analysis with the explained variable being gross domestic product per capita growth rate

The previous analysis examined the dynamics of capital flows, monetary policy, and economic growth, while the current section re-appraised the empirical findings by utilizing gross domestic product per capita growth rate, capital flows variables of foreign portfolio investment and foreign direct investment, and some variables to account for monetary policy. Prior to the dynamics, Table 5.42 displays the respective lag lengths of the variables on the basis of the *forval* approach, having the Bayesian information criterion as the default lag selection criteria, where C1 to C5 represent the respective countries.

Table 5.42: Lag length based on Bayesian Information Criterion

Variables	C1	C2	C3	C4	C5	Selected
gdpcr	1	1	1	1	1	1
Fpi	0	0	0	0	0	0
Fdi	0	0	0	0	0	0
Bmg	0	0	0	0	0	0
Cbpr	1	0	0	0	0	0
inf	0	0	0	0	1	0

Source: Author's computation from Stata 14, 2021

Given the lag length of the variables above, the dynamics among the variables occupy Table 5.43.

Table 5.43: Macroeconomic dynamics with Gross Domestic Product per capita growth rate

	PMG				MG				DFE			
	LR		SR		LR		SR		LR		SR	
D.gdpcr	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
fpi	20.78851	0.011			55.67331	0.158			20.68525	0.007		
fdi	-.2718302	0.022			-.3171525	0.028			-.236198	0.087		
Bmg	.0068919	0.829			.0261448	0.621			.0338039	0.290		
cbpr	.0409701	0.608			-.0320638	0.390			.0146874	0.865		
inf	-.0818834	0.381			-.1289289	0.252			-.1185876	0.202		
ECT			-.7897667	0.000			-.932558	0.000			-.9729165	0.000
D.fpi			-28.73527	0.098			-57.70084	0.173			-18.55562	0.027
D.fdi			-.021579	0.884			.0540025	0.550			.1199866	0.273
D.bmg			.0288818	0.400			.0070872	0.228			-.0077395	0.720
D.cbpr			.0663169	0.567			.2098318	0.123			.165658	0.219
D. inf			.1430421	0.077			.1430839	0.016			.0627521	0.330
Constant			2.080303	0.000			3.178204	0.000			2.503201	0.003
Hausman Test	Prob>chi2 = 0.9988 (not positive definite)							Prob>chi2 = 0.9917				

Source: Author's computation from Stata 14, 2021

The table above compared the three estimators of the MG, PMG, and DFE estimators. The MG shows that FDI and inf are the only statistically significant variables. A unit increase in FDI is found to reduce GDP Per Capita Growth Rate (gdpcr) by 0.3171 in the long run at the 5% level, whereas gdpcr increases by 0.1430 percent due to a one percent increase in inflation. Though most of the variables are found to be statistically insignificant, the speed of adjustment signalled by the error correction term is very strong, at 93.2 percent, which is statistically significant at the one percent level. It therefore connotes that all the variables jointly cause gdpcr, in the long run.

However, findings from the PMG estimates confirmed that while other variables are not statistically significant, the capital flows variables only significantly affect gdpcr in the long-run. A one per cent rise in FPI in the long-run promotes gdpcr by 20.788 per cent while on the contrary, gdpcr decreases by 0.2718 arising from a unit rise in FDI at the 5 per cent level of significance. The evidence from the hausman test having a prob > chi2 of 0.9988, which exceeds the critical limit of 5 percent, conveys the information that the PMG is the most efficient estimator under the null. Nevertheless, all the variables exhibit a long-run joint causality of gdpcr given the statistical significance of the error correction term at the one percent level of significance. According to the PMG model, any random deviation from the long-run equilibrium growth path results in an annual 78.9 percent speed of equilibrium adjustment.

While the fourth column of DFE estimates confirms with the PMG on the positive statistical significance of FPI on GDPCR in the long run, it fails to produce a statistical significance of FDI on GDPCR. It shows that a one percent rise in FPI stimulates gdpcr, by 20.6852 at the one percent level of significance. Nevertheless, while FPI is not statistically significant in the short-run in the context of the PMG model, it significantly affects gdpcr in the DFE. A unit increase in FPI decreases gdpcr by 18.55 at the five per cent level of significance. The ECT term, which is negative, also supports the MG and the PMG of the fact that a long-run equilibrium convergence exists among the variables at a speed of 97.2 percent. The hausman test between the MG and PMG, as well as the DFE and PMG, confirmed, however, that the null hypothesis that the PMG is the most efficient estimator cannot be rejected.

Table 5.44 displays the test for error cross-section independence among the cross-sectional units that constitute the study. While the null hypothesis that there is no serial correlation

among cross-sectional units over time cannot be rejected on the basis of the LM, however, the adjusted LM and the Pesaran LM CD fail to reject it. Consequently, the dynamics among the variables above are re-examined within the context of the xtdcce2-cce estimator as expressed in table 5.45.

Table 5.44: Bias-adjusted LM test of error cross-section independence

H0: $\text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	14.88	0.1365
LM adj*	2.111	0.0347
LM CD*	3.075	0.0021

*two-sided test

Source: Author's computation from Stata 14, 2021

Table 5.45: Accounting for cross-sectional dependence

Dependent Variable: gdpocr

ec	1	2	3	4
Variables	xtpmg - mg	xtdcce2 - mg	xtdcce2 - mg	xtdcce2 - cce
fpi	20.79* (8.205)	21.96 (25.22)	20.98 (22.53)	32.84 (105.5)
fdi	-0.272* (0.119)	-0.295* (0.117)	-0.282** (0.0913)	-0.469 (5.026)
bmng	0.00689 (0.0320)	0.0218 (0.0258)	0.0208 (0.0215)	-0.0511 (0.321)
cbpr	0.0410 (0.0799)	0.0204 (0.0892)	0.0195 (0.0760)	0.226 (2.618)
inf	-0.0819 (0.0935)	-0.108 (0.169)	-0.103 (0.140)	-0.175 (2.994)

SR

ec	-0.790*** (0.172)	-0.955*** (0.119)	-0.955*** (0.117)	-0.411 (2.100)
D.fpi	-28.74 (17.38)	-24.40** (8.911)	-24.40** (8.911)	86.93 (98.73)
D.fdi	-0.0216	0.0778	0.0778	-0.0145

	(0.148)	(0.0800)	(0.0800)	(0.227)
D.bmg	0.0289 (0.0343)	0.0106 (0.0236)	0.0106 (0.0236)	0.0489* (0.0186)
D.cbpr	0.0663 (0.116)	0.130 (0.0880)	0.130 (0.0880)	-0.300 (0.416)
D.inf	0.143 (0.0808)	0.196** (0.0609)	0.196** (0.0609)	0.145 (0.173)
_cons	2.080*** (0.495)			
N	145	145	145	140
cd		4.361	4.361	-0.487
cdp		0.0000130	0.0000130	0.626

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's computation from Stata 14, 2022

Observing the table above with a focus on the fifth column (xtdcce2-cce), which internalized the cross-sectional dependence ($cd = -0.487$, $cdp = 0.626$) among the countries, demonstrates that broad money growth is the only variable that has a significant impact on $gdpcr$. A 1% increase in BMG is found to increase $GDPCR$ by 0.0489 in the short run. However, the $xtdcce2-cce$ is characterized by a negative error correction term, which is not statistically significant.

5.14. Panel threshold

While the study previously utilized monetary policy rate differentials, this section examines the behavior of results due to the introduction of central bank policy rates. The panel fixed threshold of Hansen (1999) is utilized and the results are presented below.

5.14.1 The foreign portfolio investment threshold in relation to the log of GDP per capita

The following shows the threshold level of foreign portfolio investment given the inclusion of CBPR, the globalization index, and $lreer$.

Table 5.46: The foreign portfolio investment threshold in relation to the log of GDP per capita

Table 5.46.1 :Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	0.0499	0.0492	0.0576

Source: Author's computation from Stata 14, 2021

Table 5.46.2 : Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F Stat	Prob.	Crit. 10	Crit5	Crit1
Single	1.0594	0.0088	5.84	0.1400	7.2372	9.1862	13.9739

Source: Author's computation from Stata 14, 2021

Table 5.46.3: Fixed-effects (within) regression

Dependent Variable: lgdpc

Group variable: country			Number of obs = 150		
R-sq: within = 0.7714			Number of groups = 5		
between = 0.7431			Obs per group: min = 30		
overall = 0.5756			avg = 30.0		
F (8,137) = 57.78			max = 30		
corr(u_i, Xb) = 0.3770			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
fdi	.0025471	.0034523	0.74	0.462	-.0042796 .0093739
bmg	-.0000571	.0006711	-0.09	0.932	-.0013841 .0012699
cbpr	-.0180839	.0029765	-6.08	0.000	-.0239698 -.012198
lgin	1.409146	.1908131	7.38	0.000	1.031826 1.786466
lreer	1.338656	.1717989	7.79	0.000	.9989359 1.678377
inf	-.0000752	.0020907	-0.04	0.971	-.0042095 .0040591
_cat#c.fpi					
0	.2453412	.3650792	0.67	0.503	-.4765779 .9672602
1	-.8971531	.2434779	-3.68	0.000	-1.378614 -.4156924
_cons.	-1.427342	.5813387	-2.46	0.015	-2.5769 -.2777851
sigma_u	.25573679				
sigma_e	.08793742				

rho	.89426316	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 137) = 176.69 Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The panel fixed threshold regression above produced a single threshold of 0.0499 with a bootstrap p-value of 0.14, which is not statistically significant. By implication, the null hypothesis of a linear model cannot be rejected. A one percent increase in fpi below the threshold of 0.0499 positively stimulates lgdpc by 0.24 percent, though this is not statistically significant. The effect of fpi on lgdpc changes above the threshold. It can be observed from the table that a unit increase in fpi above the threshold level decreases lgdpc by 0.89 at the one percent level of significance. Other regression results show that cbpr, lgin, and lreer are statistically significant at one percent. A unit rise in lgin and lreer respectively stimulates lgdpc by 1.4 and 1.33, while if cbpr increases by one per cent, lgdpc falls by 0.01 per cent. The probability of F is statistically significant. This supports the reliability of the regression estimates.

5.14.2. The threshold of Foreign Direct Investment in relation to the Log of GDP per Capita

Table 5.47: The threshold of foreign direct investment in relation to the log of GDP per capita

Table 5.47.1 : Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	5.1176	4.9962	5.1213

Source: Author's computation from Stata 14, 2021

Table 5.47.2 : Threshold Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F Stat	Prob.	Crit. 10	Crit5	Crit1
Single	1.0745	0.0090	4.07	0.3367	6.3211	7.1329	10.2753

Source: Author's computation from Stata 14, 2021

Table 5.47.3: Fixed-effects (within) regression

Dependent Variable: lgdpc

Group variable: country			Number of obs = 150		
R-sq: within = 0.7647			Number of groups = 5		
between = 0.7169			Obs per group: min = 30		
overall = 0.5705			avg = 30.0		
F (8,137) = 55.64			max = 30		
corr(u_i, Xb) = 0.3690			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
fpi	-.5097352	.2046812	-2.49	0.014	-.9144783 -.1049922
bmg	-.0001391	.0006802	-0.20	0.838	-.0014841 .001206
cbpr	-.0186202	.003054	-6.10	0.000	-.0246593 -.0125811
lgin	1.341541	.195501	6.86	0.000	.9549511 1.72813
lreer	1.306736	.1743114	7.50	0.000	.9620472 1.651425
inf	-.0000425	.0021213	-0.02	0.984	-.0042372 .0041522
_cat#c.fdi					
0	.0072352	.0052835	1.37	0.173	-.0032126 .0176829
1	-.000284	.0035003	-0.08	0.935	-.0072056 .0066377
_cons.	-1.253614	.5926133	-2.12	0.036	-2.425466 -.0817618
sigma_u	.25603358				
sigma_e	.08921743				
rho	.89172315	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 137) = 168.40

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

Table 5.48: The Threshold of the Central Bank Policy Rate in Relation to the Log of GDP per Capita

Table 5.48.1: Threshold : Threshold estimator (level = 95):

Model	Threshold	Lower	Upper
Th-1	10.7600	10.5950	10.9167
Th-21	10.6900	10.6600	10.7600
Th-22	10.0000	9.5183	10.2500
Th-3	6.9583	6.0625	7.0000

Source: Author's computation from Stata 14, 2021

Table 5.48.2 : Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	F stat	Probability	Crit10	Crit5	Crit1
Single	0.9587	0.0080	19.05	0.0167	12.4887	14.7063	22.1627
Double	0.8459	0.0070	16.01	0.0300	10.5398	13.4053	17.3840
Tripple	0.7697	0.0064	11.87	0.4800	20.6763	24.0066	37.4200

Source: Author's computation from Stata 14, 2021

Table 5.48.3: Fixed-effects (within) regression

Dependent Variable: lgdpc

Group variable: country			Number of obs = 150		
R-sq: within = 0.8145			Number of groups = 5		
between = 0.6459			Obs per group: min = 30		
overall = 0.5385			avg = 30.0		
F (10,135) = 59.26			max = 30		
corr(u_i, Xb) = 0.3169			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
fdi	-.0022685	.0031636	-0.72	0.475	-.0085251 .003988
bmg	.0005686	.0006239	0.91	0.364	-.0006654 .0018026
fpi	-.419443	.1933317	-2.17	0.032	-.8017936 -.0370924
lgin	1.315666	.1782178	7.38	0.000	.9632061 1.668126
lreer	1.359613	.1635011	8.32	0.000	1.036258 1.682967
inf	.0009433	.0019047	0.50	0.621	-.0028236 .0047103
_cat#c.cbpr					
0	.0129328	.008874	1.46	0.147	-.0046173 .0304828

1	.000048	.0060857	0.01	0.994	-.0119876	.0120837
2	.0142199	.0059679	2.38	0.019	.0024172	.0260226
3	-.0077834	.003692	-2.11	0.037	-.0150851	-.0004818
_cons.	-1.486784	.5440695	-2.73	0.007	-2.562786	-.4107819
sigma_u	.26558042					
sigma_e	.07980094					
rho	.91718993	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 135) = 216.47

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

At the threshold level of 10.7600, the f– stat is 19.05 over the confidence interval of (10.5950, 10.9167). However, the bootstrap p-value is 0.0167, which is statistically significant and has the implication that the null hypothesis of a linear model be rejected. The bootstrap p-value of the double threshold is 0.0300 at the f–stat of 16.01. The triple model, on the other hand, has an f – stat of 11.87 at a bootstrap p – value of 0.4800, which is not statistically significant. The triple model is therefore the appropriate model for the explanation of the effect of cbpr in this instance. If cbpr falls below the threshold level of 10.7600, A one per cent rise in cbpr increases lgdp by 0.01 per cent, but is not statistically significant. At $10.6900 < \text{cbpr} < 10.7600$, a unit rise in cbpr increases lgdp by .000048, but is insignificant. However, at $10.6900 < \text{cbpr} < 10,000$, the effect of cbpr turns statistically significant, thus showing that a one per cent rise in cbpr increases lgdp by 0.01 per cent while at $\text{cbpr} > 6.9583$, the effect of cbpr remains statistically significant with a one per cent rise in cbpr decreasing lgdp by 0.007 per cent. The effect of a one per cent rise in cbpr is therefore optimal over the range at which $10.6900 < \text{cbpr} < 10,000$.

5.14.3. The Threshold of the Central Banks' Policy Rate in Relation to Foreign Portfolio Investment

Table. 5.49: The Threshold of the Central Bank Policy Rate in Relation to Foreign Portfolio Investment

Table 5.49.1 : Threshold estimator (level = 95):

Mmodel	Threshold	Lower	Upper
Th-1	6.9583	6.7292	7.0000

Source: Author's computation from Stata 14, 2021

Table 5.49.2 :Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F stat	Probability	Crit10	Crit5	Crit1
Single	0.1807	0.0015	19.06	0.0500	14.2686	17.7381	34.9628

Source: Author's computation from Stata 14, 2021

Table 5.49.3: Fixed-effects (within) regression

Dependent Variable: fpi

Group variable: country			Number of obs = 150		
R-sq: within = 0.1389			Number of groups = 5		
between = 0.0757			Obs per group: min = 30		
overall = 0.0541			avg = 30.0		
F (6,139) = 3.74			max = 30		
corr(u_i, Xb) = -0.2283			Prob > F = 0.0018		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	-.000192	.0002786	-0.69	0.492	-.0007429 .0003589
inf	.0005472	.0008634	0.63	0.527	-.0011598 .0022542
lreer	.1315514	.0704368	1.87	0.064	-.0077147 .2708175
lgin	.1282185	.0771799	1.66	0.099	-.0243799 .280817
_cat#c.cbpr					
0	-.0092463	.0025479	-3.63	0.000	-.0142839 -.0042087
1	-.0018277	.0013372	-1.37	0.174	-.0044715 .0008161
_cons.	-.4417644	.2387951	-1.85	0.066	-.9139047 .0303759
sigma_u	.02706272				
sigma_e	.03637211				
rho	.35633891	(fraction of variance due to u_i)			

F test that all u_i=0: F(4, 139) = 14.31

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The table above examines the threshold of cbpr with respect to fpi. The results indicate a bootstrap p value of 0.0500, which is not statistically significant. As a result, the null hypothesis of a linear relationship between cbpr and fpi cannot be rejected. The threshold is 6.9583 with 95% confidence. At cbpr below the threshold, a one per cent rise in cbpr decreases foreign portfolio investment by 0.009% at the one per cent level of significance, while above

the threshold of 6.9583, there exists a continued negative effect of cbpr on fpi, but not statistically significant.

5.14.4. The Threshold of the Central Bank Policy Rate in Relation to Foreign Direct Investment

Table 5.50: The Threshold of the Central Bank Policy Rate in Relation to Foreign Direct Investment

Table 5.50.1: Threshold estimator (level = 95):

Mmodel	Threshold	Lower	Upper
Th-1	8.0000	7.7292	8.2083
Th-21	8.0000	6.9583	8.2083
Th-22	7.7917	7.7500	8.2083
Th-3	9.6667	9.5200	10.0000

Source: Author's computation from Stata 14, 2021

Table 5.50.2 : Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	F stat	Probability	Crit10	Crit5	Crit1
Single	657.0350	5.4753	14.57	0.0267	10.0187	13.0609	16.8039
Double	643.4452	5.3620	2.53	0.7167	7.3588	8.7940	14.6525
Triple	632.5509	5.2713	2.07	0.7900	7.1283	8.9935	11.2740

Source: Author's computation from Stata 14, 2021

Table 5.50.3: Fixed-effects (within) regression

Dependent Variable: fdi

Group variable: country			Number of obs = 150		
R-sq: within = 0.2157			Number of groups = 5		
between = 0.1543			Obs per group: min = 30		
overall = 0.0805			avg = 30.0		
F (8,137) = 4.71			max = 30		
corr(u_i, Xb) = -0.3564			Prob > F = 0.0000		
Explanatory Variables	Coefficient	Standard Error	t	P > t	95%Conf. Interval
bmg	.0135866	.0164044	0.83	0.409	-.0188519 .0460251
inf	-.0210753	.0512799	-0.41	0.682	-.1224778 .0803272

lreer	-1.806606	4.261534	-0.42	0.672	-10.2335	6.620284
lgin	13.18488	4.581533	2.88	0.005	4.12521	22.24454
_cat#c.cbpr						
0	-.5576603	.1883813	-2.96	0.004	-.9301714	-.1851491
1	-1.003048	.3094192	-3.24	0.001	-1.614903	-.3911931
2	-.2152023	.1449888	-1.48	0.140	-.5019076	.0715029
3	-.1046175	.0927225	-1.13	0.261	-.2879699	.0787349
_cons.	-13.84765	14.22336	-0.97	0.332	-41.97337	14.27807
sigma_u	1.6104077					
sigma_e	2.1527293					
rho	.35881796	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 137) = 10.16

Prob > F = 0.0000

Source: Author's computation from Stata 14, 2021

The threshold level of cbpr is estimated above with respect to fdi. While cbpr is linearly related to fpi, it is found to exhibit a non-linear relationship with foreign direct investment. The table shows that at a cbpr that falls below the threshold of 8.0000, the cbpr exerts a statistically significant negative effect on FDI. A unit rise in CBPR decreases fdi by 0.55. The second threshold is exactly equal to the first threshold below which cbpr, though statistically significant, has a continued negative effect on fdi. In this instance, a one percent rise in cbpr decreases fdi by one percent.

5.15. Panel Causality Test

The panel causality test was re-examined in the context of the central bank policy rate as expressed below.

Table 5.51: Dumitrescu and Hurlin (2012) Granger non-causality test results

Direction of causality	W-bar	Z-bar	Z-bar tilde
Lgdpc cbpr	1.2057	0.3252 (0.8200) (6.4730)	0.1675 (0.9200) (5.4911)
CBPR LGDPC	4.3338	5.2712 (0.1200) (8.2018)	4.4504 (0.1200) (6.9880)

FPI CBPR	1.0615	0.0972 (0.9300) (3.1648)	-0.0299 (0.9600) (2.6264)
CBPR FPI	0.8092	-0.3018 (0.8000) (3.2679)	-0.3754 (0.7000) (2.7156)
FDI CBPR	1.2974	0.4703 (0.6700) (1.8942)	0.2931 (0.8200) (1.5261)
CBPR FDI	1.3132	0.4952 (0.6900) (3.5273)	0.3147 (0.7800) (2.9403)

Source: Authors computation from Stata 14, 2021

Table 5.51 above considers the causality between the central bank policy rate, capital flows, and the log of GDP per capita. It can be observed from the results that the null hypothesis that cbpr does not granger cause lgdpc cannot be rejected because the bootstrap p-value is not statistically significant. Causality that runs from lgdpc to cbpr implies that lgdpc does not granger cause cbpr. It therefore implies that no direction of causation exists between lgdpc and cbpr. Similarly, the non-statistical significance of the bootstrap p-values in either direction in respect of the central bank policy rate and foreign portfolio investment, on one hand, as well as the central bank policy rate and foreign direct investment, on the other hand, shows that the evidence of causation is non-existent.

5.16. A macroeconomic model for the promotion of capital flows in the Southern African Customs Union

The empirical research observed the relevance of the monetary policy rate differential, the monetary policy rate, broad money supply, inflation rate, capital flows, and other macroeconomic variables as examined in this study in affecting economic growth in the Southern African Customs Union. This section describes a general macroeconomic model for the promotion of capital flows and economic growth in the region.

Considering that capital flows are influenced by the monetary variables, therefore,

$$C = f(M) \dots\dots\dots [Eq.1]$$

Where C denotes capital flows, which include both foreign direct investment and foreign portfolio investment, and M denotes monetary policy measures. The research observed the roles of the central bank policy rate differential (cbpd), central bank policy rate (cbpr) and broad money growth (bmg) in influencing capital flows into the Southern African Customs Union.

Consequently, “C” becomes;

$$C = f(i - i^*, i, g) \dots\dots\dots [\text{Eq. 2}]$$

where $i - i^*$ (i is the domestic policy rate while i^* is the world policy rate) is the central bank policy rate differential calculated as the difference between the policy rate in the respective countries in SACU with respect to that of the United State, which is one of the key trading partners of the region and as well has the status of a world leading economy.

The central bank policy rate of the United State is therefore used as the world interest rate. The differential in the policy rate is in line with the neoclassical flow theory that capital flows to regions characterized by higher returns on investment. The central bank policy rate is i while the broad money growth rate is g .

The specific effect varies with respect to the context of analysis. It therefore necessitates the re-specification below:

$$C = \vartheta(i - i^*) + \alpha i + \beta g \dots\dots\dots [\text{Eq. 3}]$$

where ϑ , α , and β are the respective effects of the macroeconomic variables.

The desirable directional effect of the interest rate differential, interest rate and broad money growth will be heavily influenced by the monetary policy authority's effectiveness in minimizing policy conflict in the mix of monetary policy instruments.

The output side of the economy is modelled as expressed below:

$$Q = f(C, z) \dots\dots\dots [\text{Eq. 4}]$$

where C is as defined above while z captures other macroeconomic variables that exert influence on the output of the Southern African Customs Union.

$$Z = f(\text{Inf, lgin lmscp, lreer, linr})$$

$$\text{Consequently; } Q = f(i - i^*, i, g, \text{Inf, lgin lmscp, lreer, linr fdi fpi}) \dots\dots\dots [\text{Eq. 5}]$$

Where lgin; log of globalization index; lmscp; log of monetary sector credit to private sector; lreer; log of real exchange rate; linr; log of inward remittances; fdi; foreign direct investment; fpi; foreign portfolio investment.

Re-expressing equation 5, given the population of the region, becomes;

$$\frac{Q}{P} = f(i - i^*, i, g, Inf, lgin, lmscp, lreer, linr, fdi, fpi) \dots\dots\dots [Eq. 6]$$

Where $\frac{Q}{P}$ is the GDP per capita

5.17. Discussion of the empirical results

The empirical findings of the previous analysis are discussed in this section, which gives insights into relevant policy directions in respect of the Southern African Customs Union.

5.17.1 Cross-sectional time-series FGLS regression.

The empirical estimates from the cross-sectional time series fgls, which take care of the problem of heteroscedasticity and cross-sectional dependence, show that fpi and fdi are not statistically significant with respect to lgdpc for the Southern African Customs Union. The implication of this is that the capital flows of foreign direct investment and foreign portfolio investment have not significantly improved growth in the Southern African Customs Union. This could be due to the inability of the host economies to effectively transform these items of capital flows into growth. For instance, studies on the socio-economic situation of transforming R & D into innovation and growth are connected to the adequate absorptive capacity of an economy (Bilbao-Osorio & Rodríguez-Pose, 2004). Also, the study of Hermes and Lensink (2003) emphasized the precondition of a well developed financial system for FDI to positively affect economic growth. The empirical results of fdi and fpi, though insignificant, were found to exert a negative impact on lgdpc. This calls for a re-examination of the effective use of capital flows to the region.

The FGLS estimates also show the statistical significance of the globalization index on gross domestic product per capita, and it was found to have a positive effect on gross domestic product per capita in SACU. A unit increase in lgin promotes lgdpc by 1.88 at the one per cent level of significance. This supports the study of Dreher (2006), who analyzed an index of comprehensive globalization that encompasses economic, social, and political integration. The

author, in a panel study of 123 countries spanning the period 1970–2000, examined the effect globalization has had on growth. It was found in the study that globalization enhances growth while there is no effect stemming from political integration. The positive impact of the globalization index on the SACU shows that it is one of the key driving forces to integrate with the world economy through the continuous development of the social, economic, and political climate of the region. The relevance of the exchange rate in the study is worth observing considering the inter-country movement of resources, which invariably influences the exchange rate. The empirical results of the cross-sectional time series fgls produced a highly statistically significant effect of the log of the real exchange rate on the log of gross domestic product per capita. A one per cent increase in the real exchange rate is found to promote lgdpc by 1.56 per cent, which corroborates the study of Tarawalie (2010) that examined the effect of the real exchange rate on economic growth in Sierra Leone by the use of quarterly data over the period 1990Q1-2006Q4. The techniques of johansen cointegration and bivariate granger causality were used to analyze data sourced from the International Financial Statistics 2007 as well as the Bank of Sierra Leone Bulletin. It was found from the study that a positive and statistically significant relationship exists between the real exchange rate and economic growth.

The regression estimates also produced a positive, but insignificant effect of the log of foreign development assistance and official aid received. The insignificance shows that the flow of lfda to SACU has not been enhancing growth desirably over the study period. A study that also established an insignificant relationship but showed a negative effect of foreign aid on economic growth is that by Phiri (2017). The author analyzed the impact of aid on economic growth in respect of 12 Sub-Saharan African countries covering the period (1995–2014) and concludes that aid does not contribute to growth if it is mis-utilized. The experience of SACU does have an impact, positively. This requires authorities to re-examine the process and methods of utilizing foreign aid and development assistance in order to translate them into a significant and positively reinforcing effect on the living standards of the citizens in the region.

The log of inward remittances was also highly significant but dampened the lgdpc by 0.15. The implication of this is that the inward flow of remittances has not been effectively channeled into growth enhancing activities. This is in line with the study by Chami *et al.* (2005) in respect of 113 countries, which provided evidence of the negative impact of remittances on growth.

Another variable that is statistically significant is the log of monetary sector credit to the private sector (lmscp). A 1% increase in its value increases lgdpc by 0.18 percentage point. This means

that in the Southern African Customs Union, credit to the private sector has been enhancing lgdp which by implication means that the standard of living of the citizens as a result has been improving on average. However, the increase can be sustained and strengthened for a greater level of welfare for the region. This corroborates the view of Schumpeter (1911) who is of the view that the availability of domestic credit contributes relevantly to enhancing economic growth via financing for investment and manufacturing activities. Also, Jedidia *et al.* (2014) in a study on the Tunisian economy over the period 1973–2008 found that domestic credit is necessary to enhance the economy. Furthermore, Thierry *et al.* (2016) also corroborate the current finding in a study that spans 1969 and 2013 in respect of Cameroon, which arrived at the conclusion that domestic credit drives economic growth.

The xtgl regression estimates also show the statistical significance of the central bank policy rate differential for the Southern African Customs Union. The cbpd shows the difference between the monetary policy rate in the SACU community with respect to one of the trading partners and the leading world economy (the United States). Any one per cent rise in the cbpd decreases the lgdp by 0.006 per cent. The differential is a reflection of the gain that prospective investors will receive if resources are driven into the Southern African Customs Union. A higher differential is an indication of higher returns on investment, while the reverse holds, provided the differential is low. A unit increase in differential, which on average will encourage the influx of resources, is expected to promote economic growth and, consequently, living standards. However, the empirical results indicate decreased growth. It therefore necessitates that monetary policy be designed along with other policy measures that will ensure that resources effectively promote growth and living standards.

5.17.2 The dynamic interaction of capital flows, monetary policy, and economic growth in the southern african customs union

The dynamic interaction of capital flows, monetary policy, and economic growth conveys a number of results which guide appropriate policy formulation. The estimates show that though fdi is not statistically significant in the short run, it becomes significant at the one percent level in the long run and negatively affects lgdp. The net inflow of foreign direct investment as a percentage of GDP, rather than promoting growth and raising living standards, however, reduces it. This is in consonance with empirical studies like Frimpong Magnus and Oteng-Abayie (2006), which established a negative relationship between FDI and economic growth with respect to the economy of Ghana. Furthermore, Apergis (2008) discovered that FDI has a

negative impact on economic growth in countries with lower levels of income and weak liberalization policies. The Southern African Customs Union is characterized by low-income countries whose fdi effect corroborates the study of (Apergis, 2008).

The Pooled Mean Group estimates also reveal broad money growth (bmg), one of the measures of monetary policy. Though insignificant in the short run, it is significant at the one percent level in the long run and affects the log of GDP per capita positively. Broad money growth, therefore, promotes the living standard in the region. This supports the work of Hussain and Haque (2017), who analyzed the nexus in respect of money supply and per capita GDP growth rate for Bangladesh. The authors employed a vector error correction model and found that money supply significantly impacted the growth rate. Another corroborating study is that of Ogunmuyiwa and Ekone (2010), who investigated the relationship between Nigeria's money supply and economic growth. They utilized an error correction model covering the period 1920–2006. It was concluded from their research work that money supply and growth are directly related. Similarly, Muhammad *et al.* (2009) studied the nexus between money supply, government expenditure, output, and prices with respect to Pakistan. The techniques of Johansen co-integration as well as Granger causality tests were employed. It was found that broad money supply exerts a positive effect on the economic growth in the long run.

CBPD, another monetary policy evaluation metric, is found to be statistically significant at the one percent level in both the short and long runs, and to have a negative influence on lgdpc in both periods. CBPD, which is a policy rate differential, has the propensity to influence output through its influence on capital flows. A similar result was obtained in the xtgl regression. The differential with respect to the leading economy in the world, therefore, needs to be effectively designed to impact the lgdpc of the SACU desirably. The inflation rate, according to the estimates, is statistically insignificant both in the short run and the long run. This is in consonance with a study by Mothuti and Phiri (2018), who found, in respect of Botswana, covering the period 1975–2016 and employing the ARDL technique, that inflation does not have a statistically significant relationship with economic growth in the short and long run.

Another study corroborating the empirical finding of inflation on GDP per capita is that of Bonga-Bonga and Simo-Kengne (2018) in a study on South Africa over the span of 1969–2013 that used MSVAR to analyze the relationship between inflation and output growth dynamics. The authors concluded that there is no relationship between inflation and economic growth. Nonetheless, long-run inflation estimates show a positive effect on LGDPC but differ in terms

of statistical significance from Mallik and Chowdhury (2001) study, which found a direct relationship between inflation rate and economic growth in a study of Bangladesh, India, Pakistan, and Sri Lanka. The authors employed the techniques of co-integration and error correction models in order to examine the data covering the four South Asian countries, from which they established a direct relationship between inflation and economic growth in the long run. The study also recommended a moderate inflation rate to accelerate economic growth.

However, foreign portfolio investments in both the short run and the long run exert a positive impact on lgdpc. However, it is statistically insignificant. This calls for a proper examination of the peculiarities of foreign portfolio investment flows into the region and the adoption of appropriate sterilization measures in order to ensure that the respective host economies in SACU are not marginalized. On the whole, the probability value of the error correction term is statistically significant and negative, thus suggesting that all the variables exhibit long-run joint causality on lgdpc. An appropriate policy mix of monetary policy measures such as broad money growth, policy rate differentials, and realistic inflation targets, combined with capital flows such as foreign portfolio investment and foreign direct investment, will have an impact on citizens' living standards.

5.17.3. The Southern African Customs Union's threshold level of capital flows and monetary policy

Having analysed the threshold level of capital flows, monetary policy and economic growth, this section discusses the results. The threshold level is very pivotal in order to ascertain an optimal level beyond or below which sustainability will be undermined. The results established a non-linear relationship between foreign portfolio investment and the log of GDP per capita, but the relationship between foreign direct investment and the log of GDP per capita is linear. FPI is found to be statistically significant at the threshold level that falls between 0.1077 and 0.0576. The effect of FPI on lgdpc is statistically significant but decreases living standards. However, when it falls between 0.0576 and 0.0087, the effect is still statistically significant but turns positive. A one per cent rise in FPI, in this instance, increases lgdpc, and consequently living standards by 5.33 per cent. This is therefore the optimal level at which foreign portfolio investment reinforces the living standards of the citizens. The authorities in the region, therefore, need to moderate the intensity of fpi in order to avoid adverse effects. The regression estimates for the determination of the threshold level of fpi also show the statistical significance of the inflation rate and the central bank policy rate differential, with both exerting a negative

effect on lgdpc. A view supporting the negative effect of the inflation rate is that of Kremer *et al.* (2013), who found that economic growth gets distorted by inflation when it surpasses a particular critical value. The monetary authorities in SACU thus have the responsibility to eliminate the depressing effects of both variables on the standard of living of their citizens.

Foreign direct investment produced a single threshold of 5.1176 below and above which the effect is not statistically significant. Nevertheless, a one percent rise in FDI increases lgdpc by 0.009 percent while it is 0.001 above the threshold level. The insignificance of the fdi, calls for an examination of the direction and nature of fdi into the region. This may be as a result of Hanson *et al.* (2001), who asserts that the capacity of FDI to produce positive spillovers for recipient economies is weak. However, Blomstrom and Kokko (2003) assert that the prevailing conditions in the host economies determine the capacity to internalize foreign technologies and skills. They are of the view that positive spillovers are not automatic. SACU is made up of low-income economies that are not industrialized. Inflows of resources will tend to move to the extractive sectors, which may not significantly contribute to increased employment, high incomes, and healthier living standards. The regression estimates also provide evidence that the inflation rate and cbpd are statistically significant.

The panel threshold was also analyzed in order to ascertain the threshold of the central bank policy rate differential in the region. Evidence of a linear relationship was established between lgdpc and cbpd. The threshold level of 6.7500 below which cbpd positively impacts lgdpc but is not statistically significant was reached. However, as cbpd rises above the threshold, it becomes statistically significant at the one percent level and exerts a negative impact on lgdpc. A 1% increase in cbpd is found to reduce lgdpc by 0.01. Following the line of reasoning of the neoclassical theory, capital flows tend to move to regions of higher interest rates. By implication, a higher differential is an indication of higher returns abroad, which will stimulate the inflows of resources. The inflows of appropriately channeled resources are expected to contribute to the host economy. However, the experience of SACU shows that a unit increase in the differential depresses the lgdpc. This is an indication that an increasing differential is not sufficient to positively impact the host economy.

The panel threshold estimates also show that broad money growth (bmg) is linearly related to fpi, though not statistically significant either below or above the threshold level of 22.5159. The estimates show that bmg increases fpi below the threshold but decreases it above the threshold level. Broad money growth and FDI exhibit a non-linear relationship. The estimates

show that broad money growth becomes optimal when it falls below the threshold of -14.4359. It is in this instance that it significantly promotes foreign direct investment.

The threshold level of cbpd with respect to fdi is 10.1600 and is found to have a linear relationship with fdi. The estimates show that while cbpd is not statistically significant above its threshold, it is significant at the one percent level provided it falls below the threshold. The effect cbpd exerts on fdi due to a unit increase is optimal below the threshold as it is found to promote fdi by 0.32.

The relationship between cbpd and fpi is also linear, having a threshold of cbpd at 2.5000. The relationship is such that cbpd exerts a negative effect on fpi either below or above the threshold level. Nevertheless, it is only statistically significant below the threshold level. This calls for a study on why cbpd promotes FDI but decreases FPI. A comparable result is that of Makhetha-Kosi *et al.* (2016), who analyzed the response of capital flows to interest rate differentials in South Africa spanning 1990-2013. The technique of Vector Error Correction Modelling (VECM) was employed, and the authors controlled for the effects of the financial crisis. They found that the interest rate differential is positive for South Africa, but does not result in a proportionately greater inflow of capital. The authors attributed such outcomes to externalities in human capital formation as well as a risk premium favouring advanced economies. They also established that interest rate differentials do not influence the various types of capital flows in the same way.

5.17.4. Panel causality

The results of the panel causality test produced insight as regards the directional influence of the variables, which invariably guide the direction of policy formulation. Using the Dumitrescu and Hurlin (2012) Granger non-causality test for all the variables, it was found that the direction of causation between FDI and lgdpc is unidirectional, with FDI causing lgdpc. Foreign direct investment in either green field or brownfield alongside its accompanied technical capacity that expands the productive capacity in SACU will promote employment and stimulate the living standards of the citizens. A similar outcome was found by Feridun and Sissoko (2011), who analyzed in respect of the Singaporean economy, the nexus as regards FDI and gross domestic product per capita. The authors established a unidirectional causality from FDI to GDP per capita. However, the empirical findings contradict the work of Bilgic (2007) that analyzed the possibility of a causal relationship regarding FDI and economic growth in Turkey over the span

of 1992 (Quarter 2) to 2006 (Quarter 3). The techniques of the Johansen Cointegration and Granger Causality tests were deployed for the study. It was concluded that no causality runs in either direction between the two variables.

Theoretically, the causality between FDI and GDP growth can occur in either direction. Based on the "FDI-led growth hypothesis," the inflows of FDI can promote growth for the recipient economies through the increase in capital stock, the generation of new job prospects, and the ease of technology transfer (Borensztein *et al.*, 1998; De Mello Jr, 1997; Gregorio, 2003).

The results above show that, like the FDI growth nexus, a uni-directional causality was observed running from FPI to GDP per capita. Foreign portfolio investment belongs to the category of inter-country flow of financial resources and can be necessary to trigger the liquidity needs of productive activities in an economy and, by implication, for the Southern African Customs Union. Effective and appropriate sector channeling of foreign portfolio investment will contribute to growth and raise living standards for the region. It was also observed from the empirical results that a uni-directional causality runs from broad money growth (BMG) to inflation. Expansionary monetary policy without a concurrent increase in overall output will result in a rising price level in the economy. This can be observed within the quantity theory of money of $MV = PQ$ where "M" is the money supply, "V" is the velocity of money, "P" is the price level, and "Q" is output. According to the theory, expanding the money supply (M) while velocity (V) and output (Q) are held constant will invariably generate a higher price level in the economy.

The causation of inflation in the Southern African Customs Union by the money supply has implications for the real income and, consequently, for the living standards of the citizens. It, therefore, becomes necessary for the monetary authorities to embark on effective monetary stability in the region. A study that supports this empirical finding of money supply causing inflation is that of Sasongko and Huruta (2018), who employed a Granger Causality model covering monthly data that spanned January 2007 to July 2017. The authors established that for Indonesia, there is a unidirectional causation of money supply on the price level.

The study also found one-way causation running from GDP per capita to the monetary policy rate differential. The explanation for such an outcome can be situated within the IS/LM framework. An outward shift of the IS curve (while the LM curve maintains its position) signals increased productivity in the goods market brought about by favourable government fiscal

policy and will result in higher output accompanied by a rise in the interest rate. The domestic interest rate relative to the world interest rate thus generates a differential which according to the neoclassical theory have implication on the amount of inflow of resources from the foreign economies. The inflows of resources that consequently stimulate the real sector will promote the welfare of the citizens.

Other macroeconomic variables from the empirical study show that a number of them exhibit no causality. For instance, there was no evidence of a causality between foreign portfolio investment and the central banks' policy rate differential. The implication of the foregoing is that the differential in the monetary policy rate has not been motivating enough to drive portfolio investments, which is a signal that the SACU region may have the inability to attract sufficient portfolio assets while domestic investors may channel their resources to other economies, which may adversely affect output and living standards in the region. A similar result was also found between the central banks' policy rate differential and foreign direct investment. The empirical finding above negates the work of Wang, Su, *et al.* (2019) that analyzed the causal relationship of short-term capital flow in relation to interest rate differential by employing bootstrap Granger full-sample causality as well as sub-sample rolling-window approaches over the span of 2009: M01-2018:12. The authors found evidence of a one-way causality from the interest rate differential to short-term capital flow to China.

The globalization index and GDP per capita do not exhibit causality. The inability of the globalization index to cause GDP per capita necessitates the need to examine the performance of the factors that constitute the index. For instance, according to the KOF globalization index of Dreher (2006), which was updated by Dreher *et al.* (2008), globalization can be measured in terms of economic, social, and political considerations in respect of the majority of countries in the world right from 1970. It therefore implies that the effectiveness of the respective components of the index needs to be adequately managed in order to raise living standards in the region. On the other hand, GDP per capita does not cause globalization. A diversified productive base of the economy of SACU that effectively connects with the respective key institutions will be indispensable in causing globalization.

The differential between the monetary policy rate and the inflation rate exhibits no causality. This is in consonance with the previous non-causality of the monetary policy rate differential and the capital flows components of foreign portfolio and direct investment. The monetary policy rate differential that is not attracting capital flows may likely not cause inflation for the

region. However, if it were to attract sufficient capital flows, the prevailing level of economic activities will be enhanced which invariably may cause inflation. On the other hand, inflation over the study period has not caused the differential in the monetary policy rate, which is an indication that the interest rate differential is caused by non-inflation factors.

The study also provides evidence of no causality between the capital flows components of foreign portfolio and direct investment in relation to the broad money growth (Money supply). Expansion in the money supply that is biased against foreign investors may discourage foreign investment into the Southern African Customs Union and has the tendency to adversely affect employment and living standards. The non-causation of the money supply by the two major capital flow elements in the region can be foundational to the repatriation of surpluses to foreign banks, which thus reduces the prevailing amount of liquidity in the host economy.

Monetary sector credit, a financial development variable, does not cause GDP per capita for the region. Credit extended to the private sector but characterized by moral hazard by the supposed investors will result in the mis-use of funds and invariably may not substantially cause output and living standards. Also, domestic output does not cause monetary sector credit. This is an indication that monetary sector credit can be caused by other factors in SACU. This could be the soundness and development of the financial sector as well as the ease of accessing alternative sources of funds aside from the domestic financial system. For instance, domestic investors may source funds from the eurocurrency market, which is not influenced by domestic monetary regulation. A similar finding in this regard is that of Aliero *et al.* (2013), who utilized the technique of the autoregressive distributed lag (ARDL) model in a study in respect of Nigeria. They also used the technique of causality between private sector credit and economic growth covering a data set that spanned 1974–2010. The authors established a long-run relationship among the variables, while the causality test proved the absence of causality.

Evidence from the results shows that no causality runs in either direction between GDP per capita (lgdpc) and gross capital formation growth rate (gcfg). Gross capital formation is expected to cause growth. However, the formation of capital that does not contribute to the real sector may not cause output and living standards. Conversely, GDP per capita that is not characterized by savings towards capital formation may not cause gross capital formation for the Southern African Customs Union. The non-causation between the two variables calls for the need to examine the process of capital formation in the Southern African Customs Union as this, to a large extent, has implications for future productivity and the standard of living of

the citizens. This finding is in sharp contrast with Akindele (2010), who provided in his publication that within the context of the classical theories, the accumulation of capital is claimed as "the key to progress". The classicists, thus, are of the view that the accumulation of capital is the driver of economic progress through growth.

There is no causality for SACU in either direction for broad money growth (money supply) and GDP per capita. This is an indication that monetary expansion is not sufficient for stimulating output and raising the living standards of citizens. To a large extent, the direction of use of the money supply will determine its directional impact on GDP per capita. Also, other non-monetary factors such as the political system and rent-seeking activities, among others, can undermine the capacity of the money supply to cause GDP per capita. The non-causality of the money supply by GDP per capita is an indication that the money supply can be more primarily influenced by monetary variables, which could be cash ratio, bank rate, open market operations, among others. A comparable result is that of Obaid (2007), though with variation in the exact measurement of variables relative to the current study. Obaid (2007) used the technique of Granger causality to examine, over the period 1970–2006, the causal nexus between money supply (M3) and real GDP in Egypt. The author came to the conclusion that there is no causality between nominal money supply and nominal GDP. However, he established a bidirectional causality by using the real money supply alongside the real GDP in the country.

The study provides the evidence of a unidirectional causation from FDI to Irer. Foreign direct investment involves the inter-boundary movement of resources, which invariably influences the rate of exchange and the value of the domestic currency relative to foreign currencies. The prevailing exchange rate thus affects the cost of production and living standards. Connecting this to the literature is that of Morande (1988), who provided that capital inflows exert a causal relationship in relation to the real exchange rate, most especially that inflows of capital have the tendency to appreciate the domestic country's currency. It was established from the study that the unanticipated disruption of capital flows in late 1981 caused the peso to experience a real depreciation from June to August 1982. Moreover, Tsaurai (2015) established that the inflows of FDI exert an effect on real exchange rates. Furthermore, while no causality exists between foreign direct investment and inflation, the inflation rate was found to cause foreign portfolio investment. Portfolio investment falls into the category of more volatile investments and has the tendency to respond swiftly to variations in variables that contribute to the

macroeconomic stability of the host economy. Therefore, inflation, being one of the key determinants of the investment climate, will invariably influence the extent of foreign portfolio investment into the Southern African Customs Union. A corroborating finding is the study of Kumar *et al.* (2019) that analyzed, in respect of Pakistan, the causality comprised of certain selected macroeconomic indicators and foreign portfolio investment by utilizing monthly time-series data that spanned 2006–2017. The explanatory variables are external debt, inflation rate, gross domestic product, KSE-100 return, interest rate, and foreign direct investment, while the explained variable is foreign portfolio investment. The authors observed that the overall model exhibits significance as characterized by an adjusted r-square of 78.4877%. On the basis of the autoregressive distributed lag (ARDL) model, the interest rate and external debt exert significant effects on foreign portfolio investment, while in the context of granger causality, the KSE-100 return and inflation rate produce significant effects on foreign portfolio investment. However, the study of Kombui (2019) negates the empirical finding between the inflation rate and foreign direct investment. The author identified a number of factors that granger cause FDI, of which inflation is included.

The globalization index exerts a causal impact on foreign direct investment, while FDI does not. The globalization index, as noted earlier, describes an economy based on three major factors: the economic, social, and political environment. These three factors, to a large extent, determine the quality of the macroeconomic environment for foreign direct investment. A sound macroeconomic environment that stimulates FDI and economy-wide output will contribute to improved living standards for the citizens of the region. The finding is in line with the study by Aluko *et al.* (2021) that examined the causal relationship between foreign direct investment (FDI) and globalization in Africa. The authors used a panel data set comprising 50 economies spanning 1996-2016 as well as the technique of the Dumitrescu-Hurlin panel Granger causality test. It was found from the study that a unidirectional causality runs from globalization to FDI. Given the dimensions of globalization, they also established one-way causation running from political and social globalization to FDI, but in respect of economic globalization, the causal direction emanates from FDI. On the basis of country level, the authors also observed that there exist considerable variations with respect to the causalities. They concluded that policies of FDI-globalization should be handled with caution because one-size cannot fit all given within Africa the differential causal relations.

Further results also show that while $lreer$ does not cause $lfda$, $lfda$ causes $lreer$. $lfda$ captures official aid and development assistance. The causality of $lreer$ by $lfda$ may arise from the effect of the inter-country movement of resources by international economic institutions such as the International Bank for Reconstruction and Development has on the exchange rate. Relating the foregoing results to previous empirical literature is that of Murshed and Rashid (2020) that somehow corroborates the empirical finding. The authors analyzed the dynamics in terms of the responses of the real exchange rate to international remittances, foreign direct investments, and official development assistance entering the four emerging South Asian economies of Pakistan, Sri Lanka, Bangladesh, and India. The authors found that, using an econometric approach, the real exchange rate appreciated by 0.18% and 0.23%, respectively, provided there was a 1% increase in the aggregate volume of official development assistance and remittances obtained. Moreover, the real exchange rate is characterized by a depreciation of 0.19% arising from a 1% increase in the inflows of FDI. They also established the evidence on the basis of Dumitrescu and Hurlin (2012) that one-way long-run causalities stemming from official development assistance and the inflow of FDI to the real exchange rate characterized the South Asian economies. It was also found that inward international remittances and the real exchange rate exhibit a relationship that is bidirectional.

The study also establishes evidence for the region that the differential in the monetary policy rate has a causal impact on the real exchange rate but not otherwise. The differential in the policy rate, which is the difference between the prevailing policy rate in the Southern African Customs Union and the world interest rate (the United States of America), determines the attractiveness of interest-sensitive investments such as financial investments, which invariably affect the exchange rate and, by implication, the real exchange rate. The empirical results show that while $gcfg$ does not cause FDI, the reverse holds as FDI was found to Granger cause $gcfg$. Obviously, the influx of foreign direct investment, which could be greenfield or brownfield, contributes to the capital stock of the respective economies in SACU, thus contributing to employment generation, skill acquisition, enhanced GDP, and improved living standards. In another scenario, the inflation rate was found to granger cause $lreer$. Stability in the inflation rate is one of the central goals of the monetary authorities in the SACU. A moderate and stable inflation rate that drives investment activities in the economy is one of the signals to existing and prospective foreign investors, which, consequently, due to the inter-country movement of resources, influences the rate of exchange and, by implication, the real exchange rate. Another consideration is based on the fact that the real exchange rate is the nominal exchange rate less

the rate of inflation. The extent of price level variation is therefore expected to have a pronounced impact on the real exchange rate. The study by Achsani *et al.* (2010) for non-Asian economies supports the empirical finding. In an effort to compare it with what was obtained in the EU and North America, Achsani *et al.* (2010) compared the reaction of inflation to the variation in real exchange rates in Asia (ASEAN +3). They employed an explorative statistical approach as well as the Granger-causality technique and established the case of a strong correlation in respect of inflation rate movements with real exchange rates in the majority of the countries. Asia is characterized by a significant unidirectional relationship, such that the nominal and real exchange rates generate a significant effect on the inflation rate. However, in the context of the non-Asian economies, the causality operates in the opposite direction. The authors established, on the basis of utilizing panel data model with fixed effects, that the reaction of inflation to the variation in exchange rates in Asia is greater than that of the EU and North America.

Furthermore, within the context of the real exchange rate, one-way causality runs from $lmscp$ to $lreer$. Effective advancement of funds to the private sector for entrepreneurial activities can have a filter on the exchange rate due to the procurement of certain raw materials and other categories of inputs that cannot be easily obtained in the domestic economy. Gross capital formation, which is an indication of the rate of growth of the capital stock, granger cause inward remittances. The need for increased capital formation in the domestic economy can result in the diversion of remittances to achieve the goal, which results in their productive use and consequently promotes living standards. Moreover, broad money growth granger cause the real exchange rate. The prevailing amount of liquidity in the system is a function of the rate of money supply, which influences the volume of economic activities and can also be filtered on the exchange rate arising from the purchase of goods and other business resources from abroad. Finally, a bidirectional relationship characterizes inf and $lmscp$. Extension of credit facilities to the private sector will stimulate business activities and, in some measures, influence the inflation rate arising from increased liquidity in the system. However, the state of the general price level at any given period of time can determine the volume of monetary sector credit to the private sector. Advances of funds can be issued in most cases when the economy is operating below the full employment level of output.

5.17.5. Discussion of the empirical results with the use of the central bank policy rate

While the analysis above adopted the differential in the policy rate, this section considers the central bank policy rate. The panel ARDL also indicated through the hausman test that the pooled mean group, which considers the long-run homogeneity of the units that make up the study, is the best estimator. The pooled mean group shows that the central bank policy rate (cbpr) is not statistically significant in the short run, but has turned significant in the long run. A 1% increase in cbpr decreases lgdp by 0.007%. This is an indication that a higher policy rate that drives up other rates in the economy, thus increasing the cost of investment, will tend to contract the economy and reduce economic growth. A similar finding is that of Di Giovanni *et al.* (2009). The authors established that the quarterly real growth rate is moderately reduced as a result of interest rates. The technique of ordinary least squares was utilized and it was found that the real growth rate in respect of the Netherlands declines by 0.094 percentage points arising from a one percentage point increase in the interest rate, while a one percentage point rise in the interest rate in the context of France reduces the real growth rate by 0.015 percentage points. On average, the effect of the interest rate is -0.043, with respect to real growth, covering 12 European countries. The regression estimates also show that while the inflation rate is not statistically significant in the long run, it is significant at the one percent level in the short run, having a one percent rise, increasing lgdp by 0.001 percent. A moderate rise in inflation rate, *ceteris paribus*, while the cost of raw materials and other inputs are still lagging behind, will promote investment and increase economic growth as well as standard of living.

Though foreign portfolio investment positively influences lgdp, it is not statistically significant in both periods. However, FDI is statistically significant in the long run, but decreases lgdp. This is similar to the result obtained previously. The decreasing effect of FDI on lgdp can be attributed to the influx of FDI that generates a considerable volume of negative externalities that undermine the welfare of the citizens. Also, the repatriation of investment returns and low employment citizens in the host economies may not promote living standards.

A period lag of broad money growth is statistically significant at the one percent level in the long run and is found to positively affect lgdp. However, broad money growth is not statistically significant in the short run. Previous money supply growth by the monetary authorities within a year will enhance economic growth, which will positively improve the living standards of the citizens. A study that also established a long run relationship between money supply and growth is by Arfanuzzaman (2014) who examined in respect of Bangladesh,

the long-run relationship between money supply and growth rate spanning the period 1974–1989. It was concluded that a long-run relationship exists between the growth rate of GDP and money supply, with the direction of causality being from broad money supply to GDP. Another study by Chude and Chude (2016) examined the impact of broad money supply on economic growth in Nigeria and concluded that a close affinity exists between money supply and gross domestic product. The study of Babatunde and Shuaibu (2011) is corroboratory to the finding that money supply positively affects growth. The authors concluded that a positive and significant relationship exists between money supply and economic growth in their analysis of money supply, inflation, and economic growth with Nigeria as the focus country.

The dynamic regression estimate also established a positive and long-run statistically significant log of the globalization index at the one percent level for the Southern African Customs Union. A one-percentage-point increase in $lgin$ raises $lgdpc$ by 1.96. This is an indication that economic growth and living standards thrive well when factors such as economic, political, and socio-economic conditions are in the right direction and magnitude. Such an atmosphere will promote wide-spread investment activities, stimulate growth and enhance living standards. The result is consistent with Dreher (2006), who developed an index of globalization that encompasses the key components of economic, social, and political integration. The author analyzed panel data comprised of 123 countries spanning the period 1970–2000. The effect on economic growth of the overall index, along with the sub-indexes which measure the single dimensions, was considered. It was concluded that globalization enhances growth. While information flows contribute to growth, political integration does not. However, actual economic flows and restrictions in developed countries are highly related to economic growth. The results also convey that a period lag of the log of real exchange rate ($lreer$) positively affects $lgdpc$ at the one percent level of significance. A one per cent rise in $l.reer$ promotes $lgdpc$ by 3.17 per cent. An increase in the period lag of $lreer$, which makes importation of goods more expensive, will redirect purchases to the domestic economy, which will motivate domestic investors to embark on increased investment activities. Consequently, $lgdpc$ will increase alongside living standards. However, the finding negates the study by Hausmann *et al.* (2005), which shows that real exchange rate depreciations correlate with swift growth accelerations.

Overall, there is a joint causality of all variables in relation to $lgdpc$, with a rate of disequilibrium correction of 19% annually at the 1% level of significance.

5.17.6. The panel threshold

In this category, *fpi* generates a linear relationship in relation to *lgdpc* with a threshold of 0.0499. The fixed regression estimates show that *fpi* stimulates growth provided it falls below the threshold, but it is statistically insignificant. When it falls above the threshold, its effect on *lgdpc* becomes statistically significant but decreases *lgdpc*. A one per cent rise in *fpi* above the threshold of 0.0499 decreases *lgdpc* by 0.89 per cent. This is an indication that the impact of *fpi* on SACU has not been substantial. *Lreer*, *lgin*, and *cbpr* are all statistically significant at the one percent level, with *lreer* positively impacting *lgdpc*, while *cbpr*, as usual, decreases *lgdpc*.

The threshold level of *fdi* stood at 5.1176, but was not statistically significant below or above the threshold, while *lreer*, *lgin*, and *cbpr* remained significant at the one percent level and retained their respective signs. The central bank policy rate has a non-linear relationship with *lgdpc*. At *cbpr* that falls below the threshold of 10.7600, *cbpr* positively affects *lgdpc*, but not statistically significant, as well as *cbpr* that falls between 10.7600 and 10.6900. However, at a *cbpr* that falls between 10.6900 and 10.0000, the *cbpr* becomes statistically significant, and a unit increase in *cbpr* increases *lgdpc* by 0.01. On the other hand, the effect on *lgdpc* turned negative provided the threshold falls within the range of 10.000 and 6.9583, having a unit increase in *cbpr*, decreasing *lgdpc* by 0.007 and found to be statistically significant.

The foregoing sets the optimal level of *cbpr* between the range of 10.6900 and 10.0000. This is the range that positively affects per capita GDP as well as being statistically significant. The policy rate influences every other rate in the economy. Setting it at a range that minimizes the cost of investment will tend to promote investment activities and stimulate growth. The foregoing contradicts the threshold interest rate ascertained for growth by Olaniyi (2019), who examined the topic "How much is too much? the threshold effects of interest rate on growth and investment in Nigeria". The focus of the study was to ascertain a threshold level for interest rates beyond which the effect they exert on both growth and investment changes. The author adopted Hansen's (2000) threshold method and a data set that spanned 2006–2017. While the threshold of interest rate for GDP was 21.1%, it was 22.6% for investment growth, with an interest rate that falls below 21.1% exerting a positive impact on economic growth, but not optimal beyond it. A similar conclusion was made in respect of investment growth. At an interest rate below 22.6%, the interest rate promotes investment growth but is not optimal beyond it. It was therefore concluded from the study that Nigeria, as well as other developing

economies, should endeavor to set interest rate levels that do not undermine growth as well as investment. It was advised that policy measures that will sustain the interest rate below the thresholds should be pursued.

Examining cbpr with respect to fdi shows a non-linear relationship and was found to be statistically significant when it falls below the threshold of 8.000. However, the estimates show that, regardless of where cbpr falls, it has a decreasing effect on FDI. Conversely, the relationship between cbpr and fpi is linear, having a threshold of cbpr at 6.9583 below which cbpr is statistically significant but decreases fpi. It also decreases fpi above the threshold but was found to be statistically insignificant.

5.17.7 Panel causality findings using central bank policy rates

This section discusses the empirical results of the causality between the central bank policy rate, capital flows, and the log of GDP per capita. The empirical results show that no direction of causation runs between lgdpc and cbpr on one hand and the capital flows items (fdi and fpi) with respect to cbpr on the other. The lack of causality between GDP per capita and the policy rate thus implies a re-examination of the monetary system and the real sector in the Southern African Customs Union. It signals a "connectivity loss somewhere" which needs to be ascertained in order for the monetary system to have a profound impact on the living standards of the citizens. The empirical finding of the non-causal relationship between the policy rate and the log of GDP per capita comparably corroborates Clifford (2020) who used quarterly data on interest rates and GDP over the span of 2009–2019 and found that no causality existed between the two variables. Moreover, the non-causal relationship between the policy rate and foreign portfolio investment implies that the two variables may need to be supported by some other factors. For instance, investors take into consideration a host of factors that influence the viability of returns on investment, such as the prevailing political stability, the quality of infrastructure, etc. Setting the macroeconomy on an attractive investment pedestal will tend to support the policy rate towards influencing portfolio investment. The finding negates the empirical work of Osundina and Osundina (2014) that found for Nigeria, on the basis of a granger causality test, that interest rates cause portfolio investment. Furthermore, the non-causal relationship between FDI and interest rate is not far-fetched from the requirement of a slew of other factors that will help to give relevance to the interest rate consideration. The study of Kombui (2019), however, negates the empirical finding. The author analyzed the factors of FDI over the span of 1985–2015 in respect of Ghana. The technique of a robust OLS

regression as well as a Granger Causality Test to ascertain the causal impacts on longitudinal data were employed. In addition to other variables that demonstrate causality, interest rates were established to granger cause FDI.

5.17.8. Discussion of the empirical result of the panel ardl given the inclusion of lmscp and lreer as well as the results of the XTDCCE2-CCE

The xtpmg estimates were re-estimated with the inclusion of the log of monetary sector credit (lmscp) and the log of the real exchange rate. This obviously affected the output of the results, showing the dynamics among some of the variables. Moreover, an effort was made to internalize the problem of cross-sectional dependence among the constituent units through the xtdcce2-cce. Observing the PMG estimate shows that the inflation rate (inf), the central bank policy rate differential (cbpd), broad money growth (bmg) and the real exchange rate (lreer) are the only statistically significant variables in the long-run. In the context of the xtdcce2-cce, no variable is statistically significant in the long run. A one per cent rise in inflation generates a decrease in lgdp of 0.0291 in the long run, but the inflation rate is not significant in the short-run. During a period of rising price level without commensurate improvement in wages and salaries, the real incomes of citizens fall, which results in their inability to maintain their living standards. A study corroborating this is that of Bittencourt (2012) in an inflation growth nexus that established the instance of the inflation rate exerting a negative effect on output in respect of Latin America through the utilization of panel time-series data. Similarly, cbpd, while it is not significant in the short-run, it is statistically significant in the long-run at the one percent level. A unit increase in cbpd was found to cause a 0.0563 decrease in GDP per capita (lgdp). It therefore conveys the information that an increase in cbpd does not always promote economic growth. Prospective investors take into account a variety of other macroeconomic factors, including political stability, government policy, and the population, among others. It requires that other measures be designed to complement the cbpd in order to yield desirable impacts on the economy. While broad money growth has a negative impact on lgdp in the short run, it has a positive impact in the long run, with both periods statistically significant at the ten percent level. Growth rate in the money supply in the direction of economic growth enhancing projects will tend to contribute positively to the economy in the long run. However, moral hazards and adverse selection will tend to undermine the growth potential of broad money, which may consequently have a negative effect of broad money on living standards. The positive impact of broad money growth is in line with the study by Chude and Chude (2016) that examined the

"Impact of Broad Money Supply on Nigerian Economic Growth". The authors sourced data from the central bank of Nigeria that spanned 1987–2010 and utilized the method of ordinary least squares (OLS) along with other tests such as the unit root Augmented Dickey Fuller as well as the KPSS, VAR Granger causality, and co-integration. They established evidence of a significantly positive relationship between money supply and economic growth in Nigeria. It was concluded that M_2 exerts a strong impact on output and prices. However, while $lmscp$ is not statistically significant in either time period, a period lag of $lreer$ ($L.lreer$) and $lreer$ are statistically significant. A rise of $lgdpc$ by 2.166 occurs as a result of a unit increase in the period lag of the real exchange rate in the long run, while the current period of $lreer$ stimulates $lgdpc$ by 1.128.

In the short run, the $xtdcce2-cce$ produced a statistically significant positive effect of $cbpd$ on $lgdpc$. This further confirms the relevance of the central bank policy rate differential in the study. Monetary authorities in the Southern African Customs Union (SACU) should consider the differentials in the policy rates as a crucial factor that influences living standards in the region. This outcome further stresses the relevance of the monetary policy tools in the SACU.

Also, the empirical findings show that fdi negatively impacts on $lgdpc$ in $xtdcce2-cce$ in the short-run and is found to be statistically significant. This shows the severity of FDI in the region having a decreasing effect on living standards. Factors warranting this may be traceable to the type of FDI as well as the sustainability of FDI in the region. These also include the degree of employment of citizens as well as the repatriation of funds to foreign economies. Moreover, if FDI crowds out domestic investment, GDP per capita may be undermined. For instance, according to Adams (2009), FDIs have also been established, given the series of literature, to exhibit crowding out effects on domestic investment, which, according to the study of Sothan (2017), could be because of their capacity to be characterized by high quality technical know-how, greater opportunities, as well as a reduction in the market share of the firms existing in the host economy. The inability of domestic firms to thrive alongside foreign firms may result in a negative impact of FDI on the domestic economy's per capita output.

Another result from the $xtdcce2-cce$ shows that while the effect of the log of monetary sector credit is not significant in the PMG, it was found to be statistically significant in the $xtdcce2-cce$ in the short-run. The result provides that $lmscp$ has a negative effect on $lgdpc$. This, however, is not expected because government policies, through the financial sector that enhance the flows of credit to the private sector, is expected to increase the level of economic

activities, employment and standard of living. Funds received by the private sector but characterized by moral hazard will not enhance growth sustainably. Comparing the outcome with the study of Koivu (2002) supports the possibility that private sector credit may not necessarily promote output and, consequently, living standards.

Koivu (2002) noted that, in respect of transition economies, the availability of an efficient banking sector expedited economic growth. It was observed from the Soviet model that the banking sector with respect to transition economies was characterized by swift growth in the second half of the 1990s. The relationship between economic growth and the volume of credit extended to the private sector, covering 25 countries in transition, inclusive of Romania, spanning almost seven years running from 1993 to 2000, was examined. Certain conclusions were arrived at by Koivu (2002) as regards transition economies, including the fact that a substantial amount of credit results in a decline in gross domestic product. Budgetary constraints were also claimed to have adversely affected investment by making it counterproductive. Moreover, Cristea and DRĂCEA (2010), in line with the study of Koivu (2002), arrived at similar conclusions for Romania spanning 2001 to 2009, stressing that private credit growth does not enhance economic growth. It was claimed that economic growth rates had slowed due to increases in private credit, inflation, and the average exchange rate.

5.17.9 Discussion of the central bank policy rate's empirical results

The xtpmg, in this context, deviates from the previous results as it excludes the log of the globalization index and includes a financial sector index, which is the log of monetary sector credit to the private sector. The inflation rate is found to significantly affect lgdpc in the long run. This is also similar to the pattern of results obtained in the xtpmg, which has the central bank policy rate differential. However, despite having the same long-run negative effect as its counterpart xtpmg, inf in the xtdcce2-cce is not statistically significant. The directional influence of the central bank policy rate follows that of the inflation rate in the PMG, with the outcome that cbpr affects lgdpc negatively in the long run. However, the long-run negative effect on lgdpc can be linked to the capacity of the rate to drive up other interest rates in the economy, which leads to high costs of investment and consequently lower output in the economies of SACU. Notably, cbpr and cbpd follow the same pattern of effect in both xtpmg models.

Moreover, broad money growth promotes lgdpc in the short-run in the context of the xtdcce2-cce, while a period lag of broad money growth enhances lgdpc in the PMG in the long-run. An increase in broad money growth will tend to enhance liquidity in the respective economies of SACU. This will invariably result in a decrease in the lending interest rate and thus encourage more investment activities that will ultimately stimulate output, employment, and living standards. A study that exhibits a similar outcome is that of Marshal (2016), which analyzed the nexus in respect of money supply (proxied by M2) and economic growth in Nigeria by utilizing the cointegration and VAR models in a simple regression. The author found a positive and significant relationship between money supply and real gross domestic product for the country in the short and long run. Though the two series were not stationary at levels, they became stationary at the first difference by using the ADF test.

In the short run, the log of monetary sector credit to the private sector (lmscp) has a significant negative effect in both the xtpmg and xtdcce2-cce models. However, a period lag of lmscp in the long run has a negative effect on lgdpc in the xtpmg model, while it exerts a positive effect on lgdpc in the xtdcce2-cce model also in the long run, but both are found to be statistically insignificant. The short-run negative and statistical significance of lmscp further confirms the previous negative short run effect of lmscp in the xtdcce2-cce model in which cbpd was used.

5.17.10. Discussion of the empirical results with the use of gross domestic product per capita

The previously estimated panel autoregressive distributed lag model used gross domestic product per capita as the explained variable. However, this section discusses the empirical findings on the basis of utilizing gross domestic product per capita growth rate. The xtdcce2-cce was also examined in order to internalize the incidence of cross-sectional dependence. The panel ardl of table 5.43 shows that fpi and fdi are statistically significant in the explanation of gdpcr in the long-run. It shows that while fpi increases the gdpcr, fdi decreases it. On sustainable ground, foreign portfolio investment that is adequately channeled and productively utilized will tend to raise output and employment, which will tend to promote a per capita GDP growth rate over time. However, the reverse holds in respect of fdi from the empirical findings. Ceteris paribus, It is expected that increased FDI will promote output and living standards over time. A reduction in living standards over time is an indication of the non-optimality of FDI in the SACU. Living standards will tend to be undermined over time by FDI that is characterized by a high level of negative externality that is not controlled by government regulations.

Furthermore, FDI with little or no local content may not necessarily boost GDP per capita. This outcome contradicts the empirical findings of Shen *et al.* (2010) that examined the topic: "What makes international capital flows promote economic growth?" An international cross-country analysis using panel data over the period 1976–2007 in respect of 80 countries, dissolving capital inflows into foreign direct investment as well as foreign portfolio investments, The authors of the study conclude that FDI is directly related to growth, while foreign portfolio investment has an unfavourable effect on economic growth. According to the authors, variables such as banking liberalization, high income levels, twin crises, lower corruption, and human capital influenced the direct effects of FDI on growth. However, the state of financial liberalization, with respect to a Latin American region, economies wealth, as well as market governance, all have an effect on the direction of FPI on growth, while the conditionality of twin crises and human capital have no impact on how FPI affects economic growth.

The estimate also shows that while gcfg (gross capital formation growth rate) is not statistically significant in the long-run, it significantly and negatively affects gdpcr in the short-run. Capital formation, especially the fixed component, takes time. This includes factory machinery, buildings, and other heavy-duty equipment. They may, however, not be able to increase productivity and living standards in the short-run. Also, other forms of capital formation, such as accumulated savings, which over time are not efficiently invested, may not result in desirable impacts on citizens. The empirical finding contradicts the study of Akindele (2010) that provided that, based on the classical theories, the accumulation of capital is claimed as "the key to progress".

The study also observed the difference in results on the basis of the internalization of cross-sectional dependence among the countries that constitute the studies. It was observed that while broad money growth is not statistically significant in either of the time periods in the PMG, it becomes positively significant in the short-run within the xtdcce2-cce. It therefore implies that increased bmg promotes gdpcr in this context for the region. Increased growth of the M2 money supply that is adequately administered by the financial system and not characterized by the problem of asymmetric information will tend to enhance output and promote the living standards of the citizens over time. Furthermore, the increase in M2, which results in a decline in interest rates, will reduce the cost of investment and stimulate output and employment, thus raising standards of living. This finding contradicts the empirical study of Hussain and Haque (2017). The authors, in respect of Bangladesh, evaluated the nexus between money supply and per

capita GDP growth rate spanning the period 1972–2014 by using the technique of the VECM model. The variables that comprised the study include the real interest rate, the percentage of broad money to GDP, and the yearly per capita growth rate of GDP. The authors found that steady broad money is related to a per capita GDP growth rate and that money supply, in the long run, has an important influence on the growth rate of output.

Another finding in this context of the *xtdcce2-cce* is that *gcfg* significantly affects *gdpcr* in the region. The results are in support of the previous PMG outcome, showing that *gcfg* negatively affects *gdpcr*. The consistency in the impact of *gcfg*, emphasizes the fact that the process of capital formation to a large extent explains the standard of living of the citizens in the region.

A major focus of the study is to examine the dynamic relationship between capita flows, monetary policy, and economic growth in the Southern African Customs Union. Though the study re-estimated the dynamic relationship by using gross domestic product per capita growth rate, the following discussion re-estimates the model by utilizing only the key major variables while neglecting others. These include capita flows (*fpi* and *fdi*), monetary policy (*bm*, *cbpr*, and inflation rate), as well as the economic growth rate measured by the gross domestic product growth rate. The PMG model shows that foreign portfolio investment and foreign direct investment are the only statistically significant variables in the long-run, while no variable is significant in the short-run. Nevertheless, the error correction term conveys the information that all the variables are jointly significant in the causality of *gdpcr*. The capital flows variables exhibit the same directional influence on *gdpcr*. Moreover, *bm* is the only statistically significant variable in the *xtdcce2-cce* model. The empirical findings also conform with the previous directional impact of broad money growth on *gdpcr*.

5.17.11 Discussion of the major capital flow components' trend and pattern

The description of the behavioural pattern of foreign portfolio investment occupies figure 2. It can be observed that over the study period, foreign portfolio investment appeared volatile in all the economies except in Lesotho, where it appeared linearly stable. The volume and intensity of stock market deals might likely have a pronounced impact on the volatility of portfolio investments in the Southern African Customs Union. For instance, according to Mashamba and Magweva (2019), the Johannesburg Stock Exchange is classified as the continent's largest based on capitalization. It is described as being comprehensively automated and exhibiting trading in shares and derivatives as well as bonds. Also, the authors observed

that the second largest stock exchange in Africa on the basis of capitalization is the Namibia Stock Exchange, which was launched in 1992. According to the authors, the monetary union that exists in SACU, with the rand as a currency for trading, has the likely propensity to produce a "spill-over" effect among the economies.

Inference from the foregoing is that the intensity of portfolio transactions at the JSE and the volatile nature it exhibits, as it can be characterized by sudden stops and reversals, which likely characterize the South African economy, will produce a ripple effect on the member economies. However, while Eswatini and Namibia show this pattern, Lesotho does not. This may be due to the size of the economy of Lesotho and the extent to which it can attract foreign portfolio investment. Botswana's economy is also indirectly influenced by rand cross rates, despite the fact that it is not directly pegged to the rand. Prospective investors are therefore likely to channel investments to other economies in SACU and will tend to respond swiftly when market fundamentals change, which eventually results in the volatility of portfolio assets.

Corroborating the volatile state of portfolio investment, Adeola (2017) provided that the economy of South Africa is the largest recipient of portfolio equity in SSA, which was generally affected by the variation in the level of portfolio equity. Also, the World Bank (2014) observed that volatility in equities is related to the period of economic shocks. Therefore, the volatility of portfolio investment in all countries except Lesotho is unconnected to the response of portfolio investment to economic shocks like the global financial crisis. However, the stability that characterized the economy of Lesotho could be due to the low volume of transactions and the unattractiveness of the economy as a destination for portfolio investment among its counterparts in the Southern African Customs Union.

Furthermore, in order to account for the statistical significance of foreign portfolio investment (FPI) and foreign direct investment (FDI) over the study period, the study regressed each of the major capital flow components on trend. The findings show that FPI and FDI are not statistically significant over time, which is an indication that both capital flows have not sustainably impacted the Southern African Customs Union. Also, SACU, like other developing economies, is mostly dominated by the primary sector, which implies that most of the capital flows are directed into extractive activities, which may not significantly impact the citizens, whereas the flows of capital to the industrial and service sectors tend to massively expand output, promote employment, and enhance living standards substantially.

The economic performance of South Africa as a dominant economy in the region invariably produces a mirror reflection of the other economies in the union. For instance, based on World Bank (2019b), the economic growth rate of South Africa over the period 1970–2017 stood at a yearly average of 2.5%, with the 1970s and the 2000s registering GDP growth rates on average at the highest of 3.3% and 3.6%, respectively. However, the average growth rate in the 1980s and 2010s respectively recorded at 2.2% and 2.0%, while the average GDP growth rate stood at 1.4% in the 1990s, making it the decade characterized by the worst performance.

It was reported that the economy of South Africa could not rebound as much as expected. The authorities made considerable efforts to enhance governance of public resources and the sustainability of the fiscal situation, which prevented the economy from experiencing further contraction, yet economic growth got tepid with a technical recession during the first half of 2018. GDP growth was expected to be less than one percent in 2018, down from the previously low rate of 1.3 percent in 2017 (World Bank, 2019d).

As observed from the background of this empirical study, the uneven economic performance as well as the fact that all the countries remain in the enclave of low-income economies signals that capital flows in terms of FPI and FDI have not significantly impacted the region over time.

5.17.12. Foreign direct investment and central bank policy rate differential

The increased globalization of the world economy invariably integrates the economies of the world. Prospective investors divert productive resources into economies where the probability of profit maximization is very high. Among other factors, the cost of capital is an important consideration in the investment decision-making process, which can be significantly influenced by the monetary policy stance. It follows that the current level of interest rates, which determines the cost of loanable funds for investment activities, is an important factor to consider. A variability in interest rate differential is an indication of changes between the domestic interest rate and the world interest rate. In this study, the American policy rate was used as it is one of the major trading partners of the Southern African Customs Union. A high policy rate differential is an indication of a high domestic rate relative to the world rate, while the reverse holds if the policy rate is low. The disparity, therefore, among other factors such as political stability, quality of infrastructure, etc., determines the cost of capital and affects the volume of foreign direct investment. This empirical study found evidence of a positive effect of the central banks' policy rate differential on foreign direct investment provided the

differential falls below the threshold of 10.1600. A 1% increase in cbpd was found to stimulate FDI by 0.3202.

A rise in the policy rate differential is an indication of a higher domestic rate relative to the world interest rate, which is expected, according to the neoclassical theory, to promote the inflows of foreign portfolio investment as it enhances asset returns relative to returns obtainable from abroad. However, prospective investors may still embark on foreign direct investment in either green-field or brown-field in the host economy despite the higher rate of loanable funds and consequently higher cost of capital by taking other major factors into consideration. This includes the soundness of the macroeconomic environment, political stability, taxation and subsidy policies, and the market size of an economy. Improvement in the forgoing factors may increase relative to the differential in the policy rate, which may increase the opportunity cost of not investing in the host economy. Nevertheless, the empirical finding in this study negates the outcome of Karimo (2020). The author analyzed the "Impact of Interest Rate Differential and Exchange Rate Movement on the Dynamics of Nigeria's International Private Capital Flows" that spanned the period from 2010Q1 to 2019Q4. The study utilized the theory of interest rate parity as well as the Markov Switching Time Varying Transition Probability Modelling approach. It was established from the study that the dynamics of total capital and FDI flows are not determined by interest rate differentials, although they exert a significant impact on the flows of foreign portfolio investment. The author also observed that the flows of FPI in either direction and FDI inflows are significantly influenced by the movement in the real exchange rate, while it appears neutral in respect of total capital flows. It was therefore concluded from the study that shifts from interest rate parity result in the avenues for interest rates as well as the arbitrage of currency in the economy, while the use of total flows of capital obscures the evidence.

5.17.13. Discussion of the empirical results of the panel structural vector auto regression in the Southern African Customs Union.

The panel structural VAR provides insight into the relationship between capital flows, economic growth, and monetary policy through the various impulse responses and variance decompositions arising from the shocks to the error terms of the variables. Examining the graphs shows that the common shocks to e2, the error term of fpi produced a lower forecast error in the log of GDP per capita (lgdpc) compared to that of the shocks to e3, the error term of fdi. Nevertheless, both of them decrease the variance in lgdpc over time. By implication, the

two variables of *fpi* and *fdi* are crucial for SACU since they tend to minimize variance in the *lgdpc* over time. A fall in the forecast error in *lgdpc*, will tend to improve the living standards in the region. A somewhat comparable and corroboratory study is that by Berument and Dinger (2004). They analyzed the effects of capital inflows with respect to the macroeconomic performance of Turkey, an emerging and small open economy, through the use of monthly data that spanned 1992:01 to 2001:06. They employed a recursive vector autoregression model and found that positive innovations in capital inflows result in the appreciation of the local currency as well as the stimulation of output and money supply. It, however, lowers interest rates and prices in the short run, while the exchange rate regime has no impact on the effects of capital flows on macroeconomic performance.

In another respect, the common shocks to *e4*, the error term of the log of central bank policy rate (*lcbpr*), exert a very minimal forecast error in *lgdpc*, decreasing from around the 0.004 line and subsequently feeding into a stable forecast error very close to zero from around the fourth period to the tenth period. This is an indication that the minization of the shocks to the policy rate will tend to improve the economic growth in SACU. Though the shocks to the error term of *lcbpr* produced a more efficient outcome in *lgdpc*, the common shocks to *e5*, the error term of broad money growth (*bmng*), also minimized the forecast error in *lgdpc* over time, descending from around 0.004 towards the steady state. The tool of BMG is therefore crucial in the management of liquidity in order to ensure the sustainability of economic growth. In a nutshell, the common shocks to the error terms of *fpi*, *fdi*, *lcbpr*, and *bmng* all exert decreasing outcomes of variance in *lgdpc*. It therefore implies that the interrelationship of capital flows, monetary policy, and GDP per capita are of crucial consideration.

However, the common shocks to *e1* and the error term of *lgdpc* seem to promote the variance in *fpi*. This is a contributory basis for why *fpi* may be delicate as it tends to be somehow volatile. Investors will like to move financial resources to economies with more minimal shocks to GDP. It was also found that the common shocks to the error term of *fpi* generated an increase in its variance. Current and prospective investors may tend to disinvest due to negative macroeconomic factors that can undermine their profitability. Conversely, the common shocks to *e3*, the error term of *fdi*, decrease the forecast error in *fpi* over time to around 0.02 in the tenth period. This outcome is a signal for SACU to put into perspective the interplay of these two sources of capital flows. The common shocks to *e4*, the error term of *lcbpr*, generated some moderate increases in the forecast error of *lcbpr*, which later declined slightly. By implication,

a well coordinated monetary policy rate that minimizes shocks has the prospect of generating minimal variance in FPI. The role of BMG is also found to be crucial in minimizing the forecast error in fpi as it is found to exert a decreasing effect on fpi due to the common shocks to its error term e5. A more efficient bmg with minimal shocks will tend to stimulate FPI in SACU. Furthermore, it can be observed from the common shocks graph that the shocks to e2 of fpi have a large variance in fdi, while their own error term shocks e3 worsen the forecast error. Existing investors may downsize investments or relocate to economies that have the right macroeconomic fundamentals that will minimize risk and stimulate returns on investments. Nevertheless, the common shocks to e4 of lcbpr and e5 of BMG enhanced the performance of FDI as they tend to generate areas of decreasing forecast error in FDI. This study, therefore, demonstrates the indispensability of monetary policy in the management of capital flows for the Southern African Customs Union.

The study also found that the common shocks to e2 of fpi resulted in increased variance in lcbpr over time, though with a slight decline from around the eighth to the tenth period. The implication is that an economy that is characterized by incessant shocks to the fpi may tend to undermine the effectiveness of the policy rate. However, the common shocks to e3 of fdi performed better on the variance in lcbpr. It decreased the lcbpr forecast error over time and became stable around the 0.0 line in part of the ninth and tenth periods. The government should take it as a necessity to minimize the shocks to fdi, as it will tend to promote the efficiency of the policy rate. Subsequently, while the common shocks to e4 of lcbpr worsen the forecast error in lcbpr, that of e5, the error term of bmg, decreases the forecast error in lcbpr over time. The minimization of noise in BMG is a significant benefit to the effectiveness of SACU's monetary policy rate. Broad money growth, therefore, must be soundly determined by the respective apex banks with the aim of minimizing shocks to it as it tends to enhance the effectiveness of the policy rate.

Also, the shocks to e2 of fpi and e3 of fdi tend to decrease the variance in bmg in some periods. This is an indication that the monetary policy formulation of broad money growth should take into consideration the common shocks to these capital flow components as well as ensure that the common shocks to the capital flows are minimized. The common shocks to the error terms of the monetary policy tools of lcbpr and bmg are found to generate minimal variations in bmg. The impact of the BMG on the economy will thus have a pronounced effect by minimizing the shocks on the error terms of the policy rate and that of the BMG.

Some similar outcomes in the idiosyncratic shocks and the composite shocks with respect to the common shocks were noted. For example, the idiosyncratic and composite shocks to e_2 of fpi had an increasing but then decreasing effect on the variance of $lgdpc$, while it begins to decline immediately in the case of the common shocks. On average, any shock in fpi is very key to the economic growth of SACU. However, the shocks to e_3 of fdi across the three categories exert a decreasing effect on the variance of $lgdpc$ over time. The probability of having minimal swings in $lgdpc$ will be high if the relevant authorities in SACU provide an enabling environment that will promote FDI and greatly reduce the incidence of sudden stops in FDI investments. Also, the respective shocks to e_4 exert minimal forecast error in $lgdpc$ over time. This is an indication that a policy rate set with the right precision will tend to minimize the variance in $lgdpc$. Similarly, the respective categories of shocks to e_5 resulted in the gradual reduction of variance in $lgdpc$ over time. The previous conclusion on e_4 of $lcbpr$ also holds in the case of BMG.

Observing the idiosyncratic and composite shocks showed that the shocks to e_2 of fpi tend to produce increased variance in fpi . This is an indication of the volatile nature of fpi as investors can swiftly redirect resources to economies having a higher prospect of returns on investments. However, the reverse is the case with regards to the respective shocks to e_3 of fdi . The forecast error in fpi declined over time across the three categories. This implies that there are some measures of symbiotic relation between fdi and fpi . Appropriate and sound macroeconomic environment that minimizes shocks to FDI will tend to stimulate FPI. Subsequently, the variance in fpi had some periods of rise and decline due to the respective shocks to e_4 (the error term of $lcbpr$). The variance is most minimal in the case of common shocks compared to idiosyncratic and composite shocks. The three categories of shocks on e_5 , the error term of $bmng$, resulted in a fpi that tends to decrease in variance over time. The money supply tool is therefore crucial in fixing it appropriately and in the right sectors of the economy that will enhance the flow of fpi into the economy. In another respect, the shocks to e_1 of $lgdpc$ resulted in some increases and decreases in the variance of fdi over time. Such a mixed effect signals why FDI flows have not sustainably promoted economic growth and, consequently, living standards in the Southern African Customs Union.

The respective shocks to e_2 of FPI also caused episodes of a rise and decline in FDI. This further reinforces the earlier decision on the symbioticity of the two capital flow components. The economies may be undermined by either of the two if any of them is not appropriately

managed. However, it is noteworthy that the respective shocks to e_3 of FDI result in increased forecast error in FDI over time. Similar variance may be linked to the problem of sudden stops and other gradual dis-investment. Contrary to the outcome in the case of common shocks, the idiosyncratic and composite shocks to e_4 of lcbpr caused a decline over time in FDI. These two categories of shocks have similar outcomes on fdi and minimize the forecast error in fdi. Therefore, they are very crucial for policy formulation in terms of the central bank policy rate.

Across the three categories of shocks to e_5 of BMG, the forecast errors in fdi have some periods of increases as well as decreases. This combination of outcomes suggests that the policy design on money supply should be fine-tuned in order to stabilize the Fdi. Similarly, lcbpr had periods of increases and periods of decreases emanating from the respective shocks to e_1 of lgdpc. Erratic fluctuations in economic activities may tend to undermine the effectiveness of the monetary policy rate. The performance of lcbpr arising from the idiosyncratic and composite shocks to e_2 of fpi appears somehow more unstable compared to the case of common shocks. It, therefore, implies that the monetary authorities should take into consideration the various shocks in an economy that influence FPI in order to ascertain why the monetary policy rate has not been soundly effective. Lcbpr seems to perform better from the respective shocks to the error term e_3 of fdi because, in most periods, the variance in lcbpr seems to be decreasing. Appropriate measures that minimize the shocks to e_3 will tend to promote the effectiveness of the monetary policy rate.

Furthermore, the idiosyncratic and composite shocks to e_4 , the error term of lcbpr, generated some fluctuations in the forecast error of lcbpr. Therefore, formulating a monetary policy rate is not sufficient. The underlining macroeconomic conditions that tend to transmit shocks to the policy rate must be given due consideration. Moreover, the variance in lcbpr declines majorly because of the respective shocks to e_5 of bmg. The monetary policy rate should therefore be maintained by minimizing constraints on the money supply. Observing the variance in bmg on the ground of the shocks to e_1 of lgdpc shows that the idiosyncratic and composite shocks produced more variance in bmg compared to common shocks. The factors constituting the composite and idiosyncratic shocks that produced more forecast errors in BMG need to be ascertained and appropriately controlled in order to enhance the effectiveness of BMG on the economy. In a similar vein, the forecast error in bmg on the ground of the shocks to e_2 of fpi is higher in the context of idiosyncratic and composite shocks than in that of common shocks. The inflows and outflows of FPI will invariably influence the prevailing liquidity in the

economy. Disinvestment or downsizing due to poor economic signals will invariably influence the liquidity in the system. Furthermore, it was found from the results that the various shocks to e_3 of fdi produced a few fluctuations in the forecast error of BMG. This implies that the fixation of money supply must put into perspective the possible influences on FDI that can undermine the effectiveness of money supply on the economy. Such factors which can impact the money supply can be through instances such as the borrowing of money from the eurocurrency market in order to sideline the prevailing policies on borrowing in the domestic economy. The patronage of the eurocurrency market can therefore reduce the effectiveness of the effect of money supply by the monetary authorities. However, the various shocks to lcbpr seem to exert minimal variance in bmg. It therefore signals the minimization or elimination of weak factors for the lcbpr towards promoting the effectiveness of the money supply. Finally, while common shocks to e_5 , the error term of bmg, result in a minimal forecast error in bmg, those of idiosyncratic and composite shocks produce more variance in bmg. It becomes crucial to identify the underlining factors that constitute these shocks as well as nip them in the bud in order to promote the effectiveness of the money supply.

Examining the impulse response graphs shows that the reactions of lgdpc to the respective shocks to e_2 of fpi produced some fluctuations in lgdpc. The fluctuations in lgdpc streaming from the various shocks to e_2 can be linked to the volatile nature of fpi. Subsequently, the response of lgdpc to the respective shocks to e_3 of FDI also produced swings over time, which consequently implies that FDI to SACU has produced instability in lgdpc over time. The shocks to the error terms of the two variables, fpi and fdi, therefore exert pronounced effects on the response of output and living standards for SACU.

In another respect, while lgdpc responded by fluctuating around the steady state due to the common shocks to e_4 , it nevertheless had some decline to the steady state in the case of the idiosyncratic and composite shocks. Summarising, this shows that shocks to lcbpr declines output and undermine living standards. Such a feedback effect of the shocks to e_4 of lcbpr on lgdpc may be due to unhealthy practices in the financial market that minimize the expected effect of the monetary policy rate on the economy. In another regard, it appears that there are some volatile responses in lgdpc as a result of the respective shocks to e_5 of bmg. The money supply, from the quantitative theory of money, has a profound relationship with output. If the velocity of money is constant as well as the price level, fluctuations in money supply are

expected to generate some responses in output. Therefore, the shocks to the error term of bmg will have a pronounced effect on output and, consequently, living standards.

The idiosyncratic, common, and composite shocks to e_1 of lgdp caused some areas of negative responses in fpi. Existing investors and prospective ones may be very sensitive to the output growth of the economy as a signal to measure the level of economic activities and the aggregate demand prevailing at any time. Therefore, any unexpected shock to the error term of lgdp will have a pronounced effect on fpi. The respective shocks to e_2 of fpi also produced fluctuating responses in fpi. Fpi flows to financial products may depend on the soundness and strength of the financial market, which is unconnected to the soundness of the monetary policy of the apex banks. As a result, shocks to e_2 from any of the factors influencing fpi will have a large impact on the responses of fpi in the Southern African Customs Union. Subsequently, the various shocks to e_3 of fdi resulted in some fluctuations over time in fpi. This can be related to the previous explanation in the case of variance decomposition, where I attributed such a relationship to the symbioticness of the two variables.

The impulse response of fpi to the various shocks in the error term e_4 of lcbpr showed that fpi fluctuated over time around the steady state. Aside from other factors such as the pull and push factors, any unwarranted forces influencing lcbpr will have feedback on the responses of FPI in the Southern African Customs Union. In another respect, the various shocks to e_5 , the error term of bmg, resulted in some fluctuating responses, mostly around the steady state. The foregoing gives credence to the core impact of monetary policy on the responses of fpi in the Southern African Customs Union.

It was also observed that the respective shocks to e_1 of lgdp resulted in the fluctuating responses of fdi in the negative quadrant. By implication, unpleasant forces on lgdp will tend to negatively affect fdi in the region. Subsequently, the various shocks to e_2 of FPI resulted in some fluctuating responses in fdi. Also, the three categories of shocks to e_3 of fdi resulted in some unstable responses in fdi. The preceding explanation applies in the case of common shocks. The next reaction of fdi stemmed from the respective shocks to e_4 , the error term of lcbpr. It shows some fluctuations of fdi around the steady state. The stability of the fdi is therefore unconnected to the soundness of the monetary policy rate, which is adequately and robustly determined. Moreover, the shocks from the three categories to e_5 , the error term of bmg, describe the impulse response of fdi as having some fluctuations over time. The stability of the fdi therefore implies the minimization of these shocks.

Furthermore, examining the impulse response of lcbpr provided information that it responded throughout the negative quadrant on the ground of the three instances of shocks. By implication, the shocks to e1 of the lgdpc produced negative responses in lcbpr. Such a negative response in the lcbpr therefore undermines the effectiveness of the monetary policy rate. The respective shocks to e2 of fpi were also found to produce some fluctuating response in lcbpr, mostly around the steady state. This implies that an effort should be made to minimize unwarranted circumstances for FPI and should be sustained in order to increase the effectiveness of the policy rate. Observing the impulse response of lcbpr to the respective shocks to e3 of fdi shows that lcbpr responded in some negative and positive areas. In this regard, a similar conclusion can be reached regarding fpi. The respective shocks to e4 of lcbpr also produced some fluctuations in lcbpr. Such fluctuations can negatively influence investment decisions by existing and prospective investors, which invariably influence the magnitude of capital flows into the respective economies of SACU. Also, the respective shocks to the error term of bmg exert some fluctuations in lcbpr. These two are monetary policy variables whose deteriorating effects on one will likely influence the other.

The final consideration is the observation of the impulse response of BMG to the respective shocks. The graphs show that BMG had some fluctuations across the three cases due to the respective shocks to e1 of lgdpc. The earlier conclusion, in which an explanation was provided via the quantity theory of money, can also suffice in this instance. Subsequently, the respective shocks to e2 of fpi provided some fluctuating responses in bmg. Previous information on such a pattern of results can also be applicable in this context. The impulse response graphs also show that the shocks from the different directions to e3 of FDI produced some fluctuating responses in BMG. Moreover, the three categories of shocks to e4 of lcbpr resulted in some fluctuating responses in bmg, further providing evidence of the interlinkage of these two variables. Structural factors in the economy that undermine the monetary policy rate will likely have feedback on the money supply (bmg). Finally, the three types of shocks to e5, the error term of bmg, resulted in some fluctuations in bmg over time. To a large extent, the effectiveness of the money supply (bmg) on the economy will require the removal of constraints that generate shocks in the financial market and the economy at large.

5.17.14. Conclusion

The empirical findings in this study provide information on the necessity of the authorities in the Southern African Customs Union to design a robust macroeconomic blueprint that will

enhance the effectiveness of monetary policy, promote capital flows, and stimulate living standards.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter brings the study to the summit as it summarizes and provides policy recommendations. It is divided into five parts. section 6.1 summarizes the study, while section 6.2 displays relevant conclusions from the study. Policy recommendations and contribution to knowledge are expressed in sections 6.3 and 6.4 while limitations and suggestions for future areas of research are contained in section 6.5 and 6.6 respectively.

6.1 Summary

The subject of capital flows is an integral global topic, including the Southern African Customs Union. SACU is a century-old market founded in 1910, with major trading partners including the world's leading economies, such as the United States and China. The region, over the years, has been experiencing an influx of capital flows in varying degrees, which has not really translated into substantial growth and development. Evidence was found from the study in the context of the cross-sectional dependence corrected model of FDI generating a negatively significant effect on the region's living standards in the short-run, while FDI negatively and significantly affected living standards in the non-crossectionally corrected model provided monetary sector credit to the private sector and the real exchange rate variables are excluded. This shows the sensitivity of the panel ARDL model to including variables. However, in either instance, FPI is not statistically significant. The statistical significance of foreign direct investment calls for authorities in SACU to formulate appropriate policies towards its enhancement and sustainability. Foreign direct investment, which could be either green-field or brown-field, should be supported by other domestic measures like local content policy and disconcentration of flows from extractive to manufacturing activities. The probability of increased employment, productivity, and improved living standards will thus be high.

The results of the study have shown the significance of monetary policy as an invaluable tool in the management of capital flows in the Southern African Customs Union. Evidence across the various analyses produced by the central bank's policy rate differential was found to be statistically significant and negatively impacting on the log of GDP per capita. This is an indication that the differential in interest rates, on average, has not been promoting living standards in the region. Similar outcomes were also obtained in the instances where the central

bank policy rate was used. However, the model that included variables of $lreer$ and $lmscp$ resulted in a $cbpd$ that is characterized by a positive but insignificant effect in the short run, while it is significantly negative in the long run. The $xtdcce2-cce$ produced a positive effect of $cbpd$ in the short run, which implies that an increase in the policy rate differential stimulates $lgdpc$ in the short run. In both the $xtpmg$ and $xtdcce2-cce$ models, the use of $cbpr$ produced a short-run positive but insignificant effect on $lgdpc$ in both models, while it was negatively significant in the long run in the PMG but insignificant in the $xtdcce2-cce$ model. The behavioural effects of $cbpd$ and $cbpr$ indicate their importance in influencing capital flows and output in the Southern African Customs Union. It therefore becomes pertinent for the monetary authorities, such as the South African Reserve Banks within the CMA and the Bank of Botswana, to embark on the effective management of monetary policy rates alongside other monetary policy tools towards stimulating capital flows and promoting the sustainability of growth in the region.

The study also examined the dynamic relationship with an emphasis on per capita GDP growth rate within the context of the PMG and the $xtdcce2-cce$. The findings on the basis of the PMG show that while FDI decreases the per capita GDP growth rate, FPI increases it. Moreover, while broad money growth was found to positively affect per capita growth rate in a particular set of variables, in the context of the $xtdcce2-cce$, both broad money growth (with a positive effect) and gross capital formation growth rate (with a negative effect) affected GDPCR in another instance.

6.2 Conclusions

The study empirically examined the nexus between capital flows, monetary policy, and economic growth in the Southern African Customs Union with a view to ascertaining how to improve capital inflows through the use of appropriate monetary policy measures in order to stimulate GDP per capita and consequently promote living standards in the region. The panel unit root test analyzed by the LLC and IPS produced combinations of series that are integrated of $I(0)$ and $I(1)$, which implies that the problem of higher order of integration was not present in the data set. The data set does not exhibit the problem of multicollinearity, which was also consistent with the matrix of correlations. However, while the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity shows the absence of heteroscedasticity, the White test, however, shows the presence of heteroscedasticity. This justifies the use of feasible generalized least squares, which takes into account cross-sectional dependence issues, serial correlation, and

heterogeneity in panel data. The PCSE model was also utilized in order to correct the model for the presence of serial correlation. The dynamic relationship of capital flows, monetary policy and economic growth was examined by the panel ARDL with the pooled mean group as the best estimator, among others, such as the mean group and the dynamic fixed effect ascertained through the hausman test. The error correction term from the pooled mean group estimate is highly significant. This gives credence to the long-run stability of the parameter estimates within the Southern African Customs Union.

However, while the Breusch-Pagan LM test as well as the adjusted LM test show no evidence of cross-sectional dependence for all the variables, they do, however, show the problem of cross-sectional dependence in the set of variables analyzed for the panel ARDL. This warranted the use of the `xtdcce2-cce` model, which has the capacity to internalize the cross-sectional dependence among the units that constitute the study. The problem of cross-sectional dependence was observed in the data set by the Breusch-Pagan LM test of independence and the `xtcdf` test of cross-dependence. The cross-sectional dependence can be attributed to the high degree of association among the countries that constitute SACU, especially in the Common Monetary Area, in which South Africa exercises discretionary monetary policy. The pooled mean group estimates are therefore appropriate given the depth of interdependence among the countries. Nevertheless, in order to account for the cross-sectional dependence, the study utilized the `xtdcce2-cce` model of Ditzén (2016).

The causality test was examined through the `xtgcause` command in line with the methods of Dumitrescu and Hurlin (2012) for analyzing causality in panel data, which is built to automatically select lag length among the variables being tested for Granger causality. The significance of using the `xtgcause` command to test for Granger causality is that it allows the computation of the bootstrap p-value. Utilizing bootstrap is essential in the presence of cross-sectional dependence.

Moreover, the panel threshold was conducted to ascertain the optimal level of capital flows and monetary policy with respect to GDP per capita for the Southern African Customs Union. The fixed effect panel threshold model of Hansen (1999) was used for the test. The `xthreg` command proposed by Wang (2015) was used to implement the threshold which accommodates bootstrapping.

Furthermore, the study examined the economic growth effects of capital flows and monetary policy through the Panel Structural Vector Auto Regression of Pedroni (2013). The methodology provided an avenue to capture the effect of common shocks, idiosyncratic shocks, and composite shocks with respect to impulse response and variance decomposition.

The analysis of the dynamic relationship between capital flows, monetary policy and economic growth by the selected model of the pooled mean group gives credence to the homogeneity existing among the countries that constitute SACU. The results show the monetary variables of broad money growth (bmg) and the central bank policy rate differential to be highly significant at the one percent level in influencing living standards in the region. The study therefore concludes that broad money growth and central bank policy rate differentials are very key in the monetary policy management process of the monetary authorities in the region. The capital flows variables of fpi and fdi show the relative significance of the two. While fdi is negative and statistically significant at one percent in the long-run, fpi is significant at 10 percent. As a result, the study concludes that FDI into SACU, rather than promoting citizen welfare, reduces it. Though fpi increases the living standards in the region, a lower p-value is needed to claim this. The significance of the error correction term at the one per cent level produced the evidence of joint causality of all the explanatory variables in the long run. The study therefore concludes in this regard that with the right policy mix and direction in respect of fpi, fdi, bmg, and inf and the fixing of the central bank policy rate that is consistent in producing the differential that is optimal, there will be a pronounced effect on the GDP per capita in the long run. Other variants of the analysis support the significance of the monetary policy variables. For instance, cbpd, bmg, cbpr, and inf are of crucial consideration.

Other findings from the study include the determination of thresholds for capital flows and monetary policy. It was concluded from the results that the optimal level of central bank policy rate differential that drives foreign direct investment occurs below the threshold of 10.1600 and was found to be statistically significant at the one percent level. Below this threshold, a unit increase in cbpd increases fdi by 0.32. FPI has a non-linear relationship with lgdpc and is found to be optimal at the threshold of 0.0087 at which it exerts a positive impact on lgdpc. Broad money growth and foreign direct investment exhibit a non-linear relationship with the optimality of bmg at the threshold of -14.4359, thus exerting a positive effect on foreign direct investment.

Relevant conclusions are also observed from the panel causality test. For instance, the monetary variables BMG and CBPD were found to have no causal relationship with both foreign portfolio investment and foreign direct investment. However, there is a one-way causality from FDI to *lreer*, whereas inflation causes foreign portfolio investment. The foregoing pattern of causality between capital flows and the monetary policy variables signals a redesign of monetary policy to substantially promote capital flows.

However, a unidirectional relationship, respectively, running from FDI and FPI to *lgdpc*, was established in the study. The implication is that foreign portfolio investment and foreign direct investment of the appropriate magnitude and sectoral direction will tend to influence the living standards of the citizens. In either direction, BMG and *lgdpc* do not cause each other, while *lgdpc* is found to cause *cbpd* but not otherwise. Also, no causality runs in either direction between the monetary policy rate and the variables of FPI, FDI, and *lgdpc*. It therefore suffices that the real sector and the monetary system need to be harmonized by the optimal determination of policy rates and ensuring monetary transmission through an appropriate and effective channel.

The study further excluded the central bank policy rate differential and used the central bank policy rate, *lreer*, and the log of the globalization index. Given this arrangement, the pooled mean group was selected by the hausman test over the mean group and the dynamic fixed effect, which also confirms the long run homogeneity existing among the countries that constitute SACU. The region is therefore appropriate to continue as a union.

Relevant conclusions in this regard include that FDI still remained negatively significant while FPI remained positively insignificant. The results also show that the monetary policy variables are very key in the region considering their long-run statistical significance. While the period lag of broad money growth increases *lgdpc*, *cbpr* decreases it. The other variables in the long-run, the log of the globalization index and a period lag of the log of the real exchange rate, are highly significant at the one percent level and have a positive impact on *lgdpc*. These two variables must therefore be sustained. It was observed from the results that while *cbpd* is statistically significant in the short run in the previous model, *cbpr* is insignificant in the short run in the current model. It is therefore concluded that emphasis should be placed on the central bank policy rate differential that has both a short-run and long-run impact. The significance of the inflation rate in the current model, which increases *lgdpc* in the short run, signals the need for monetary policy measures that stabilize it.

Moreover, the study re-examined the panel ARDL with an emphasis on the per capita GDP growth rate. The PMG estimates show that the major components of capital flows (FPI and FDI) do not affect the per capita GDP growth rate similarly. Specifically, while FPI significantly promote per capita GDP growth rate, that of FDI decreases it. The extent to which capital flows have a desirable impact on the per capita GDP growth rate will be determined in large part by the direction, adaptability, and possibly the extent of local content of foreign investment in the respective Southern African Customs Union economies.

The comparative conclusion from the panel threshold shows that while $cbpd$ exhibits a linear relationship with respect to fdi , $cbpr$ exhibits a non-linear relationship with respect to fdi in the context of the added variables of $lgin$ and $lreer$. At $cbpd$ that falls below the threshold, $cbpd$ increases fdi , while $cbpr$ reduces fdi at the first and second threshold, though significant.

The analysis of the Panel Structural VAR provided more evidence for the study. For instance, the common shocks to the error terms of fpi , fdi , $lcbpr$, and bmg all exert decreasing outcomes of the variance in $lgdpc$. It was found from the Panel Structural VAR that the role of money supply (bmg) is crucial in the minimization of the forecast error in fpi on the basis that it exerts a decreasing effect in fpi due to the common shocks to its error term. The common shocks to $e4$, the error terms of $lcbpr$ and $e5$, and the bmg were discovered to improve fdi performance because they tend to generate areas of decreasing forecast error in fdi . This study therefore establishes the indispensability of monetary policy in the management of capital flows for the Southern African Customs Union (SACU). It is also evident from the study that $lcbpr$, the log of central bank policy rate, seems to perform better from the respective shocks to the error term $e3$ of fdi because in most periods the variance in $lcbpr$ seems to be decreasing.

In the final analysis, it becomes expedient to state that the macroeconomic stability of an economy or a region is unconnected to the soundness and choice of monetary policies, which invariably influence the level of domestic investment and the attractiveness of foreign investors in the domestic economy, among other factors. This study took inventory of the static and dynamic effects of monetary policy as well as the various types of capital flows as they affect the living standards of the citizens of SACU. It is very crucial that economies in the global north, such as those in the Southern African Customs Union, reposition their economies from being highly concentrated in extractive activities to a system that is adequately industrialized and driven by modern technology. As a result, shifting capital flows into more manufacturing activities relative to those in the primary sector will have a positive effect on the economy. The

economies in SACU will thus be scaled up through intensive diversification, increased employment, productivity expansion, and improvement in the quality of life and living standards of the citizens.

6.3 Policy recommendations

The study has empirically examined the nexus between capital flows, monetary policy and economic growth in the Southern African Customs Union by using various econometric approaches. Based on the findings of the study, the following lines of policy are recommended.

Firstly, the differential in the central bank policy rate that is highly significant is an indication that the neoclassical theory, which requires that capital flows to regions of high returns, is a valid proposition. Nevertheless, an increase in the differential lowers economic growth and living standards in the Southern African Customs Union. This is an indication that the higher differential is not enough to have a direct impact on the domestic economy. It is therefore recommended that the governments, through the monetary authorities, embark on an effective policy mix alongside the monetary policy rate that will direct capital flows to growth and development-enhancing projects. In this regard, the government should motivate foreign investors to prioritise green-field or brown-field investment over more volatile foreign portfolio assets that significantly employ citizens from the domestic economy.

Furthermore, the study found a period lag of broad money growth exerting a significant positive impact on a period lag of the log of GDP per capita. The respective monetary authorities across SACU should ensure broad money growth that eases the condition of credit in the system towards stimulating a high level of economic activity, which will result in a higher level of employment, production, and living standards.

A comparison of fdi and fpi reveals that fdi has a negative impact on lgdp, while fpi has a positive impact, but only by 10%. The set of economies in this study is developing, which are largely concentrated in extractive activities. Foreign direct investment flows mostly to extractive industries in the host region, which enriches and stimulates industrial activities in the developed economies, which in the long run will dampen economic growth in the developing economies. It is therefore recommended that this direction be changed. The region can embark on an import substitution approach such that industrial goods that were previously imported are now being produced in the economy. The government can also stimulate the scale

of industrial activities through various business combinations in the economy, such as vertical integration, horizontal integration, and conglomerates, with an adequate macroeconomic environment and lower cost of production. This could take the form of social overhead capital sufficiently provided by the government in order to minimize the overhead cost of private sector industrial activities. Such a provision of resources can be supported with a minimum tax and the provision of subsidies, all with the goal of ensuring that the influx of capital flows results in the diversification of the domestic economy, thus increasing economic growth and promoting living standards.

Another line of recommendation is on the joint causality of monetary policy variables and capital flows on long-run economic growth in the Southern African Customs Union. Policy prescription suggests that adequate measures be put in place to ensure that long-run co-movement does not deviate due to inconsistency in government macroeconomic policies. A sound and well-integrated macroeconomic blueprint that specifies sound and effective monetary policy structures as well as internalizes the behavioural structures of capital flows should be built for sustainability and consistency.

The empirical analysis examined the impact of some of the main macroeconomic variables on the per capita GDP growth rate in the region. Based on the varied outcomes of capital flows (FPI and FDI) on per capita GDP growth rate, it is recommended that the respective authorities in the region appraise the direction, the depth, and the domestic policy regulation of foreign investment in the respective economies in order to generate the desirable impact of capital flows in the system. The study established the sensitivity of the model when certain adjustments were made. The monetary authorities are, in this regard, advised to carefully consider the choice of monetary variables with a minimum trade-off of policy conflict in order to achieve a desirable macroeconomic impact on the respective economies of the Southern African Customs Union.

Moreover, it is recommended that the central bank's policy rate differential be set below the threshold of 10.1600. A unit increase below this threshold is found to promote foreign direct investment into the Southern African Customs Union. However, the threshold of broad money growth (bm_g) is -14.4359, at which it exerts a positive effect on foreign direct investment. Another point to consider is the statistical significance and positive impact of the log of the globalization index and the period lag of the log of the real exchange rate. The study, therefore, prescribes that the three dimensions of the globalization index that encompass economic,

social, and political integration should be improved and sustained in order to achieve higher growth and the soundness of the economic life of the citizens. Also, a unit increase in the real exchange rate, which increases $lgdpc$, can be linked to the inelastic nature of commodities exported by SACU. The study recommends that the prices of those commodities be increased for greater returns to the Southern African Customs Union. The study further recommends that emphasis should be placed on the central bank policy rate differential rather than the central bank policy rate. This becomes a key consideration as $cbpd$ below the threshold of 10.1600 increases fdi , while the central bank policy rate negatively impacts fdi at the first and second thresholds.

It was observed in the study, among other findings, that foreign portfolio investment and foreign direct investment cause gross domestic product per capita. Also, the globalization index, while it does not cause foreign portfolio investment, does cause foreign direct investment. It is therefore recommended that the macroeconomic conditions in the respective economies be substantially improved in order to attract foreign direct investment in the form of green-field or brown-field investment. The social, economic, and political conditions should be strengthened. Undesirable practices such as corruption and other structural rigidities should be eliminated, while effort should be geared towards the design of investment-friendly fiscal and monetary policies.

Finally, based on the Panel Structural VAR, appropriate measures that minimize the shocks to the error term of fdi should be implemented in order to promote the effectiveness of the monetary policy rate. Also, the monetary policy formulation of broad money growth should take into consideration the common shocks to the error term of fpi and that of fdi , as well as designed measures that ensure that the respective common shocks are minimized.

6.4 Contribution to knowledge.

The study examined the nexus of capital flows, monetary policy, and economic growth in the Southern African Customs Union. The study provided more information on the role of monetary policy in the management of capital flows. In most instances, the use of the central bank policy rate differential ($cbpd$) and the central bank policy rate ($cbpr$) resulted in similar effects on the gross domestic product per capita. By implication, the study contributes to knowledge by providing evidence that the differential in interest rates, though consistent with the neoclassical theory, is not sufficient as the central bank policy rate tends to have a similar

impact on GDP per capita. Moreover, the analysis of capital flows, monetary policy, and economic growth given the strong monetary policy coordination of South Africa is of relevance to SACU and the academia given the limited study in this context. Finally, the study provided a macroeconomic model that will generate capital flows for the Southern African Customs Union towards promoting sustainable economic growth and development for the region.

6.5 Limitations of the study

The study is restricted to the five countries that constitute the Southern African Customs Union. It, therefore, implies that the scope cannot be extended. The use of a large array of countries could significantly impact the results of the study.

6.6 Suggestions for further studies

Researchers can empirically analyze the nexus of capital flows, monetary policy, and economic growth by examining instances of unions having more countries, such as the Southern African Development Community (SADC), European Union (EU), and Economic Community of West African States (ECOWAS).

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Appendices

A. Descriptive Statistics

```
. sum lgdp pc fpi fdi lgin lreer linr lfda lmscp inf cbpd bmg gcfg, detail
```

LGDP				
	Percentiles	Smallest		
1%	2.582279	2.544143		
5%	2.667272	2.582279		
10%	2.901373	2.606593	Obs	150
25%	3.194168	2.608104	Sum of Wgt.	150
50%	3.505859		Mean	3.419425
		Largest	Std. Dev.	.3510372
75%	3.705311	3.897255		
90%	3.80642	3.900985	Variance	.1232271
95%	3.865022	3.903492	Skewness	-.8112029
99%	3.903492	3.91801	Kurtosis	2.844072
FPI				
	Percentiles	Smallest		
1%	-.0943073	-.0971621		
5%	-.0438261	-.0943073		
10%	-.030598	-.0722556	Obs	150
25%	-.0046584	-.0635724	Sum of Wgt.	150
50%	0		Mean	.0096628
		Largest	Std. Dev.	.0435419
75%	.0136724	.1320084		
90%	.0699254	.1436315	Variance	.0018959
95%	.1204056	.1467246	Skewness	1.370576
99%	.1467246	.1689095	Kurtosis	5.867789
FDI				
	Percentiles	Smallest		
1%	-2.738912	-6.89768		
5%	-.2082659	-2.738912		
10%	.2873784	-1.442685	Obs	150
25%	.9940205	-1.427064	Sum of Wgt.	150
50%	2.230034		Mean	2.702213
		Largest	Std. Dev.	2.572367
75%	3.881199	8.83219		
90%	6.479566	9.394326	Variance	6.617072
95%	7.665576	9.684826	Skewness	.4863146
99%	9.684826	10.91159	Kurtosis	4.420804

LGIN

	Percentiles	Smallest		
1%	1.549875	1.545386		
5%	1.587425	1.549875		
10%	1.596894	1.556969	Obs	150
25%	1.636226	1.569584	Sum of Wgt.	150
50%	1.6865		Mean	1.693073
		Largest	Std. Dev.	.0778094
75%	1.75392	1.849148		
90%	1.80995	1.849173	Variance	.0060543
95%	1.846518	1.849995	Skewness	.345016
99%	1.849995	1.851258	Kurtosis	2.268674

LREER

	Percentiles	Smallest		
1%	1.829184	1.78395		
5%	1.905981	1.829184		
10%	1.934486	1.855076	Obs	150
25%	1.963882	1.880822	Sum of Wgt.	150
50%	1.996193		Mean	1.993021
		Largest	Std. Dev.	.0522949
75%	2.027384	2.102391		
90%	2.052784	2.106285	Variance	.0027348
95%	2.063714	2.119933	Skewness	-.5270457
99%	2.119933	2.123956	Kurtosis	4.659861

LINR

	Percentiles	Smallest		
1%	.9270957	.8782427		
5%	1.116391	.9270957		
10%	1.184212	.9619483	Obs	150
25%	1.663918	.9957179	Sum of Wgt.	150
50%	1.930846		Mean	2.054771
		Largest	Std. Dev.	.6211037
75%	2.694703	3.035862		
90%	2.941438	3.049737	Variance	.3857698
95%	3.009592	3.054133	Skewness	.0675204
99%	3.054133	3.063867	Kurtosis	1.886464

LFDA

	Percentiles	Smallest		
1%	7.34084	7.118265		
5%	7.464639	7.34084		
10%	7.571009	7.34557	Obs	150
25%	7.872564	7.447933	Sum of Wgt.	150
50%	8.115274		Mean	8.15249
		Largest	Std. Dev.	.4330035
75%	8.402158	9.071985		
90%	8.846246	9.112384	Variance	.187492
95%	9.027688	9.145187	Skewness	.4033803
99%	9.145187	9.15237	Kurtosis	2.846863

LMSCP

	Percentiles	Smallest		
1%	.7283359	.720652		
5%	.9909426	.7283359		
10%	1.088711	.8593258	Obs	150
25%	1.210633	.8669253	Sum of Wgt.	150
50%	1.330583		Mean	1.424638
		Largest	Std. Dev.	.2871582
75%	1.705824	1.871763		
90%	1.82244	1.872729	Variance	.0824598
95%	1.834067	1.88473	Skewness	-.0532919
99%	1.88473	1.89374	Kurtosis	1.996401

INF

	Percentiles	Smallest		
1%	-.6920301	-9.616154		
5%	3.062032	-.6920301		
10%	3.453431	2.062852	Obs	150
25%	5.181082	2.281946	Sum of Wgt.	150
50%	7.014937		Mean	7.725164
		Largest	Std. Dev.	4.328724
75%	9.494707	17.29745		
90%	12.47303	18.10037	Variance	18.73785
95%	14.32098	21.55252	Skewness	1.493299
99%	21.55252	33.81258	Kurtosis	12.46222

CBPD

	Percentiles	Smallest		
1%	1.71	1.42		
5%	2.75	1.71		
10%	4.25	1.75	Obs	150
25%	5	1.75	Sum of Wgt.	150
50%	8.21		Mean	8.069933
		Largest	Std. Dev.	3.437665
75%	10.75	14.5		
90%	12.96	14.5	Variance	11.81754
95%	14	15	Skewness	.1391217
99%	15	15.44	Kurtosis	2.127875

BMG

	Percentiles	Smallest		
1%	-13.98581	-14.43592		
5%	.5972701	-13.98581		
10%	3.121273	-6.606884	Obs	150
25%	6.390409	-5.144148	Sum of Wgt.	150
50%	11.7701		Mean	13.34758
		Largest	Std. Dev.	11.28582
75%	18.31603	41.56764		
90%	25.30493	46.57018	Variance	127.3698
95%	30.9308	59.59443	Skewness	1.585306
99%	59.59443	72.39275	Kurtosis	9.11556

GCFg

Percentiles		Smallest		
1%	-26.84052	-29.68453		
5%	-12.63929	-26.84052		
10%	-9.131691	-25.21162	Obs	150
25%	-3.512189	-23.92719	Sum of Wgt.	150
50%	2.863664		Mean	5.201384
		Largest	Std. Dev.	14.86937
75%	11.09576	38.04062		
90%	26.66091	42.04408	Variance	221.0981
95%	35.57808	51.83914	Skewness	1.065847
99%	51.83914	71.0425	Kurtosis	5.491822

B. Correlation Matrix

```
. pwcorr lgdpdc fpi fdi lgin lreer linr lfda lmscp inf cbpd bmg gcfg, star(0.05) sig
```

	lgdpdc	fpi	fdi	lgin	lreer	linr	lfda	
lgdpdc	1.0000							
fpi	0.0485 0.5556	1.0000						
fdi	-0.1624* 0.0471	0.3780* 0.0000	1.0000					
lgin	0.6301* 0.0000	0.0241 0.7695	0.0338 0.6817	1.0000				
lreer	0.4603* 0.0000	0.0217 0.7919	-0.2867* 0.0004	0.0301 0.7145	1.0000			
linr	-0.3542* 0.0000	-0.4522* 0.0000	-0.1379 0.0925	0.1595 0.0512	-0.1214 0.1388	1.0000		
lfda	0.3775* 0.0000	-0.2154* 0.0081	-0.1660* 0.0423	0.6424* 0.0000	0.1605* 0.0497	0.3751* 0.0000	1.0000	
lmscp	0.6024* 0.0000	0.0114 0.8902	-0.0213 0.7960	0.6464* 0.0000	0.3002* 0.0002	-0.0351 0.6697	0.7366* 0.0000	
inf	-0.2769* 0.0006	0.0310 0.7061	-0.0109 0.8944	-0.4511* 0.0000	-0.1288 0.1163	-0.1367 0.0954	-0.1257 0.1253	
cbpd	-0.5051* 0.0000	-0.0402 0.6257	0.0891 0.2782	-0.4288* 0.0000	-0.2410* 0.0030	-0.0248 0.7629	-0.1652* 0.0433	
bmg	-0.0049 0.9524	0.0685 0.4047	0.1106 0.1777	-0.0814 0.3221	0.0012 0.9884	-0.1833* 0.0247	-0.0419 0.6109	
gcfg	-0.0906 0.2702	0.0393 0.6330	0.0785 0.3395	-0.0060 0.9424	0.0892 0.2777	0.0230 0.7801	0.0859 0.2959	
		lmscp	inf	cbpd	bmg	gcfg		
lmscp		1.0000						
inf		-0.1857* 0.0229	1.0000					
cbpd		-0.2593* 0.0014	0.5214* 0.0000	1.0000				
bmg		-0.0208 0.8007	0.0785 0.3400	0.1893* 0.0203	1.0000			
gcfg		0.0026 0.9752	0.0609 0.4594	0.0814 0.3221	0.0979 0.2333	1.0000		

C. Multi Collinearity

```
. vif
```

Variable	VIF	1/VIF
lfda	4.19	0.238416
lmscp	3.65	0.274324
lgin	2.96	0.337549
linr	1.91	0.523301
inf	1.67	0.599931
cbpd	1.64	0.610693
fpi	1.50	0.666835
lreer	1.44	0.692732
fdi	1.40	0.713776
bmg	1.10	0.908418
gcfg	1.07	0.934639
Mean VIF	2.05	

```
.
```

D. Test for Heteroscedasticity

D.1 Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lgdpc

chi2(1)      =      2.59
Prob > chi2   =      0.1074
```

D.2 White test for heteroskedasticity

```
. imtest, white
```

```
White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity
```

```
chi2(77)      =      110.08
Prob > chi2    =      0.0080
```

```
Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	110.08	77	0.0080
Skewness	15.80	11	0.1489
Kurtosis	2.61	1	0.1064
Total	128.48	89	0.0039

E. Panel Least Square

```
. regress lgdp pc fpi fdi lgin lreer linr lfda lmscp inf gcfg cbpd bmg
```

Source	SS	df	MS	Number of obs	=	150
				F(11, 138)	=	64.16
Model	15.3577735	11	1.39616123	Prob > F	=	0.0000
Residual	3.00306693	138	.021761355	R-squared	=	0.8364
				Adj R-squared	=	0.8234
Total	18.3608404	149	.123227117	Root MSE	=	.14752

lgdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fpi	-1.463465	.3398862	-4.31	0.000	-2.135524	-.7914072
fdi	-.0083464	.0055608	-1.50	0.136	-.0193418	.0026489
lgin	2.858566	.2673308	10.69	0.000	2.329972	3.38716
lreer	2.187672	.2776562	7.88	0.000	1.638662	2.736683
linr	-.2820984	.0268974	-10.49	0.000	-.3352826	-.2289141
lfda	.0182455	.0571598	0.32	0.750	-.0947768	.1312678
lmscp	.0339151	.080352	0.42	0.674	-.1249651	.1927953
inf	.0089102	.0036045	2.47	0.015	.0017831	.0160373
gcfg	-.0020178	.0008407	-2.40	0.018	-.0036801	-.0003555
cbpd	-.0215882	.0044986	-4.80	0.000	-.0304832	-.0126931
bmg	.0004747	.0011235	0.42	0.673	-.0017468	.0026962
_cons	-5.251593	.7834685	-6.70	0.000	-6.800748	-3.702438

.

F. Test for serial correlation

```
. xtserial lgdp pc fpi fdi lgin lreer linr lfda lmscp inf gcfg cbpd bmg, output
```

```
Linear regression                               Number of obs      =           145
                                                F(4, 4)              =              .
                                                Prob > F              =              .
                                                R-squared             =           0.5633
                                                Root MSE             =           .03538
```

(Std. Err. adjusted for 5 clusters in country)

D.lgdp c	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
fpi						
D1.	-.015842	.1139116	-0.14	0.896	-.3321114	.3004274
fdi						
D1.	-.0013124	.0006708	-1.96	0.122	-.0031748	.00055
lgin						
D1.	.2345852	.2994131	0.78	0.477	-.5967188	1.065889
lreer						
D1.	1.019052	.1305212	7.81	0.001	.6566674	1.381437
linr						
D1.	.0663931	.0522668	1.27	0.273	-.0787227	.2115089
lfda						
D1.	.0053678	.0206183	0.26	0.807	-.0518777	.0626132
lmscp						
D1.	.0002419	.0554504	0.00	0.997	-.1537131	.1541969
inf						
D1.	.0001535	.0002541	0.60	0.578	-.0005519	.000859
gcfg						
D1.	.0000506	.0001862	0.27	0.799	-.0004665	.0005676
cbpd						
D1.	-.0018642	.0004027	-4.63	0.010	-.0029824	-.000746
bmg						
D1.	-.0001104	.0001239	-0.89	0.423	-.0004544	.0002335

Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 4) = 75.764

Prob > F = 0.0010

.

G. Bias-adjusted LM test of error cross-section independence

```
. xtcsi lgdpc fpi fdi inf cbpd bmg gcfg lfda linr lreer lgin lmscp , trend
```

Bias-adjusted LM test of error cross-section independence

H0: Cov(u_{it}, u_{jt}) = 0 for all t and $i \neq j$

Test	Statistic	p-value
LM	16.04	0.0985
LM adj*	1.839	0.0660
LM CD*	3.223	0.0013

*two-sided test

.

H. Cross-sectional time-series FGLS regression

```
. xtgls lgdpc fpi fdi lgin lreer linr lfda lmscp inf gcfg cbpd bmg , panel (hetero) corr(ar1)
```

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: common AR(1) coefficient for all panels (0.6762)

Estimated covariances	=	5	Number of obs	=	150
Estimated autocorrelations	=	1	Number of groups	=	5
Estimated coefficients	=	12	Time periods	=	30
			Wald chi2(11)	=	269.70
			Prob > chi2	=	0.0000

lgdpc	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fpi	-.1385876	.1948141	-0.71	0.477	-.5204162	.2432411
fdi	-.002416	.0025696	-0.94	0.347	-.0074523	.0026202
lgin	1.889675	.2557479	7.39	0.000	1.388419	2.390932
lreer	1.569329	.2187723	7.17	0.000	1.140543	1.998115
linr	-.1550145	.0289051	-5.36	0.000	-.2116675	-.0983616
lfda	.037107	.0430661	0.86	0.389	-.0473009	.121515
lmscp	.1849452	.0750946	2.46	0.014	.0377625	.3321278
inf	.001148	.0016122	0.71	0.476	-.0020118	.0043078
gcfg	-.0001462	.0003495	-0.42	0.676	-.0008313	.0005388
cbpd	-.0060009	.0028453	-2.11	0.035	-.0115777	-.0004242
bmg	.0002619	.0005036	0.52	0.603	-.0007251	.0012489
_cons	-3.08757	.6610246	-4.67	0.000	-4.383155	-1.791986

.

I. Correlation matrix of residuals

Correlation matrix of residuals:

```

      __e1    __e2    __e3    __e4    __e5
__e1  1.0000
__e2  0.1320  1.0000
__e3 -0.5640  0.3375  1.0000
__e4  0.1774  0.3024 -0.0851  1.0000
__e5 -0.1199  0.4000  0.0969  0.7251  1.0000

```

Breusch-Pagan LM test of independence: $\chi^2(10) = 38.673$, $Pr = 0.0000$

Based on 30 complete observations over panel units

J. The xtcd test for cross sectional dependence

```
. xtcd lgdpc fpi fdi lgin lreer linr lfda lmscp inf cbpd bmg gcfg
```

xtcd test on variables lgdpc fpi fdi lgin lreer linr lfda lmscp inf cbpd bmg gcfg

Panelvar: country

Timevar: year

Variable	CD-test	p-value	average joint T	mean ρ	mean abs(ρ)
lgdpc	16.886	0.000	30.00	0.97	0.97
fpi	.883	0.377	30.00	0.05	0.20
fdi	-.05	0.960	30.00	0.00	0.21
lgin	15.898	0.000	30.00	0.92	0.92
lreer	4.621	0.000	30.00	0.27	0.50
linr	1.186	0.236	30.00	0.07	0.42
lfda	7.838	0.000	30.00	0.45	0.45
lmscp	4.868	0.000	30.00	0.28	0.35
inf	10.333	0.000	30.00	0.60	0.60
cbpd	11	0.000	30.00	0.64	0.64
bmg	3.282	0.001	30.00	0.19	0.24
gcfg	-.014	0.989	30.00	0.00	0.13

Notes: Under the null hypothesis of cross-section independence, $CD \sim N(0,1)$

P-values close to zero indicate data are correlated across panel groups.

.

K. The PCSE regression

```
. xtpcse lgdpc fpi fdi lgin lreer linr lfda lmscp inf gcfg cbpd bmg , corr(ar1)
```

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)

```
Group variable:  country          Number of obs   =       150
Time variable:  year             Number of groups =        5
Panels:         correlated (balanced)  Obs per group:
Autocorrelation: common AR(1)          min =       30
                                         avg  =       30
                                         max  =       30

Estimated covariances   =       15      R-squared       =       0.9128
Estimated autocorrelations =        1      Wald chi2(11)    =       267.74
Estimated coefficients   =       12      Prob > chi2     =       0.0000
```

lgdpc	Panel-corrected					
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fpi	-.2184329	.1997311	-1.09	0.274	-.6098986	.1730327
fdi	-.0018577	.0027906	-0.67	0.506	-.0073272	.0036118
lgin	2.09736	.290866	7.21	0.000	1.527273	2.667447
lreer	1.600588	.2454942	6.52	0.000	1.119428	2.081748
linr	-.20452	.0283901	-7.20	0.000	-.2601636	-.1488765
lfda	.0332542	.0462847	0.72	0.472	-.0574622	.1239705
lmscp	.1684685	.0767665	2.19	0.028	.0180089	.3189282
inf	.0013515	.0017066	0.79	0.428	-.0019934	.0046963
gcfg	-.0001981	.0003985	-0.50	0.619	-.000979	.0005829
cbpd	-.0079954	.0030529	-2.62	0.009	-.0139789	-.0020119
bmg	.0004188	.0005398	0.78	0.438	-.0006393	.0014768
_cons	-3.350482	.7343721	-4.56	0.000	-4.789825	-1.91114
rho	.6762236					

.

L. Lag length criteria for all the variables

ARDL(1,1,1,0,0,1,0,1,0,0,0,0) regression

Sample: 1991 - 2019

Number of obs = 29
F(16, 12) = 99.29
Prob > F = 0.0000
R-squared = 0.9925
Adj R-squared = 0.9825
Root MSE = 0.0222

Log likelihood = 82.116751

	lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lgdpc						
L1.		.5293157	.1234541	4.29	0.001	.2603324 .798299
fpi						
--.		-.2448271	.133002	-1.84	0.091	-.5346135 .0449593
L1.		.4275901	.1858408	2.30	0.040	.0226778 .8325025
fdi						
--.		.0040069	.0024307	1.65	0.125	-.0012892 .009303
L1.		.0071805	.002252	3.19	0.008	.0022739 .0120871
lgin						
lreer		.226447	.3205388	0.71	0.493	-.471947 .924841
		-1.26341	.5277666	-2.39	0.034	-2.413315 -.1135057
linr						
--.		.0819177	.0326845	2.51	0.028	.0107043 .1531311
L1.		-.1560252	.0359401	-4.34	0.001	-.234332 -.0777185
lfda						
		.0073598	.0252097	0.29	0.775	-.0475673 .062287
lmscp						
--.		-.0180033	.1344086	-0.13	0.896	-.3108544 .2748478
L1.		.4786483	.1554951	3.08	0.010	.1398537 .817443
inf						
		.0044774	.004496	1.00	0.339	-.0053186 .0142734
gcfg		-.0002483	.0002954	-0.84	0.417	-.0008918 .0003952
cbpd		-.0080319	.003996	-2.01	0.067	-.0167384 .0006747
bm		-.0002477	.0004905	-0.50	0.623	-.0013164 .000821
_cons		3.38045	1.275004	2.65	0.021	.6024557 6.158445

e(lags) [1,12]

lgdpc	fpi	fdi	lgin	lreer	linr	lfda	lmscp	inf	gcfg	cbpd	bm
r1	1	1	1	0	0	1	0	1	0	0	0

ARDL(1,0,1,0,0,1,0,0,0,1,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(16, 12) = 223.79
Prob > F = 0.0000
R-squared = 0.9967
Adj R-squared = 0.9922
Root MSE = 0.0167

Log likelihood = 90.360978

	lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lgdpc						
L1.		.5684071	.0573564	9.91	0.000	.4434384 .6933759
fpi						
--.		-.2529927	.3269759	-0.77	0.454	-.965412 .4594265
fdi						
--.		-.0041924	.0017831	-2.35	0.037	-.0080774 -.0003074
L1.		.0026794	.0021887	1.22	0.244	-.0020893 .0074481
lgin						
lreer		1.0685	.2794562	3.82	0.002	.4596177 1.677383
		1.972039	.31798	6.20	0.000	1.27922 2.664858
linr						
--.		.0300813	.0634491	0.47	0.644	-.1081624 .1683251
L1.		-.1239174	.063198	-1.96	0.074	-.261614 .0137791
lfda						
lmscp		-.0577817	.0338422	-1.71	0.113	-.1315177 .0159542
		.0979582	.1038457	0.94	0.364	-.1283022 .3242186
inf		-.0009867	.0016899	-0.58	0.570	-.0046686 .0026952
gcfg						
--.		.0007587	.0005534	1.37	0.195	-.000447 .0019645
L1.		.0010913	.0004812	2.27	0.043	.0000429 .0021397
cbpd						
		.0006386	.0023554	0.27	0.791	-.0044934 .0057707
bm						
--.		-.0003922	.0005836	-0.67	0.514	-.0016637 .0008793
L1.		.0010206	.0005566	1.83	0.092	-.000192 .0022333
_cons		-3.683113	.7925165	-4.65	0.001	-5.409858 -1.956368

e(lags) [1,12]

lgdpc	fpi	fdi	lgin	lreer	linr	lfda	lmscp	inf	gcfg	cbpd	bm
r1	1	0	1	0	0	1	0	0	1	0	1

ARDL(1,0,0,0,1,0,1,0,1,1,0,0) regression

Sample: 1991 - 2019

Number of obs = 29

F(16, 12) = 793.25

Prob > F = 0.0000

R-squared = 0.9991

Adj R-squared = 0.9978

Log likelihood = 108.46764

Root MSE = 0.0089

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.7354973	.0368294	19.97	0.000	.655253	.8157415
fpi	-1.297327	1.295572	-1.00	0.336	-4.120136	1.525483
fdi	-.0037535	.0015988	-2.35	0.037	-.0072369	-.00027
lgin	1.433267	.1989449	7.20	0.000	.9998035	1.866731
lreer						
--.	.9013559	.0921427	9.78	0.000	.7005942	1.102118
L1.	-.8420161	.0734098	-11.47	0.000	-1.001962	-.68207
linr	.1635528	.046834	3.49	0.004	.0615103	.2655952
lfda						
--.	-.0937612	.0197434	-4.75	0.000	-.1367783	-.0507441
L1.	.0840318	.018929	4.44	0.001	.042789	.1252746
lmscp	-.0458266	.0190739	-2.40	0.033	-.0873851	-.0042681
inf						
--.	-.0011803	.0004294	-2.75	0.018	-.0021157	-.0002448
L1.	-.0016901	.0004958	-3.41	0.005	-.0027703	-.0006098
gcfg						
--.	-.0000966	.0001307	-0.74	0.474	-.0003813	.0001881
L1.	.0002273	.0001444	1.57	0.141	-.0000872	.0005419
cbpd	-.0014343	.0012346	-1.16	0.268	-.0041242	.0012557
bmj	.0004784	.0002368	2.02	0.066	-.0000375	.0009943
_cons	-1.99464	.309727	-6.44	0.000	-2.669477	-1.319803

e(lags) [1,12]

	lgdpc	fpi	fdi	lgin	lreer	linr	lfda	lmscp	inf	gcfg	cbpd	bmj
r1	1	0	0	0	1	0	1	0	1	1	0	0

ARDL(1,1,0,1,1,1,0,1,1,0,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(19, 9) = 108.46
Prob > F = 0.0000
R-squared = 0.9957
Adj R-squared = 0.9865
Root MSE = 0.0210

Log likelihood = 87.919422

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	1.041029	.1287572	8.09	0.000	.7497602	1.332298
fpi						
--.	.4596854	.1975079	2.33	0.045	.0128915	.9064792
L1.	.4541594	.1976804	2.30	0.047	.0069752	.9013435
fdi	-.0034739	.0022282	-1.56	0.153	-.0085143	.0015666
lgin						
--.	-.9172345	.5837623	-1.57	0.151	-2.237797	.4033275
L1.	-1.008713	.5318013	-1.90	0.090	-2.211732	.1943046
lreer						
--.	1.572696	.346713	4.54	0.001	.7883767	2.357015
L1.	-1.880814	.3541352	-5.31	0.000	-2.681924	-1.079705
linr						
--.	.0429807	.0476597	0.90	0.391	-.0648331	.1507945
L1.	.092386	.047359	1.95	0.083	-.0147475	.1995194
lfda	.1255021	.0654062	1.92	0.087	-.0224571	.2734614
lmscp						
--.	.0519861	.2115513	0.25	0.811	-.4265761	.5305483
L1.	.3044959	.2170152	1.40	0.194	-.1864267	.7954184
inf						
--.	-.0014851	.0034219	-0.43	0.675	-.009226	.0062558
L1.	-.0073827	.0029428	-2.51	0.033	-.0140398	-.0007257
gcfg	.0002149	.0003269	0.66	0.527	-.0005247	.0009545
cbpd	.0032319	.0031676	1.02	0.334	-.0039337	.0103976
bmj						
--.	-.0014237	.0006562	-2.17	0.058	-.0029082	.0000608
L1.	-.0008673	.0004766	-1.82	0.102	-.0019456	.0002109
_cons	2.033677	1.152017	1.77	0.111	-.5723665	4.639721

e(lags) [1,12]

	lgdpc	fpi	fdi	lgin	lreer	linr	lfda	lmscp	inf	gcfg	cbpd	bmj
r1	1	1	0	1	1	1	0	1	1	0	0	1

ARDL(1,1,0,0,1,1,0,1,0,0,0,1) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(17, 11)	=	109.73
		Prob > F	=	0.0000
		R-squared	=	0.9941
		Adj R-squared	=	0.9851
Log likelihood =	88.843321	Root MSE	=	0.0184

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9025069	.09304	9.70	0.000	.6977272	1.107287
fpi						
--.	-.2427714	.2576494	-0.94	0.366	-.8098539	.324311
L1.	-.3837726	.1920775	-2.00	0.071	-.8065323	.038987
fdi	.0132126	.0073819	1.79	0.101	-.0030348	.02946
lgin	.4245321	.3322137	1.28	0.228	-.3066653	1.15573
ltreer						
--.	1.740861	.2329851	7.47	0.000	1.228064	2.253658
L1.	-1.209614	.1784934	-6.78	0.000	-1.602475	-.8167524
linr						
--.	-.2147136	.0945126	-2.27	0.044	-.4227345	-.0066927
L1.	.2598483	.0903595	2.88	0.015	.0609685	.4587281
lfda	-.0502029	.0855828	-0.59	0.569	-.2385693	.1381636
lmscp						
--.	-.7867827	.2496129	-3.15	0.009	-1.336177	-.2373884
L1.	.2690888	.1942388	1.39	0.193	-.1584279	.6966054
inf	-.0014171	.0034517	-0.41	0.689	-.0090142	.0061801
gcfg	.0012209	.000988	1.24	0.242	-.0009536	.0033954
cbpd	.0015631	.0030175	0.52	0.615	-.0050784	.0082047
bmg						
--.	.0009228	.0012161	0.76	0.464	-.0017539	.0035995
L1.	.0028578	.0009545	2.99	0.012	.000757	.0049587
_cons	-.259215	.8848627	-0.29	0.775	-2.206785	1.688355

e(lags) [1,12]

	lgdpc	fpi	fdi	lgin	ltreer	linr	lfda	lmscp	inf	gcfg	cbpd	bmg
r1	1	1	0	0	1	1	0	1	0	0	0	1

M. Panel unit root test for all the variables.

M.1. LLC for the log of GDP per capita

```
. xtunitroot llc d.lgdpc, lags(1)
```

Levin-Lin-Chu unit-root test for D.lgdpc

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.3000	
Adjusted t*	-5.6887	0.0000

M.2. LLC for the Log of GDP per capita with trend

```
. xtunitroot llc d.lgdpc, trend lags(1)
```

Levin-Lin-Chu unit-root test for D.lgdpc

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.3156	
Adjusted t*	-4.3541	0.0000

M.3. IPS for the log of GDP per capita

```
. xtunitroot ips d.lgdpc, lags(1)
```

Im-Pesaran-Shin unit-root test for D.lgdpc

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included		sequentially
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-6.0409	0.0000

M.4 . IPS for the log of GDP per capita , trend

```
. xtunitroot ips d.lgdpc, trend lags(1)
```

Im-Pesaran-Shin unit-root test for D.lgdpc

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included		sequentially
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.5224	0.0000

M.5. LLC for fpi

```
. xtunitroot llc fpi, lags(1)
```

Levin-Lin-Chu unit-root test for fpi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.7368	
Adjusted t*	-2.4608	0.0069

M.6. LLC for fpi, trend

```
. xtunitroot llc fpi, trend lags(1)
```

Levin-Lin-Chu unit-root test for fpi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.6632	
Adjusted t*	-1.7804	0.0375

M.7. IPS for fpi

```
. xtunitroot ips fpi, lags(1)
```

Im-Pesaran-Shin unit-root test for fpi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.4382	0.0000

M.8 . IPS for fpi, trend

```
. xtunitroot ips fpi, trend lags(1)
```

Im-Pesaran-Shin unit-root test for fpi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-2.9271	0.0017

M.9. LLC for fdi

```
. xtunitroot llc fdi, lags(0)
```

Levin-Lin-Chu unit-root test for fdi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.3804	
Adjusted t*	-5.6356	0.0000

M.10. LLC for fdi, trend

```
. xtunitroot llc fdi, trend lags(0)
```

Levin-Lin-Chu unit-root test for fdi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.3650	
Adjusted t*	-5.5841	0.0000

M.11. IPS for fdi

```
. xtunitroot ips fdi, lags(0)
```

Im-Pesaran-Shin unit-root test for fdi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-5.4644	0.0000

M.12. IPS for fdi, trend

```
. xtunitroot ips fdi, trend lags(0)
```

Im-Pesaran-Shin unit-root test for fdi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-5.2235	0.0000

M.13. llc for the log of globalization index

```
. xtunitroot llc lgin, lags(0)
```

Levin-Lin-Chu unit-root test for lgin

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0
Panel means: Included
Time trend: Not included

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-4.5446	
Adjusted t*	-3.4713	0.0003

M.14. llc for the log of globalization index, trend

```
. xtunitroot llc d.lgin, trend lags(0)
```

Levin-Lin-Chu unit-root test for D.lgin

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common Asymptotics: N/T -> 0
Panel means: Included
Time trend: Included

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-12.4008	
Adjusted t*	-8.7246	0.0000

M.15. IPS for the log of globalization index

```
. xtunitroot ips d.lgin, lags(0)
```

Im-Pesaran-Shin unit-root test for D.lgin

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-9.1321	0.0000

M.16. IPS for the log of globalization index

```
. xtunitroot ips d.lgin, trend lags(0)
```

Im-Pesaran-Shin unit-root test for D.lgin

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-9.3085	0.0000

M.17. LLC for the log of real exchange rate

```
. xtunitroot llc lreer, lags(1)
```

Levin-Lin-Chu unit-root test for lreer

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.0071	
Adjusted t*	-2.9755	0.0015

M.18 . LLC for the log of real exchange rate, trend

```
. xtunitroot llc lreer, trend lags(1)
```

Levin-Lin-Chu unit-root test for lreer

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.6121	
Adjusted t*	-3.3190	0.0005

M.19. IPS for the log of real exchange rate.

```
. xtunitroot ips lreer, lags(1)
```

Im-Pesaran-Shin unit-root test for lreer

Ho: All panels contain unit roots	Number of panels =	5

Ha: Some panels are stationary	Number of periods =	30

AR parameter: Panel-specific

Asymptotics: T,N -> Infinity

Panel means: Included

sequentially

Time trend: Not included

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-2.2629	0.0118

M.20. IPS for the log of real exchange rate, trend

```
. xtunitroot ips lreer, trend lags(1)
```

Im-Pesaran-Shin unit-root test for lreer

Ho: All panels contain unit roots	Number of panels =	5

Ha: Some panels are stationary	Number of periods =	30

AR parameter: Panel-specific

Asymptotics: T,N -> Infinity

Panel means: Included

sequentially

Time trend: Included

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-2.7015	0.0035

M. 21 and 22 . LLC for the log of inward remittances and trend respectively

```
. xtunitroot llc d.linr, lags(1)
```

Levin-Lin-Chu unit-root test for D.linr

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.0471	
Adjusted t*	-4.5164	0.0000

```
. xtunitroot llc d.linr, trend lags(1)
```

Levin-Lin-Chu unit-root test for D.linr

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.4142	
Adjusted t*	-3.5288	0.0002

M.23. IPS for the log of inward remittances

```
. xtunitroot ips d.linr, lags(1)
```

Im-Pesaran-Shin unit-root test for D.linr

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N ->	Infinity
Panel means: Included		sequentially
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.7706	0.0000

M.24. IPS for the log of inward remittances, trend

```
. xtunitroot ips d.linr, trend lags(1)
```

Im-Pesaran-Shin unit-root test for D.linr

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N ->	Infinity
Panel means: Included		sequentially
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-3.6353	0.0001

M.25 AND 26 . LLC for the log of Official Aid and Development Assistance and trend respectively

```
. xtunitroot llc lfda, lags(0)
```

Levin-Lin-Chu unit-root test for lfda

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-4.1697	
Adjusted t*	-1.8611	0.0314

```
. xtunitroot llc d.lfda, trend lags(0)
```

Levin-Lin-Chu unit-root test for D.lfda

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-15.0590	
Adjusted t*	-11.7148	0.0000

M.27. IPS for for the log of Official Aid and Development Assistance

```
. xtunitroot ips d.lfda, lags(0)
```

Im-Pesaran-Shin unit-root test for D.lfda

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-12.0095	0.0000

M.28. IPS for the log of Official Aid and Development Assistance, trend

```
. xtunitroot ips d.lfda, trend lags(0)
```

Im-Pesaran-Shin unit-root test for D.lfda

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-11.5580	0.0000

M.29. LLC for the log of monetary sector credit to the private sector

```
. xtunitroot llc lmscp, lags(1)
```

Levin-Lin-Chu unit-root test for lmscp

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.4742	
Adjusted t*	-3.5404	0.0002

M.30. LLC for the log of monetary sector credit to the private sector, trend

```
. xtunitroot llc lmscp, trend lags(1)
```

Levin-Lin-Chu unit-root test for lmscp

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-10.7716	
Adjusted t*	-7.2046	0.0000

M.31. . IPS for the log of monetary sector credit to the private sector

```
. xtunitroot ips lmscp, lags(1)
```

Im-Pesaran-Shin unit-root test for lmscp

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-2.5243	0.0058

M.32. IPS for the log of monetary sector credit to the private sector, trend

```
. xtunitroot ips lmscp, trend lags(1)
```

Im-Pesaran-Shin unit-root test for lmscp

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.9128	0.0000

M.33. LLC for inflation rate

```
. xtunitroot llc inf, lags(0)
```

Levin-Lin-Chu unit-root test for inf

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-6.6395	
Adjusted t*	-4.8681	0.0000

M.34. LLC for inflation rate, trend

```
. xtunitroot llc inf, trend lags(0)
```

Levin-Lin-Chu unit-root test for inf

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.6562	
Adjusted t*	-6.4043	0.0000

M.35. IPS for inflation rate

```
. xtunitroot ips inf, lags(0)
```

Im-Pesaran-Shin unit-root test for inf

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-4.5556	0.0000

M.36. IPS for inflation rate, trend

```
. xtunitroot ips inf, trend lags(0)
```

Im-Pesaran-Shin unit-root test for inf

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-6.1786	0.0000

M.37. LLC for gross capital formation

```
. xtunitroot llc gcfg, lags(0)
```

Levin-Lin-Chu unit-root test for gcfg

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-12.4330	
Adjusted t*	-10.2337	0.0000

M.38. LLC for gross capital formation, trend

```
. xtunitroot llc gcfg, trend lags(0)
```

Levin-Lin-Chu unit-root test for gcfg

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-12.9610	
Adjusted t*	-9.4138	0.0000

M.39. IPS for gross capital formation

```
. xtunitroot ips gcfg, lags(0)
```

Im-Pesaran-Shin unit-root test for gcfg

Ho: All panels contain unit roots	Number of panels =	5

Ha: Some panels are stationary	Number of periods =	30

AR parameter: Panel-specific

Asymptotics: T,N -> Infinity

Panel means: Included

sequentially

Time trend: Not included

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-10.1431	0.0000

M.40 . IPS for gross capital formation, trend

```
. xtunitroot ips gcfg, trend lags(0)
```

Im-Pesaran-Shin unit-root test for gcfg

Ho: All panels contain unit roots	Number of panels =	5

Ha: Some panels are stationary	Number of periods =	30

AR parameter: Panel-specific

Asymptotics: T,N -> Infinity

Panel means: Included

sequentially

Time trend: Included

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-9.4527	0.0000

M.41. LLC for Central Bank Policy Rate Differential

```
. xtunitroot llc cbpd, lags(0)
```

Levin-Lin-Chu unit-root test for cbpd

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.4634	
Adjusted t*	-3.0212	0.0013

M.42. LLC for Central Bank Policy Rate Differential, trend

```
. xtunitroot llc cbpd, trend lags(0)
```

Levin-Lin-Chu unit-root test for cbpd

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.9222	
Adjusted t*	-4.6686	0.0000

M.43. IPS for Central Bank Policy Rate Differential

```
. xtunitroot ips cbpd, lags(0)
```

Im-Pesaran-Shin unit-root test for cbpd

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-2.3393	0.0097

M.44. IPS for Central Bank Policy Rate Differential, trend

```
. xtunitroot ips cbpd, trend lags(0)
```

Im-Pesaran-Shin unit-root test for cbpd

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-3.5086	0.0002

M.45. . LLC for broad money growth

```
. xtunitroot llc bmg, lags(1)
```

Levin-Lin-Chu unit-root test for bmg

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.6237	
Adjusted t*	-3.8048	0.0001

M.46. LLC for broad money growth, trend

```
. xtunitroot llc bmg, trend lags(1)
```

Levin-Lin-Chu unit-root test for bmg

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.3576	
Adjusted t*	-3.3056	0.0005

M.47. IPS for broad money growth

```
. xtunitroot ips bmg, lags(1)
```

Im-Pesaran-Shin unit-root test for bmg

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.6199	0.0000

M.48. IPS for broad money growth, trend

```
. xtunitroot ips bmg, trend lags(1)
```

Im-Pesaran-Shin unit-root test for bmg

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-3.6962	0.0001

N. Second generation CIPS Test

N.1. CIPS test for the log of GDP per capita and the trend respectively

```
. xtcips lgdpc, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for lgdpc
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -2.718 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

```
. xtcips lgdpc, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for lgdpc
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -3.406 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.2. CIPS test for fpi and the trend respectively

```
. xtcips fpi, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for fpi
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.330 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

```
. xtcips fpi, maxl(5) bglag(1)trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for fpi
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.079 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.3. CIPS test for fdi and the trend respectively

```
. xtcips fdi, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for fdi
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

Individual ti were truncated during the aggregation process

H0 (homogeneous non-stationary): $\beta_i = 0$ for all i

CIPS* = -3.900 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

```
. xtcips fdi, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for fdi
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

Individual ti were truncated during the aggregation process

H0 (homogeneous non-stationary): $\beta_i = 0$ for all i

CIPS* = -4.263 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.4. CIPS test for central bank policy rate differential and the trend respectively

```
. xtcips cbpd, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for cbpd
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -2.783 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

```
. xtcips cbpd, maxl(5) bglag(1)trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for cbpd
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -2.834 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.5. CIPS test for broad money growth and the trend respectively

```
. xtcips bmg, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for bmg
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

Individual t_i were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -4.620 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

```
. xtcips bmg, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for bmg
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

Individual t_i were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -4.703 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.6. CIPS test for the first difference of central bank policy rate differential, trend and inflation rate

```
. xtcips d.cbpd, maxl(5) bglag(1)trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.cbpd
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

Individual ti were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -5.634 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

```
. xtcips inf, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for inf
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.161 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.7. CIPS test for inf, trend and the log of inward remittances (differenced) respectively

```
. xtcips inf, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for inf
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.260 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

```
. xtcips d.lnr, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lnr
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.598 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.8. CIPS test for the log of inward remittances, trend (differenced) and of the log of official development assistance

```
. xtcips d.lnr, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lnr
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $\beta_i = 0$ for all i

CIPS = -3.984 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

```
. xtcips d.lfda, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lfda
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

Individual t_i were truncated during the aggregation process

H0 (homogeneous non-stationary): $\beta_i = 0$ for all i

CIPS* = -5.627 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.9. CIPS test for the log of official development assistance, trend (differenced)

```
. xtcips d.lfda, maxl(5) bglag(1)trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lfda
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

Individual t_i were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -5.784 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.10. CIPS test for the log of monetary sector credit to the private sector (differenced)

```
. xtcips d.lmscp, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lmscp
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.572 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.11. CIPS test for the log of monetary sector credit to the private sector, trend (differenced) and of the log of real exchange rate (differenced)

```
. xtcips d.lmscp, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lmscp
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.727 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

```
. xtcips d.lreer, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lreer
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -4.158 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.12. CIPS test for the log of real exchange rate, trend

```
. xtcips lreer, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for lreer
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -2.935 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.13. CIPS test for gross capital formation growth rate.

```
. xtcips gcfg, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for gcfg
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -5.299 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.14. CIPS test for gross capital formation growth rate, trend

```
. xtcips gcfg, maxl(5) bglag(1)trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for gcfg
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -5.364 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.15. CIPS test for the log of globalization index (differenced)

```
. xtcips d.lgin, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lgin
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

Individual t_i were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -4.827 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.16. CIPS test for the log of globalization index, trend (differenced)

```
. xtcips d.lgin, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for D.lgin
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

Individual t_i were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -5.018 N,T = (5,29)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

.

N.17. CIPS test for central bank policy rate

```
. xtcips cbpr, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for cbpr
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS = -3.203 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

.

N.18. CIPS test for central bank policy rate , trend

```
. xtcips cbpr, maxl(5) bglag(1)trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for cbpr

Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

H0 (homogeneous non-stationary): $\beta_i = 0$ for all i

CIPS = -3.227 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

O. Optimal lag length selection for the Variables lgdpc, fpi, fdi, inf, cbpd, bmg

O. 1 forval i = 1/5 {

```
ardl lgdpc fpi fdi inf cbpd bmg if (c_id==`i'), maxlag(1 1 1 1 1 1)
```

```
matrix list e(lags)
```

```
di
```

```
}
```

ARDL(1,0,1,1,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(9, 19) = 77.48
Prob > F = 0.0000
R-squared = 0.9735
Adj R-squared = 0.9609
Root MSE = 0.0331

Log likelihood = 63.795603

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.739094	.070074	10.55	0.000	.5924275	.8857605
fpi	-.0146003	.1740431	-0.08	0.934	-.3788768	.3496761
fdi						
--.	.0038135	.0036953	1.03	0.315	-.0039209	.0115478
L1.	.0048628	.003006	1.62	0.122	-.0014289	.0111545
inf						
--.	-.0018929	.0036611	-0.52	0.611	-.0095556	.0057699
L1.	-.0102027	.0039372	-2.59	0.018	-.0184433	-.0019621
cbpd	.0061271	.0038966	1.57	0.132	-.0020286	.0142828
bmg						
--.	-.001975	.0005413	-3.65	0.002	-.0031078	-.0008421
L1.	-.0017409	.0005581	-3.12	0.006	-.0029091	-.0005727
_cons	1.060427	.2816085	3.77	0.001	.4710136	1.64984

e(lags)[1,6]

lgdpc	fpi	fdi	inf	cbpd	bmg
r1	1	0	1	0	1

ARDL(1,0,0,0,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(7, 21) = 114.49
Prob > F = 0.0000
R-squared = 0.9745
Adj R-squared = 0.9660
Root MSE = 0.0349

Log likelihood = 60.867969

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.7889881	.0479176	16.47	0.000	.6893379	.8886383
fpi	-.0805133	.4755722	-0.17	0.867	-1.06952	.9084932
fdi	-.0081133	.0027452	-2.96	0.008	-.0138223	-.0024043
inf	-.0016451	.0028252	-0.58	0.567	-.0075204	.0042303
cbpd	-.0090678	.0031264	-2.90	0.009	-.0155695	-.0025661
bmg						
--.	-.0009037	.0009223	-0.98	0.338	-.0028217	.0010142
L1.	.0029164	.0008738	3.34	0.003	.0010992	.0047336
_cons	.8012281	.1757339	4.56	0.000	.4357695	1.166687

e(lags)[1,6]

lgdpc	fpi	fdi	inf	cbpd	bmg
r1	1	0	0	0	1

ARDL(1,0,0,1,0,0) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(7, 21)	=	64.42
		Prob > F	=	0.0000
		R-squared	=	0.9555
		Adj R-squared	=	0.9407
Log likelihood =	52.608268	Root MSE	=	0.0463

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9857227	.0656058	15.02	0.000	.849288	1.122157
fpi	4.378391	5.491889	0.80	0.434	-7.042617	15.7994
fdi	-.0068469	.0054445	-1.26	0.222	-.0181694	.0044756
inf						
--.	.0012486	.0015986	0.78	0.444	-.0020759	.0045731
L1.	.0042445	.0014882	2.85	0.010	.0011495	.0073395
cbpd	-.006191	.0049606	-1.25	0.226	-.0165071	.004125
bmj	-.0004488	.0010754	-0.42	0.681	-.0026853	.0017877
_cons	.1045407	.2231776	0.47	0.644	-.3595825	.5686639

e(lags) [1,6]

lgdpc	fpi	fdi	inf	cbpd	bmj
r1	1	0	0	1	0

ARDL(1,0,0,0,0,0) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(6, 22)	=	66.18
		Prob > F	=	0.0000
		R-squared	=	0.9475
		Adj R-squared	=	0.9332
Log likelihood =	51.799987	Root MSE	=	0.0466

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9274779	.0882426	10.51	0.000	.744474	1.110482
fpi	.2415852	.1917164	1.26	0.221	-.1560102	.6391806
fdi	-.0067455	.0038187	-1.77	0.091	-.0146649	.001174
inf	7.96e-06	.0041197	0.00	0.998	-.0085357	.0085516
cbpd	-.0059355	.0044987	-1.32	0.201	-.0152652	.0033943
bmj	.0009331	.0008441	1.11	0.281	-.0008174	.0026836
_cons	.3165891	.3352338	0.94	0.355	-.3786433	1.011821

e(lags) [1,6]

lgdpc	fpi	fdi	inf	cbpd	bmj
r1	1	0	0	0	0

ARDL(1,0,0,1,0,1) regression

Sample: 1991 - 2019
 Number of obs = 29
 F(8, 20) = 33.63
 Prob > F = 0.0000
 R-squared = 0.9308
 Adj R-squared = 0.9031
 Root MSE = 0.0468
 Log likelihood = 53.052409

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9141551	.1044165	8.75	0.000	.6963461	1.131964
fpi	.2315099	.4178685	0.55	0.586	-.6401484	1.103168
fdi	-.0038532	.0103951	-0.37	0.715	-.025537	.0178306
inf						
--.	-.0097263	.0053682	-1.81	0.085	-.0209242	.0014715
L1.	.0140585	.0061491	2.29	0.033	.0012318	.0268852
cbpd	-.0113416	.0057314	-1.98	0.062	-.0232971	.0006139
bmg						
--.	.0010746	.0021528	0.50	0.623	-.0034161	.0055653
L1.	.0032821	.0019448	1.69	0.107	-.0007746	.0073388
_cons	.3314584	.4075182	0.81	0.426	-.5186097	1.181527

e(lags) [1,6]
 lgdpc fpi fdi inf cbpd bmg
 r1 1 0 0 1 0 1

P. Panel Unit Root Test Given the lag length in “O” above.

P.1. LLC of the log of gross domestic product per capita (differenced)

. xtunitroot llc d.lgdpc, lags(1)

Levin-Lin-Chu unit-root test for D.lgdpc

Ho: Panels contain unit roots Number of panels = 5
 Ha: Panels are stationary Number of periods = 29

AR parameter: Common Asymptotics: N/T -> 0
 Panel means: Included
 Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.3000	
Adjusted t*	-5.6887	0.0000

.

P.2 . LLC of the log of gross domestic product per capita, trend (differenced)

```
. xtunitroot llc d.lgdpc, trend lags(1)
```

Levin-Lin-Chu unit-root test for D.lgdpc

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.3156	
Adjusted t*	-4.3541	0.0000

.

P.3. LLC of foreign portfolio investment

```
. xtunitroot llc fpi, lag (0)
```

Levin-Lin-Chu unit-root test for fpi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.2363	
Adjusted t*	-4.6585	0.0000

.

P.4 LLC for foreign portfolio investment, trend and foreign direct investment

```
. xtunitroot llc fpi, trend lag (0)
```

Levin-Lin-Chu unit-root test for fpi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common	Asymptotics: N/T -> 0	
Panel means: Included		
Time trend: Included		

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.2118	
Adjusted t*	-3.9866	0.0000

.

```
. xtunitroot llc fdi, lag (0)
```

Levin-Lin-Chu unit-root test for fdi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.3804	
Adjusted t*	-5.6356	0.0000

.

P.5. LLC for foreign direct investment, trend

```
. xtunitroot llc fdi, trend lag (0)
```

Levin-Lin-Chu unit-root test for fdi

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common Asymptotics: N/T -> 0

Panel means: Included

Time trend: Included

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-9.3650	
Adjusted t*	-5.5841	0.0000

.

P.6. LLC of inflation rate and trend respectively

```
. xtunitroot llc inf, lag (1)
```

Levin-Lin-Chu unit-root test for inf

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.4599	
Adjusted t*	-3.1206	0.0009

```
. xtunitroot llc inf, trend lag (1)
```

Levin-Lin-Chu unit-root test for inf

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.1192	
Adjusted t*	-3.8252	0.0001

.

P.7. LLC of bmg and trend respectively

```
. xtunitroot llc bmg, lag (1)
```

Levin-Lin-Chu unit-root test for bmg

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.6237	
Adjusted t*	-3.8048	0.0001

```
. xtunitroot llc bmg, trend lag (1)
```

Levin-Lin-Chu unit-root test for bmg

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-8.3576	
Adjusted t*	-3.3056	0.0005

.

P.8. LLC of central bank policy rate differential and trend respectively

```
. xtunitroot llc cbpd, lag (0)
```

Levin-Lin-Chu unit-root test for cbpd

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-5.4634	
Adjusted t*	-3.0212	0.0013

```
. xtunitroot llc cbpd, trend lag (0)
```

Levin-Lin-Chu unit-root test for cbpd

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	30

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 0 lags

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-7.9222	
Adjusted t*	-4.6686	0.0000

.

P.9. IPS of the log of gross domestic product per capita

```
. xtunitroot ips d.lgdpc, lags(1)
```

Im-Pesaran-Shin unit-root test for D.lgdpc

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-6.0409	0.0000

.

P.10. IPS of the log of gross domestic product per capita, trend

```
. xtunitroot ips d.lgdpc, trend lags(1)
```

Im-Pesaran-Shin unit-root test for D.lgdpc

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	29
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.5224	0.0000

.

P.11. IPS for foreign portfolio investment

```
. xtunitroot ips fpi, lags(0)
```

Im-Pesaran-Shin unit-root test for fpi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-5.8721	0.0000

.

P.12. IPS for foreign portfolio investment, trend

```
. xtunitroot ips fpi, trend lags(0)
```

Im-Pesaran-Shin unit-root test for fpi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-4.4005	0.0000

.

P.13. IPS for foreign direct investment

```
. xtunitroot ips fdi, lags(0)
```

Im-Pesaran-Shin unit-root test for fdi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-5.4644	0.0000

.

P.14. IPS for foreign direct investment, trend

```
. xtunitroot ips fdi, trend lags(0)
```

Im-Pesaran-Shin unit-root test for fdi

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-5.2235	0.0000

.

P.15. IPS for broad money growth

```
. xtunitroot ips bmg, lags(1)
```

Im-Pesaran-Shin unit-root test for bmg

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.6199	0.0000

.

P.16. IPS for broad money growth, trend

```
. xtunitroot ips bmg, trend lags(1)
```

Im-Pesaran-Shin unit-root test for bmg

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-3.6962	0.0001

.

P.17. IPS for inflation rate and trend respectively

```
. xtunitroot ips inf, lags(1)
```

Im-Pesaran-Shin unit-root test for inf

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30

AR parameter: Panel-specific	Asymptotics: T,N -> Infinity
Panel means: Included	sequentially
Time trend: Not included	

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-2.7812	0.0027

.

```
. xtunitroot ips inf, trend lags(1)
```

Im-Pesaran-Shin unit-root test for inf

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30

AR parameter: Panel-specific	Asymptotics: T,N -> Infinity
Panel means: Included	sequentially
Time trend: Included	

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.0914	0.0000

.

P.18. IPS for central bank policy rate differential and trend respectively

```
. xtunitroot ips cbpd, lags(0)
```

Im-Pesaran-Shin unit-root test for cbpd

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Not included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-2.3393	0.0097

```
. xtunitroot ips cbpd, trend lags(0)
```

Im-Pesaran-Shin unit-root test for cbpd

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included	sequentially	
Time trend: Included		

ADF regressions: 0 lags

	Statistic	p-value
W-t-bar	-3.5086	0.0002

Q. The Introduction of Gross Domestic Product per Capita Growth Rate (GDPCR)

Q.1. LLC for gdpqr and trend respectively

```
. xtunitroot llc d.gdpqr, lags(1)
```

Levin-Lin-Chu unit-root test for D.gdpqr

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-13.2005	
Adjusted t*	-5.7470	0.0000

```
. xtunitroot llc d.gdpqr, trend lags(1)
```

Levin-Lin-Chu unit-root test for D.gdpqr

Ho: Panels contain unit roots	Number of panels =	5
Ha: Panels are stationary	Number of periods =	29

AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Included	

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-13.5751	
Adjusted t*	-4.0291	0.0000

Q.2. IPS for gdp_{pcr} and trend respectively

```
. xtunitroot ips gdppcr, lags(1)
```

Im-Pesaran-Shin unit-root test for gdp_{pcr}

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included		sequentially
Time trend: Not included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-4.0871	0.0000

```
. xtunitroot ips gdppcr, trend lags(1)
```

Im-Pesaran-Shin unit-root test for gdp_{pcr}

Ho: All panels contain unit roots	Number of panels =	5
Ha: Some panels are stationary	Number of periods =	30
AR parameter: Panel-specific	Asymptotics: T,N -> Infinity	
Panel means: Included		sequentially
Time trend: Included		

ADF regressions: 1 lag

	Statistic	p-value
W-t-bar	-2.4881	0.0064

Q.3. CIPS for gdpcr and trend repectively

```
. xtcips gdpcr, maxl(5) bglag(1)
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for gdpcr
Deterministics chosen: constant

Dynamics: lags criterion decision General to Particular based on F joint test

Individual ti were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -4.932 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.21	-2.33	-2.57

```
. xtcips gdpcr, maxl(5) bglag(1) trend
```

Pesaran Panel Unit Root Test with cross-sectional and first difference mean included for gdpcr
Deterministics chosen: constant & trend

Dynamics: lags criterion decision General to Particular based on F joint test

Individual ti were truncated during the aggregation process

H0 (homogeneous non-stationary): $b_i = 0$ for all i

CIPS* = -5.023 N,T = (5,30)

	10%	5%	1%
Critical values at	-2.73	-2.86	-3.1

Q.4. Descriptive statistic for gdpocr

GDPCR				
	Percentiles	Smallest		
1%	-7.144644	-9.442021		
5%	-2.863621	-7.144644		
10%	-1.461764	-4.550338	Obs	150
25%	.1593923	-3.993821	Sum of Wgt.	150
50%	1.652237		Mean	1.88857
		Largest	Std. Dev.	3.098903
75%	3.778705	7.322171		
90%	5.036592	10.10178	Variance	9.6032
95%	5.815391	10.58504	Skewness	.4824689
99%	10.58504	17.49748	Kurtosis	7.752733

Q.5. Re-analyzed dynamics of capital flows, monetary policy and economic growth with the use Gross Domestic Product per Capita Growth Rate as the explanatory variable.

Q.5a. Lag length Length Criteria

```
. forval i = 1/5 {
2.
. ardl gdpocr fpi fdi bmg cbpd inf gcfg if (c_id==`i'), maxlag(1 1 1 1 1 1 1)
3.
. matrix list e(lags)
4.
. di
5.
. }
```

ARDL(1,1,0,0,0,0,0) regression

Sample:	1991 -	2019	Number of obs	=	29
			F(8, 20)	=	1.24
			Prob > F	=	0.3277
			R-squared	=	0.3314
			Adj R-squared	=	0.0640
Log likelihood = -75.454798			Root MSE	=	3.9304

gdpocr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpocr						
L1.	-.1885031	.2003474	-0.94	0.358	-.6064204	.2294142
fpi						
--.	-16.69765	21.62606	-0.77	0.449	-61.80882	28.41353
L1.	44.40224	25.40196	1.75	0.096	-8.585324	97.38981
fdi	.3387819	.4019152	0.84	0.409	-.4995985	1.177162
bmg	.0261624	.0511286	0.51	0.614	-.0804899	.1328147
cbpd	-.3387511	.4022123	-0.84	0.410	-1.177751	.500249
inf	.373833	.365625	1.02	0.319	-.3888473	1.136513
gcfg	-.0682683	.0469579	-1.45	0.162	-.1662208	.0296841
_cons	1.354359	2.402543	0.56	0.579	-3.657259	6.365977

```
e(lags) [1,7]
      gdpocr  fpi  fdi  bmg  cbpd  inf  gcfg
r1      1      1      0      0      0      0      0
```

ARDL(1,0,1,0,0,0,0) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(8, 20)	=	1.35
		Prob > F	=	0.2769
		R-squared	=	0.3505
		Adj R-squared	=	0.0907
Log likelihood = -49.804756		Root MSE	=	1.6230

gdpcr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpcr						
L1.	-.072382	.097888	-0.74	0.468	-.2765728	.1318089
fpi	-9.18234	22.04336	-0.42	0.681	-55.16399	36.79931
fdi						
--.	-.0879157	.1286529	-0.68	0.502	-.3562809	.1804495
L1.	-.2590325	.1408337	-1.84	0.081	-.5528065	.0347414
bmj	.0358967	.0444135	0.81	0.428	-.0567482	.1285416
cbpd	-.2064759	.1351696	-1.53	0.142	-.4884348	.075483
inf	.0187947	.1328703	0.14	0.889	-.2583679	.2959573
gcfg	-.0824629	.03779	-2.18	0.041	-.1612915	-.0036344
_cons	3.770477	1.064677	3.54	0.002	1.5496	5.991354

e(lags) [1,7]

	gdpcr	fpi	fdi	bmj	cbpd	inf	gcfg
r1	1	0	1	0	0	0	0

ARDL(1,0,0,0,0,0,0) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(7, 21)	=	0.93
		Prob > F	=	0.5019
		R-squared	=	0.2373
		Adj R-squared	=	-0.0169
Log likelihood = -63.15717		Root MSE	=	2.5100

gdpcr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpcr						
L1.	.1906224	.213464	0.89	0.382	-.2533002	.6345451
fpi	32.54071	318.3903	0.10	0.920	-629.5881	694.6695
fdi	-.4767104	.3131696	-1.52	0.143	-1.127982	.1745615
bmj	-.0195464	.0608879	-0.32	0.751	-.1461697	.1070769
cbpd	-.0577225	.2247207	-0.26	0.800	-.5250547	.4096098
inf	-.0363034	.0821078	-0.44	0.663	-.2070559	.1344492
gcfg	.0257527	.0317683	0.81	0.427	-.0403131	.0918185
_cons	4.297711	3.043303	1.41	0.173	-2.031184	10.62661

e(lags) [1,7]

	gdpcr	fpi	fdi	bmj	cbpd	inf	gcfg
r1	1	0	0	0	0	0	0

ARDL(1,0,0,0,0,0,0) regression

Sample: 1991 - 2019 Number of obs = 29
 F(7, 21) = 0.46
 Prob > F = 0.8543
 R-squared = 0.1322
 Adj R-squared = -0.1571
 Log likelihood = -70.435639 Root MSE = 3.2261

gdpocr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpocr						
l1.	.1163038	.2336899	0.50	0.624	-.3696809	.6022885
fpi	11.49803	10.43365	1.10	0.283	-10.19992	33.19599
fdi	-.0276579	.2575578	-0.11	0.916	-.5632786	.5079628
bmg	.0237832	.0593421	0.40	0.693	-.0996254	.1471918
cbpd	.0317015	.2697889	0.12	0.908	-.5293552	.5927582
inf	-.0483741	.271342	-0.18	0.860	-.6126608	.5159125
gcfg	.025418	.03945	0.64	0.526	-.0566228	.1074588
_cons	.7550068	1.981298	0.38	0.707	-3.365329	4.875342

e(lags) [1,7]
 gdpocr fpi fdi bmg cbpd inf gcfg
 r1 1 0 0 0 0 0 0

ARDL(1,0,0,0,0,1,0) regression

Sample: 1991 - 2019 Number of obs = 29
 F(8, 20) = 11.59
 Prob > F = 0.0000
 R-squared = 0.8226
 Adj R-squared = 0.7516
 Log likelihood = -37.660833 Root MSE = 1.0677

gdpocr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpocr						
l1.	.0868507	.1684761	0.52	0.612	-.2645842	.4382856
fpi	13.1856	10.09636	1.31	0.206	-7.875043	34.24624
fdi	-.2938302	.2790824	-1.05	0.305	-.8759859	.2883255
bmg	.1024751	.0536917	1.91	0.071	-.0095238	.2144741
cbpd	.0318431	.1134364	0.28	0.782	-.2047811	.2684673
inf						
--.	-.2051816	.1126192	-1.82	0.083	-.4401011	.0297379
l1.	-.2636384	.1459939	-1.81	0.086	-.5681763	.0408996
gcfg	.0650699	.0473766	1.37	0.185	-.0337559	.1638957
_cons	2.767343	1.008219	2.74	0.012	.6642356	4.870451

e(lags) [1,7]
 gdpocr fpi fdi bmg cbpd inf gcfg
 r1 1 0 0 0 0 1 0

Q.5b. The Pooled Mean Group Estimate

```
. xtmg d.gdpcr d.fpi d.fdi d.bmg d.cbpd d.inf d.gcfg, lr (l.gdpcr fpi fdi bmg cbpd inf gcfg) ec (ECT) replace pmg
```

```
Iteration 0: log likelihood = -315.39365
Iteration 1: log likelihood = -309.99113
Iteration 2: log likelihood = -308.17903
Iteration 3: log likelihood = -307.4596
Iteration 4: log likelihood = -302.72624
Iteration 5: log likelihood = -301.15435
Iteration 6: log likelihood = -301.14704
Iteration 7: log likelihood = -301.14704
```

Pooled Mean Group Regression
(Estimate results saved as pmg)

```
Panel Variable (i): countries      Number of obs      =      145
Time Variable (t): year           Number of groups   =       5
                                   Obs per group: min =      29
                                   avg =      29.0
                                   max =      29
```

```
Log Likelihood      = -301.147
```

D.gdpcr		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT							
	fpi	22.2895	8.384998	2.66	0.008	5.855204	38.72379
	fdi	-.3099822	.1154042	-2.69	0.007	-.5361702	-.0837941
	bmg	.0023477	.034209	0.07	0.945	-.0647007	.0693962
	cbpd	-.0866664	.1060339	-0.82	0.414	-.294489	.1211561
	inf	.0434742	.0908178	0.48	0.632	-.1345255	.2214738
	gcfg	.0063397	.0250892	0.25	0.801	-.0428342	.0555136
SR							
	ECT	-.7935757	.154502	-5.14	0.000	-1.096394	-.4907574
	fpi						
	D1.	-21.67731	12.06763	-1.80	0.072	-45.32943	1.974806
	fdi						
	D1.	.0514391	.1693591	0.30	0.761	-.2804986	.3833769
	bmg						
	D1.	.0357505	.0351213	1.02	0.309	-.0330861	.1045871
	cbpd						
	D1.	-.0248351	.0876652	-0.28	0.777	-.1966557	.1469855
	inf						
	D1.	.1171008	.0666007	1.76	0.079	-.0134342	.2476357
	gcfg						
	D1.	-.0248296	.0107535	-2.31	0.021	-.0459062	-.0037531
	_cons	2.329883	.506441	4.60	0.000	1.337277	3.322489

Q.5c. The Mean Group Estimate

```
. xtmgm d.gdpcr d.fpi d.fdi d.bmg d.cbpd d.inf d.gcfg, lr (l.gdpcr fpi fdi bmg cbpd inf gcfg) ec (ECT) replace mg
```

Mean Group Estimation: Error Correction Form
(Estimate results saved as mg)

D.gdpcr		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT	fpi	91.23656	76.58347	1.19	0.234	-58.86428	241.3374
	fdi	-.1882526	.1922983	-0.98	0.328	-.5651503	.1886452
	bmg	-.0175297	.0474401	-0.37	0.712	-.1105106	.0754512
	cbpd	-.205893	.1315799	-1.56	0.118	-.4637848	.0519988
	inf	.0196674	.1443322	0.14	0.892	-.2632185	.3025533
	gcfg	.0377964	.035824	1.06	0.291	-.0324173	.1080101
SR	ECT	-.9970764	.0533949	-18.67	0.000	-1.101728	-.8924243
	fpi						
	D1.	-71.59681	58.55349	-1.22	0.221	-186.3595	43.16592
	fdi						
	D1.	.1480694	.1407479	1.05	0.293	-.1277913	.4239301
	bmg						
	D1.	.0158158	.0105187	1.50	0.133	-.0048005	.0364322
	cbpd						
	D1.	.2364587	.2111941	1.12	0.263	-.1774741	.6503915
	inf						
	D1.	.0444673	.1214833	0.37	0.714	-.1936355	.2825701
	gcfg						
	D1.	-.0394319	.019105	-2.06	0.039	-.0768769	-.0019869
_cons		3.685308	1.307194	2.82	0.005	1.123254	6.247361

Q.5d. The hausman Test

```
. hausman mg pmg, sigmamore
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) mg	(B) pmg		
fpi	91.23656	22.2895	68.94706	89.29877
fdi	-.1882526	-.3099822	.1217296	.1933971
bmg	-.0175297	.0023477	-.0198774	.0437796
cbpd	-.205893	-.0866664	-.1192266	.1118213
inf	.0196674	.0434742	-.0238068	.1425671
gcfg	.0377964	.0063397	.0314567	.0336275

b = consistent under Ho and Ha; obtained from xtmgm

B = inconsistent under Ha, efficient under Ho; obtained from xtmgm

Test: Ho: difference in coefficients not systematic

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 11.20
Prob>chi2 = 0.0824
(V_b-V_B is not positive definite)
```

Q.5e. Cross-section dependence test

```
. xtcsi gdpcr fpi fdi bmg cbpd inf gcfg, trend
```

Bias-adjusted LM test of error cross-section independence

H0: Cov(u_{it}, u_{jt}) = 0 for all t and $i \neq j$

Test	Statistic	p-value
LM	17.32	0.0676
LM adj*	3.418	0.0006
LM CD*	3.277	0.0011

*two-sided test

Q.5f. Dynamics Internalizing Cross-Sectional Dependence (Xtdcce2-cce)

	(1) xtpmg - mg	(2) xtdcce2 - mg	(3) xtdcce2 - mg	(4) xtdcce2 - cce
ec				
fpi	22.29** (8.385)	22.20 (53.69)	20.37 (48.05)	23.21 (253.9)
fdi	-0.310** (0.115)	-0.305*** (0.0865)	-0.280** (0.0834)	-0.565 (0.380)
bmg	0.00235 (0.0342)	0.00287 (0.0369)	0.00263 (0.0429)	-0.0162 (0.0711)
cbpd	-0.0867 (0.106)	-0.0517 (0.254)	-0.0475 (0.233)	0.0841 (1.214)
inf	0.0435 (0.0908)	-0.0377 (0.138)	-0.0346 (0.119)	-0.0598 (0.601)
gcfg	0.00634 (0.0251)	0.0416* (0.0199)	0.0382 (0.0212)	0.0616 (0.0394)
SR				
ec	-0.794*** (0.155)	-0.918*** (0.0624)	-0.918*** (0.0601)	-0.451 (0.283)
D.fpi	-21.68 (12.07)	-21.48* (9.226)	-21.48* (9.226)	50.67 (74.66)
D.fdi	0.0514 (0.169)	0.0807 (0.136)	0.0807 (0.136)	0.0292 (0.190)
D.bmg	0.0358 (0.0351)	0.0311 (0.0333)	0.0311 (0.0333)	0.0797* (0.0342)
D.cbpd	-0.0248 (0.0877)	-0.0478 (0.0656)	-0.0478 (0.0656)	-0.0440 (0.195)
D.inf	0.117 (0.0666)	0.207** (0.0711)	0.207** (0.0711)	0.0287 (0.103)
D.gcfg	-0.0248* (0.0108)	-0.0491*** (0.0141)	-0.0491*** (0.0141)	-0.0752*** (0.0175)
_cons	2.330*** (0.506)			
N	145	145	145	145
cd		5.225	5.225	0.553
cdp		0.000000174	0.000000174	0.580

Standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

.

Q.5g. The Dynamic Fixed Effect Regression

```
. xtpmg d.gdpcr d.fpi d.fdi d.bmg d.cbpd d.inf d.gcfg, lr (l.gdpcr fpi fdi bmg cbpd inf gcfg) ec (ECT) replace dfe
```

Dynamic Fixed Effects Regression: Estimated Error Correction Form
(Estimate results saved as DFE)

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT	fpi	19.40655	7.537393	2.57	0.010	4.633533	34.17957
	fdi	-.2176587	.138354	-1.57	0.116	-.4888275	.05351
	bmg	.0312966	.0321946	0.97	0.331	-.0318037	.094397
	cbpd	-.1113488	.1134091	-0.98	0.326	-.3336265	.1109289
	inf	-.0549356	.0971253	-0.57	0.572	-.2452977	.1354265
	gcfg	.027381	.025658	1.07	0.286	-.0229077	.0776697
SR	ECT	-.9861273	.079574	-12.39	0.000	-1.14209	-.8301651
	fpi D1.	-17.39184	8.427853	-2.06	0.039	-33.91013	-.8735569
	fdi D1.	.1332554	.1086827	1.23	0.220	-.0797588	.3462697
	bmg D1.	-.0106733	.0218846	-0.49	0.626	-.0535664	.0322198
	cbpd D1.	.0837091	.1095418	0.76	0.445	-.1309889	.2984071
	inf D1.	.0455057	.0658391	0.69	0.489	-.0835365	.1745479
	gcfg D1.	-.0293411	.0164008	-1.79	0.074	-.0614862	.0028039
	_cons	2.924872	.8250858	3.54	0.000	1.307733	4.54201

Q.5h. The hausman test

```
. hausman DFE pmg, sigmamore
```

	Coefficients			
	(b) DFE	(B) pmg	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
fpi	19.40655	22.2895	-2.882947	10.29597
fdi	-.2176587	-.3099822	.0923234	.2146809
bmg	.0312966	.0023477	.0289489	.0452379
cbpd	-.1113488	-.0866664	-.0246824	.1693294
inf	-.0549356	.0434742	-.0984098	.1450108
gcfg	.027381	.0063397	.0210413	.0375984

b = consistent under Ho and Ha; obtained from xtprmg

B = inconsistent under Ha, efficient under Ho; obtained from xtprmg

Test: Ho: difference in coefficients not systematic

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 2.40
Prob>chi2 = 0.8798
```

Q.5I. Re-examined dynamics having gdpcr as dependent variable with the use of CBPR as one of the explanatory variables

Q.5I (i). Lag Length Criteria

```
. forval i = 1/5 {
2.
. ardl gdpcr fpi fdi bmg cbpr inf if (c_id==`i'), maxlag(1 1 1 1 1 1)
3.
. matrix list e(lags)
4.
. di
5.
. }
```

ARDL(1,0,0,0,1,0) regression

Sample:	1991 -	2019	Number of obs	=	29
			F(7, 21)	=	0.91
			Prob > F	=	0.5144
			R-squared	=	0.2337
			Adj R-squared	=	-0.0218
Log likelihood = -77.433045			Root MSE	=	4.1064

gdpcr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpcr						
L1.	-.2544203	.198501	-1.28	0.214	-.6672258	.1583852
fpi	6.726323	21.31527	0.32	0.755	-37.6012	51.05385
fdi	.3838219	.3893963	0.99	0.336	-.4259721	1.193616
bmg	-.0333557	.0601396	-0.55	0.585	-.1584228	.0917114
cbpr						
--.	1.136474	.8144	1.40	0.177	-.5571639	2.830111
L1.	-1.240799	.6481781	-1.91	0.069	-2.58876	.1071609
inf	.0853188	.4768618	0.18	0.860	-.9063696	1.077007
_cons	3.328848	2.787822	1.19	0.246	-2.468746	9.126441

```
e(lags) [1,6]
gdpcr fpi fdi bmg cbpr inf
r1 1 0 0 0 1 0
```

ARDL(1,0,0,0,0) regression

Sample: 1991 - 2019 Number of obs = 29
 F(6, 22) = 0.51
 Prob > F = 0.7963
 R-squared = 0.1215
 Adj R-squared = -0.1181
 Log likelihood = -54.184143 Root MSE = 1.7997

gdpcr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpcr L1.	-.020487	.1051764	-0.19	0.847	-.2386094	.1976355
fpi	3.692541	23.35374	0.16	0.876	-44.74015	52.12524
fdi	-.1311468	.1418146	-0.92	0.365	-.4252523	.1629586
bmj	.0165652	.0477201	0.35	0.732	-.0824003	.1155307
cbpr	-.0166238	.1156468	-0.14	0.887	-.2564607	.2232131
inf	-.0884645	.1346936	-0.66	0.518	-.3678019	.1908729
_cons	2.859169	1.200835	2.38	0.026	.3687887	5.349549

e(lags)[1,6]
 gdpcr fpi fdi bmj cbpr inf
 r1 1 0 0 0 0 0

ARDL(1,0,0,0,0) regression

Sample: 1991 - 2019 Number of obs = 29
 F(6, 22) = 0.98
 Prob > F = 0.4599
 R-squared = 0.2115
 Adj R-squared = -0.0035
 Log likelihood = -63.63955 Root MSE = 2.4934

gdpcr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpcr L1.	.1870824	.2135815	0.88	0.391	-.2558586	.6300233
fpi	-54.19415	292.163	-0.19	0.855	-660.1032	551.7149
fdi	-.5684398	.2929707	-1.94	0.065	-1.176024	.0391442
bmj	-.0258127	.0579222	-0.45	0.660	-.1459359	.0943105
cbpr	-.0254587	.1794827	-0.14	0.888	-.3976831	.3467656
inf	-.034975	.0796804	-0.44	0.665	-.2002221	.1302721
_cons	4.668878	3.048768	1.53	0.140	-1.65388	10.99164

e(lags)[1,6]
 gdpcr fpi fdi bmj cbpr inf
 r1 1 0 0 0 0 0

ARDL(1,0,0,0,0,0) regression

Sample: 1991 - 2019

Number of obs = 29
F(6, 22) = 0.48
Prob > F = 0.8129
R-squared = 0.1167
Adj R-squared = -0.1242
Root MSE = 3.1799

Log likelihood = -70.692487

gdpocr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpocr						
L1.	.1413291	.2261694	0.62	0.538	-.3277175	.6103757
fpi	11.77497	9.718193	1.21	0.239	-8.379326	31.92927
fdi	.0366743	.2499133	0.15	0.885	-.4816141	.5549627
bmj	.022355	.0581499	0.38	0.704	-.0982405	.1429504
cbpr	.0522464	.1912492	0.27	0.787	-.3443802	.4488731
inf	-.0387679	.2350911	-0.16	0.871	-.5263169	.4487812
_cons	.2111985	2.028769	0.10	0.918	-3.99621	4.418608

e(lags) [1,6]

	gdpocr	fpi	fdi	bmj	cbpr	inf
r1	1	0	0	0	0	0

ARDL(1,0,0,0,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(7, 21) = 12.44
Prob > F = 0.0000
R-squared = 0.8057
Adj R-squared = 0.7409
Root MSE = 1.0904

Log likelihood = -38.978651

gdpocr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdpocr						
L1.	.1613558	.1592027	1.01	0.322	-.1697245	.492436
fpi	19.14158	9.171507	2.09	0.049	.0683914	38.21478
fdi	-.5048573	.2382616	-2.12	0.046	-1.000349	-.0093653
bmj	.1442896	.0492693	2.93	0.008	.0418286	.2467507
cbpr	.0083923	.0854071	0.10	0.923	-.1692216	.1860062
inf						
--.	-.2507696	.1082598	-2.32	0.031	-.4759081	-.0256311
L1.	-.2262499	.1376778	-1.64	0.115	-.5125665	.0600667
_cons	3.063867	1.003171	3.05	0.006	.9776595	5.150075

e(lags) [1,6]

	gdpocr	fpi	fdi	bmj	cbpr	inf
r1	1	0	0	0	0	1

.

Q.5I (ii). The Pooled Mean Group Estimate

```
. xtpmg d.gdpocr d.fpi d.fdi d.bmg d.cbpr d.inf, lr (l.gdpocr fpi fdi bmg cbpr inf) ec (ECT) replace pmg
```

```
Iteration 0: log likelihood = -321.00056
Iteration 1: log likelihood = -316.6413 (not concave)
Iteration 2: log likelihood = -309.17523
Iteration 3: log likelihood = -308.47616
Iteration 4: log likelihood = -308.47278
Iteration 5: log likelihood = -308.47278
```

Pooled Mean Group Regression
(Estimate results saved as pmg)

```
Panel Variable (i): countries      Number of obs      =      145
Time Variable (t): year           Number of groups   =       5
                                   Obs per group: min =      29
                                   avg =      29.0
                                   max =      29
```

```
Log Likelihood      = -308.4728
```

D.gdpocr		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT							
	fpi	20.78851	8.205308	2.53	0.011	4.706402	36.87062
	fdi	-.2718302	.1190647	-2.28	0.022	-.5051926	-.0384677
	bmg	.0068919	.0319516	0.22	0.829	-.0557321	.0695159
	cbpr	.0409701	.0799076	0.51	0.608	-.1156458	.1975861
	inf	-.0818834	.0935021	-0.88	0.381	-.2651441	.1013773
SR							
	ECT	-.7897667	.1716766	-4.60	0.000	-1.126247	-.4532867
	fpi						
	D1.	-28.73527	17.38366	-1.65	0.098	-62.80662	5.336078
	fdi						
	D1.	-.021579	.1484679	-0.15	0.884	-.3125707	.2694128
	bmg						
	D1.	.0288818	.0342953	0.84	0.400	-.0383357	.0960993
	cbpr						
	D1.	.0663169	.1157088	0.57	0.567	-.1604682	.2931019
	inf						
	D1.	.1430421	.0808493	1.77	0.077	-.0154197	.3015039
	_cons	2.080303	.4950015	4.20	0.000	1.110117	3.050488

Q.5I (iii). The Mean Group

```
. xtpmg d.gdpocr d.fpi d.fdi d.bmg d.cbpr d.inf, lr (l.gdpocr fpi fdi bmg cbpr inf) ec (ECT) replace mg
```

Mean Group Estimation: Error Correction Form
(Estimate results saved as mg)

D.gdpocr		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT							
	fpi	55.67331	39.44049	1.41	0.158	-21.62862	132.9752
	fdi	-.3171525	.1438929	-2.20	0.028	-.5991773	-.0351276
	bmg	.0261448	.0528607	0.49	0.621	-.0774603	.1297499
	cbpr	-.0320638	.0373246	-0.86	0.390	-.1052188	.0410911
	inf	-.1289289	.1124557	-1.15	0.252	-.3493381	.0914802
SR							
	ECT	-.932558	.0826621	-11.28	0.000	-1.094573	-.7705434
	fpi D1.	-57.70084	42.31657	-1.36	0.173	-140.6398	25.23812
	fdi D1.	.0540025	.090277	0.60	0.550	-.1229372	.2309423
	bmg D1.	.0070872	.0058749	1.21	0.228	-.0044275	.0186018
	cbpr D1.	.2098318	.1360521	1.54	0.123	-.0568255	.476489
	inf D1.	.1430839	.0591594	2.42	0.016	.0271335	.2590343
	_cons	3.178204	.8909863	3.57	0.000	1.431903	4.924505

Q.5I (iv). The hausman test

```
.
. hausman mg pmg, sigmamore
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) mg	(B) pmg		
fpi	55.67331	20.78851	34.8848	41.78025
fdi	-.3171525	-.2718302	-.0453223	.0997718
bmg	.0261448	.0068919	.0192529	.0472827
cbpr	-.0320638	.0409701	-.073034	.
inf	-.1289289	-.0818834	-.0470456	.0774336

b = consistent under Ho and Ha; obtained from xtpmg
B = inconsistent under Ha, efficient under Ho; obtained from xtpmg

Test: Ho: difference in coefficients not systematic

```
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 0.23
Prob>chi2 = 0.9988
(V_b-V_B is not positive definite)
```

Q.5I (V). The Dynamic Fixed Effect

```
. xtprog d.gdpcr d.fpi d.fdi d.bmg d.cbpr d.inf, lr (l.gdpcr fpi fdi bmg cbpr inf) ec (ECT) replace dfe
```

Dynamic Fixed Effects Regression: Estimated Error Correction Form
(Estimate results saved as DFE)

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT	fpi	20.68525	7.607355	2.72	0.007	5.775109	35.59539
	fdi	-.236198	.1377938	-1.71	0.087	-.5062688	.0338729
	bmg	.0338039	.0319382	1.06	0.290	-.0287939	.0964017
	cbpr	.0146874	.0866093	0.17	0.865	-.1550636	.1844384
	inf	-.1185876	.0928923	-1.28	0.202	-.3006532	.0634779
SR	ECT	-.9729165	.0777445	-12.51	0.000	-1.125293	-.82054
	fpi						
	D1.	-18.55562	8.411838	-2.21	0.027	-35.04252	-2.068717
	fdi						
	D1.	.1199866	.1094046	1.10	0.273	-.0944425	.3344158
	bmg						
	D1.	-.0077395	.0216068	-0.36	0.720	-.0500882	.0346091
	cbpr						
	D1.	.165658	.1347761	1.23	0.219	-.0984983	.4298144
	inf						
	D1.	.0627521	.0644542	0.97	0.330	-.0635757	.18908
	_cons	2.503201	.8433321	2.97	0.003	.8503006	4.156102

Q.5I. (VI). The LM Test

```
. xtcsi gdpcr fpi fdi bmg cbpr inf, trend
```

Bias-adjusted LM test of error cross-section independence

H_0 : $\text{Cov}(u_{it}, u_{jt}) = 0$ for all t and $i \neq j$

Test	Statistic	p-value
LM	14.88	0.1365
LM adj*	2.111	0.0347
LM CD*	3.075	0.0021

*two-sided test

Q.5I.(VII). Dynamics Internalizing Cross-Sectional Dependence (xtdcce2-cce)

```
. eststo xtpmg:qui xtpmg d.gdpcr d.fpi d.fdi d.bmg d.cbpr d.inf if year>=1990, lr(1.gdpcr fpi fdi bmg cbpr
.
. eststo xtdcce2_mg: qui xtdcce2 d.gdpcr d.fpi d.fdi d.bmg d.cbpr d.inf if year >= 1990, lr(1.gdpcr fpi f
.
. eststo xtdcce2_mg2: qui xtdcce2 d.gdpcr d.fpi d.fdi d.bmg d.cbpr d.inf if year >= 1990 , lr(1.gdpcr fpi
.
. eststo xtdcce2_cce: qui xtdcce2 d.gdpcr d.fpi d.fdi d.bmg d.cbpr d.inf if year >= 1990 ,lr(1.gdpcr fpi f
> ions(xtpmgnames)
.
. esttab xtpmg xtdcce2_mg xtdcce2_mg2 xtdcce2_cce, mtitles("xtpmg - mg" "xtdcce2 - mg" "xtdcce2 - mg" "xtdcce2 - cce")
```

	(1) xtpmg - mg	(2) xtdcce2 - mg	(3) xtdcce2 - mg	(4) xtdcce2 - cce
ec				
fpi	20.79* (8.205)	21.96 (25.22)	20.98 (22.53)	32.84 (105.5)
fdi	-0.272* (0.119)	-0.295* (0.117)	-0.282** (0.0913)	-0.469 (5.026)
bmg	0.00689 (0.0320)	0.0218 (0.0258)	0.0208 (0.0215)	-0.0511 (0.321)
cbpr	0.0410 (0.0799)	0.0204 (0.0892)	0.0195 (0.0760)	0.226 (2.618)
inf	-0.0819 (0.0935)	-0.108 (0.169)	-0.103 (0.140)	-0.175 (2.994)
SR				
ec	-0.790*** (0.172)	-0.955*** (0.119)	-0.955*** (0.117)	-0.411 (2.100)
D.fpi	-28.74 (17.38)	-24.40** (8.911)	-24.40** (8.911)	86.93 (98.73)
D.fdi	-0.0216 (0.148)	0.0778 (0.0800)	0.0778 (0.0800)	-0.0145 (0.227)
D.bmg	0.0289 (0.0343)	0.0106 (0.0236)	0.0106 (0.0236)	0.0489* (0.0186)
D.cbpr	0.0663 (0.116)	0.130 (0.0880)	0.130 (0.0880)	-0.300 (0.416)
D.inf	0.143 (0.0808)	0.196** (0.0609)	0.196** (0.0609)	0.145 (0.173)
_cons	2.080*** (0.495)			
N	145	145	145	140
cd		4.361	4.361	-0.487
cdp		0.0000130	0.0000130	0.626

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

.

R. The Dynamic Regressions

R. 1. Pooled Mean Group Regression

```
. xtpmg d.lgdpc d.fpi d.fdi d.bmg d.cbpd d.inf , lr (l.lgdpc fpi fdi l.bmg cbpd l.inf )ec (ECT) replace pmg full
```

```
Iteration 0:  log likelihood = 260.77436 (not concave)
Iteration 1:  log likelihood = 265.21785 (not concave)
Iteration 2:  log likelihood = 269.56211 (not concave)
Iteration 3:  log likelihood = 271.51207 (not concave)
Iteration 4:  log likelihood = 272.66843 (not concave)
Iteration 5:  log likelihood = 273.74086 (not concave)
Iteration 6:  log likelihood = 275.5399 (not concave)
Iteration 7:  log likelihood = 277.22574
Iteration 8:  log likelihood = 277.72831
Iteration 9:  log likelihood = 277.82538
Iteration 10: log likelihood = 277.82547
Iteration 11: log likelihood = 277.82547
```

Pooled Mean Group Regression
(Estimate results saved as PMG)

```
Panel Variable (i): country      Number of obs      =          145
Time Variable (t): year          Number of groups    =           5
                                Obs per group: min =          29
                                avg =         29.0
                                max =          29

                                Log Likelihood      = 277.8255
```

	D.lgdpc	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
ECT						
	fpi	2.542373	1.490966	1.71	0.088	-.3798675 5.464613
	fdi	-.0496381	.0125874	-3.94	0.000	-.0743089 -.0249673
	bmg					
	l1.	.0142817	.0046927	3.04	0.002	.0050843 .0234792
	cbpd	-.0580289	.0119961	-4.84	0.000	-.0815409 -.0345169
	inf					
	l1.	.0218775	.0135705	1.61	0.107	-.0047202 .0484752
country_1						
	ECT	-.0137782	.0300385	-0.46	0.646	-.0726526 .0450962
	fpi					
	D1.	-.2707687	.1983261	-1.37	0.172	-.6594807 .1179432
	fdi					
	D1.	-.0010404	.0027282	-0.38	0.703	-.0063875 .0043067
	bmg					
	D1.	.0003596	.0004426	0.81	0.416	-.0005078 .001227
	cbpd					
	D1.	-.0095649	.0042548	-2.25	0.025	-.0179041 -.0012257
	inf					
	D1.	.0076908	.0040969	1.88	0.060	-.000339 .0157207
	_cons	.0686391	.1143559	0.60	0.548	-.1554943 .2927725
country_2						
	ECT	-.2023352	.0443429	-4.56	0.000	-.2892458 -.1154246
	fpi					
	D1.	.056707	.2880418	0.20	0.844	-.5078445 .6212585
	fdi					
	D1.	.0048586	.0024194	2.01	0.045	.0001167 .0096004
	bmg					
	D1.	-.000494	.0007178	-0.69	0.491	-.0019009 .0009129
	cbpd					
	D1.	-.0028772	.0026266	-1.10	0.273	-.0080252 .0022708
	inf					
	D1.	-.0011546	.0021247	-0.54	0.587	-.005319 .0030098
	_cons	.7341659	.1641542	4.47	0.000	.4124295 1.055902

country_3							
	ECT	-.0714272	.0311899	-2.29	0.022	-.1325582	-.0102961
	fpi						
	D1.	1.137665	3.309224	0.34	0.731	-5.348294	7.623624
	fdi						
	D1.	-.0092593	.0038685	-2.39	0.017	-.0168414	-.0016771
	bmj						
	D1.	-.0002213	.0006425	-0.34	0.731	-.0014806	.001038
	cbpd						
	D1.	-.0060993	.0030519	-2.00	0.046	-.0120809	-.0001176
	inf						
	D1.	-.0005989	.0009036	-0.66	0.507	-.0023699	.0011721
	_cons	.2503527	.1034534	2.42	0.016	.0475878	.4531176
country_4							
	ECT	-.0822838	.0353202	-2.33	0.020	-.1515101	-.0130576
	fpi						
	D1.	-.2055827	.2139472	-0.96	0.337	-.6249114	.2137461
	fdi						
	D1.	.000131	.0027309	0.05	0.962	-.0052214	.0054834
	bmj						
	D1.	.0003436	.0005737	0.60	0.549	-.0007808	.001468
	cbpd						
	D1.	-.0042366	.0035638	-1.19	0.235	-.0112214	.0027483
	inf						
	D1.	.0021795	.002685	0.81	0.417	-.003083	.0074421
	_cons	.3120095	.1362295	2.29	0.022	.0450046	.5790143
country_5							
	ECT	-.1288999	.0534209	-2.41	0.016	-.233603	-.0241968
	fpi						
	D1.	-.0161394	.2675885	-0.06	0.952	-.5406032	.5083243
	fdi						
	D1.	.0021356	.0056759	0.38	0.707	-.008989	.0132602
	bmj						
	D1.	-.000136	.0014124	-0.10	0.923	-.0029043	.0026323
	cbpd						
	D1.	-.0032914	.0045195	-0.73	0.466	-.0121495	.0055667
	inf						
	D1.	-.0050939	.0044403	-1.15	0.251	-.0137968	.003609
	_cons	.5066338	.2098615	2.41	0.016	.0953129	.9179547

```
Panel Variable (i): country
Time Variable (t): year
```

Log Likelihood = 277.8255

•

R.2. Mean Group

```
. xtpmg d.lgdpc d.fpi d.fdi d.bmg d.cbpd d.inf, lr ( l.lgdpc fpi fdi l.bmg cbpd l.inf) ec (ECT) replace mg
```

Mean Group Estimation: Error Correction Form

(Estimate results saved as mg)

D.lgdpc	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]		
ECT							
fpi	189.8302	190.6679	1.00	0.319	-183.872	563.5323	
fdi	.0012365	.1118813	0.01	0.991	-.2180468	.2205199	
bmg							
L1.	.0918534	.0759928	1.21	0.227	-.0570898	.2407967	
cbpd	-.1739738	.1081016	-1.61	0.108	-.3858491	.0379015	
inf							
L1.	.2290489	.1609581	1.42	0.155	-.0864233	.5445211	
SR							
ECT	-.0894981	.0559526	-1.60	0.110	-.1991631	.020167	
fpi							
D1.	-.5007673	.5110086	-0.98	0.327	-1.502326	.5007912	
fdi							
D1.	-.0008081	.0029091	-0.28	0.781	-.0065098	.0048936	
bmg							
D1.	.0000117	.0005926	0.02	0.984	-.0011497	.001173	
cbpd							
D1.	-.0047146	.0008831	-5.34	0.000	-.0064454	-.0029838	
inf							
D1.	-.001417	.0017676	-0.80	0.423	-.0048815	.0020475	
_cons	.3390206	.2179003	1.56	0.120	-.0880562	.7660973	

R.3. The Hausman Test

```
. hausman mg pmg , sigmamore
```

Note: the rank of the differenced variance matrix (3) does not equal the number of coefficients being tested (5); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

—— Coefficients ——				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	mg	pmg	Difference	S.E.
fpi	189.8302	2.542373	187.2878	233.5941
fdi	.0012365	-.0496381	.0508746	.1364935
bmg				
l1.	.0918534	.0142817	.0775717	.0929851
cbpd	-.1739738	-.0580289	-.1159449	.1318975
inf				
l1.	.2290489	.0218775	.2071714	.1967322

b = consistent under Ho and Ha; obtained from xtmg

B = inconsistent under Ha, efficient under Ho; obtained from xtmg

Test: Ho: difference in coefficients not systematic

$$\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 3.34$$

$$\text{Prob} > \chi^2 = 0.3422$$

(V_b-V_B is not positive definite)

.

R.4.The Dynamic Fixed Effect

```
. xtpmg d.lgdpc d.fpi d.fdi d.bmg d.cbpd d.inf , lr (l.lgdpc fpi fdi l.bmg cbpd l.inf) ec (ECT) replace dfe
```

Dynamic Fixed Effects Regression: Estimated Error Correction Form
(Estimate results saved as DFE)

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT	fpi	4.198341	2.610391	1.61	0.108	-.9179302	9.314613
	fdi	-.0342807	.0343722	-1.00	0.319	-.101649	.0330875
	bmg						
	L1.	.011128	.0088374	1.26	0.208	-.006193	.0284489
	cbpd	-.0591396	.0282425	-2.09	0.036	-.1144939	-.0037853
	inf						
	L1.	.0206159	.0262481	0.79	0.432	-.0308295	.0720613
SR	ECT	-.0702646	.02976	-2.36	0.018	-.1285932	-.011936
	fpi						
	D1.	-.2206987	.1317982	-1.67	0.094	-.4790183	.037621
	fdi						
	D1.	-.0016077	.0017115	-0.94	0.348	-.0049622	.0017468
	bmg						
	D1.	.000069	.0003478	0.20	0.843	-.0006127	.0007506
	cbpd						
	D1.	-.005143	.0017384	-2.96	0.003	-.0085501	-.0017358
	inf						
	D1.	-.0002501	.0010687	-0.23	0.815	-.0023446	.0018444
	_cons	.2684092	.113015	2.37	0.018	.0469038	.4899146

R.5.The Hausman Test

```
. hausman DFE pmg , sigmamore
```

	—— Coefficients ——			
	(b) DFE	(B) pmg	(b-B) Difference	$\sqrt{\text{diag}(V_b - V_B)}$ S.E.
fpi	4.198341	2.542373	1.655969	.
fdi	-.0342807	-.0496381	.0153574	.
bmg				
L1.	.011128	.0142817	-.0031538	.
cbpd	-.0591396	-.0580289	-.0011107	.
inf				
L1.	.0206159	.0218775	-.0012616	.

b = consistent under Ho and Ha; obtained from xtprgm

B = inconsistent under Ha, efficient under Ho; obtained from xtprgm

Test: Ho: difference in coefficients not systematic

```
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = -4.31  chi2<0 ==> model fitted on these
                    data fails to meet the asymptotic
                    assumptions of the Hausman test;
                    see suest for a generalized test
```

S. Diagnostics

S.1. Multicollinearity Test

Variable	VIF	1/VIF
cbpd	1.45	0.689111
inf	1.39	0.718027
fdi	1.20	0.833999
fpi	1.19	0.842276
bmg	1.05	0.952944
Mean VIF	1.26	

.

S.2. Heteroskedasticity

```
. imtest, white

White's test for Ho: homoskedasticity
    against Ha: unrestricted heteroskedasticity

      chi2(20)      =      29.62
    Prob > chi2     =      0.0762

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	29.62	20	0.0762
Skewness	11.13	5	0.0489
Kurtosis	0.51	1	0.4756
Total	41.26	26	0.0292

.

S.3. Cross-sectional dependence

```
. xtcd f lgdpc fpi fdi inf cbpd bmg
```

xtcd test on variables lgdpc fpi fdi inf cbpd bmg

Panelvar: country

Timevar: year

Variable	CD-test	p-value	average joint T	mean ρ	mean abs(ρ)
lgdpc	16.886	0.000	30.00	0.97	0.97
fpi	.883	0.377	30.00	0.05	0.20
fdi	-.05	0.960	30.00	0.00	0.21
inf	10.333	0.000	30.00	0.60	0.60
cbpd	11	0.000	30.00	0.64	0.64
bmg	3.282	0.001	30.00	0.19	0.24

Notes: Under the null hypothesis of cross-section independence, $CD \sim N(0,1)$

P-values close to zero indicate data are correlated across panel groups.

.

T. Robustness check to account for the presence of cross sectional dependence

T.1. Optimal lag length selection

ARDL(1,1,1,0,1,1,1,0) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(13, 15)	=	71.19
		Prob > F	=	0.0000
		R-squared	=	0.9841
		Adj R-squared	=	0.9702
Log likelihood =	71.171784	Root MSE	=	0.0289

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.4168775	.1429781	2.92	0.011	.1121268	.7216281
fpi						
--.	-.1231656	.1620824	-0.76	0.459	-.4686361	.2223049
L1.	.3001903	.2103523	1.43	0.174	-.1481651	.7485457
fdi						
--.	.0037549	.0034049	1.10	0.287	-.0035024	.0110121
L1.	.0061659	.0027939	2.21	0.043	.0002109	.0121208
cbpd						
	.0006481	.0051476	0.13	0.901	-.0103237	.01162
bmj						
--.	-.0011577	.0007703	-1.50	0.154	-.0027996	.0004841
L1.	-.0011587	.0006135	-1.89	0.078	-.0024664	.000149
inf						
--.	-.0015723	.0042062	-0.37	0.714	-.0105377	.0073931
L1.	-.0085704	.0042359	-2.02	0.061	-.017599	.0004582
lmSCP						
--.	.1037199	.1671834	0.62	0.544	-.252623	.4600627
L1.	.3987319	.197061	2.02	0.061	-.0212937	.8187576
lreer						
--.	-1.196281	.592838	-2.02	0.062	-2.459886	.0673229
_cons	4.006223	1.341086	2.99	0.009	1.147765	6.864681

```
e(lags) [1,8]
      lgdpc    fpi    fdi    cbpd    bmj    inf    lmSCP    lreer
r1      1      1      1      0      1      1      1      0
```

ARDL(1,0,0,0,0,0,0,1) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(9, 19)	=	283.97
		Prob > F	=	0.0000
		R-squared	=	0.9926
		Adj R-squared	=	0.9891
Log likelihood =	78.867179	Root MSE	=	0.0197

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.8239647	.0449861	18.32	0.000	.7298077	.9181217
fpi						
--.	-.1837487	.2698969	-0.68	0.504	-.7486494	.381152
fdi						
--.	-.0023699	.0018165	-1.30	0.208	-.0061719	.001432
cbpd						
--.	-.001027	.0020047	-0.51	0.614	-.0052229	.0031689
bmj						
--.	.0001089	.0006172	0.18	0.862	-.0011829	.0014008
inf						
--.	-.0007816	.0016135	-0.48	0.634	-.0041586	.0025954
lmSCP						
--.	-.0050488	.0668049	-0.08	0.941	-.1448732	.1347755
lreer						
--.	2.291484	.2954836	7.76	0.000	1.67303	2.909938
L1.	-1.416083	.2880228	-4.92	0.000	-2.018922	-.8132448
_cons						
--.	-1.103774	.582528	-1.89	0.073	-2.323019	.1154713

```
e(lags) [1,8]
      lgdpc    fpi    fdi    cbpd    bmj    inf    lmSCP    lreer
r1      1      0      0      0      0      0      0      1
```

ARDL(1,0,0,0,0,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(9, 19) = 258.98
Prob > F = 0.0000
R-squared = 0.9919
Adj R-squared = 0.9881
Root MSE = 0.0208

Log likelihood = 77.334443

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9975734	.0281842	35.39	0.000	.9385832	1.056564
fpi	1.12438	2.584931	0.43	0.668	-4.285944	6.534703
fdi	-.0069033	.003122	-2.21	0.039	-.0134376	-.000369
cbpd	-.0007783	.0024177	-0.32	0.751	-.0058387	.0042821
bmg	-.0001184	.000486	-0.24	0.810	-.0011357	.0008988
inf	-.0002664	.0006723	-0.40	0.696	-.0016736	.0011408
lmscp	-.0285828	.0295323	-0.97	0.345	-.0903945	.0332289
lreer						
--.	.9437487	.1063222	8.88	0.000	.7212137	1.166284
L1.	-.9593624	.1121676	-8.55	0.000	-1.194132	-.724593
_cons	.1245251	.2053209	0.61	0.551	-.3052165	.5542667

e(lags)[1,8]

lgdpc	fpi	fdi	cbpd	bmg	inf	lmscp	lreer
r1	1	0	0	0	0	0	1

ARDL(1,0,0,0,0,1,0,1) regression

Sample: 1991 - 2019

Number of obs = 29
F(10, 18) = 140.46
Prob > F = 0.0000
R-squared = 0.9873
Adj R-squared = 0.9803
Root MSE = 0.0253

Log likelihood = 72.4316

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9652716	.0582705	16.57	0.000	.8428499	1.087693
fpi	.250698	.1058471	2.37	0.029	.0283214	.4730746
fdi	-.0019243	.0022615	-0.85	0.406	-.0066755	.0028269
cbpd	.005174	.0030797	1.68	0.110	-.0012962	.0116441
bmg	-.000474	.0004962	-0.96	0.352	-.0015165	.0005684
inf						
--.	-.000591	.0024293	-0.24	0.811	-.0056947	.0045127
L1.	-.0042176	.0020449	-2.06	0.054	-.0085136	.0000785
lmscp	-.0764371	.0907789	-0.84	0.411	-.2671565	.1142823
lreer						
--.	1.933072	.2612373	7.40	0.000	1.384232	2.481911
L1.	-1.181364	.2708706	-4.36	0.000	-1.750442	-.612286
_cons	-1.228579	.4569582	-2.69	0.015	-2.188612	-.2685451

e(lags)[1,8]

lgdpc	fpi	fdi	cbpd	bmg	inf	lmscp	lreer
r1	1	0	0	0	1	0	1

ARDL(1,0,1,0,1,0,1,1) regression

Sample: 1991 - 2019

Number of obs = 29

F(12, 16) = 119.33

Prob > F = 0.0000

R-squared = 0.9890

Adj R-squared = 0.9807

Log likelihood = 79.651548

Root MSE = 0.0209

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9934725	.0551055	18.03	0.000	.8766541	1.110291
fpi	.3946702	.1881059	2.10	0.052	-.0040965	.7934368
fdi						
--.	-.0038162	.0056859	-0.67	0.512	-.0158698	.0082374
L1.	-.0077183	.0051572	-1.50	0.154	-.0186511	.0032145
cbpd	-.0034836	.0025174	-1.38	0.185	-.0088203	.0018532
bmj						
--.	.0014283	.0009789	1.46	0.164	-.0006469	.0035035
L1.	.0026629	.0009828	2.71	0.015	.0005795	.0047463
inf	-.0031911	.0022982	-1.39	0.184	-.0080631	.0016809
lmscp						
--.	-.5281404	.2234895	-2.36	0.031	-1.001917	-.0543637
L1.	.519478	.2265424	2.29	0.036	.0392295	.9997265
lreer						
--.	1.255534	.1356892	9.25	0.000	.9678856	1.543182
L1.	-1.140892	.1184189	-9.63	0.000	-1.391929	-.8898554
_cons	-.1543455	.4073825	-0.38	0.710	-1.017958	.7092668

e(lags) [1,8]

	lgdpc	fpi	fdi	cbpd	bmj	inf	lmscp	lreer
r1	1	0	1	0	1	0	1	1

T.2. Accounting for cross sectional dependence

	(1) xtpmg - mg	(2) xtdcce2 - mg	(3) xtdcce2 - mg	(4) xtdcce2 - cce
ec				
fpi	0.652 (1.037)	1.922 (10.90)	0.137 (0.187)	-1.732 (630.5)
fdi	0.00242 (0.0159)	0.00386 (0.0850)	0.000275 (0.00242)	0.00713 (1.092)
inf	-0.0291** (0.0112)	-0.0473 (0.0556)	-0.00337*** (0.000952)	-0.0269 (0.568)
cbpd	-0.0563*** (0.0118)	-0.0110 (0.0606)	-0.000785 (0.00323)	-0.0423 (4.111)
bmg	0.0123* (0.00553)	0.00371 (0.0123)	0.000264 (0.000803)	0.00845 (0.195)
lmscp	-0.501 (0.334)	-0.338 (1.434)	-0.0241 (0.0852)	0.662 (16.73)
L.lreer	2.166*** (0.585)	3.015 (2.605)	0.215 (0.128)	1.356 (12.87)
SR				
ec	-0.0723*** (0.0201)	-0.0713 (0.669)	-0.0713 (0.0815)	-0.0420 (47.60)
D.fpi	0.473 (0.543)	0.294 (0.414)	0.294 (0.414)	0.863 (0.840)
D.fdi	-0.00111 (0.00101)	-0.00196*** (0.000487)	-0.00196*** (0.000487)	-0.00114*** (0.000227)
D.inf	0.00169 (0.00131)	0.00330** (0.00113)	0.00330** (0.00113)	0.000575 (0.000470)
D.cbpd	0.00196 (0.00234)	0.000363 (0.00147)	0.000363 (0.00147)	0.00172*** (0.000422)
D.bmg	-0.000900* (0.000432)	-0.000360** (0.000119)	-0.000360** (0.000119)	0.0000833 (0.000153)
D.lmscp	-0.167 (0.108)	-0.0803 (0.0627)	-0.0803 (0.0627)	-0.142*** (0.0334)
D.lreer	1.128** (0.431)	1.176** (0.439)	1.176** (0.439)	0.0863 (0.454)
_cons	0.0442* (0.0174)			
N	145	145	145	145
cd		5.842	5.842	-1.580
cdp		5.16e-09	5.16e-09	0.114

Standard errors in parentheses
 * p<0.05, ** p<0.01, *** p<0.001

.

U. Trend of Foreign Portfolio Investment and Foreign Direct Investment respectively

. regress fpi Trend

Source	SS	df	MS	Number of obs	=	150
				F(1, 148)	=	2.34
Model	.004400626	1	.004400626	Prob > F	=	0.1281
Residual	.27808751	148	.00187897	R-squared	=	0.0156
				Adj R-squared	=	0.0089
Total	.282488136	149	.001895894	Root MSE	=	.04335

fpi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Trend	-.0001251	.0000817	-1.53	0.128	-.0002866	.0000364
_cons	.0191071	.0071141	2.69	0.008	.0050488	.0331654

. regress fdi Trend

Source	SS	df	MS	Number of obs	=	150
				F(1, 148)	=	0.13
Model	.836837157	1	.836837157	Prob > F	=	0.7234
Residual	985.106882	148	6.65612758	R-squared	=	0.0008
				Adj R-squared	=	-0.0059
Total	985.94372	149	6.61707194	Root MSE	=	2.5799

fdi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Trend	.001725	.0048649	0.35	0.723	-.0078887	.0113386
_cons	2.571977	.423419	6.07	0.000	1.735249	3.408705

V. Thresholds

V.1. Threshold of fpi with respect to the log of Gross Domestic Product per capita

```
. xthreg lgdp pc bmg inf cbpd fdi, rx(fpi) qx(fpi) thnum(3) grid(400) trim(0.01 0.01 0.05) bs(300 300 300)
Estimating the threshold parameters: 1st ..... 2nd ..... 3rd ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for double threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for triple threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	0.1077	0.0878	0.1189
Th-21	0.0576	0.0419	0.0669
Th-22	0.0087	-0.0128	0.0096
Th-3	-0.0552	-0.0789	-0.0488

Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	2.5141	0.0210	6.80	0.0600	6.3675	6.9548	9.2651
Double	2.2394	0.0187	14.72	0.0100	9.7742	11.1756	14.1511
Triple	2.0649	0.0172	10.14	0.9933	45.2747	48.3650	53.0635

```
Fixed-effects (within) regression               Number of obs   =       150
Group variable: country                        Number of groups =        5

R-sq:  within = 0.5483                          Obs per group: min =       30
        between = 0.7406                          avg       =      30.0
        overall  = 0.4017                          max       =       30

                                F(8,137)         =      20.78
corr(u_i, Xb)  = 0.3131                          Prob > F       =      0.0000
```

lgdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bmg	-.0003467	.0009452	-0.37	0.714	-.0022157	.0015223
inf	-.0084062	.0028601	-2.94	0.004	-.014062	-.0027505
cbpd	-.0235482	.0039577	-5.95	0.000	-.0313744	-.015722
fdi	.0024813	.0047315	0.52	0.601	-.0068749	.0118375
_cat#c.fpi						
0	-.7373899	.8142311	-0.91	0.367	-2.347476	.8726962
1	-4.635233	1.088989	-4.26	0.000	-6.788634	-2.481833
2	5.337773	1.079576	4.94	0.000	3.202986	7.47256
3	.0416837	.3648465	0.11	0.909	-.6797751	.7631426
_cons	3.622731	.0354701	102.13	0.000	3.552591	3.69287
sigma_u	.28664201					
sigma_e	.12360781					
rho	.84320101	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 137) = 108.43 Prob > F = 0.0000

V.2. Threshold of fdi with respect to the log of Gross Domestic Product per capita

```
. xthreg lgdpc fpi bmg cbpr lgin lreer inf, rx(fdi) qx(fdi) thnum(1) grid(300) trim(0.01) bs(300)
Estimating the threshold parameters: 1st ..... Done
Bootstrap for single threshold
```

```
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	5.1176	4.9962	5.1213

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	1.0745	0.0090	4.07	0.3367	6.3211	7.1329	10.2753

```
Fixed-effects (within) regression          Number of obs   =       150
Group variable: country                   Number of groups =        5
```

```
R-sq:  within = 0.7647                      Obs per group: min =       30
        between = 0.7169                      avg =       30.0
        overall = 0.5705                      max =       30
```

```
corr(u_i, Xb) = 0.3690                      F(8,137)         =      55.64
                                                Prob > F         =      0.0000
```

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fpi	-.5097352	.2046812	-2.49	0.014	-.9144783	-.1049922
bmg	-.0001391	.0006802	-0.20	0.838	-.0014841	.001206
cbpr	-.0186202	.003054	-6.10	0.000	-.0246593	-.0125811
lgin	1.341541	.195501	6.86	0.000	.9549511	1.72813
lreer	1.306736	.1743114	7.50	0.000	.9620472	1.651425
inf	-.0000425	.0021213	-0.02	0.984	-.0042372	.0041522
_cat#c.fdi						
0	.0072352	.0052835	1.37	0.173	-.0032126	.0176829
1	-.000284	.0035003	-0.08	0.935	-.0072056	.0066377
_cons	-1.253614	.5926133	-2.12	0.036	-2.425466	-.0817618
sigma_u	.25603358					
sigma_e	.08921743					
rho	.89172315	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(4, 137) = 168.40          Prob > F = 0.0000
```

.

V.3. Threshold of central bank policy rate differential with respect to the log of Gross Domestic Product per capita

```
. xthreg lgdp pc bmg inf fpi fdi, rx(cbpd) qx(cbpd) thnum(1)grid(300)trim(0.01) bs(300)
Estimating the threshold parameters: 1st ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	6.7500	5.5200	7.0000

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	2.4420	0.0203	10.55	0.1367	11.3414	15.0479	17.9254

```
Fixed-effects (within) regression      Number of obs   =      150
Group variable: country                Number of groups =       5
```

```
R-sq:  within = 0.4730      Obs per group: min =      30
      between = 0.3204      avg      =     30.0
      overall  = 0.2387      max      =      30
```

```
corr(u_i, Xb) = 0.1524      F(6,139)      =     20.79
                          Prob > F      =     0.0000
```

lgdp c	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bmg	-.0008504	.0010083	-0.84	0.400	-.002844	.0011432
inf	-.0101966	.0030378	-3.36	0.001	-.0162028	-.0041904
fpi	-.3606598	.3003606	-1.20	0.232	-.9545261	.2332066
fdi	.0059009	.00497	1.19	0.237	-.0039257	.0157274
_cat#c.cbpd						
0	.0091067	.0107525	0.85	0.398	-.012153	.0303663
1	-.0150819	.0051168	-2.95	0.004	-.0251986	-.0049651
_cons	3.574662	.0507877	70.38	0.000	3.474246	3.675079
sigma_u	.31372275					
sigma_e	.13254449					
rho	.84853831	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(4, 139) = 145.32      Prob > F = 0.0000
```

.

V.4. Threshold of central bank policy rate differential with respect to foreign portfolio investment

```
. xthreg fpi bmg inf , rx(cbpd) qx(cbpd) thnum(1) grid(300) trim(0.01) bs(300)
Estimating the threshold parameters: 1st ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	2.5000	2.0000	2.7500

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	0.2062	0.0017	4.07	0.6267	12.4153	14.1432	18.9278

Fixed-effects (within) regression

Number of obs = 150

Group variable: country

Number of groups = 5

R-sq: within = 0.0346

Obs per group: min = 30

between = 0.0015

avg = 30.0

overall = 0.0230

max = 30

F(4,141) = 1.26

corr(u_i, Xb) = -0.0315

Prob > F = 0.2869

fpi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bmg	-.000046	.0002903	-0.16	0.874	-.0006198	.0005279
inf	.0001671	.0008727	0.19	0.848	-.0015581	.0018922
_cat#c.cbpd						
0	-.020598	.0092566	-2.23	0.028	-.0388977	-.0022984
1	-.001511	.0012707	-1.19	0.236	-.0040231	.0010011
_cons	.0228355	.0097961	2.33	0.021	.0034693	.0422018
sigma_u	.02413458					
sigma_e	.03823841					
rho	.28487858	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 141) = 11.45

Prob > F = 0.0000

.

V.5. Threshold of central bank policy rate differential with respect to foreign direct investment

```
. xthreg fdi bmg inf , rx(cbpd) qx(cbpd) thnum(1) grid(300) trim(0.01) bs(300)
Estimating the threshold parameters: 1st ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	10.1600	9.4150	10.2500

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	743.6067	6.1967	8.32	0.2233	12.3416	15.3750	22.6491

Fixed-effects (within) regression
Group variable: country

R-sq: within = 0.0731
between = 0.0112
overall = 0.0478

corr(u_i, Xb) = -0.0893

Number of obs = 150
Number of groups = 5
Obs per group: min = 30
avg = 30.0
max = 30
F(4,141) = 2.78
Prob > F = 0.0292

fdi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bmg	.0139101	.0175092	0.79	0.428	-.0207044	.0485245
inf	-.0533957	.0526595	-1.01	0.312	-.1574998	.0507085
_cat#c.cbpd						
0	.3202283	.1089642	2.94	0.004	.1048135	.5356431
1	.1464941	.0750103	1.95	0.053	-.001796	.2947843
_cons	.9602062	.7142311	1.34	0.181	-.4517797	2.372192
sigma_u	1.2583039					
sigma_e	2.3068291					
rho	.22930875	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 141) = 8.69 Prob > F = 0.0000

.

V.6. The Threshold of broad money growth with respect to foreign direct investment

```
. xthreg fdi cbpd inf , rx(bmg) qx(bmg) thnum(3) grid(400) trim(0.01 0.01 0.05) bs(300 300 300)
Estimating the threshold parameters: 1st ..... 2nd ..... 3rd ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for double threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for triple threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	-14.4359	.	.
Th-21	-14.4359	.	.
Th-22	10.5848	10.5497	10.6941
Th-3	13.5643	13.3506	13.5792

Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	718.0720	5.9839	12.88	0.0000	5.4382	7.1507	9.1723
Double	681.4822	5.6790	6.44	0.0867	6.0577	7.6168	9.2478
Triple	657.4958	5.4791	4.38	0.6233	13.0478	15.6976	24.2155

Fixed-effects (within) regression
Group variable: country

Number of obs = 150
Number of groups = 5

R-sq: within = 0.1774
between = 0.0315
overall = 0.1506

Obs per group: min = 30
avg = 30.0
max = 30

corr(u_i, Xb) = 0.0080

F(6,139) = 5.00
Prob > F = 0.0001

fdi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
cbpd	.0733599	.0686499	1.07	0.287	-.0623732	.209093
inf	-.0533029	.0501452	-1.06	0.290	-.1524488	.045843
_cat#c.bmg						
0	.6317	.1573729	4.01	0.000	.3205459	.9428541
1	-.1053841	.0547483	-1.92	0.056	-.2136312	.0028629
2	.082324	.049403	1.67	0.098	-.0153544	.1800025
3	-.0073863	.0175831	-0.42	0.675	-.0421513	.0273787
_cons	2.756702	.5616893	4.91	0.000	1.646142	3.867261
sigma_u	1.1958352					
sigma_e	2.1886846					
rho	.22989367	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 139) = 8.77

Prob > F = 0.0000

.

V.7. The Threshold of broad money growth with respect to foreign portfolio investment

```
. xthreg fpi cbpd inf , rx(bmg) qx(bmg) thnum(1) grid(300) trim(0.01) bs(300)
```

Estimating the threshold parameters: 1st Done

Bootstrap for single threshold

```
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	22.5159	22.3672	22.5890

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	0.2087	0.0017	2.57	0.6033	6.3417	7.9276	10.5180

Fixed-effects (within) regression

Number of obs = 150

Group variable: country

Number of groups = 5

R-sq: within = 0.0112

Obs per group: min = 30

between = 0.1870

avg = 30.0

overall = 0.0004

max = 30

F(4,141) = 0.40

corr(u_i, Xb) = -0.1533

Prob > F = 0.8090

fpi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
cbpd	-.0008773	.0012407	-0.71	0.481	-.0033302	.0015755
inf	.0002476	.0008938	0.28	0.782	-.0015195	.0020146
_cat#c.bmg						
0	.0004573	.0005167	0.89	0.378	-.0005642	.0014788
1	-.0000782	.0002964	-0.26	0.792	-.0006641	.0005076
_cons	.0112791	.0091987	1.23	0.222	-.0069062	.0294643
sigma_u	.02465197					
sigma_e	.03869967					
rho	.28865022	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 141) = 11.36

Prob > F = 0.0000

.

W. Panel Causality test

W.1. i. Causality of the log of Gross Domestic Product per capita and foreign direct investment

ii. Causality of the log of Gross Domestic Product per capita and foreign portfolio investment

```
. xtgcause lgdpdc fdi , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).
```

```
W-bar = 7.2863
```

```
Z-bar = 5.9103 (p-value* = 0.0000, 95% critical value = 2.4144)
```

```
Z-bar tilde = 4.7280 (p-value* = 0.0000, 95% critical value = 1.8269)
```

```
-----  
H0: fdi does not Granger-cause lgdpdc.
```

```
H1: fdi does Granger-cause lgdpdc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

```
. xtgcause lgdpdc fpi , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.7800
```

```
Z-bar = 2.8144 (p-value* = 0.0300, 95% critical value = 2.6325)
```

```
Z-bar tilde = 2.3230 (p-value* = 0.0300, 95% critical value = 2.1655)
```

```
-----  
H0: fpi does not Granger-cause lgdpdc.
```

```
H1: fpi does Granger-cause lgdpdc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.2. Causality of the log of Gross Domestic Product per capita and central bank policy rate differential

```
. xtgcause lgdpc cbpd , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 0.6263
```

```
Z-bar = -0.5909 (p-value* = 0.6200, 95% critical value = 5.7488)
```

```
Z-bar tilde = -0.6258 (p-value* = 0.5700, 95% critical value = 4.8639)
```

```
-----  
H0: cbpd does not Granger-cause lgdpc.
```

```
H1: cbpd does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.3. Causality of the log of Gross Domestic Product per capita and the log of real exchange rate

```
. xtgcause lgdpc lreer , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).
```

```
W-bar = 5.8453
```

```
Z-bar = 4.2991 (p-value* = 0.0400, 95% critical value = 3.8266)
```

```
Z-bar tilde = 3.3910 (p-value* = 0.0400, 95% critical value = 2.9988)
```

```
-----  
H0: lreer does not Granger-cause lgdpc.
```

```
H1: lreer does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.4.i. Causality of the log of Gross Domestic Product per capita and inflation rate

ii.Causality of the log of Gross Domestic Product per capita and the log of official aid and development assistance

```
. xtgcause lgdpc inf , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----
```

```
Bootstrap replications (100)
```

```
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          2.0864
```

```
Z-bar =          1.7177   (p-value* = 0.2200, 95% critical value = 5.3261)
```

```
Z-bar tilde =     1.3733   (p-value* = 0.2200, 95% critical value = 4.4979)
```

```
-----
```

```
H0: inf does not Granger-cause lgdpc.
```

```
H1: inf does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

```
. xtgcause lgdpc lfda , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----
```

```
Bootstrap replications (100)
```

```
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          0.6475
```

```
Z-bar =          -0.5573   (p-value* = 0.6700, 95% critical value = 4.6060)
```

```
Z-bar tilde =     -0.5967   (p-value* = 0.6300, 95% critical value = 3.8744)
```

```
-----
```

```
H0: lfda does not Granger-cause lgdpc.
```

```
H1: lfda does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.5. i. Causality of the log of Gross Domestic Product per capita and the log of inward remittances

ii. Causality of foreign portfolio investment and central bank policy rate differential

```
. xtgcause lgdpc linr , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          1.2903
```

```
Z-bar =          0.4590   (p-value* = 0.7000, 95% critical value = 4.5487)
```

```
Z-bar tilde =     0.2834   (p-value* = 0.7400, 95% critical value = 3.8248)  
-----
```

```
H0: linr does not Granger-cause lgdpc.
```

```
H1: linr does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

```
. xtgcause fpi cbpd , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          2.3816
```

```
Z-bar =          2.1845   (p-value* = 0.1100, 95% critical value = 3.4305)
```

```
Z-bar tilde =     1.7775   (p-value* = 0.1100, 95% critical value = 2.8564)  
-----
```

```
H0: cbpd does not Granger-cause fpi.
```

```
H1: cbpd does Granger-cause fpi for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.6. i. Causality of foreign direct investment and central bank policy rate differential

ii. Causality of the log of gross domestic product per capita and the log of globalization index

```
. xtgcause fdi cbpd , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 1.4935

Z-bar = 0.7803 (p-value* = 0.4900, 95% critical value = 2.3587)

Z-bar tilde = 0.5616 (p-value* = 0.6000, 95% critical value = 1.9283)

H0: cbpd does not Granger-cause fdi.

H1: cbpd does Granger-cause fdi for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

```
. xtgcause lgdpc lgin , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 8 (lags tested: 1 to 8).

W-bar = 35.7193

Z-bar = 15.4956 (p-value* = 0.0700, 95% critical value = 19.2123)

Z-bar tilde = 2.2639 (p-value* = 0.0700, 95% critical value = 2.9363)

H0: lgin does not Granger-cause lgdpc.

H1: lgin does Granger-cause lgdpc for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.7. i. Causality of central bank policy rate differential and inflation rate.

ii. Causality of inflation rate and broad money growth

```
. xtgcause cbpd inf , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 8 (lags tested: 1 to 8).

W-bar = 24.1704

Z-bar = 9.0395 (p-value* = 0.1300, 95% critical value = 12.4105)

Z-bar tilde = 1.0960 (p-value* = 0.1300, 95% critical value = 1.7058)

H0: inf does not Granger-cause cbpd.

H1: inf does Granger-cause cbpd for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

```
. xtgcause inf bmg , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 2.8753

Z-bar = 2.9652 (p-value* = 0.0400, 95% critical value = 2.4811)

Z-bar tilde = 2.4535 (p-value* = 0.0400, 95% critical value = 2.0343)

H0: bmg does not Granger-cause inf.

H1: bmg does Granger-cause inf for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.8. i. The causality of foreign portfolio investment and broad money growth

ii. The causality of foreign direct investment and broad money growth

```
. xtgcause fpi bmg , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 0.8784

Z-bar = -0.1923 (p-value* = 0.8300, 95% critical value = 2.3800)

Z-bar tilde = -0.2806 (p-value* = 0.7300, 95% critical value = 1.9468)

H0: bmg does not Granger-cause fpi.

H1: bmg does Granger-cause fpi for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

```
. xtgcause fdi bmg , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 1.2283

Z-bar = 0.3610 (p-value* = 0.7500, 95% critical value = 2.4847)

Z-bar tilde = 0.1985 (p-value* = 0.8500, 95% critical value = 2.0375)

H0: bmg does not Granger-cause fdi.

H1: bmg does Granger-cause fdi for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.9. i. The causality of the log of gross domestic product per capita and the log of monetary sector credit to the private sector

ii. The causality of the log of gross domestic product per capita and the log of gross capital formation growth rate.

```
. xtgcause lgdpc lmscp , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 8 (lags tested: 1 to 8).
```

```
W-bar =          34.0476
```

```
Z-bar =          14.5611   (p-value* = 0.1400, 95% critical value = 23.1948)
```

```
Z-bar tilde =       2.0948   (p-value* = 0.1400, 95% critical value = 3.6567)  
-----
```

```
H0: lmscp does not Granger-cause lgdpc.
```

```
H1: lmscp does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
. xtgcause lgdpc gcfg , lags(bic) bootstrap breps(100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          0.9582
```

```
Z-bar =          -0.0661   (p-value* = 0.9400, 95% critical value = 1.9811)
```

```
Z-bar tilde =     -0.1713   (p-value* = 0.8300, 95% critical value = 1.6014)  
-----
```

```
H0: gcfg does not Granger-cause lgdpc.
```

```
H1: gcfg does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```


W.10. i. The causality of foreign direct investment and the log of gross domestic product per capita

ii. The causality of foreign portfolio investment and the log of gross domestic product per capita

```
. xtgcause fdi lgdpc , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 1.8508

Z-bar = 1.3452 (p-value* = 0.1800, 95% critical value = 2.8851)

Z-bar tilde = 1.0507 (p-value* = 0.2100, 95% critical value = 2.3842)

H0: lgdpc does not Granger-cause fdi.

H1: lgdpc does Granger-cause fdi for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

```
. xtgcause fpi lgdpc , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 1.2720

Z-bar = 0.4300 (p-value* = 0.6200, 95% critical value = 3.6610)

Z-bar tilde = 0.2582 (p-value* = 0.7400, 95% critical value = 3.0560)

H0: lgdpc does not Granger-cause fpi.

H1: lgdpc does Granger-cause fpi for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.11. i. The causality of central bank policy rate differential and the log of gross domestic product per capita

ii. The causality of the log of gross domestic product per capita and broad money growth.

```
. xtgcause cbpd lgdpc , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 4.7549

Z-bar = 5.9371 (p-value* = 0.0200, 95% critical value = 4.7417)

Z-bar tilde = 5.0270 (p-value* = 0.0200, 95% critical value = 3.9919)

H0: lgdpc does not Granger-cause cbpd.

H1: lgdpc does Granger-cause cbpd for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

```
. xtgcause lgdpc bmg , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 0.8982

Z-bar = -0.1610 (p-value* = 0.9100, 95% critical value = 2.8674)

Z-bar tilde = -0.2535 (p-value* = 0.8400, 95% critical value = 2.3689)

H0: bmg does not Granger-cause lgdpc.

H1: bmg does Granger-cause lgdpc for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.12. i. The causality of broad money growth and the log of gross domestic product per capita

ii. The causality of broad money growth and foreign portfolio investment.

```
. xtgcause bmg lgdpc , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 8 (lags tested: 1 to 8).

W-bar = 28.8510

Z-bar = 11.6561 (p-value* = 0.0500, 95% critical value = 13.7848)

Z-bar tilde = 1.5693 (p-value* = 0.0500, 95% critical value = 1.9544)

H0: lgdpc does not Granger-cause bmg.

H1: lgdpc does Granger-cause bmg for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

```
. xtgcause bmg fpi , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 2.0637

Z-bar = 1.6818 (p-value* = 0.0900, 95% critical value = 2.5361)

Z-bar tilde = 1.3422 (p-value* = 0.1100, 95% critical value = 2.0820)

H0: fpi does not Granger-cause bmg.

H1: fpi does Granger-cause bmg for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

W.13. i. The causality of broad money growth and foreign direct investment

ii. The causality of central bank policy rate differential and foreign portfolio investment

```
. xtgcause bmg fdi , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 0.3700

Z-bar = -0.9961 (p-value* = 0.3500, 95% critical value = 2.8663)

Z-bar tilde = -0.9767 (p-value* = 0.2900, 95% critical value = 2.3679)

H0: fdi does not Granger-cause bmg.

H1: fdi does Granger-cause bmg for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

```
. xtgcause cbpd fpi , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 1.8991

Z-bar = 1.4217 (p-value* = 0.2300, 95% critical value = 3.0476)

Z-bar tilde = 1.1170 (p-value* = 0.2600, 95% critical value = 2.5249)

H0: fpi does not Granger-cause cbpd.

H1: fpi does Granger-cause cbpd for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.14. The causality of central bank policy rate differential and foreign direct investment

```
. xtgcause cbpd fdi , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 0.4543

Z-bar = -0.8628 (p-value* = 0.4400, 95% critical value = 3.3525)

Z-bar tilde = -0.8612 (p-value* = 0.3700, 95% critical value = 2.7889)

H0: fdi does not Granger-cause cbpd.

H1: fdi does Granger-cause cbpd for at least one panelvar (country).

*p-values computed using 100 bootstrap replications.

.

W.15. The causality of the log of real exchange rate and the log of GDP per capita

```
. xtgcause lreer lgdpc, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 2 (lags tested: 1 to 8).

W-bar = 3.3510

Z-bar = 1.5105 (p-value* = 0.3500, 95% critical value = 5.8022)

Z-bar tilde = 1.0767 (p-value* = 0.4100, 95% critical value = 4.6383)

H0: lgdpc does not Granger-cause lreer.

H1: lgdpc does Granger-cause lreer for at least one panelvar (countries).

*p-values computed using 100 bootstrap replications.

W.16. The causality of inflation rate and the log of GDP per capita

```
. xtgcause inf lgdp, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).
W-bar =          5.5134
Z-bar =          3.9281   (p-value* = 0.0700, 95% critical value = 4.5208)
Z-bar tilde =     3.0831   (p-value* = 0.0700, 95% critical value = 3.5749)
-----
H0: lgdp does not Granger-cause inf.
H1: lgdp does Granger-cause inf for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.17. The causality of the log of official aid and development assistance and the log of GDP per capita

```
. xtgcause lfda lgdp, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          1.8262
Z-bar =          1.3063   (p-value* = 0.4800, 95% critical value = 5.8577)
Z-bar tilde =     1.0170   (p-value* = 0.5100, 95% critical value = 4.9582)
-----
H0: lgdp does not Granger-cause lfda.
H1: lgdp does Granger-cause lfda for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.18. The causality of the log of inward remittances and the log of GDP per capita

```
. xtgcause linr lgdp, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 8 (lags tested: 1 to 8).
W-bar =          17.8257
Z-bar =          5.4927   (p-value* = 0.4100, 95% critical value = 14.9264)
Z-bar tilde =     0.4543   (p-value* = 0.5000, 95% critical value = 2.1609)
-----
H0: lgdp does not Granger-cause linr.
H1: lgdp does Granger-cause linr for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

.

W.19. The causality of the log of globalization Index and the log of GDP per capita

```
. xtgcause lgin lgdpc, lags (bic) bootstrap breps (100) seed (18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 8 (lags tested: 1 to 8).
```

```
W-bar = 19.0912
```

```
Z-bar = 6.2002 (p-value* = 0.2400, 95% critical value = 14.5198)
```

```
Z-bar tilde = 0.5823 (p-value* = 0.3400, 95% critical value = 2.0874)  
-----
```

```
H0: lgdpc does not Granger-cause lgin.
```

```
H1: lgdpc does Granger-cause lgin for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.20. The causality of inflation rate and central bank policy rate differential

```
. xtgcause inf cbpd, lags (bic) bootstrap breps (100) seed (18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.4344
```

```
Z-bar = 2.2679 (p-value* = 0.1400, 95% critical value = 3.5605)
```

```
Z-bar tilde = 1.8498 (p-value* = 0.1400, 95% critical value = 2.9690)  
-----
```

```
H0: cbpd does not Granger-cause inf.
```

```
H1: cbpd does Granger-cause inf for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.21. The causality of broad money growth rate and inflation rate

```
. xtgcause bmg inf, lags (bic) bootstrap breps (100) seed (18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 1.2189
```

```
Z-bar = 0.3461 (p-value* = 0.6600, 95% critical value = 2.2017)
```

```
Z-bar tilde = 0.1856 (p-value* = 0.8400, 95% critical value = 1.7924)  
-----
```

```
H0: inf does not Granger-cause bmg.
```

```
H1: inf does Granger-cause bmg for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.22. The causality between the log of monetary sector credit to the private sector and the log of GDP per capita

```
. xtgcause lmscp lgdpc, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.7176
```

```
Z-bar = 2.7158 (p-value* = 0.3400, 95% critical value = 5.8759)
```

```
Z-bar tilde = 2.2375 (p-value* = 0.3400, 95% critical value = 4.9740)  
-----
```

```
H0: lgdpc does not Granger-cause lmscp.
```

```
H1: lgdpc does Granger-cause lmscp for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.23. The causality between gross capital formation growth rate and the log of GDP per capita

```
. xtgcause gcfg lgdpc, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 0.8527
```

```
Z-bar = -0.2329 (p-value* = 0.9000, 95% critical value = 1.9730)
```

```
Z-bar tilde = -0.3158 (p-value* = 0.7800, 95% critical value = 1.5944)  
-----
```

```
H0: lgdpc does not Granger-cause gcfg.
```

```
H1: lgdpc does Granger-cause gcfg for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.24. The causality between foreign portfolio investment and the log of real exchange rate

```
. xtgcause fpi lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 0.6626
```

```
Z-bar = -0.5335 (p-value* = 0.5700, 95% critical value = 3.4283)
```

```
Z-bar tilde = -0.5761 (p-value* = 0.4800, 95% critical value = 2.8545)  
-----
```

```
H0: lreer does not Granger-cause fpi.
```

```
H1: lreer does Granger-cause fpi for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```


W.25. The causality between the log of real exchange rate and foreign portfolio investment

```
. xtgcause lreer fpi, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).
W-bar =          4.3608
Z-bar =          2.6394    (p-value* = 0.0600, 95% critical value = 2.7861)
Z-bar tilde =      2.0136    (p-value* = 0.0600, 95% critical value = 2.1353)
-----
H0: fpi does not Granger-cause lreer.
H1: fpi does Granger-cause lreer for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.

.
```

W.26. The causality between foreign direct investment and and the log of real exchange rate

```
. xtgcause fdi lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          2.1878
Z-bar =          1.8781    (p-value* = 0.1000, 95% critical value = 3.1164)
Z-bar tilde =      1.5122    (p-value* = 0.1000, 95% critical value = 2.5844)
-----
H0: lreer does not Granger-cause fdi.
H1: lreer does Granger-cause fdi for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.

.
```

W.27 The causality between the log of real exchange rate and foreign direct investment

```
. xtgcause lreer fdi, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).
W-bar =          4.0342
Z-bar =          2.2743    (p-value* = 0.0200, 95% critical value = 1.9783)
Z-bar tilde =      1.7106    (p-value* = 0.0200, 95% critical value = 1.5530)
-----
H0: fdi does not Granger-cause lreer.
H1: fdi does Granger-cause lreer for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.

.
```

W.28. The causality between inflation rate and foreign portfolio investment

```
. xtgcause inf fpi, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 0.2869

Z-bar = -1.1275 (p-value* = 0.2700, 95% critical value = 2.7787)

Z-bar tilde = -1.0904 (p-value* = 0.2600, 95% critical value = 2.2921)

H0: fpi does not Granger-cause inf.

H1: fpi does Granger-cause inf for at least one panelvar (countries).

*p-values computed using 100 bootstrap replications.

.

W.29. The causality between foreign portfolio investment and inflation rate

```
. xtgcause fpi inf, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 8 (lags tested: 1 to 8).

W-bar = 60.6383

Z-bar = 29.4257 (p-value* = 0.0100, 95% critical value = 20.4230)

Z-bar tilde = 4.7840 (p-value* = 0.0100, 95% critical value = 3.1553)

H0: inf does not Granger-cause fpi.

H1: inf does Granger-cause fpi for at least one panelvar (countries).

*p-values computed using 100 bootstrap replications.

.

W.30. The causality between inflation rate and foreign direct investment

```
. xtgcause inf fdi, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

Dumitrescu & Hurlin (2012) Granger non-causality test results:

Optimal number of lags (BIC): 1 (lags tested: 1 to 8).

W-bar = 0.9556

Z-bar = -0.0702 (p-value* = 0.9500, 95% critical value = 3.2957)

Z-bar tilde = -0.1749 (p-value* = 0.8700, 95% critical value = 2.7397)

H0: fdi does not Granger-cause inf.

H1: fdi does Granger-cause inf for at least one panelvar (countries).

*p-values computed using 100 bootstrap replications.

W.31. The causality between foreign direct investment and inflation rate

```
. xtgcause fdi inf, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 1.7129
```

```
Z-bar = 1.1272 (p-value* = 0.2500, 95% critical value = 2.4586)
```

```
Z-bar tilde = 0.8619 (p-value* = 0.3300, 95% critical value = 2.0149)  
-----
```

```
H0: inf does not Granger-cause fdi.
```

```
H1: inf does Granger-cause fdi for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.32. The causality between the log of globalization index and foreign portfolio investment

```
. xtgcause lgin fpi, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 8 (lags tested: 1 to 8).
```

```
W-bar = 25.1456
```

```
Z-bar = 9.5847 (p-value* = 0.1100, 95% critical value = 13.0733)
```

```
Z-bar tilde = 1.1946 (p-value* = 0.1100, 95% critical value = 1.8257)  
-----
```

```
H0: fpi does not Granger-cause lgin.
```

```
H1: fpi does Granger-cause lgin for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.33. The causality between foreign portfolio investment and the log of globalization index

```
. xtgcause fpi lgin, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 0.1646
```

```
Z-bar = -1.3210 (p-value* = 0.1800, 95% critical value = 3.0894)
```

```
Z-bar tilde = -1.2579 (p-value* = 0.1600, 95% critical value = 2.5610)  
-----
```

```
H0: lgin does not Granger-cause fpi.
```

```
H1: lgin does Granger-cause fpi for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.34. The causality between the log of globalization index and foreign direct investment

```
. xtgcause lgin fdi, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 8 (lags tested: 1 to 8).
```

```
W-bar = 15.2653
```

```
Z-bar = 4.0614 (p-value* = 0.2500, 95% critical value = 12.1390)
```

```
Z-bar tilde = 0.1954 (p-value* = 0.7200, 95% critical value = 1.6567)
```

```
-----  
H0: fdi does not Granger-cause lgin.
```

```
H1: fdi does Granger-cause lgin for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.35. The causality between foreign direct investment and the log of globalization index

```
. xtgcause fdi lgin, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 4.6780
```

```
Z-bar = 5.8154 (p-value* = 0.0000, 95% critical value = 2.7545)
```

```
Z-bar tilde = 4.9216 (p-value* = 0.0000, 95% critical value = 2.2711)
```

```
-----  
H0: lgin does not Granger-cause fdi.
```

```
H1: lgin does Granger-cause fdi for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.36. The causality between the log of inward remittances and the log of real exchange rate

```
. xtgcause linr lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.0603
```

```
Z-bar = 1.6764 (p-value* = 0.2400, 95% critical value = 3.5031)
```

```
Z-bar tilde = 1.3375 (p-value* = 0.2600, 95% critical value = 2.9193)
```

```
-----  
H0: lreer does not Granger-cause linr.
```

```
H1: lreer does Granger-cause linr for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.37. The causality between the log of real exchange rate and the log of inward remittances

```
. xtgcause lreer linr, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          2.8248
Z-bar =          2.8853    (p-value* = 0.1200, 95% critical value = 3.7096)
Z-bar tilde =      2.3843    (p-value* = 0.1200, 95% critical value = 3.0981)
-----
H0: linr does not Granger-cause lreer.
H1: linr does Granger-cause lreer for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.38. The causality between the log of real exchange rate and the log of official aid and development assistance

```
. xtgcause lreer lfda, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 3 (lags tested: 1 to 8).
W-bar =          8.4083
Z-bar =          4.9371    (p-value* = 0.0000, 95% critical value = 3.5560)
Z-bar tilde =      3.6394    (p-value* = 0.0000, 95% critical value = 2.5545)
-----
H0: lfda does not Granger-cause lreer.
H1: lfda does Granger-cause lreer for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.39. The causality between the log of official aid and development assistance and the log of real exchange rate.

```
. xtgcause lfda lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          0.8391
Z-bar =         -0.2544    (p-value* = 0.7700, 95% critical value = 3.6190)
Z-bar tilde =     -0.3344    (p-value* = 0.7400, 95% critical value = 3.0197)
-----
H0: lreer does not Granger-cause lfda.
H1: lreer does Granger-cause lfda for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.40. The causality between the log of real exchange rate and central bank policy rate differential

```
. xtgcause lreer cbpd, lags (bic) bootstrap breps (100) seed (18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 4 (lags tested: 1 to 8).
```

```
W-bar = 18.3009
```

```
Z-bar = 11.3059 (p-value* = 0.0000, 95% critical value = 4.7427)
```

```
Z-bar tilde = 7.9439 (p-value* = 0.0000, 95% critical value = 3.1537)  
-----
```

```
H0: cbpd does not Granger-cause lreer.
```

```
H1: cbpd does Granger-cause lreer for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.41. The causality between central bank policy rate differential and the log of real exchange rate

```
. xtgcause cbpd lreer, lags (bic) bootstrap breps (100) seed (18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.3587
```

```
Z-bar = 2.1483 (p-value* = 0.1400, 95% critical value = 4.0111)
```

```
Z-bar tilde = 1.7462 (p-value* = 0.1400, 95% critical value = 3.3592)  
-----
```

```
H0: lreer does not Granger-cause cbpd.
```

```
H1: lreer does Granger-cause cbpd for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.42. The causality between gross capital formation growth rate and foreign portfolio investment

```
. xtgcause gcfg fpi, lags (bic) bootstrap breps (100) seed (18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 1.1919
```

```
Z-bar = 0.3035 (p-value* = 0.8200, 95% critical value = 2.8566)
```

```
Z-bar tilde = 0.1487 (p-value* = 0.9200, 95% critical value = 2.3595)  
-----
```

```
H0: fpi does not Granger-cause gcfg.
```

```
H1: fpi does Granger-cause gcfg for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.43. The causality between foreign portfolio investment and gross capital formation growth rate

```
. xtgcause fpi gcfg, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          0.4499
Z-bar =         -0.8698    (p-value* = 0.4300, 95% critical value = 2.2671)
Z-bar tilde =    -0.8672    (p-value* = 0.3600, 95% critical value = 1.8490)
-----
H0: gcfg does not Granger-cause fpi.
H1: gcfg does Granger-cause fpi for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.44. The causality between foreign direct investment and gross capital formation growth rate

```
. xtgcause fdi gcfg, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          0.6512
Z-bar =         -0.5515    (p-value* = 0.5300, 95% critical value = 3.1820)
Z-bar tilde =    -0.5917    (p-value* = 0.4600, 95% critical value = 2.6413)
-----
H0: gcfg does not Granger-cause fdi.
H1: gcfg does Granger-cause fdi for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.45. The causality between gross capital formation growth rate and foreign direct investment

```
. xtgcause gcfg fdi, lags (bic) bootstrap breps (100) seed (18457234)nodots

-----
Bootstrap replications (100)
-----

Dumitrescu & Hurlin (2012) Granger non-causality test results:
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
W-bar =          2.9847
Z-bar =          3.1381    (p-value* = 0.0200, 95% critical value = 2.2508)
Z-bar tilde =     2.6032    (p-value* = 0.0200, 95% critical value = 1.8350)
-----
H0: fdi does not Granger-cause gcfg.
H1: fdi does Granger-cause gcfg for at least one panelvar (countries).
*p-values computed using 100 bootstrap replications.
```

W.46. The causality between inflation rate and the log of real exchange rate

```
. xtgcause inf lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 3.2867
```

```
Z-bar = 3.6156 (p-value* = 0.0500, 95% critical value = 3.4771)
```

```
Z-bar tilde = 3.0167 (p-value* = 0.0500, 95% critical value = 2.8968)
```

```
-----  
H0: lreer does not Granger-cause inf.
```

```
H1: lreer does Granger-cause inf for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.47. The causality between the log of real exchange rate and inflation rate

```
. xtgcause lreer inf, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 8 (lags tested: 1 to 8).
```

```
W-bar = 53.0930
```

```
Z-bar = 25.2077 (p-value* = 0.0100, 95% critical value = 11.7295)
```

```
Z-bar tilde = 4.0209 (p-value* = 0.0100, 95% critical value = 1.5826)
```

```
-----  
H0: inf does not Granger-cause lreer.
```

```
H1: inf does Granger-cause lreer for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

W.48. The causality between the log of real exchange rate and the log of monetary sector credit to the private sector

```
. xtgcause lreer lmscp, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).
```

```
W-bar = 8.3315
```

```
Z-bar = 7.0788 (p-value* = 0.0000, 95% critical value = 3.4441)
```

```
Z-bar tilde = 5.6977 (p-value* = 0.0000, 95% critical value = 2.6814)
```

```
-----  
H0: lmscp does not Granger-cause lreer.
```

```
H1: lmscp does Granger-cause lreer for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```


W.49. The causality between the log of monetary sector credit to the private sector and the log of real exchange rate

```
. xtgcause lmscp lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.6419
```

```
Z-bar = 2.5961 (p-value* = 0.1100, 95% critical value = 3.7700)
```

```
Z-bar tilde = 2.1340 (p-value* = 0.1100, 95% critical value = 3.1504)  
-----
```

```
H0: lreer does not Granger-cause lmscp.
```

```
H1: lreer does Granger-cause lmscp for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.50. The causality between gross capital formation growth rate and the log of inward remittances

```
. xtgcause gcfg linr, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 2.4399
```

```
Z-bar = 2.2766 (p-value* = 0.0500, 95% critical value = 2.3308)
```

```
Z-bar tilde = 1.8573 (p-value* = 0.0500, 95% critical value = 1.9042)  
-----
```

```
H0: linr does not Granger-cause gcfg.
```

```
H1: linr does Granger-cause gcfg for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.51. The causality between the log of inward remittances and gross capital formation growth rate

```
. xtgcause linr gcfg, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 7 (lags tested: 1 to 8).
```

```
W-bar = 21.6587
```

```
Z-bar = 8.7603 (p-value* = 0.0100, 95% critical value = 5.3734)
```

```
Z-bar tilde = 3.0644 (p-value* = 0.0100, 95% critical value = 1.7287)  
-----
```

```
H0: gcfg does not Granger-cause linr.
```

```
H1: gcfg does Granger-cause linr for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.52. The causality between broad money growth rate and the log of real exchange rate

```
. xtgcause bmg lreer, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).  
W-bar =          1.7044  
Z-bar =          1.1138    (p-value* = 0.3300, 95% critical value = 3.7828)  
Z-bar tilde =      0.8504    (p-value* = 0.4000, 95% critical value = 3.1615)  
-----
```

```
H0: lreer does not Granger-cause bmg.
```

```
H1: lreer does Granger-cause bmg for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.53. The causality between the log of real exchange rate and broad money growth rate

```
. xtgcause lreer bmg, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 2 (lags tested: 1 to 8).  
W-bar =          4.5645  
Z-bar =          2.8672    (p-value* = 0.0400, 95% critical value = 2.5956)  
Z-bar tilde =      2.2026    (p-value* = 0.0400, 95% critical value = 1.9773)  
-----
```

```
H0: bmg does not Granger-cause lreer.
```

```
H1: bmg does Granger-cause lreer for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.54. The causality between inflation rate and the log of monetary sector credit to the private sector

```
. xtgcause inf lmscp, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----  
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).  
W-bar =          6.1576  
Z-bar =          8.1548    (p-value* = 0.0100, 95% critical value = 4.7358)  
Z-bar tilde =      6.9473    (p-value* = 0.0100, 95% critical value = 3.9867)  
-----
```

```
H0: lmscp does not Granger-cause inf.
```

```
H1: lmscp does Granger-cause inf for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

W.55. The causality between the log of monetary sector credit to the private sector and inflation rate

```
. xtgcause lmscp inf, lags (bic) bootstrap breps (100) seed (18457234)nodots
```

```
-----
Bootstrap replications (100)
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 3.0519
```

```
Z-bar = 3.2443 (p-value* = 0.0200, 95% critical value = 2.4308)
```

```
Z-bar tilde = 2.6952 (p-value* = 0.0200, 95% critical value = 1.9908)
```

```
-----
H0: inf does not Granger-cause lmscp.
```

```
H1: inf does Granger-cause lmscp for at least one panelvar (countries).
```

```
*p-values computed using 100 bootstrap replications.
```

X. Central bank policy rate, capital flows and economic growth in the Southern African Customs Union

X.1. Lag length criteria

```
ARDL(1,1,0,0,0,1,0,0) regression
```

```
Sample: 1991 - 2019
Number of obs = 29
F( 10, 18) = 67.97
Prob > F = 0.0000
R-squared = 0.9742
Adj R-squared = 0.9599
Root MSE = 0.0336
Log likelihood = 64.197016
```

	lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lgdpc						
L1.		.6937581	.1239202	5.60	0.000	.4334114 .9541048
fpi						
L1.		-.133133	.181462	-0.73	0.473	-.5143704 .2481045
fdi						
L1.		.7619103	.2372862	3.21	0.005	.2633904 1.26043
lgin						
L1.		.0010678	.0037582	0.28	0.780	-.0068279 .0089634
lreer						
L1.		-.0009985	.0005381	-1.86	0.080	-.002129 .000132
inf						
L1.		-.0048367	.0055681	-0.87	0.396	-.0165348 .0068614
_cons						
L1.		-.6368114	.5120148	-1.24	0.230	-1.712515 .4388918
		1.138792	.5121831	2.22	0.039	.0627354 2.214849
lreer						
L1.		-.1124283	.4666876	-0.24	0.812	-1.092903 .8680458
inf						
L1.		.0002222	.0044842	0.05	0.961	-.0091987 .0096432
_cons						
L1.		.5637292	.7665833	0.74	0.472	-1.046803 2.174261

```
e(lags)[1,8]
r1 lgdpc 1 fpi 1 fdi 0 bmg 0 cbpr 0 lgin 1 lreer 0 inf 0
```

```
ARDL(1,0,0,1,0,0,0,0) regression
```

```
Sample: 1991 - 2019
Number of obs = 29
F( 9, 19) = 372.17
Prob > F = 0.0000
R-squared = 0.9944
Adj R-squared = 0.9917
Root MSE = 0.0172
Log likelihood = 82.763913
```

	lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lgdpc						
L1.		.5280405	.0444406	11.88	0.000	.4350252 .6210558
fpi						
L1.		.00423	.2442446	0.02	0.986	-.5069797 .5154398
fdi						
L1.		-.0047228	.0014548	-3.25	0.004	-.0077678 -.0016778
bmg						
L1.		-.0000998	.000469	-0.21	0.834	-.0010814 .0008818
cbpr						
L1.		.0013073	.0004931	2.65	0.016	.0002753 .0023394
lgin						
L1.		-.0020215	.0017444	-1.16	0.261	-.0056727 .0016296
lreer						
L1.		.9125081	.2697419	3.38	0.003	.3479319 1.477084
inf						
L1.		1.841133	.2226146	8.27	0.000	1.375195 2.307071
_cons						
L1.		-.0018382	.0013899	-1.32	0.202	-.0047473 .0010709
		-3.506789	.6721713	-5.22	0.000	-4.913659 -2.099918

```
e(lags)[1,8]
r1 lgdpc 1 fpi 0 fdi 0 bmg 1 cbpr 0 lgin 0 lreer 0 inf 0
```

ARDL(1,1,0,0,0,0,1,0) regression

Sample: 1991 - 2019 Number of obs = 29
F(10, 18) = 497.93
Prob > F = 0.0000
R-squared = 0.9964
Adj R-squared = 0.9944
Log likelihood = 89.059658 Root MSE = 0.0142

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.7596575	.0516753	14.70	0.000	.6510917	.8682232
fpi						
--.	2.179937	1.674154	1.30	0.209	-1.33733	5.697204
L1.	3.091334	1.887074	1.64	0.119	-.8732606	7.055928
fdi	-.0009255	.0024671	-0.38	0.712	-.0061087	.0042577
bmj	.0002404	.0003646	0.66	0.518	-.0005255	.0010064
cbpr	.0016254	.0021488	0.76	0.459	-.002889	.0061399
lgin	1.185714	.2616395	4.53	0.000	.6360296	1.735398
lreer						
--.	1.026288	.071033	14.45	0.000	.8770534	1.175523
L1.	-.7190097	.0891297	-8.07	0.000	-.9062642	-.5317551
inf	-.0003735	.0004475	-0.83	0.415	-.0013136	.0005667
_cons	-1.878274	.4935252	-3.81	0.001	-2.915132	-.8414163

e(lags)[1,8]

lgdpc fpi fdi bmj cbpr lgin lreer inf
r1 1 1 0 0 0 0 1 0

ARDL(1,0,1,1,0,0,1,0) regression

Sample: 1991 - 2019 Number of obs = 29
F(11, 17) = 131.51
Prob > F = 0.0000
R-squared = 0.9884
Adj R-squared = 0.9809
Log likelihood = 73.673199 Root MSE = 0.0249

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	1.107714	.0975099	11.36	0.000	.9019865	1.313442
fpi	.3392388	.1288542	2.63	0.017	.0673803	.6110973
fdi						
--.	-.0020728	.00231	-0.90	0.382	-.0069465	.0028009
L1.	.0052732	.0029885	1.76	0.096	-.0010319	.0115783
bmj						
--.	-.0010438	.0005587	-1.87	0.079	-.0022227	.000135
L1.	-.0013182	.0005526	-2.39	0.029	-.002484	-.0001523
cbpr	.0041467	.0027843	1.49	0.155	-.0017276	.010021
lgin	-.6571736	.3672347	-1.79	0.091	-1.431971	.1176238
lreer						
--.	2.108936	.310666	6.79	0.000	1.453488	2.764384
L1.	-1.423265	.3308674	-4.30	0.000	-2.121334	-.725196
inf	-.0026244	.0030607	-0.86	0.403	-.0090818	.0038331
_cons	-.6150089	.8226516	-0.75	0.465	-2.350652	1.120634

e(lags)[1,8]

lgdpc fpi fdi bmj cbpr lgin lreer inf
r1 1 0 1 1 0 1 0

ARDL(1,0,0,1,0,0,1,0) regression

Sample: 1991 - 2019

Number of obs = 29

F(10, 18) = 164.01

Prob > F = 0.0000

R-squared = 0.9891

Adj R-squared = 0.9831

Log likelihood = 79.908245

Root MSE = 0.0195

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.8223143	.0713013	11.53	0.000	.6725159	.9721128
fpi	.2479574	.1816932	1.36	0.189	-.1337659	.6296807
fdi	-.0071139	.004467	-1.59	0.129	-.0164988	.002271
bmj						
--.	.0011778	.0008514	1.38	0.183	-.000611	.0029666
L1.	.0022188	.0009348	2.37	0.029	.0002548	.0041828
cbpr	-.0073112	.0024413	-2.99	0.008	-.0124402	-.0021821
lgin	.309048	.1909205	1.62	0.123	-.0920611	.710157
lreer						
--.	1.30276	.1351407	9.64	0.000	1.01884	1.58668
L1.	-.8327466	.1461024	-5.70	0.000	-1.139696	-.5257968
inf	.0024089	.0029001	0.83	0.417	-.0036839	.0085017
_cons	-.7988298	.5459162	-1.46	0.161	-1.945757	.3480976

e(lags)[1,8]

	lgdpc	fpi	fdi	bmj	cbpr	lgin	lreer	inf
r1	1	0	0	1	0	0	1	0

.

X.2. Dynamic regressions

X.2.1. Mean Group Estimation

```
. xtmg d.lgdpc d.fpi d.fdi d.bmg d.cbpr d.lgin d.lreer d.inf , lr ( l.lgdpc fpi fdi l.bmg cbpr lgin l.lreer inf) ec
```

Mean Group Estimation: Error Correction Form
(Estimate results saved as mg)

D.lgdpc		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT							
	fpi	2.802759	3.728555	0.75	0.452	-4.505075	10.11059
	fdi	-.0184688	.0109711	-1.68	0.092	-.0399716	.0030341
	bmg						
	L1.	.0088538	.0056984	1.55	0.120	-.0023149	.0200224
	cbpr	-.0154459	.0077776	-1.99	0.047	-.0306897	-.0002021
	lgin	4.202165	1.658392	2.53	0.011	.951776	7.452553
lreer							
L1.	.0602518	1.959676	0.03	0.975	-3.780643	3.901146	
inf	.0179571	.015089	1.19	0.234	-.0116169	.0475311	
SR	ECT	-.2652896	.0922213	-2.88	0.004	-.4460399	-.0845392
	fpi						
	D1.	-.7183142	.5944299	-1.21	0.227	-1.883375	.446747
	fdi						
	D1.	-.0010932	.0018388	-0.59	0.552	-.0046972	.0025107
	bmg						
	D1.	-.0001082	.0004695	-0.23	0.818	-.0010284	.000812
	cbpr						
	D1.	.0010729	.0006276	1.71	0.087	-.0001573	.0023031
lgin							
D1.	-.2877338	.1930111	-1.49	0.136	-.6660287	.0905611	
lreer							
D1.	1.077917	.5700555	1.89	0.059	-.0393708	2.195206	
inf							
D1.	.0011862	.0015599	0.76	0.447	-.0018712	.0042437	
_cons	-1.208764	.5833027	-2.07	0.038	-2.352017	-.0655122	

X.2.2. Pooled Mean Group Regression

```
. xtmg d.lgdpc d.fpi d.fdi d.bmg d.cbpr d.lgin d.lreer d.inf , lr ( l.lgdpc fpi fdi l.bmg cbpr lgin l.lreer inf) ec (ECT) replace pmg

Iteration 0: log likelihood = 337.3343 (not concave)
Iteration 1: log likelihood = 342.74262 (not concave)
Iteration 2: log likelihood = 346.04222 (not concave)
Iteration 3: log likelihood = 351.78246 (not concave)
Iteration 4: log likelihood = 354.78423 (not concave)
Iteration 5: log likelihood = 355.99986
Iteration 6: log likelihood = 357.60753
Iteration 7: log likelihood = 358.3448
Iteration 8: log likelihood = 358.61175
Iteration 9: log likelihood = 358.96743
Iteration 10: log likelihood = 358.97196
Iteration 11: log likelihood = 358.97196
```

Pooled Mean Group Regression
(Estimate results saved as pmg)

```
Panel Variable (i): country      Number of obs   =      145
Time Variable (t): year          Number of groups =       5
                                Obs per group: min =      29
                                avg      =     29.0
                                max      =      29
                                Log Likelihood =    358.972
```

	D.lgdpc	Coeff.	Std. Err.	z	P> z	[95% Conf. Interval]
ECT	fpi	.4942941	.4686814	1.05	0.292	-.4243045 1.412893
	fdi	-.0103062	.0044743	-2.30	0.021	-.0190757 -.0015367
	bmg					
	L1.	.003366	.0011969	2.81	0.005	.00102 .0057119
	cbpr	-.007454	.00356	-2.09	0.036	-.0144314 -.0004766
	lgin	1.964694	.2928855	6.71	0.000	1.390649 2.538739
	lreer					
	L1.	3.174851	.3142595	10.10	0.000	2.558914 3.790788
	inf	-.0042998	.0037561	-1.14	0.252	-.0116617 .0030622
SR	ECT	-.1931069	.0624754	-3.09	0.002	-.3155563 -.0706574
	fpi					
	D1.	.1451339	.2316069	0.63	0.531	-.3088073 .5990751
	fdi					
	D1.	-.0004531	.0007584	-0.60	0.550	-.0019395 .0010334
	bmg					
	D1.	.000075	.0000975	0.77	0.442	-.0001161 .0002661
	cbpr					
	D1.	.0016955	.0009005	1.88	0.060	-.0000694 .0034605
	lgin					
	D1.	-.2481154	.2657244	-0.93	0.350	-.7689257 .2726949
	lreer					
	D1.	.9278557	.5519565	1.68	0.093	-.1539592 2.009671
	inf					
	D1.	.0014702	.0004881	3.01	0.003	.0005136 .0024269
	_cons	-1.155236	.3756716	-3.08	0.002	-1.891539 -.4189333

X.2.3. The Hausman test

```
. hausman mg pmg, sigmamore
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) mg	(B) pmg		
fpi	2.802759	.4942941	2.308465	6.869433
fdi	-.0184688	-.0103062	-.0081626	.0197597
bmg				
L1.	.0088538	.003366	.0054878	.0104548
cbpr	-.0154459	-.007454	-.0079919	.0139145
lgin	4.202165	1.964694	2.237471	3.048462
lreer				
L1.	.0602518	3.174851	-3.114599	3.6052
inf	.0179571	-.0042998	.0222569	.0276101

b = consistent under Ho and Ha; obtained from xtmg

B = inconsistent under Ha, efficient under Ho; obtained from xtmg

Test: Ho: difference in coefficients not systematic

```
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 2.40
Prob>chi2 = 0.9345
(V_b-V_B is not positive definite)
```

X.2.4. The Dynamic Fixed Effect Regression

```
. xtpmg d.lgdpc d.fpi d.fdi d.bmg d.cbpr d.lgin d.lreer d.inf , lr ( l.lgdpc fpi fdi l.bmg cbpr lgin l.lreer inf) ec (ECT) replace dfe
```

Dynamic Fixed Effects Regression: Estimated Error Correction Form
(Estimate results saved as DFE)

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ECT	fpi	1.282264	.8086538	1.59	0.113	-.3026683	2.867196
	fdi	-.0046664	.0121844	-0.38	0.702	-.0285474	.0192145
	bmg						
	L1.	-.0010259	.0027157	-0.38	0.706	-.0063485	.0042968
	cbpr	-.0093927	.0096204	-0.98	0.329	-.0282485	.009463
	lgin	1.210013	.5997967	2.02	0.044	.0344328	2.385593
	lreer						
	L1.	2.107164	.5429981	3.88	0.000	1.042907	3.17142
	inf	-.0176984	.0097322	-1.82	0.069	-.0367732	.0013764
SR	ECT	-.1283445	.0303873	-4.22	0.000	-.1879025	-.0687865
	fpi						
	D1.	-.1302964	.0926189	-1.41	0.159	-.3118262	.0512334
	fdi						
	D1.	-.0018018	.001236	-1.46	0.145	-.0042243	.0006207
	bmg						
	D1.	-.0001363	.000238	-0.57	0.567	-.0006027	.0003301
	cbpr						
	D1.	.0017496	.0015609	1.12	0.262	-.0013097	.0048088
	lgin						
	D1.	-.263726	.2055765	-1.28	0.200	-.6666486	.1391965
	lreer						
	D1.	1.268534	.102176	12.42	0.000	1.068273	1.468796
	inf						
	D1.	.0015492	.0007904	1.96	0.050	9.72e-09	.0030984
	_cons	-.3154169	.2326342	-1.36	0.175	-.7713716	.1405378

X.2.5. The Hausman test

```
. hausman DFE pmg, sigmamore
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) DFE	(B) pmg		
fpi	1.282264	.4942941	.7879698	.
fdi	-.0046664	-.0103062	.0056398	.
bmg				
L1.	-.0010259	.003366	-.0043918	.
cbpr	-.0093927	-.007454	-.0019388	.
lgin	1.210013	1.964694	-.7546808	.
lreer				
L1.	2.107164	3.174851	-1.067687	.
inf	-.0176984	-.0042998	-.0133986	.

b = consistent under Ho and Ha; obtained from xtprmg
B = inconsistent under Ha, efficient under Ho; obtained from xtprmg

Test: Ho: difference in coefficients not systematic

```
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = -54.96      chi2<0 ==> model fitted on these
                        data fails to meet the asymptotic
                        assumptions of the Hausman test;
                        see suest for a generalized test
```


X.2.6. Multicollinearity test

. vif

Variable	VIF	1/VIF
cbpr	1.86	0.538658
lgin	1.60	0.625596
inf	1.47	0.681005
fdi	1.32	0.757448
fpi	1.21	0.829029
lreer	1.16	0.860372
bmj	1.06	0.942387
Mean VIF	1.38	

Y. Dynamic relationship with variable adjustment

Y.1. Lag length

ARDL(1,0,1,1,1,0,1,0) regression

Sample: 1991 - 2019

Number of obs = 29
F(12, 16) = 76.45
Prob > F = 0.0000
R-squared = 0.9829
Adj R-squared = 0.9700
Root MSE = 0.0290

Log likelihood = 70.125738

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lgdpc					
L1.	.4388443	.1302759	3.37	0.004	.1626717 .7150169
fpi	-.0684909	.1553508	-0.44	0.665	-.3978198 .260838
fdi					
--.	.0063021	.0034806	1.81	0.089	-.0010763 .0136806
L1.	.0083234	.0028113	2.96	0.009	.0023638 .0142831
cbpr					
--.	.0114647	.0064631	1.77	0.095	-.0022364 .0251659
L1.	-.0138663	.0048918	-2.83	0.012	-.0242365 -.0034961
bmj					
--.	-.000903	.0005582	-1.62	0.125	-.0020862 .0002803
L1.	-.0007137	.0004383	-1.63	0.123	-.0016429 .0002155
inf					
--.	-.004406	.0037722	-1.17	0.260	-.0124026 .0035907
lmscp					
--.	-.09224	.160211	-0.58	0.573	-.4318722 .2473922
L1.	.6258792	.1986779	3.15	0.006	.2047008 1.047058
lreer					
--.	-.991256	.5641634	-1.76	0.098	-2.187229 .2047169
_cons	3.448232	1.277475	2.70	0.016	.7401058 6.156357

e(lags) [1,8]

lgdpc fpi fdi cbpr bmj inf lmscp lreer
r1 1 0 1 1 1 0 1 0

ARDL(1,0,0,0,1,0,1,1) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(11, 17)	=	297.83
		Prob > F	=	0.0000
		R-squared	=	0.9948
		Adj R-squared	=	0.9915
Log likelihood =	84.048513	Root MSE	=	0.0174

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.7599804	.051377	14.79	0.000	.6515843	.8683764
fpi	-.1181561	.2392446	-0.49	0.628	-.6229181	.3866059
fdi	-.0035014	.0016858	-2.08	0.053	-.0070582	.0000553
cbpr	-.0029528	.0016831	-1.75	0.097	-.006504	.0005983
bmj						
--.	-.0001117	.0005531	-0.20	0.842	-.0012788	.0010553
L1.	.0012755	.0006094	2.09	0.052	-.0000103	.0025613
inf	-.0005982	.0014441	-0.41	0.684	-.003645	.0024485
lmscp						
--.	.0581447	.0834381	0.70	0.495	-.1178942	.2341837
L1.	-.1288965	.0741635	-1.74	0.100	-.2853678	.0275748
lreer						
--.	1.979417	.2811448	7.04	0.000	1.386254	2.572581
L1.	-.8029846	.3537644	-2.27	0.037	-1.549362	-.0566068
_cons	-1.394518	.4977443	-2.80	0.012	-2.444667	-.3443698

e(lags)[1,8]

	lgdpc	fpi	fdi	cbpr	bmj	inf	lmscp	lreer
r1	1	0	0	0	1	0	1	1

ARDL(1,0,0,0,0,1,1,1) regression

Sample: 1991 - 2019

Number of obs = 29

F(11, 17) = 301.31

Prob > F = 0.0000

R-squared = 0.9949

Adj R-squared = 0.9916

Log likelihood = 84.008573

Root MSE = 0.0174

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9279174	.0366031	25.35	0.000	.8506917	1.005143
fpi	3.192512	2.333478	1.37	0.189	-1.730698	8.115721
fdi	-.0048713	.0026236	-1.86	0.081	-.0104065	.0006639
cbpr	-.0055316	.0023433	-2.36	0.030	-.0104757	-.0005876
bmj	-.0000732	.0004062	-0.18	0.859	-.0009303	.0007838
inf						
--.	-.0000917	.0006086	-0.15	0.882	-.0013758	.0011923
L1.	-.0016448	.0008612	-1.91	0.073	-.0034617	.0001721
lmjcp						
--.	-.1736442	.0609442	-2.85	0.011	-.3022253	-.0450631
L1.	.1610592	.0617846	2.61	0.018	.030705	.2914135
lmrer						
--.	1.013408	.1178809	8.60	0.000	.7647014	1.262115
L1.	-.8662301	.1193505	-7.26	0.000	-1.118038	-.6144225
_cons	.0540854	.1859348	0.29	0.775	-.3382027	.4463736

e(lags)[1,8]

	lgdpc	fpi	fdi	cbpr	bmj	inf	lmjcp	lmrer
r1	1	0	0	0	0	1	1	1

ARDL(1,0,0,0,0,0,0,1) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(9, 19)	=	131.05
		Prob > F	=	0.0000
		R-squared	=	0.9841
		Adj R-squared	=	0.9766
Log likelihood =	69.161829	Root MSE	=	0.0275

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	1.011098	.0762156	13.27	0.000	.8515764	1.170619
fpi	.2658501	.1115324	2.38	0.028	.03241	.4992902
fdi	-.0018688	.0025483	-0.73	0.472	-.0072025	.003465
cbpr	.0021091	.0029036	0.73	0.476	-.0039681	.0081864
bmj	-.0004675	.0005634	-0.83	0.417	-.0016467	.0007116
inf	.0000599	.0025035	0.02	0.981	-.0051801	.0052999
lmjcp	-.0734034	.0993462	-0.74	0.469	-.2813374	.1345306
lreer						
--.	1.720126	.2737641	6.28	0.000	1.147131	2.293121
L1.	-1.065217	.3265272	-3.26	0.004	-1.748647	-.3817882
_cons	-1.225905	.4891286	-2.51	0.021	-2.249663	-.2021466

e(lags)[1,8]

	lgdpc	fpi	fdi	cbpr	bmj	inf	lmjcp	lreer
r1	1	0	0	0	0	0	0	1

ARDL(1,0,1,0,1,0,1,1) regression

Sample:	1991 - 2019	Number of obs	=	29
		F(12, 16)	=	146.68
		Prob > F	=	0.0000
		R-squared	=	0.9910
		Adj R-squared	=	0.9842
Log likelihood =	82.613644	Root MSE	=	0.0189

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lgdpc						
L1.	.9227255	.0620874	14.86	0.000	.791106	1.054345
fpi	.2941902	.1750184	1.68	0.112	-.0768323	.6652126
fdi						
--.	-.0047152	.0050379	-0.94	0.363	-.0153952	.0059647
L1.	-.0084341	.0045431	-1.86	0.082	-.0180649	.0011968
cbpr	-.006026	.0024652	-2.44	0.026	-.0112521	-.0008
bmg						
--.	.0015062	.0008464	1.78	0.094	-.0002881	.0033004
L1.	.0031047	.0009171	3.39	0.004	.0011605	.0050489
inf	-.0024918	.0019683	-1.27	0.224	-.0066644	.0016809
lmscp						
--.	-.4091627	.2098795	-1.95	0.069	-.8540875	.035762
L1.	.4647984	.2064079	2.25	0.039	.0272333	.9023636
ltreer						
--.	1.240699	.1225914	10.12	0.000	.980817	1.500581
L1.	-1.03747	.1181602	-8.78	0.000	-1.287959	-.7869815
_cons	-.1662596	.3642406	-0.46	0.654	-.9384151	.6058959

e(lags)[1,8]

	lgdpc	fpi	fdi	cbpr	bmg	inf	lmscp	ltreer
r1	1	0	1	0	1	0	1	1

Y.2. Accounting for cross sectional dependence

	(1) xtpmg - mg	(2) xtdcce2 - mg	(3) xtdcce2 - mg	(4) xtdcce2 - cce
ec				
fpi	0.517 (0.881)	1.402 (0.993)	0.128 (0.180)	-0.0270 (54.62)
fdi	0.00417 (0.0161)	0.00800 (0.0261)	0.000729 (0.00207)	0.00215 (0.178)
inf	-0.0230** (0.00797)	-0.0326* (0.0133)	-0.00298*** (0.000711)	-0.0159 (0.103)
cbpr	-0.0475*** (0.00655)	-0.0208 (0.0241)	-0.00189 (0.00206)	-0.0372 (0.194)
L.bmg	0.0148** (0.00488)	0.00331 (0.00847)	0.000301 (0.000887)	0.00746 (0.0441)
L.lreer	2.178*** (0.456)	2.590 (2.501)	0.236 (0.122)	1.059 (3.180)
L.lmscp	-0.361 (0.223)	-0.258 (0.342)	-0.0235 (0.0931)	0.417 (1.758)
SR				
ec	-0.0833*** (0.0240)	-0.0912 (0.544)	-0.0912 (0.101)	-0.0541 (3.936)
D.fpi	0.663 (0.664)	0.326 (0.417)	0.326 (0.417)	0.700 (0.723)
D.fdi	-0.00115 (0.000992)	-0.00196** (0.000616)	-0.00196** (0.000616)	-0.000766 (0.000477)
D.inf	0.00137 (0.000758)	0.00254** (0.000824)	0.00254** (0.000824)	0.000597 (0.000556)
D.cbpr	0.00275 (0.00161)	0.00202 (0.00124)	0.00202 (0.00124)	0.000768 (0.000835)
D.bmg	0.0000474 (0.000178)	-0.000175 (0.000112)	-0.000175 (0.000112)	0.000391* (0.000173)
D.lreer	1.041* (0.462)	1.094* (0.457)	1.094* (0.457)	0.286 (0.397)
D.lmscp	-0.203* (0.0802)	-0.124 (0.0652)	-0.124 (0.0652)	-0.119*** (0.0203)
_cons	0.0275 (0.0160)			
N	145	145	145	145
cd		5.540	5.540	-1.271
cdp		3.02e-08	3.02e-08	0.204

Standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

.

Z. Panel threshold

Z.1. The threshold of foreign portfolio investment with respect to the log of GDP per capita

```
. xthreg lgdpc fdi bmg cbpr lgin lreer inf, rx(fpi) qx(fpi) thnum(1) grid(300) trim(0.01) bs(300)
Estimating the threshold parameters: 1st ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	0.0499	0.0492	0.0576

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	1.0594	0.0088	5.84	0.1400	7.2372	9.1862	13.9739

```
Fixed-effects (within) regression               Number of obs   =       150
Group variable: country                        Number of groups =        5

R-sq:  within = 0.7714                          Obs per group: min =       30
        between = 0.7431                             avg   =      30.0
        overall = 0.5756                             max   =       30

                                                F(8,137)        =      57.78
corr(u_i, Xb) = 0.3770                          Prob > F         =      0.0000
```

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	.0025471	.0034523	0.74	0.462	-.0042796	.0093739
bmg	-.0000571	.0006711	-0.09	0.932	-.0013841	.0012699
cbpr	-.0180839	.0029765	-6.08	0.000	-.0239698	-.012198
lgin	1.409146	.1908131	7.38	0.000	1.031826	1.786466
lreer	1.338656	.1717989	7.79	0.000	.9989359	1.678377
inf	-.0000752	.0020907	-0.04	0.971	-.0042095	.0040591
_cat#c.fpi						
0	.2453412	.3650792	0.67	0.503	-.4765779	.9672602
1	-.8971531	.2434779	-3.68	0.000	-1.378614	-.4156924
_cons	-1.427342	.5813387	-2.46	0.015	-2.5769	-.2777851
sigma_u	.25573679					
sigma_e	.08793742					
rho	.89426316	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 137) = 176.69 Prob > F = 0.0000

.

Z.2. The threshold of central bank policy rate with respect to the log of GDP per capita

```
. xthreg lgdpc fdi bmg fpi lgin lreer inf, rx(cbpr) qx(cbpr) thnum(3)grid(400)trim(0.01 0.01 0.05)bs(300 300 300)
Estimating the threshold parameters: 1st ..... 2nd ..... 3rd ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for double threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for triple threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	10.7600	10.5950	10.9167
Th-21	10.6900	10.6600	10.7600
Th-22	10.0000	9.5183	10.2500
Th-3	6.9583	6.0625	7.0000

Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	0.9587	0.0080	19.05	0.0167	12.4887	14.7063	22.1627
Double	0.8459	0.0070	16.01	0.0300	10.5398	13.4053	17.3840
Triple	0.7697	0.0064	11.87	0.4800	20.6763	24.0066	37.4200

```
Fixed-effects (within) regression                Number of obs   =       150
Group variable: country                        Number of groups =        5

R-sq:  within = 0.8145                          Obs per group: min =       30
        between = 0.6459                          avg =           30.0
        overall = 0.5385                          max =           30

                                                F(10,135)       =       59.26
corr(u_i, Xb) = 0.3169                          Prob > F         =       0.0000
```

lgdpc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	-.0022685	.0031636	-0.72	0.475	-.0085251	.003988
bmg	.0005686	.0006239	0.91	0.364	-.0006654	.0018026
fpi	-.419443	.1933317	-2.17	0.032	-.8017936	-.0370924
lgin	1.315666	.1782178	7.38	0.000	.9632061	1.668126
lreer	1.359613	.1635011	8.32	0.000	1.036258	1.682967
inf	.0009433	.0019047	0.50	0.621	-.0028236	.0047103
_cat#c.cbpr						
0	.0129328	.008874	1.46	0.147	-.0046173	.0304828
1	.000048	.0060857	0.01	0.994	-.0119876	.0120837
2	.0142199	.0059679	2.38	0.019	.0024172	.0260226
3	-.0077834	.003692	-2.11	0.037	-.0150851	-.0004818
_cons	-1.486784	.5440695	-2.73	0.007	-2.562786	-.4107819
sigma_u	.26558042					
sigma_e	.07980094					
rho	.91718993	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 135) = 216.47 Prob > F = 0.0000

Z.3. The threshold of central bank policy rate with respect to foreign portfolio investment

```
. xthreg fpi bmg inf lreer lgin , rx(cbpr) qx(cbpr) thnum(1) grid(300) trim(0.01) bs(300)
```

Estimating the threshold parameters: 1st Done

Bootstrap for single threshold

```
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	6.9583	6.7292	7.0000

Threshold effect test (bootstrap = 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	0.1807	0.0015	19.06	0.0500	14.2686	17.7381	34.9628

Fixed-effects (within) regression

Number of obs = 150

Group variable: country

Number of groups = 5

R-sq: within = 0.1389

Obs per group: min = 30

between = 0.0757

avg = 30.0

overall = 0.0541

max = 30

F(6,139) = 3.74

corr(u_i, Xb) = -0.2283

Prob > F = 0.0018

fpi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bmg	-.000192	.0002786	-0.69	0.492	-.0007429	.0003589
inf	.0005472	.0008634	0.63	0.527	-.0011598	.0022542
lreer	.1315514	.0704368	1.87	0.064	-.0077147	.2708175
lgin	.1282185	.0771799	1.66	0.099	-.0243799	.280817
_cat#c.cbpr						
0	-.0092463	.0025479	-3.63	0.000	-.0142839	-.0042087
1	-.0018277	.0013372	-1.37	0.174	-.0044715	.0008161
_cons	-.4417644	.2387951	-1.85	0.066	-.9139047	.0303759
sigma_u	.02706272					
sigma_e	.03637211					
rho	.35633891	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 139) = 14.31

Prob > F = 0.0000

.

Z.4. The threshold of central bank policy rate with respect to foreign direct investment

```
. xthreg fdi bmg inf lreer lgin , rx(cbpr) qx(cbpr) thnum(3) grid(400) trim(0.01 0.01 0.05) bs(300 300 300)
Estimating the threshold parameters: 1st ..... 2nd ..... 3rd ..... Done
Bootstrap for single threshold
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for double threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
Bootstrap for triple threshold model:
..... + 50
..... + 100
..... + 150
..... + 200
..... + 250
..... + 300
```

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	8.0000	7.7292	8.2083
Th-21	8.0000	6.9583	8.2083
Th-22	7.7917	7.7500	8.2083
Th-3	9.6667	9.5200	10.0000

Threshold effect test (bootstrap = 300 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	657.0350	5.4753	14.57	0.0267	10.0187	13.0609	16.8039
Double	643.4452	5.3620	2.53	0.7167	7.3588	8.7940	14.6525
Triple	632.5509	5.2713	2.07	0.7900	7.1283	8.9935	11.2740

Fixed-effects (within) regression

Number of obs = 150

Group variable: country

Number of groups = 5

R-sq: within = 0.2157

Obs per group: min = 30

between = 0.1543

avg = 30.0

overall = 0.0805

max = 30

F(8,137) = 4.71

corr(u_i, Xb) = -0.3564

Prob > F = 0.0000

fdi	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bmg	.0135866	.0164044	0.83	0.409	-.0188519	.0460251
inf	-.0210753	.0512799	-0.41	0.682	-.1224778	.0803272
lreer	-1.806606	4.261534	-0.42	0.672	-10.2335	6.620284
lgin	13.18488	4.581533	2.88	0.005	4.12521	22.24454
_cat#c.cbpr						
0	-.5576603	.1883813	-2.96	0.004	-.9301714	-.1851491
1	-1.003048	.3094192	-3.24	0.001	-1.614903	-.3911931
2	-.2152023	.1449888	-1.48	0.140	-.5019076	.0715029
3	-.1046175	.0927225	-1.13	0.261	-.2879699	.0787349
_cons	-13.84765	14.22336	-0.97	0.332	-41.97337	14.27807
sigma_u	1.6104077					
sigma_e	2.1527293					
rho	.35881796	(fraction of variance due to u_i)				

F test that all u_i=0: F(4, 137) = 10.16

Prob > F = 0.0000

.

AA. Panel causality

AA.1 The causality between the log of GDP per capita and central bank policy rate

```
. xtgcause lgdpc cbpr, lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 1.2057
```

```
Z-bar = 0.3252 (p-value* = 0.8200, 95% critical value = 6.4730)
```

```
Z-bar tilde = 0.1675 (p-value* = 0.9200, 95% critical value = 5.4911)  
-----
```

```
H0: cbpr does not Granger-cause lgdpc.
```

```
H1: cbpr does Granger-cause lgdpc for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

AA.2 The causality between foreign portfolio investment and central bank policy rate

```
. xtgcause fpi cbpr, lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----  
Bootstrap replications (100)  
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:  
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 1.0615
```

```
Z-bar = 0.0972 (p-value* = 0.9300, 95% critical value = 3.1648)
```

```
Z-bar tilde = -0.0299 (p-value* = 0.9600, 95% critical value = 2.6264)  
-----
```

```
H0: cbpr does not Granger-cause fpi.
```

```
H1: cbpr does Granger-cause fpi for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

AA.3. The causality between foreign direct investment and central bank policy rate

```
. xtgcause fdi cbpr, lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----
```

```
Bootstrap replications (100)
```

```
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          1.2974
```

```
Z-bar =          0.4703   (p-value* = 0.6700, 95% critical value = 1.8942)
```

```
Z-bar tilde =     0.2931   (p-value* = 0.8200, 95% critical value = 1.5261)
```

```
-----
```

```
H0: cbpr does not Granger-cause fdi.
```

```
H1: cbpr does Granger-cause fdi for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

AA.4. The causality between central bank policy rate and the log of GDP per capita

```
. xtgcause cbpr lgdpc , lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----
```

```
Bootstrap replications (100)
```

```
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar =          4.3338
```

```
Z-bar =          5.2712   (p-value* = 0.1200, 95% critical value = 8.2018)
```

```
Z-bar tilde =     4.4504   (p-value* = 0.1200, 95% critical value = 6.9880)
```

```
-----
```

```
H0: lgdpc does not Granger-cause cbpr.
```

```
H1: lgdpc does Granger-cause cbpr for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

AA. 5. The causality between central bank policy rate and foreign portfolio investment

```
. xtgcause cbpr fpi, lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----
```

```
Bootstrap replications (100)
```

```
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 0.8092
```

```
Z-bar = -0.3018 (p-value* = 0.8000, 95% critical value = 3.2679)
```

```
Z-bar tilde = -0.3754 (p-value* = 0.7000, 95% critical value = 2.7156)
```

```
-----
```

```
H0: fpi does not Granger-cause cbpr.
```

```
H1: fpi does Granger-cause cbpr for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

AA.6. The causality between central bank policy rate and foreign direct investment

```
. xtgcause cbpr fdi, lags(bic) bootstrap breps (100) seed(18457234) nodots
```

```
-----
```

```
Bootstrap replications (100)
```

```
-----
```

```
Dumitrescu & Hurlin (2012) Granger non-causality test results:
```

```
-----
```

```
Optimal number of lags (BIC): 1 (lags tested: 1 to 8).
```

```
W-bar = 1.3132
```

```
Z-bar = 0.4952 (p-value* = 0.6900, 95% critical value = 3.5273)
```

```
Z-bar tilde = 0.3147 (p-value* = 0.7800, 95% critical value = 2.9403)
```

```
-----
```

```
H0: fdi does not Granger-cause cbpr.
```

```
H1: fdi does Granger-cause cbpr for at least one panelvar (country).
```

```
*p-values computed using 100 bootstrap replications.
```

```
.
```

AB. Articles

AB.1. Published Articles

The following publications are extracts from the thesis:

1. Aromolaran, O. and Olebogeng, D.D. (2021). Central bank policy rate differential: The impact on Foreign Portfolio Investment and Foreign Direct Investment. Vol. 13 No. 2 (2021): International Journal of Economics and Financial Studies: doi:10.34111/ijefs.20212014
2. Aromolaran, O. and Olebogeng, D.D. (2021). Macroeconomic Policy Directions in the Southern African Customs Union. Vol. 13 No. 2 (2021): International Journal of Economics and Financial Studies: doi:10.34111/ijefs.20212015
3. Aromolaran, O. and Olebogeng, D.D. (2021). The Dynamics of Capital Flows, Monetary Policy and Economic Growth in the Southern African Customs Union. *European Journal of Economics, Law and Social Sciences*. <https://iipcccl.org/wp-content/uploads/2021/09/662-681.pdf>

AB.2. Submitted Article

The following article, containing some parts of the thesis, has been submitted to the International Journal of Economics and Financial Studies:

1. Aromolaran, O. and Olebogeng, D.D. (2022). *Monetary Policy and Living Standards in the Southern African Customs Union: A Threshold Analysis*