The Relationship Between Electricity Prices And Foreign Direct Investment In South Africa

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DEDICATION

I dedicate this project to my cherished daughter, Buhlebendalo, in the hopes that it would serve as an example for her and an encouragement to always find the inner fortitude to pursue her dreams and to stay motivated despite any obstacles.

I also dedicate this piece to Miss Obakeng Maphuto, my late mother.

ABSTRACT

Inward foreign direct investment has a considerable impact on host countries' economic growth, especially those that are still in their infant stage. Since 2008, South Africa has endured intermittent electricity supply and rising electricity bills up to this date. Theoretical literature suggests that attracting inward foreign investment depends entirely on the macroeconomic state of the receiving nation. This research empirically examines how electricity tariffs affect the attraction of IFDI in South Africa. To accomplish this for the period 1988–2020, the Autoregressive Distributed Lag (ARDL) co-integration technique is utilized in this research. The study's conclusions showed that there is a long-term connection between inward foreign direct investment, electricity price, electricity supply, inflation and exchange rate, ceteris paribus. Furthermore, the findings indicated that electricity prices and inflation have a detrimental impact on inward foreign direct investment (IFDI). The results of electricity supply and exchange rate revealed that both variables contribute positively towards inward foreign direct investment. Thus, it is recommended that the South African government takes action to lessen the impact of high electricity tariffs on incoming foreign direct investment.

Keywords: Inward FDI, Electricity supply, Electricity price, South Africa, ARDL, Economic growth

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
ARDL	Auto-Regressive Distributed Lag
CSAs	Country specific benefits
CSP	Concentrated solar power
DBSA	Development Bank of Southern Africa
DTIC	Department of Trade Industry & Competition
ECOWAS	Economic Community of West African States
EDI	Electricity Distribution Industry
EGARCH	Exponential Generalized Autoregressive Conditional heteroskedastic
EP	Electricity price
ES	Electricity Supply
ESI	Electricity supply industry
EXCH	Exchange rate
FDI	Foreign Direct Investment
FPE	Final prediction error
FSAs	Firm-specific advantages
GMM	Generalized Method of Moments
GVCs	Global Value Chains
IFDI	Inward Foreign Direct Investment
INF	Inflation
IPPs	Independent power providers
IRP	Integrated Resource Plan

ITSMO	The Independent Transmission System and Market Operator
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
kVA	kilovolt-ampere
kWh	Kilowatt hour
M&As	Mergers and acquisitions
MNE	Multinational Enterprise
NDP	National Development Plan
NERSA	National Energy Regulator of South Africa
OECD	Organization for Economic Cooperation and Development
PP	Phillips Perron
RE	Renewable energy
SACU	Southern African Customs Union
SARB	South African Reserve Bank
SC	Schwarz Information Criterion
SEZ	Special Economic Zones
SOE	State-owned enterprises
SVAR	Structural Vector Autoregressive
TOU	Time of Use
UNCTAD	United Nations Conference on Trade and Development
VECM	Vector Error Correction Model

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CHAPTER 1

OVERVIEW AND INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

Foreign direct investment (FDI) has played a significant role in the economic progress of several emerging countries in Africa over the past few years (World Investment Report, 2011). FDI is an investment that is made by a multinational company from abroad in one economy in a business enterprise of the host country; this investment is made to build long-lasting relationships, gain lasting interest, and boost the economic growth of the recipient country (International Monetary Fund, 2019). Inward foreign direct investment (IFDI) serves to drive the economy in many emerging countries by filling a financial gap in all sectors of the economy.

Moreover, it is believed that if a country attracts foreign direct investment, this will result in positive spill-over externalities, such as the introduction of cutting-edge technologies by foreign companies to the recipient nation, and the transfer of creative management techniques (Mouzinho,2016). Thus, the importance of IFDI injections was brought to attention by committing the Department of Trade and Industry and Competition (DTIC) to regulate foreign direct investment inflows, and to further captivate potential foreign multinational companies to invest in the Republic of South Africa (DTIC, 2015).

South Africa experienced severe power shortages in 2008, as a governmental investment alone was unable to fulfil a growing electrical demand. After removing regulatory barriers and restructuring feed-in-tariff programmes, the government was able to attract private and international direct investment (Victor & Heller, 2015). Moreover, the industries which were energy intensive were also encouraged to ensure they consume electricity since the price of electricity was kept very low to encourage consumption. Thus, this situation resulted to an increase in economic growth of the country and wealth of citizens (Victor & Heller,2015).

Since then, there have been numerous instances of power outages in the country, with the largest and longest waves coming in 2014 and 2020 (Department of Energy,2020). The restructuring of South Africa's electricity tariffs began in 2008, and during 2008-2018, average real electricity costs increased by about 33% annually (Department of

Energy, 2018). These increases have significantly altered the importance of electricity expenses in business budgets and the attractiveness of the nation as a corporate location with cheap production costs.

Eskom, which is completely controlled by the government, has a monopoly on the South African electricity supply industry (ESI). Eskom is a horizontally integrated energy company with sales and size that place it among the top seven in the world. It meets over 93 percent of South Africa's electricity needs, which is half of all power produced in Africa (Teljeur, Sheik, Kolobe & da Costa, 2016). The National Energy Regulator of South Africa (NERSA) oversees the country's energy market, and Eskom has had a monopoly on energy generation, distribution, and transmission for many years (Hansen, 2012).

Eskom has been given permission to increase electricity rates from 2019 up until 2021 at a rate higher than inflation (NERSA, 2021). Rising electricity tariffs, along with other economic costs, impact overall manufacturing costs, and do not provide South African producers a competitive advantage. This eventually affects the investment choices made by both domestic and foreign businesses, and it can have a detrimental effect on global trade, investment, and production trends.

When Eskom encountered an electrical supply deficit in 2007/2008, the increase in electricity rates started (Department of Energy, 2018). Although Eskom's issues with electricity production were foreseen twenty years ago, the utility opted not to invest in new, suitable plant facilities (Department of Minerals and Energy,1998).

Foreign investors prefer a country with relatively lax environmental standards in comparison to their own. This is one of the factors that investors consider when considering the possibility of outward FDI. Both fundamental tax legislation and environmental regulations fall under this category. When host countries benefit from FDI inflows while their environmental circumstances worsen, this tendency is known in the literature as the creation of "pollution havens."

Energy security, defined as the supply of continuous, dependable, and uninterrupted electrical services inside a host country via a sophisticated infrastructure network, is regarded as a component that foreign multinationals consider for operating a lucrative business.

The National Development Plan (NDP) and National Planning Commission of South Africa (2012) both identify encouraging FDI as a key element in spurring economic growth, eradicating economic deprivation, and reducing income inequality. President Ramaphosa, the national president, has set a goal to bring in up to $100 billion in foreign investment by 2023. This goal was set before the COVID-19 outbreak devastated the world economy in 2018. According to the report of the United Nations Conference on Trade and Development (UNCTAD Report, 2021), foreign direct investment inflows to South Africa contracted by two-thirds, from R56.9 bn in 2019 to R39.9 bn in the first quarter of 2020. Additionally, more contraction of inward foreign direct investment into the nation were anticipated to be much higher, due to international bans on trade and the COVID-19 pandemic. Given that South Africa's financial and economic situation was precarious even before the COVID-19 outbreak, this could be detrimental to the country's post-pandemic recovery.

Yoo (2018) argues that inward foreign direct investment is another vital economic indicator, which can be impacted by energy tariffs and slow down the economic activity of any country. According to Thompson (2019), South Africa's electricity costs are twice as high as those in BRICS nations such as Russia, and far more than those in many SACU developing countries that South Africa supplies electricity to. Therefore, this implies that electricity in South Africa is actually more expensive in relative terms than the raw per-kilowatt price might suggest.

A rise in electricity tariffs increases the production costs, which ultimately prevents foreign investments. Barkirtas (2012) argues that a rise in electricity tariffs may lead to reduced production competitiveness. In contrast, Ibrahim (2015) discovered that power consumption, and the effect of foreign direct investment on economic development has a favourable long-run relationship. For instance, countries with high financial investments, and increased gross domestic product (GDP), have been proven to be consuming great amounts of electricity. This has sparked policymakers' desire to investigate whether usage of electricity and foreign direct investment have a long-term beneficial impact on the economy.

Meanwhile, Tang et al. (2011) employed the neoclassical Solow growth model, from 1971 to 2011. Moreover, the study used Granger causality and co-integration tests; the results showed a uni-directional causal connection running from power consumption to economic growth.

Power consumption, economic expansion, exports, and labour force integration were all examined by Lean and Smith (2010). The research on the long-term relationship between energy usage and foreign direct investment on economic expansion are credited to Long et al. (2018) as the forerunners, and subsequent literature has built on their work.

The main issue with the above studies is that they ignore electricity tariffs in the nexus of foreign direct investment. Bilgili, Tulce and Dogan (2012) indicated that there are limited studies which investigated the connection between electricity prices and inward foreign direct investment. This emphasized the necessity for and significance of this study to be conducted. A study on the relationship between power prices and inbound foreign direct investment was done by Bilgili, Tulce, and Dogan in 2012. The findings from the research confirmed that the price of power is a factor in the amount of foreign direct investment that the country receives. They also examined the relationship between the cost of other energy sources, comprising coal, unrefined oil, natural gas, and extraction of other fossil fuels; their findings revealed that indeed the country's inward FDI is influenced by energy prices.

Ziesemer and Barteková (2019) examined how power costs affected inflows of foreign direct investment into European countries from 2003 to 2013. Their study's premise is that production costs and power costs have a significant impact on net FDI. Their findings demonstrate that unit labour costs, the advantages of secondary education (Interpreted as accessibility of skills) and power costs are among the critical draw factors for inviting FDI.

It is essential for South African policymakers to have cognition on the link between electricity tariffs and inward foreign direct investment (IFDI). Following the subsequent loadshedding situation that ensued in 2022, the cognition and understanding of this relationship will be crucial for the future of the South African energy supply.

South Africa is an energy-importing country, and a rise in energy tariffs severely impacts the economy through low foreign exchange reserves, high inflation, and currency depreciation. The non-availability of natural gas, and loadshedding, have had an adverse impact on South Africa's economy. South Africa's economy desperately needs foreign investment, but the current energy crisis is preventing that from happening.

Investors are reluctant to invest; the rationale being that they are afraid that the government of South Africa is not able to cope with the energy shortfall (Michael Kugel man, 2013). Another problematic issue is the tariff structures set by NERSA, with incentives for FBE (Free Basic Electricity) and penalties being inefficient to reduce their transmission and distribution losses.

Eskom thus intervenes through subsidies, realizing that electricity is a necessity of life, but it is not affordable for many households. Therefore, this situation results in circular debt, and the state must pay the unsuitable level of circular debt.

Consequently, this study's principal goal is to empirically assess how electricity/energy tariffs influenced the attractiveness of inward FDI to South Africa from 1988 to 2020, and to derive policy implications from the results. It is therefore within this context, to be more specific, that this study determines and examines whether a long-term or short-term link exists among inward foreign direct investment, electricity prices, electricity supply, exchange rate, and inflation rate.

The study adds to the limited empirical literature that considers the electricity market circumstances, along with the rest of the host country's socio-economic conditions, to be significant factors for inward FDI, particularly from the perspective of an emerging economy. Additionally, the timely nature of this research is vital, as emerging nations develop long-term recovery plans for the post-COVID-19 period.

The proper distribution of stimulus funds to initiatives that will generate returns and support an economic recovery is essential. Lastly, the South African power industry has been constrained for more than ten years; giving quantitative proof of its importance not only for domestic economic circumstances but also for foreign investment attractiveness will free up space for future policy execution.

1.2 PROBLEM STATEMENT

Since 1994, South Africa's demand for energy has risen at faster pace (Odendaad, 2011). The economy has experienced substantial structural changes since the country's democratization in 1994. Electrification for the disadvantaged rural communities was one of these structural improvements. According to Inglezi (2011), almost two-thirds of the country lacked access to power during the apartheid era, and hence providing energy to everyone was regarded as a critical aspect of economic recovery after 1994.

Eskom commissioned the Council for Scientific and Industrial Research (CSIR) to perform a study to forecast electricity use. The study examined the patterns of power usage in the country from 1972 to 2009 using the following data sources: Statistics SA, South African Energy Statistics, NERSA, Department of Energy, Eskom's statistical yearbook, and Eskom annual reports. The findings revealed that energy usage increased across the board in all areas of the economy, though at varying rates.

The supply of electricity did not increase in lockstep with the rise in demand. Moreover, reserve supply has declined during the recent years as well. As an illustration, reserve margins in 2004 were 25%, in 2005 were 20%, in 2006 were 16%, and in 2008 they were between 8% and 10% (Government Information, 2008).

Early in 2008, the country faced power disruptions, which highlighted the stark disparity between supply and demand for electricity. In January 2008, for example, power facilities capable of producing around 8700MW were unavailable (Government Information, 2008). As a result, there was a 22% shortfall of electricity that year. The Government of South Africa (2008) set a goal to boost the availability of electricity by constructing energy facilities, such as Kusile and Medupi power stations and enacting energy-saving initiatives. Eskom announced that Medupi, which is the fourth-largest, coal-fired power station in the world, had achieved commercial operation. However, in August 2021, Medupi’s unit four generator exploded, resulting in massive damage, exorbitant costs, and a reduction in generation capacity (Government Information ,2021). Moreover, even with the damage, Medupi managed to record energy availability improvements from 64% in 2021 to 85% in 2022 (Government Information,2022).

In addition, Eskom announced that Kusile unit four, out of a total six units, was completed in June 2021 and it will cost a further R14 billion to finalise the construction of Kusile's remaining two units. Therefore, this implies that Kusile is not yet fully operational to increase electricity supply (Government Information,2022)

Since then, power outages have grown commonplace in South Africa, with the most significant and prolonged waves coming in 2014, 2019, and 2022 (Government Information ,2022).

To reduce the nation's reliance on coal, the South African government (2022) intended to increase the supply of electricity by granting 25 tenders for renewable energy initiatives totalling R50 bn. The 25 projects – 13 photovoltaic plants and 12 wind farms – were awarded to independent power producers, increasing the nation's capacity to generate electricity by 2583 megawatts (MW) (Department of Energy, 2022).

South Africa is living with loadshedding, and ESKOM is drowning in multibillion-dollar debt. As a result, numerous businesses are switching to solar energy, with the goal of becoming totally dependent on it by 2025 (Department of Energy, 2022). Due to industry's and consumers' forced reduction in electricity purchases, most industries will experience lower productivity and profitability. Power blackouts not only significantly affect daily life for the populace but also make South Africa less attractive as a location for foreign investment. For South Africa to recruit new fixed investments, a consistent and effective electricity supply is essential.

The rise in electricity tariffs is yet another significant outcome of power outages. ESKOM received approval acquiescence for a rise in tariffs which is more than the rate of inflation, from 2019 to 2023 (NERSA decision, 2019).

According to Lu (2017), an increase in electricity tariffs will cause the operating margins of many businesses to shrink. Moreover, these tariff increases have also had a significant impact on how much electricity cost weighs on business budgets, and how desirable it is to invest in a country with low production costs.

Multinational firms invest in South Africa because of the country's fairly priced energy, and they come to South Africa to rely on the comparative advantage. Therefore, they claim that high electricity rates have a negative impact on their profitability (Ingelesi,2011).

Industry associations and small, medium, and micro-enterprises claimed that a deeper knowledge of the effects of increased energy tariffs on the South African economy at the industry level was necessary during the 2018 NERSA hearing.

Power outages in South Africa cost the economy more than $30 million per day and hinder economic growth (www.sarb.gov.za). Therefore, NERSA must be aware of the effects of rising energy tariffs on the industry sector (Department of Energy,2022).

Numerous stakeholders have raised their concerns about the negative effects of electricity tariffs, including the potential loss of 90 000 jobs in the mining sector alone (www.engineeringnews.co.za).

After two straight quarters of growth, South Africa's GDP declined by 0.7% in the second quarter(Q2) of 2022. This demonstrates how the June 2022 power outages influenced economic growth(www.sarb.gov.za). In addition to loadshedding, there was also a rise in electricity tariffs, which exacerbated the current electricity crisis. This situation puts the South African economy at risk.

According to Mazambani (2015), electricity influences all economic sectors in South Africa, either directly or indirectly, so an increment in energy rates will influence each sector and ultimately influence the overall economy. From 1994 until 2007, South Africa's electricity tariffs were extremely low. Therefore, foreign investors used to take advantage of the country's favourable economic conditions (Rossouw, 2012). As a result, an increment in energy tariffs may affect the unemployment rate, because businesses may find it difficult to maintain the increased pressure on their manufacturing costs.

The goal of this study is to ascertain the relationship between inward foreign direct investment, electricity price, power supply, inflation, and exchange rate at the sectoral and national level. According to Bildirici (2012), an increment in power rates will have adverse impact on the quality of produced merchandise and on investors' confidence. Understanding the impact of electricity pricing on inward foreign investment is vital for policymakers because it is a foundation of society and the expansion of developing nations' economies, like South Africa. This makes it important for them to make informed decisions on policy recommendations.

1.3 OBJECTIVES OF THE STUDY

This study's main goal is to econometrically assess the empirical link between electricity tariffs and the FDI coming into South Africa from 1988 to 2020. The secondary objectives are as follows:

(a) To provide an overview of the connection between foreign direct investment and the energy sector in South Africa.

(b) To assess whether co-integration exists between foreign direct investment inflows and the macroeconomic indicators, which are mainly electricity supply, electricity price, inflation, and exchange rate.

(c) To explore the policy measures that will improve electricity pricing.

1.4 RESEARCH QUESTIONS

The research seeks to answer the following questions.

(a) What are the difficulties faced in the electricity and energy supply industry?

(b) Will the implementation of a renewable energy independent power producer programme help in electricity shortages?

1.5 HYPOTHESES OF THE STUDY

H0: High electricity tariffs do not have an impact on attracting foreign investors.

H1: High electricity tariffs have an impact on attracting foreign investors.

1.6 SIGNIFICANCE OF THE STUDY

Electrical power is necessary for production factors. Additionally, it is necessary for today's technologies. As a result, ensuring a steady electricity supply is critical. The experience of power disruptions in South Africa stimulated policymakers' interest in investing more in electricity-related research. The effects of power outages on important economic sectors have demonstrated the need for a reliable electricity supply.

The stimulation of other industries' productivity is aided by strengthening the electrical supply. This will result in foreign direct investments, increased employment, and overall community improvement.

The timeliness of this paper is especially critical as emerging nations establish policies for long-term, sustainable recovery in the post-COVID-19 future. The proper distribution of stimulus funds to programmes that will generate returns and support an economic recovery is essential. Lastly, the South African electrical industry has been restricted for more than ten years; therefore, giving quantitative proof of its importance not only for domestic economic circumstances but also for foreign investment attractiveness will free up space for future policy execution.

1.7 RESEARCH METHODOLOGY

The focus of this dissertation is to empirically evaluate the impact of high electricity tariffs on inward foreign direct investment, keeping in mind the negative economic impact that high electricity prices and the interrupted supply of electricity have on attracting foreign investors to South Africa. A time-series data for selected variables will be sourced from IMF, Stats SA, SARB, and Eskom ranging from1988 to 2020.

The selection of the beginning and ending times was restricted by the data on electricity supply that was readily available. In doing so, the main goal of this dissertation is to use the ARDL technique, stationarity tests, diagnostic tests, and stability techniques to investigate the connection among the parameters. Data will be collected spanning the years 1988 – 2020.

Annual data for foreign direct investment inflows will be sourced from the IMF online database for South Africa; moreover, data for electricity prices and electricity supply will be sourced from the Eskom database, the data for Inflation will be obtained from the Stats SA online database, and the exchange rate will be obtained from the South Africa Reserve Bank online database.

1.8 LAYOUT OF THE DISSERTATION

There are six chapters in this dissertation:

Chapter 1: Presents the introduction of the study. It explains how the paper's problem statement and objectives were developed.

Chapter 2: Will discuss the developments in IFDI and the energy sector from 1990 to 2020, and the history of FDI will be unpacked together with the history of renewable energy and the electricity supply industry

Chapter 3: includes the theoretical underpinnings of FDI theories, and empirical literature of the studies which were conducted before.

Chapter 4: comprises the methodology of the study. Variables that will be employed in the model are examined together with the data utilized. Tests that will be conducted in the study are explained in detail.

Chapter 5: comprises data analyses of the study, as well as the results obtained in the research paper and interpretations.

Chapter 6: includes the research paper's conclusions, recommendations for policies, restrictions on the study, and potential future research fields.

1.9 CONCLUSION

Chapter One consists of the introduction to the dissertation. Firstly, the chapter described the significance of power supply in inviting inward foreign direct investment. The importance of IFDI as a source of capital, labour, and other production factors was also covered. Moreover, the introduction revealed the knowledge of a long-term connection among the selected variables.

After regulatory impediments were removed and feed-in tariffs were rebuilt, it was demonstrated that the economy's structure had changed since the start of South Africa's democracy in 1994.

Since then, inward foreign direct investment has increased, resulting in a situation where the electrical supply could not keep up with demand in manufacturing plants.

Inward foreign direct investment and power supply were discovered to be negatively correlated. This resulted in the 2008 power outages, which caused business interruptions, productivity losses, and low investor confidence, resulting in the layoff of numerous employees.

Chapter one further discussed how electricity tariffs increased after the 2008 power failures. Electricity prices increased because of the power outages, preventing 2009/2010 inflation from exceeding 3%. The effect of power outages on foreign investment and the consequent increase in electricity prices resulted in the formation of a problem statement, from which objectives of the research are derived.

The dissertation's significance is that it will supplement the already-written literature and assist policymakers in the electricity sector, by ensuring that there is a balance between demand and supply of electricity; making this quantitative proof is necessary not only for domestic economic circumstances but also for foreign investment attractiveness. This chapter also covered the study technique, including how and where data would be obtained, in addition to the analysis and interpretation of data methodologies.

Chapter two will review the background history and trends of IFDI in Africa, globally, and in South Africa. Moreover, the chapter will discuss the determinants of FDI.

The history of South Africa's energy industry and the connection between power pricing and foreign direct investment will be covered in the last section of this chapter. We will look at prospective solutions for the power supply industry and suggest structures that can function well in South Africa.

CHAPTER 2

OVERVIEW OF SOUTH AFRICA'S IFDI AND ENERGY SECTOR

2.1 INTRODUCTION

This chapter discusses developments in FDI inflows and the power sector from 1990 to 2020. There are five sections in this chapter. Firstly, the opening section provides an overview of foreign direct investment in South Africa. Secondly, historical FDI trends from a global, regional, and local standpoint. The third section addresses the elements affecting foreign direct investment in South Africa, followed by a description of the nation's power industry. Lastly, the chapter ends with the fifth section, which sums up the chapter.

2.2 EVALUATION OF THE HISTORICAL BACKGROUND OF FOREIGN DIRECT INVESTMENT IN SOUTH AFRICA

South Africa is an emerging nation whose economic progress is heavily dependent on foreign investment. To maintain the efficient operation of South Africa's abundant natural resources, which in turn supports the economy's further expansion, foreign direct investment (FDI) is necessary.

Asiedu (2015) asserts that the nature and volume of foreign investment coming into South Africa are influenced by the projected returns, and the risks related to those rewards. The following are the several types of FDI expectations.

The first is that there are several macroeconomic concerns about political and economic stability, as well as constitutional policies on multinational investment. The second issue is a reduction in the country's regulatory framework effectiveness.

In the case of power plants in the energy industry, the inefficiency of a nation's policy structure pertains to arrival and departure, labour relations, and labour usage flexibility, taxation, and the transparency of finance and environmental safety and health standards. Thirdly, significant issues are the calibre and quantity of financial and physical infrastructure, including banking, finance, power, transportation, and telecommunications.

In terms of these expectations, Asiedu (2015) highlighted that South Africa does admirably in terms of meeting these expectations. The environment for investing in South Africa has radically changed over time. Sanctions and boycotts had a significant impact on South Africa's foreign commerce and investment throughout the 1970s and 1980s.

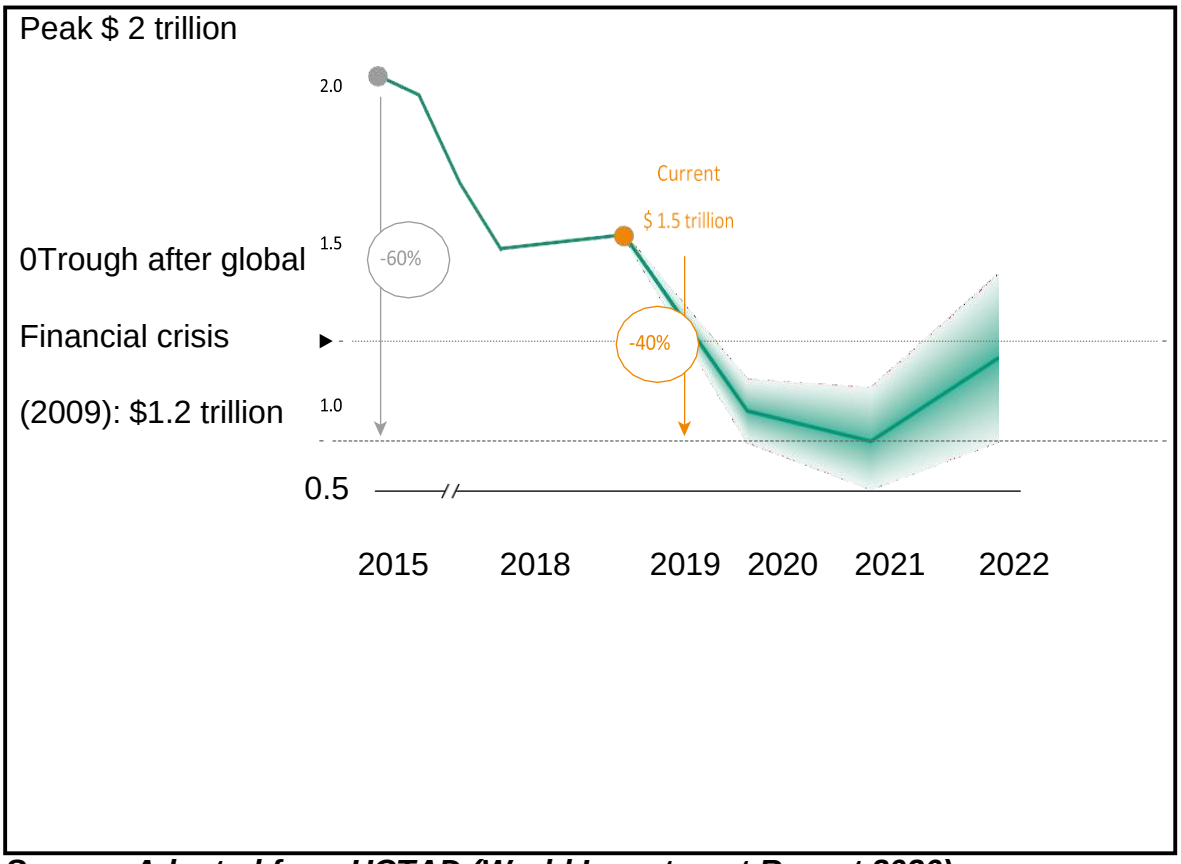
Sanctions and anti-apartheid activities resulted in limited investment in South Africa, if not outright disinvestment. Compared to foreign direct investment, domestic investment that prioritized substitution of imports took the lead (Gelb, 2002). When the African National Congress (ANC) took office in 1994, the investment climate underwent a substantial transformation. South Africa’s economy became more open and globally focused, which increased political stability.

2.3 ANALYSIS OF FDI INFLOWS INTO GLOBAL, AFRICAN, AND SOUTH AFRICAN MARKETS

2.3.1 IFDI TRENDS

The COVID-19 global pandemic caused FDI to decline significantly. Figure 2.1 below shows that global FDI flows in 2019 totalled $1.54 trillion; by 2020, it was predicted that these flows will have decreased by up to 40% (World Investment Report, 2020:1). FDI is below $1 trillion, based on Figure 2.1 below, for the very first time since 2006. FDI is anticipated to decline by a further 15% in 2021, before starting to recover in 2022. A recovery is possible in 2022, with FDI returning to the underlying trend prior to COVID-19, but only within the upper bound of expectations (World Investment Report, 2020:1).

FIGURE 2. 1 INFLOWS OF GLOBAL FDI, FORECAST FOR 2015–2019 & 2020–2022.



Source: Adapted from UCTAD (World Investment Report,2020)

Figure 2.1 shows the decline due to COVID-19 follows multiple years of poor or sluggish growth, adding to a longer-term decreasing trend. By 2021, it is expected that global FDI flows will have decreased from $3 trillion in 2015 to less than $900 billion, a 60% decrease (World Investment Report, 2020:1).

UNCTAD (2020) reports that worldwide FDI flows increased slightly, by 4% to $1.24 trillion in 2019. Inbound FDI to developed economies increased by 6% to $900 billion. It was mainly driven by growth in specific countries, such as Switzerland and Ireland, after drastically adverse inflows in 2018. However, it was centred in Europe. This has been ascribed to a rise in cross-border mergers and acquisitions, as well as company engagement (World Investment Report, 2020:10).

FDI inflow to developing nations fell by 2% to $685 billion in 2020, according to WIR (2020:4). Since 2010, inflows to developing countries have remained largely stable, fluctuating within a far smaller range than those to industrialized economies, staying around $675 billion on aggregate.

Strong local demand and a rise in multinational acquisitions and mergers because of competitive values of business assets, rapid income growth, and potent macroeconomic factors like a growing market have been cited as the causes of this (World Investment Report, 2020: 4).

2.3.2 FDI INFLOWS TO AFRICA

Africa's portion of the worldwide FDI inflow fell by roughly 10% from 2010 to $45 billion in 2019, according to UNCTAD (2020). The OCED countries have dominated FDI inflows to Africa, representing 86% of all FDI inflows from 2010-2018. Up to 4% of African FDI comes from India and China. Investments made within Africa and in the Eastern Mediterranean made up the remaining 16% (International Monetary Fund, 2020:13).

Between 2012 and 2018, 70% of African investment went to South Africa, Nigeria, and Egypt. OECD extractive corporations from the United States of America and France have been the main investors (World Investment Report, 2020:7).

Foreign direct investment into Africa is largely directed to South Africa. In 2019, it had a 28 percent inward FDI stock (World Investment Report, 2020:13). Various policy changes have been credited with the increase in IFDI in South Africa. The COVID-19 pandemic, on the other hand, has slowed growth to less than 12% in 2020 and 2021 (World Investment Report, 2020:7). Morocco was also viewed as a significant source of intra-African FDI. Morocco received 65 percent of its foreign FDI from North Africa in 2019 and 75 percent from Tunisia (WIR, 2020:23). As a result, intra-African FDI is viewed as an important factor in regional economic integration and fully integrated productivity expansion in Africa.

According to World Investment Report (2011:90), the extractive industry, which is the main sector, has received the majority of inward FDI. This reflects the amount of money invested in oil and mineral exploitation.

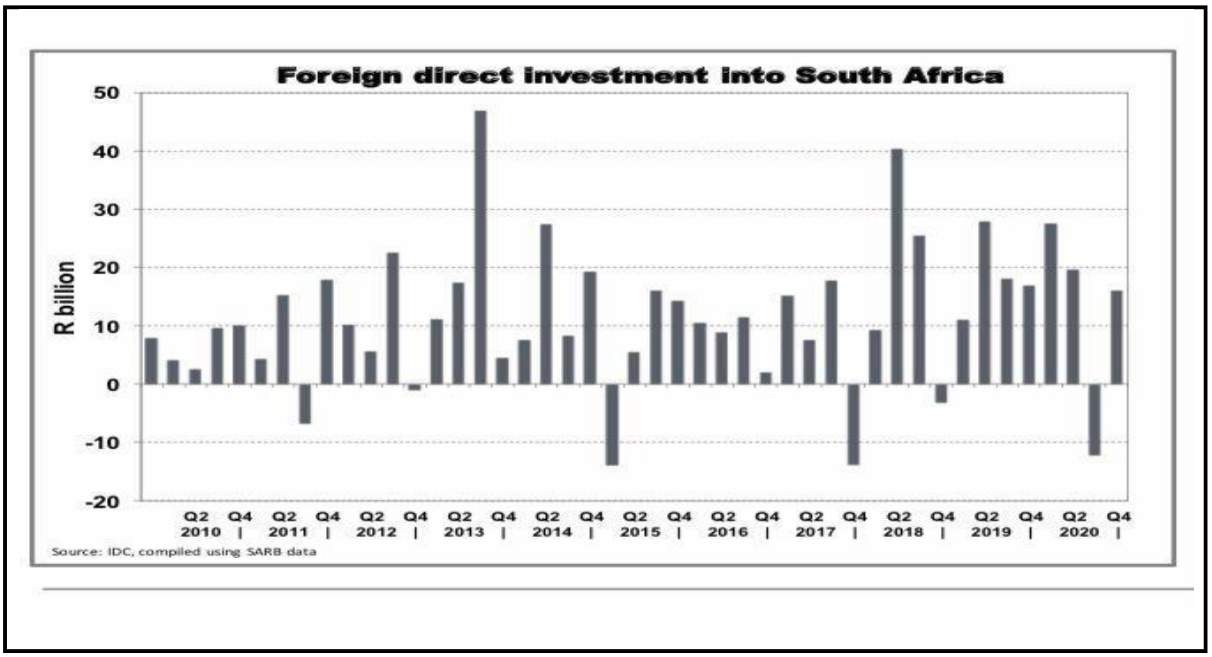
Almost half of all inflows to Africa were directed to South Africa, Angola, Equatorial Guinea, Nigeria, Egypt, and Sudan. Through a succession of mergers and acquisitions in the banking, mining and service sectors, other types of FDI have entered Africa. According to the International Monetary Fund (2011:22), the increase in foreign direct investment in Africa was largely attributed to ongoing efforts to promote political stability, and economic and financial reforms.

2.3.3 TRENDS IN FDI STOCKS AND FLOWS IN SOUTH AFRICA

According to the Department of Trade and Industry (2018:44), South Africa has a conducive environment for investors, and foreign direct investment has been essential for the country's economic growth. South Africa has made significant economic adjustments to entice more foreign direct investment since the end of apartheid. This, however, has not been realized. FDI has been low in comparison to other developing market countries since 2010. High unemployment, a scarcity of skilled labour, the prevalence of the COVID-19 pandemic, and, to a lesser extent, government bureaucracy has all been blamed for the consequences (International Monetary Fund, 2020:6).

The bureaucracy includes, among other things, difficulty in obtaining work permits for managers and experts, as well as the time spent waiting for them, the expense and inconvenience of complying with the Constitution, and insufficient structural reforms. Moreover, the COVID-19 pandemic is a shock to FDI supply, demand, and policy. The lockdown procedures delayed ongoing investment projects. In the case of a severe recession, MNEs are reassessing change developments. Governments have implemented new investment restrictions because of crisis-related policy changes.

Figure 2.2 Shows the Total Amount of Foreign Direct Investment Inflows into South Africa from 2010 to 2020



Source: SARB DATA

South Africa saw a positive FDI influx in 2010 of R10.2 billion, as depicted in the graph above. South Africa's inclusion in the BRICS (Brazil, Russia, India, China, and South Africa) programme in December 2010 is credited with this increase. The FIFA 2010 Soccer World Cup is also credited with this increase.

South Africa's investment fell from $6 billion (R60.6 billion) in 2011 to $4.6 billion (R46.46 billion) in 2012 (www.sarb.gov.za). When a foreign mining corporation sold its ownership in a corporate framework in the third quarter of 2012, this was mostly caused by net divestment, according to UNCTAD (2012).

In 2013, South Africa's total FDI inward stock was $139 billion (R1.4 trillion), accounting for 35.6 percent of GDP, up from 9.9 percent in 1995 (www.sarb.gov.za). Intercompany financing and stock inflows accounted for most of the rise in 2013.

The outperformance of the commodity sector and political unpredictability were the main causes of South Africa's 41% reduction in FDI inflows in 2018, according to the United Nations Commission on Trade and Development (UNCTAD, 2018). In general, an uncertain political situation has a detrimental impact on investors' decisions to invest in a country (Dunning, 2003).

Data from the South African Reserve Bank show that FDI inflows fell by 31% to R51.1 billion in 2020, down from R74 billion in 2019. At the beginning of 2020, South Africa experienced a recession, and its credit rating was downgraded to junk status (www.sarb.gov.za).

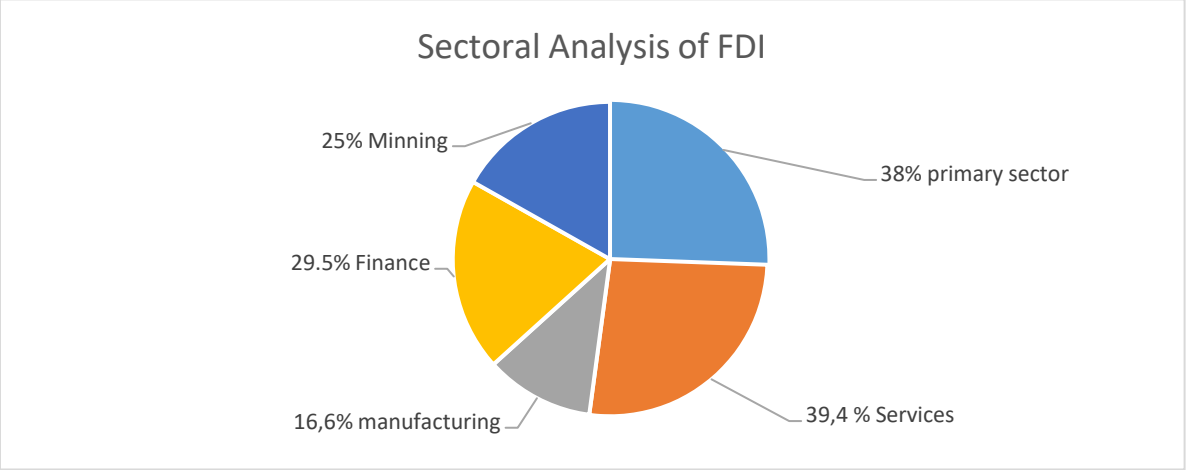
In a world where firm valuations are at record lows, this has harmed the country's capacity to attract FDI. According to UNTACD (2020), FDI into South Africa has averaged 5.9% of total fixed investment expenditure during the last decade. From a worldwide viewpoint, this is a poor showing, but it is not out of line when compared to other BRICS economies, except for Brazil, which has substantially higher ratios. South Africa will probably find it difficult to draw the kind of investment required to meet its post-COVID recovery needs in the present pandemic situation.

2.4 FDI IN SOUTH AFRICA: SECTORAL ANALYSIS, SOURCES, AND DETERMINANTS

2.4.1 SOUTH AFRICA'S SECTORAL ANALYSIS OF FDI

South Africa, like the rest of the world, will see a significant drop in foreign investment because of the COVID-19 pandemic. Because of the country's resource-oriented investment profile, the crisis will be compounded by low commodity prices. Investment in Global Value Chain (GVC)-intensive manufacturing industries will be among the hardest hit, undermining South Africa's efforts to diversify its economy and industrialize (UNCTAD, 2020).

FIGURE 2.2. 1 SOUTH AFRICA'S SECTORAL ANALYSIS OF FDI



Source: Own Construction

Figure 2.2.1 shows the sectoral analysis of FDI in South from 2010 and 2020. According to UNCTAD (2020:6), the primary sector accounted for 38 percent of inward FDI stock between 2010 and 2020, with mining and quarrying accounting for 25.5 percent of the total. The services sector garnered 39.4% of the vote. This was primarily in finance, which accounted for 29.5 percent of the total.

Community, social, and personal activities, as well as power and other utilities like natural gas, drew relatively low international investment, with a percentage contribution that was nearly zero. During the same year, the manufacturing industry attracted the least amount of inward FDI stock, accounting for 16.6% of total inward FDI stock.

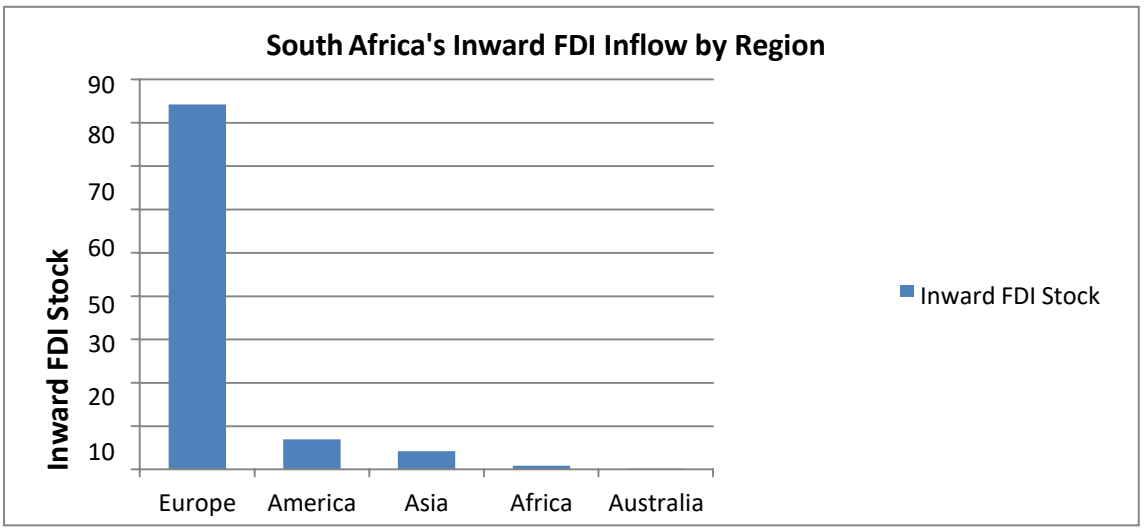
According to WIR (2011), subsequent sector liberalization, political emancipation, and investor confidence are largely responsible for the financial sector's growth as an appealing investment sector.

South Africa has drawn in green-field projects in industries like transportation, pharmaceuticals, food processing and information technology. This pattern might signal a transition in FDI motives away from resource extraction and toward industry and efficiency improvement (UNCTAD, 2019).

2.4.2 SOUTH AFRICA'S FDI INFLOW SOURCES

UNCTAD (2020:6) conducted a study of regional FDI sources in South Africa from 2010 to 2020. The results show that Europe is the continent from which South Africa receives the most foreign direct investment. Europe contributed R4 758 277 million in inward FDI, representing 85% of all inward FDI across all countries. America comes in second with R396 620 million, accounting for 8%, while Asia comes in third with R241 373 million, representing 5 percent. Only a very small portion of all inward FDI came from Australia and Africa.

Figure: 2.3 FDI Inflows from Regional Sources (2010-2020)



SOURCE: Adapted from UNCTAD (2021)

With R 3 497 478 million (61.8%) of the total FDI from other countries, the United Kingdom was the main source, the Netherlands came in second with R422 517 million (7.6%), the United States with R385 116 million (6.9%), Germany with R364 372 million (6.7%), and Switzerland with R173 684 million (3.2%) (UNCTAD, 2021:5).

Multinational companies operating in South Africa with privileged entry to the United Kingdom's market due to free-trade agreements are responsible for the EU's supremacy as a major source of investment (World Investment Report, 2018:33). For the United States higher growth share, the African Growth and Opportunity Act (AGOA), which took effect in November 2000, has been cited. Some IFDI has been drawn to the textile industry, especially in Free State Province (WIR, 2018:23). Mergers and acquisitions were the main factors behind the total inward FDI of R423 507 million and R364 372 million, from Germany and the Netherlands respectively, between 2010 and 2020 (SARB, 2021).

2.4.3 DRIVERS OF FOREIGN DIRECT INVESTMENT IN SOUTH AFRICA

Drivers of foreign direct investment will be covered in this section. The factors that contribute to IFDI are included in this section. These include infrastructure, availability of natural resources, returns on investment, stability in political relations, fiscal incentives, financial development, size of the market, trade openness, international reserves, and external debt.

2.4.3.1 INFRASTRUCTURE

The availability of robust infrastructure is essential for attracting FDI regardless of the type of FDI. It is frequently said that strong infrastructure stimulates investment productivity and increases inflow of FDI (Asiedu, 2015).

2.4.3.2 INTERNATIONAL RESERVES

The movement of capital in developing economies is heavily influenced by international reserves. International reserves are widely recognized as the most crucial element in a nation's investment climate (Asiedu, 2015). High levels of international reserves encourage foreign investment by boosting investor confidence.

2.4.3.3 AVAILABILITY OF NATURAL RESOURCES

The availability of the environment's resources is another factor to consider while luring in foreign investment.

Investors looking for resources often create subsidiaries abroad in which a reliable, stable, or lower-cost supply of constituents like natural resources and power supply sources can be readily provided to their headquarters (Jenkins & Thomas, 2012).

Due to their lower production costs, investors favour nations with significant mineral and oil reserves. The list of nations with abundant natural resources includes South Africa.

2.4.3.4 RETURNS ON INVESTMENT

FDI is directed toward countries that offer higher rates of return on investment. Since most developing nations lack a robust capital market, determining the return on investment in these nations can be challenging (Asiedu, 2015). The return on investment is typically determined using the opposite, or real GDP per person.

Foreign investors may be drawn to nations and industries where there are already many foreign investors. Other countries' investment decisions are considered a positive indicator of favourable conditions in this scenario. This circumstance is frequently referred to as "agglomeration economies" (Campos & Kinoshita, 2003). Positive externalities result from the concentration of foreign investors. There are three different types of externalities that have been found. The first is that overseas investors can benefit from technological spillovers. Second, they can use a portion of the trained labour and specialized input materials available to them. Lastly, they can split the profits from advertising and promotion.

2.4.3.5 STABILITY IN POLITICAL RELATIONS

A stable political climate attracts more foreign direct investment than one that is unstable. Political rights and rule of law are not respected in less democratic countries. Foreign investors may be turned off by these circumstances. When governments change, international investors want to know that their investments and enterprises will be unaffected (Onyeiwu & Shrestha, 2014).

2.4.3.6 FISCAL INCENTIVES

Fiscal incentives, according to Lim (2013:13), boost the host country's geographical benefits. To offer these incentives, reduced corporation taxes, cheaper import and export duties, or exemptions like tax holidays could be used. These are linked to foreign direct investment policies to entice FDI, resulting in a favourable association. To promote open and market-based industry, the Department of Trade and Industry (DTI) of South Africa established industrial development zones (IDZs).

These zones offer financial advantages, such as tax breaks and free raw material imports (Streak, 1998:6)

2.4.3.7 FINANCIAL DEVELOPMENT

International companies may find it simpler to fund long- and short-term operations and fulfil capital requirements in the marketplace if financial markets are more developed. A project's financing options include using debt instruments traded on the financial markets or obtaining credit from the banking industry.

2.4.3.8 SIZE OF THE MARKET

For optimum resource utilization, FDI-seeking markets require a broad market. Inward FDI will increase as a country's market size grows, as more commodities may be produced. Because of economies of scale and cheaper fixed costs, larger market size lowers the cost of production. Investors prefer investing in economies that are growing, because they may profit from efficient resource management and economies of scale due to the vast market size. Consequently, a favourable connection between size of the market and foreign direct investment is anticipated (Lim, 2013).

2.4.3.9 TRADE OPENNESS

The ratio of gross domestic product to net proportion of exports, which is used to evaluate market opening, indicates how easy it is for investors to transfer large amounts of funds in and out of a nation. FDI can be encouraged by fewer capital controls and more flexible trade policies, whereas FDI can be discouraged by restrictive regulations. For instance, South Africa obtained less FDI during the apartheid era since the government had various capital controls and was less open to the outside world. Capital regulations were lifted with the advent of democracy, allowing FDI to flourish (Shrestha, 2005).

2.5 OVERVIEW OF SOUTH AFRICA'S POWER SECTOR

2.5.1 INTRODUCTION

The rising demand for power, the increasing cost of energy from conventional sources, and the restricted availability of electricity are all causes for concern around the world. The demand for energy generation could be reduced by expanding the sources of power to fulfil the protracted power generation objectives.

Diversification entails locating other energy sources for the generation of power, such as renewable energy. Great strain is being placed on South Africa's energy grid in terms of supplying and maintaining electricity to its customers.

Electricity generation might be considered a major factor in South Africa's socio-economic development.

The difficulties are already so severe that extracting enough resources to meet rising electrical demand will become increasingly challenging over time. Important variations in the energy industry are being brought about by the growth of the industrial and energy industries.

Eskom supplies 94 percent of the nation's electricity, although the use of independent power producers (IPPs), who contribute to the power system, reduces the danger of an inadequate supply owing to rising demand.

There is no conducive business environment for IPPs to thrive in, even though a small proportion of them sell power to Eskom. There is no active effort being made to implement policies and procedures. To integrate IPP entrepreneurs into the power network, smart grid access has become a feasible alternative.

The electrical industry may have feasible choices if it invests in renewable power sources, which would also help to ease current supply problems and create an environment that would encourage the development of IPPs and other forms of entrepreneurship.

2.6 THE TRENDS IN ELECTRICITY SUPPLY, ENERGY SUPPLY, AND ELECTRICITY PRICES

It was previously discussed in the study's introduction that a sufficient supply of electricity and stable electricity prices can influence investor confidence, particularly in an energy-intensive nation like South Africa.

Historical data on energy supply, and electricity prices may be crucial in influencing the current condition of limited electricity supply and high electricity prices. Therefore, the emphasis of this subsection will be on trends in South Africa's electricity supply, energy supply, and electricity costs.

2.6.1 TRENDS IN ELECTRICITY SUPPLY

Coal accounts for 93.2 percent of energy generation, nuclear for 4.2 percent, gas for 1.3 percent, and hydroelectricity for 1.32 percent. Eskom, South Africa's largest electricity supplier, is responsible for 95 percent of electricity delivered in the country and 45 percent in Africa (De Lille, 2011). SACU countries are among the African countries to which Eskom exports energy (Khobai,2013).

The South African Power Pool agreement states that South Africa sends approximately 1200 GWh of electricity to these Southern African nations each month.

Table 2.1 Statistics about South African Electricity Supply

YEAR	GWh			
	Indigenous Production	Imports	Exports	Domestic Supply
1992	167816	334	1814	166336
1993	174581	100	2589	172092
1994	182452	54	2679	179827
1995	187825	149	3000	184974
1996	200266	29	5579	194716
1997	210052	5	6617	203440
1998	205374	2375	4532	203217
1999	203012	6673	4266	205419
2000	210363	4719	4007	211075
2001	197908	9200	6996	200112
2002	206105	9496	7242	208359
2003	221642	8194	10263	219573
2004	234045	9818	13254	230609
2005	230024	11079	13422	227681
2006	240964	10624	13589	237999
2007	244318	11348	14496	241170
2008	239520	10572	14168	235924
2009	231356	12295	14052	229599
2010	240747	12193	14668	238272
2011	243602	11890	14964	240528
2012	239203	10006	15035	234174
2013	256073	9428	13 929	231445

YEAR	GWh			
	Indigenous Production	Imports	Exports	Domestic Supply
2014	252578	11177	13 836	233105
2015	230615	1156	14964	19755
2016	228218	10555	16549	228546
2017	239203	8568	15035	229669
2018	228218	9687	14964	231805
2019	229330	9804	15035	227336
2020	227336	9844	13054	230857
2021	20108	11890	14964	240528
2022	20587	10006	15035	234174

Source: Stats SA (2022)

The amount of power provided by Eskom from 1992 to 2022 is depicted in Table 2.1 Between 1992 and 2000, electricity generation surged dramatically. The totals began to fluctuate in the early 2000s. For example, between 2000 and 2001, the local electricity supply declined from 211075/GW to 200112/GW. From 2001 to 2002, there was a lower increase of 4.12%, and from 2002 to 2003, the little increase peaked at 5.38 percent. The table also shows that power generation declined by 1.27 percent from 2004 to 2005, before increasing by 4.53 percent the next year. Since demand was so high in those years – from the mid-2000s to 2006 – it is crucial to take these rises into account.

As seen in Table 2.1, there was also a substantial amount of electricity exported to foreign nations. Except for the years 1997 to 2000, the amount of power exported increased every year, according to the data. For example, between 2002 and 2003, exports climbed by 41.71 percent. In 2004, the growth was 29.14 percent, while exports climbed by 1.24 percent between 2005 and 2006.

This demonstrates that, even though power generation increased by a smaller margin, more electricity was constantly exported from South Africa. Moreover, the nation was importing less and exporting more, which had an impact on the local electrical supply.

2.6.1.1 THE GENERATION OF ELECTRICITY BY FUEL TYPE

Electrical power can be produced using a variety of fuels, although only three are mentioned in this section. Nuclear power, hydroelectricity, and coal are examples of these.

Table 2.2: South Africa's electricity production by type of fuel

Electricity production by type of fuel		
	YEAR:2000	YEAR: 2018
Coal	5995	10 123
Oil	1207	808
Natural Gas	2760	6118
Nuclear	2591	2718
Hydro	2613	4203
Wind and Solar PV	32	1857
Other renewables	217	739
Total generation	**15 436**	**26 603**
Electricity demanded	**13 152**	**23 031**

Source: Department of Energy (2020)

2.6.1.1.1 NUCLEAR POWER

In 2000, nuclear energy supplied around 2.1 percent of South Africa's fundamental energy needs. Table 2.2. illustrates that nuclear power generation grew from 2591 megawatts per hour in 2000 to 2718 megawatts an hour in 2018.

South Africa was one of the biggest uranium-producing countries in 2012, with an estimated 279 100 t of uranium, or nearly 5.2% of the largest proven oil reserves in the world (Chamber of Mines, 2012). Nuclear power facilities use uranium to produce electricity, which makes up around 3% of the world's electricity supply.

The only nuclear power plant in the nation is run by Eskom, and it is in Koeberg, Western Cape. Furthermore, it is expected that this nuclear power station would have doubled Eskom's electrical capacity to 80 000/MW, with 20 000/MW coming from nuclear energy by the year 2025 (Department of Energy, 2019).

2.6.1.1.2 HYDROELECTRICITY

In 2000, 2.5 percent of all electricity was generated from hydroelectric facilities. According to Table 2.2, the amount of electricity produced by hydroelectricity increased from 2613/MW to 4203/MW between 2000 and 2018. Eskom bought more energy from the hydroelectric Inga 2 and 3 projects in the Democratic Republic of the Congo (DRC). Additionally, it utilized Cahora Bassa hydropower in Mozambique. One of the difficulties South Africa confronts in creating more hydroelectricity is its low rainfall. The acquisition of a comparable interest in the envisioned Inga power project, on the other hand, is anticipated to increase the nation's production of electricity (Department of Energy, 2009).

2.6.1.1.3 COAL

Coal-fired power plants in South Africa produce most of the country's electricity. Over 93 percent of the nation's electricity is produced from coal. Table 2.2. indicates that coal-fired energy generation rose from 5995 megawatts in 2000 to 10123 megawatts in 2018.

The State has prioritized reducing coal consumption due to the pollution that coal-fired power stations produce. By 2025, coal-fired electricity is expected to account for only 70% of total electricity generation (Department of Energy, 2018).

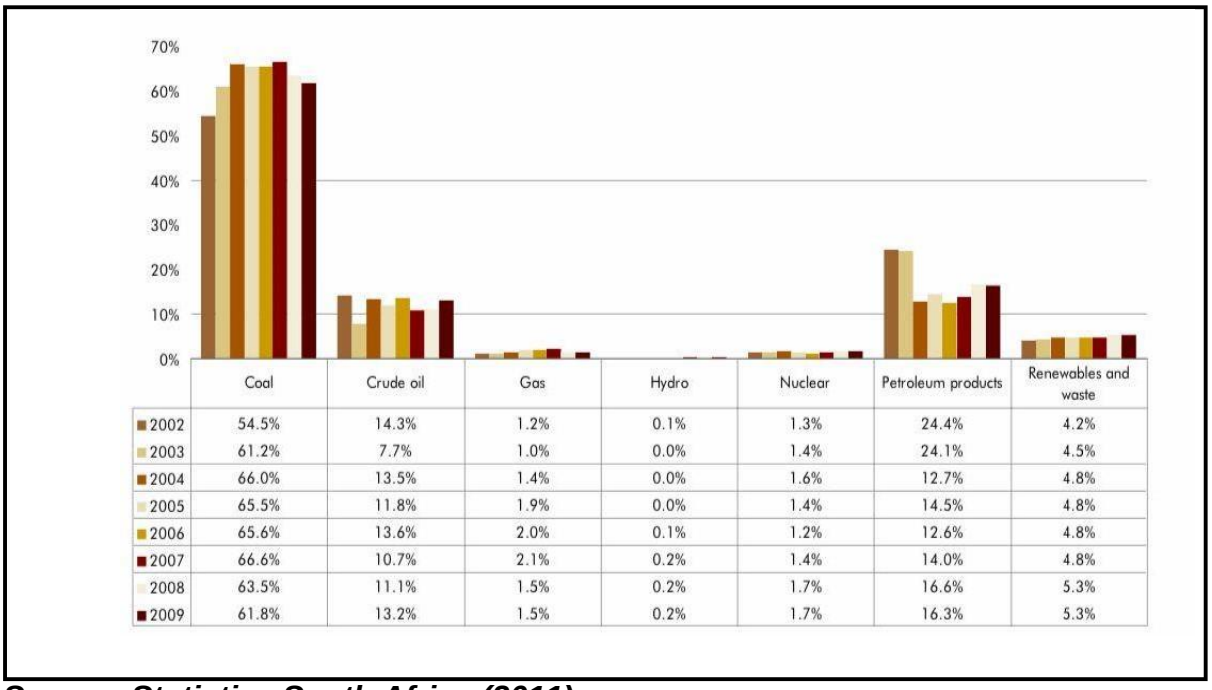
2.7 TRENDS IN ENERGY SUPPLY

Easily available and reasonably priced coal is the main source of energy in South Africa. Moreover, oil is scarce in South Africa, and its uranium mines produce uranium that is exported, then re-imported after being enhanced for use in nuclear power plants (Department of Energy, 2020). The nation also makes use of hydropower to produce electricity from renewable sources, the majority of which is imported (Department of Energy, 2020). Other sources of renewable energy used to produce electricity include biomass, wind, and solar.

Crude oil imports are primarily used to meet South Africa's liquid fuel needs. The State intends to boost South Africa's energy efficiency through expanding the country's energy sources. This will necessitate a greater reliance on renewable energy technology.

Biomass and regenerated natural processes make up renewable energy, which can be used as a source of power. In the 2004 White Paper on Renewable Energy, it was stated that by 2015, renewable energy sources can only contribute up to 1000 GWh of the total energy usage over the long term (Department of Energy, 2019:3).

FIGURE: 2.4 SUPPLY OF PRIMARY ENERGY BY SOURCE IN SA,2002-2009



	Coal	Crude oil	Gas	Hydro	Nuclear	Petroleum products	Renewables and waste
2002	54.5%	14.3%	1.2%	0.1%	1.3%	24.4%	4.2%
2003	61.2%	7.7%	1.0%	0.0%	1.4%	24.1%	4.5%
2004	66.0%	13.5%	1.4%	0.0%	1.6%	12.7%	4.8%
2005	65.5%	11.8%	1.9%	0.0%	1.4%	14.5%	4.8%
2006	65.6%	13.6%	2.0%	0.1%	1.2%	12.6%	4.8%
2007	66.6%	10.7%	2.1%	0.2%	1.4%	14.0%	4.8%
2008	63.5%	11.1%	1.5%	0.2%	1.7%	16.6%	5.3%
2009	61.8%	13.2%	1.5%	0.2%	1.7%	16.3%	5.3%

Source: Statistics South Africa (2011)

FIGURE 2.4 depicts the overall energy supply's trends from 2002-2009. Figure 2.4 shows that the primary source of energy is coal, while hydroelectricity makes up the smallest portion of the energy supply.

Although coal has been vulnerable to a variety of developments since 2006, its participation increased by 6.7 percent from 2002 to 2003, and decreased by 0.5 percent from 2004 to 2005; from 2005 to 2006, it increased by 0.1 percent. Furthermore, it increased by 1 percent from 2006 to 2007, then from 2007 to 2008 it decreased by 3.1%, it deteriorated again by 1.7 percent from 2008 to 2009.

In general, the contribution of coal has dropped by 8.5 percent. Since 2002, hydroelectricity has increased its contribution by 0.8%. Since 2002, the price of crude oil has climbed by 9.2%, while the quantity of natural gas has increased by 7.8%.

Nuclear power's output share decreased from 5.2% in 2002 to 2.9% in 2009. Renewables' share of the economy declined from 9.4% in 2002 to 8.6% in 2009.

2.7.1 DIVERSIFICATION OF ENERGY SOURCES AND ALTERNATIVE ENERGY SOURCES

According to CSIR (2015), foreign investment is required for the country to meet its target of producing 6 925 megawatts from renewable energy sources to transition to a low-carbon economy and support socioeconomic development and ecologically sustainable growth.

With the advent of new energy sources and a process of diversification, the need for electricity generation could be reduced. Diversification refers to the exploration of alternative sources of energy to produce electricity. Several concerns, such as growing resource depletion, import reliance, climate change, and air pollution, are placing pressure on technology choices for the energy system. A cleaner and more self-sufficient energy supply is the main goal of the new energy production and conversion technologies that are now being developed and deployed in terms of alternative energy sources (Van-Ruijven, 2008).

2.7.2 RENEWABLE ENERGY AND FOREIGN DIRECT INVESTMENT

(a) The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

The Department of Energy (2009) states that one of the state's urgent measures to increase the nation's power generation capacity is REIPPPP.

The government's decision to diversify South Africa's energy mix, which was outlined in the nation's 1998 White Paper on Energy Policy, will be put into action by this initiative, which has as its main objective securing private sector investment for the construction of new electricity production capacity.

REIPPPP was developed to aid in the accomplishment of more general national development objectives such as creating jobs, social advancement, and economic change, particularly through increasing economic ownership.

A competitive tendering process called the South African REIPPPP attempts to encourage private sector investments in the country's grid-connected renewable energy (RE). Bids for projects involving landfill gas, wind energy, solar (PV), focused solar power (CSP), small hydro, biomass, and solar PV are being solicited from independent power providers (IPPs). Bids are evaluated based on price (bid tariff) and industrial development criteria after first being verified to meet basic regulatory requirements for assessment.

Four of these so-called "Bid Windows" rounds of bidding were completed between 2011 and 2015, with an additional round for CSP exclusively. With 390 bids, less than 25% (92)1 of them were chosen for the acquisition of 6,328 MW for R193 billion in the form of foreign direct investment (Department of Energy, 2018).

Furthermore, recommended bidders' projects are presently among the world's cheapest grid connected RE projects.

Solar PV and wind energy are now cheaper than Eskom's average cost of supply and significantly less expensive than the company's new coal power plants, according to the winning bids in the most recent procurement.

The programme is on track to meet the National Development Plan's (NDP) interim goal of adding 7,000 MW of operational renewable energy production capacity by 2030, and the Integrated Resource Plan's (IRP) goal of 17,800 MW from renewable energy generation by 2030 (DOE, 2015).

2.7.3 DIFFERENT TYPES OF IPPS IN DEVELOPING ECONOMIES

The current economic growth model has led to a serious deterioration in the quality of the environment and a rapid exhaustion of natural resources. Therefore, quick fixes for maintaining the electricity industry are needed (Ojha, 2015).

Power-generating firms, known as IPPs, were founded in accordance with the social market economy's objectives to meet the need for electricity while diversifying the current power mix (Ojha, 2015).

IPPs are private companies that generate electricity but are not part of the public utility system. They have developed into a sector that serves the public and their network of services, while also having an immediate and major impact on climate change mitigation, because of their expanding influence and global presence (Nathwani & Chen, 2012).

If there is industry permission, private sector participation in the power sector (in the form of IPPs) can help to increase access (Clark & Wamukonya, 2005). Therefore, renewable energy is normally not an easily transmissible kind of production and is frequently found in regions of the country where the grid is not already well-served, so it presents a special challenge for grid operators (Pickering, 2010). Developing markets continue to face difficulties since new renewable energy installations are often located distant from the current grid, requiring expensive transmission lines to supply consumers with electricity (De Oliveira, 2005).

In most cases, the IPP Company structure will include the following elements:

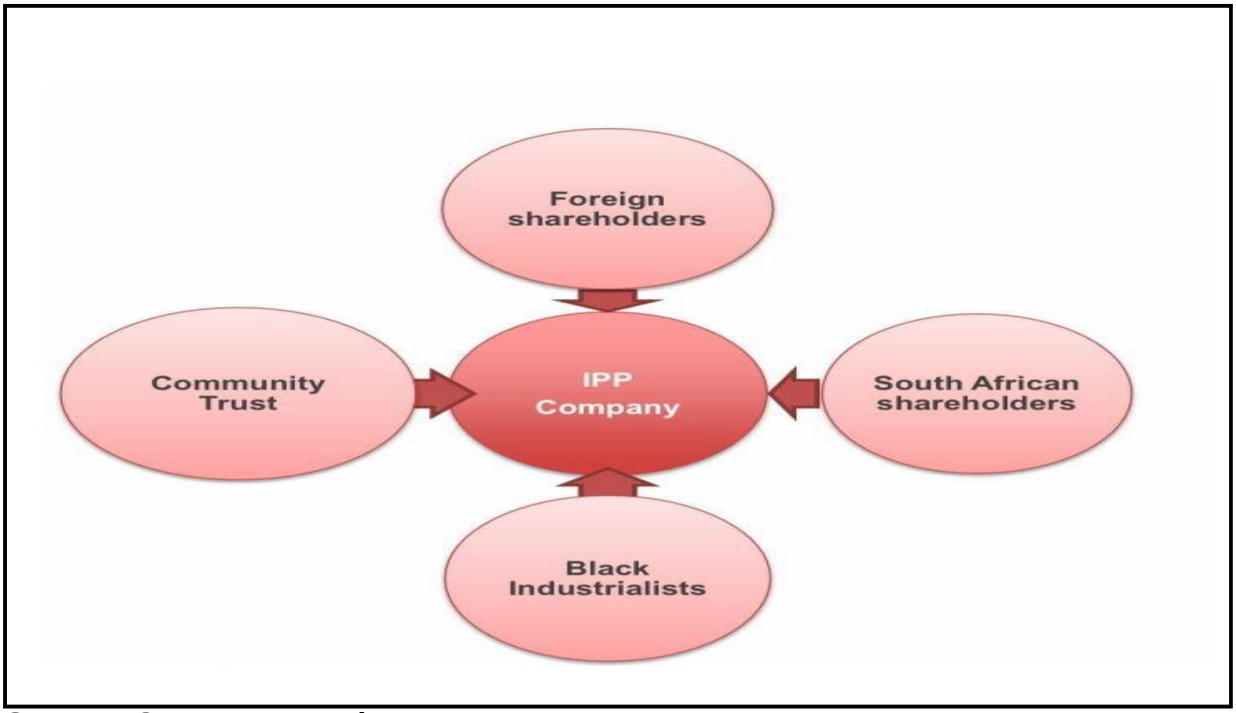
i. Black industrialists who are increasing their shareholding, with projects to be signed requiring an average of 40% ownership**.**

ii. Additional shareholders from South Africa.

iii. Community Foundations that stand in for the localities where the projects are being undertaken.

iv. Foreign direct investment (FDI) from investors boosts the nation's capacity and balance of payments.

Figure 2.5: What is an IPP Company?



Source: Own construction

(b) *The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) success so far.*

The South African REIPPPP has received international acclaim for its achievements. Since 2011, 92 IPPs (apart from SP-IPPPP initiatives) have received 6,327MW of capacity from the Department of Energy, with another 1,800MW soon to be awarded (Department of Energy, 2021).

For South Africa, the programme has proven extremely useful. The tariff cuts made possible by the bid windows have been one of the most significant benefits. Eskom's average price is more expensive than the most recent wind and solar PV offers and far less expensive than the company's new coal power plants.

Eskom saved large net costs in 2015 because of the REIPPPP projects, both by reducing the amount of fuel used and by partially offsetting load shedding, which would have resulted in unsold electricity (CSIR, 2015).

By reducing the dependence on oil, they have helped to diversify the energy mix while also offering significant environmental advantages.

In addition to contributing to B-BBEE and government procurement goals, the REIPPPP's concurrent inclusion of industrial development goals led to the creation of a sizable number of jobs.

The REIPPPP is an important lesson for other developing countries because it has been shown to be so innovative and effective. The concept might be utilized as a foundation for quicker tender implementations while still achieving certain bigger development goals; however, it would need to be customized for country-specific factors.

2.8 DEVELOPMENT OF POWER OUTAGES

This section investigates the fourteen-year evolution of the South African electricity crisis, which culminated in the load shedding incidents of January 2008, November 2014, December 2019 – March 2020, and June 2022.

South Africa's electrical reserve margin has been rapidly shrinking over the past fourteen years because of rising electricity consumption and the commissioning of few new generation facilities (Gasealahwe, 2019). Energy-intensive industries were encouraged to increase their consumption of electricity. Electricity prices were also kept low to encourage consumption. Due to network shortcomings and a lack of regional generation resources, load shedding was necessary in 2006. The first instance of nationwide power outage took place in the early months of 2007, because of an inability to meet demand with the available generation capacity.

Several load shedding events started during the generation maintenance season in October, November, and December 2007, after surviving a winter peak demand of 37,000 MW. A national power emergency was declared by the government on January 25, 2008, because of nearly daily load shedding for two weeks in January 2008. Due to South Africa's inability to meet its electrical needs, estimates of gross domestic product per capita and investor confidence were revised downward, and Eskom’s reputation was jeopardized because of daily power outages (Berstein & Dagut, 2008).

Although at first these structural limitations (power outages) were believed to be short-term, they are now becoming more and more part of the fabric of the economy.

Moreover, 10% of South Africa's electricity is produced from the Majuba power station, where a coal storage silo collapsed, the current load shedding period began anew in November 2014.

Load shedding incidents in 2014 were brought on by a lack of fuel, the depletion of hydroelectric plants' water reserves, and the breakdown of crucial system components, as well as the generating capacity of electricity machines being offline due to planned maintenance (Eskom Report, 2014). The reserve margin (distance between real supply and demand) has significantly decreased because of Eskom's insufficient supply in late January 2015, and the system was constrained. Given that having access to power is one of the major factors driving economic activity, this is not good news for the nation's capacity to build its economy and remain globally competitive.

The entire economic impact of load shedding on South Africa's economy in 2019 was estimated by the Council for Scientific and Industrial Research (CSIR Report, 2020) to be between ZAR 59 billion and ZAR 118 billion. To prevent the national system from getting overwhelmed, Eskom reduced the demand on it, which resulted in 530 hours of planned power outages for South Africans in 2019. However, this was less than in 2015, which had a total of 852 hours of rotating power outages in South Africa, a reduction in 2019 was more severe. This consisted of the implementation of Stage 6 power cuts, which was unprecedented, in December. Moreover, the report from CSIR revealed that Eskom's energy availability factor (EAF) was over 90% and had been declining since 2001. In 2019, EAF fell to its lowest average ever, 67%.

The year 2022 is the worst year on record for blackouts. The economy of South Africa shrank by 0.7% in the second quarter. Deep-level mine employees are at risk from severe outages, and manufacturing suffers throughout the most industrialized country in Africa (Radarr, 2022).

Eskom also poses a serious threat to the public purse because the government is guaranteeing up to R350 billion of its debt. Because of the frequent breakdowns of its outdated and inadequately maintained power plants, Eskom struggles to supply the demand for electricity. Since 2008, the country has seen rolling blackouts. This year, 2022, Eskom has experienced disruptions for ten straight months (Radarr, 2022).

2.9 ESKOM'S ROAD TO RECOVERY AND GOVERNMENT NATIONAL ENERGY RESPONSE

A National Response Plan was started as soon as the national emergency was declared on January 25, 2008, with an emphasis on supply side activities, sectoral interventions, and demand side initiatives. In accordance with this strategy, Eskom started an internal recovery programme that also included measures to address flaws that had been found. The security of supply condition was the primary concern of this plan (NERSA, 2008).

The South African government (2008) also identified energy pricing as a major problem, after examining the causes of the shortage. Due to the extremely low price of energy in comparison to other nations, it is challenging for a nation to acquire sufficient funds to finance additional generation capacity.

In May 2008, a social conversation was also held to talk about the rise in supply costs brought on by the requested tariff hike. This was accomplished through the National Economic Development and Labour Council (NEDLAC). There was some agreement that price increases should be bigger but spread out over a longer period. Eskom has requested an additional tariff rise of 100% for the fiscal years 2008 till 2009 and 2009 till 2010. This increase caused the price to rise only a little bit over the rate of inflation. However, NERSA determined that a 13.3% adjustment should be implemented (NERSA Decision, 2008).

In 2009, Eskom also asked for a 45 percent price increase that had been planned for the previous three years. The three-year price rise was dubbed Multi-Year Price Determination 2 by NERSA (MYPD2). NERSA also openly shared its opinion on a potential price trend for the next five years. Since then, the government has made it clear that it will provide Eskom with some amount of financial assistance as well as debt guarantees.

Eskom executed a 9-point recovery plan for 2019 power outages which includes:

i. R49 billion spend on maintenance over the next five years.
ii. A 40percentage - point improvement in scheduled maintenance above the winter plan from the previous year.

iii. Set apart R5.5 billion to address challenges caused by the underperformance of the Kusile and Medupi coal generation plants.

iv. Greater use of diesel fuel and proper planning and infrastructure.

v. To lessen the strain on Eskom's plants, Eskom also intended to urge people to save more electricity (estimate~100 to 500 MW).

(Eskom Factor Report, 2019)

With the goal of constructing new renewable energy power production at two of its powerplants in the province of Mpumalanga, Eskom agreed lease terms with 4 independent power producer companies in response to the President's call for "an ambitious, urgent, and rapid response to the energy crisis" on the 14th of October 2022 (www.eskom.co.za). Moreover, Eskom aimed to open additional land close to its power plants, and other places in which there is sufficient grid capability, to connect renewable energy generators. In the future, initiatives of this sort may have access to up to 30 000 acres.

According to the Department of Public Works and Infrastructure (DPWI, 2021), delays in commissioning, poor performance of recently built coal generation capacity, and deterioration of the existing Eskom coal fleets are only a few of the problems that have contributed to power blackouts since 2014, with the energy availability factor falling from 94% in 2002 to 67% in 2019. Eskom's financial collapse has been heavily attributed to policy paralysis throughout the previous 20 years. Eskom's price has historically not kept up with depreciation, making it difficult for it to save money for future investments.

The South African Government (2022) executed a plan to end power outages. A distinct component of the plan focuses on the more urgent adjustments that the government expects to make over the next three years. Most of the plan is concentrated on improvements that will be executed by 2050.

The plan is detailed as followed:

i. According to the law, Eskom will be divided into three distinct companies: generating, transmission, and distribution. By 2021 – 2022, the Independent Transmission System and Market Operator (ITSMO) is anticipated to be operational. A Centre of Excellence for Power

Generation will be established in 2022 and relocate to the ITSMO by 2023.

ii. The pledge to raise the licensing threshold for self-generation to 100 MW will take effect in 2021–2022. Development will be made easier with the use of a large database of initiatives, especially for transmission infrastructure.
iii. By 2021/2022, plans will be in place to reduce dependency on coal, and substantial implementation will start in 2022–2023.

(South African Government, 2022)

2.10 IMPACT OF POWER OUTAGES ON FOREIGN INVESTORS' CONFIDENCE

Load shedding damaged South Africa's viability as an investment destination and significantly affected the public. For new fixed investments to be attracted, a dependable and effective electrical supply is essential (Gasealahwe 2020).

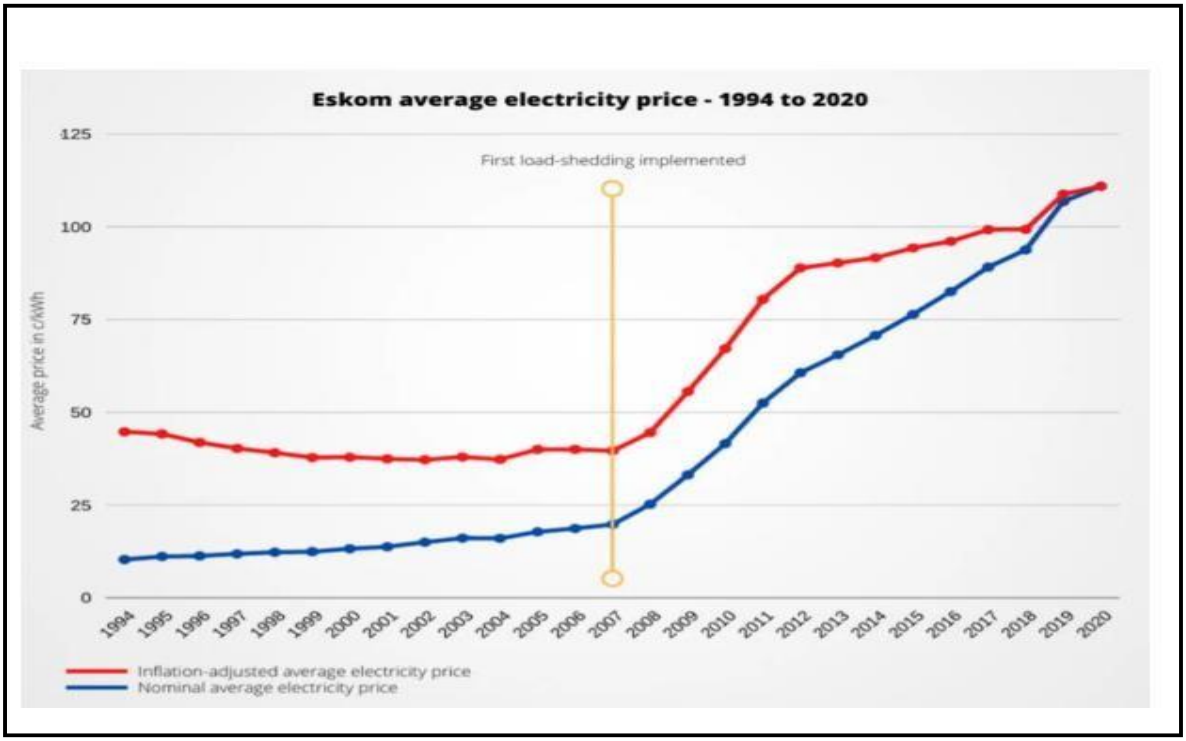
Also, it fosters a favourable atmosphere for economic development. Power outages, according to Zietsman (2012), are a drag on economic growth. According to Zietsman's (2012) research, when approximately 8.5% of South Africa's electricity is not served, the nominal GDP growth rate falls by approximately 6%.

The first quarter of 2008 saw significant and ongoing load shedding, which destroyed investor and public confidence in Eskom, South Africa's energy utility. In January 2008, load shedding occurred almost every day for two weeks, which prompted the government to proclaim a national electricity emergency. Furthermore, this resulted in a substantial impact on economic growth rates across the board and tarnished the image of both Eskom and South Africa (Chettiar, Lakmeeharan & Koch, 2009).

The South African electricity crises of 2008 and 2022 have made the necessity for renewable energy sources clear. The expansion of IPPs and the integration of renewable energy further into the power sector are being investigated as potential solutions to South Africa's energy crisis (Pickering, 2020).

2.11 IMPACT OF LOADSHEDDING ON ELECTRICITY PRICES

Figure 2.6: Compares inflation and the average nominal electricity price from 1994-2020

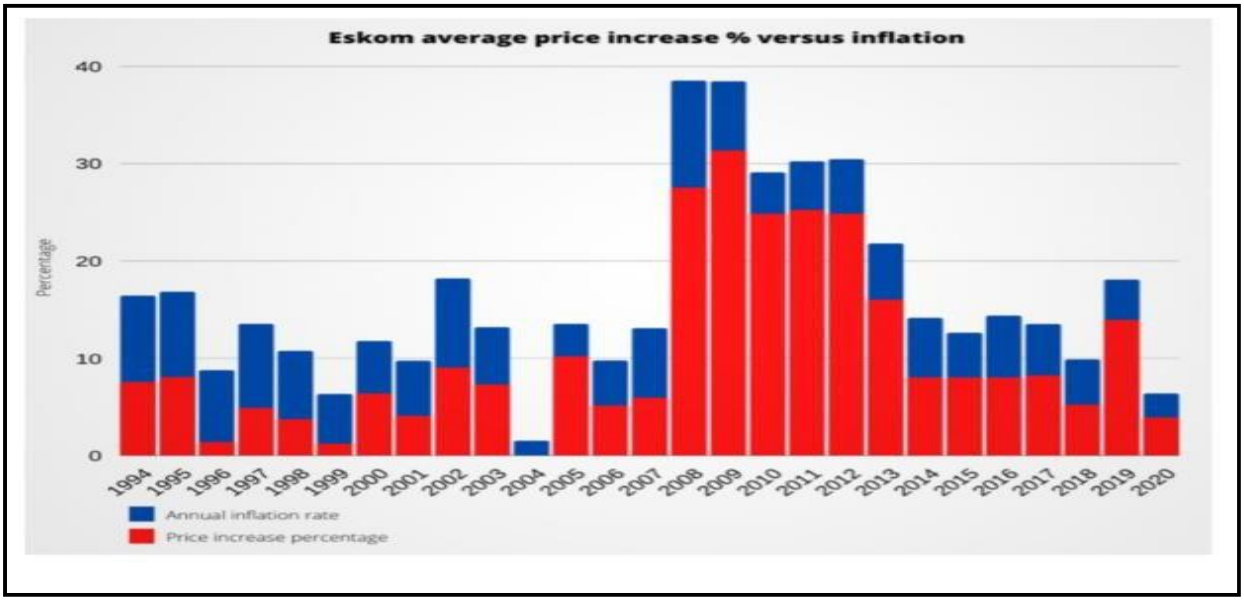


Source: Eskom Tariff Book, 2020

Based on figure 2.6 above, South Africans paid the least for electricity from 1999 to 2004, between 37 and 38 cents per kWh in real terms (Eskom Tariff Book, 2020:7). However, excluding the effects of inflation, between 2007 and 2020, Eskom's annual electricity price grew by over 460%.

Even after accounting for inflation, which increased by almost 100% between 5 July 2007 and, the typical electricity price was still 180% higher as of 20 July 2020 (Eskom Tariff Book, 2020:7). Based on figure 2.6 above, electricity prices, both nominal and adjusted for inflation indicate a sharp increase starting in 2007, which was detrimental to the economy.

Figure 2.7: Compares Eskom's average price rise to inflation from 1994-2020



Source:Eskom Tariff Book, 2020

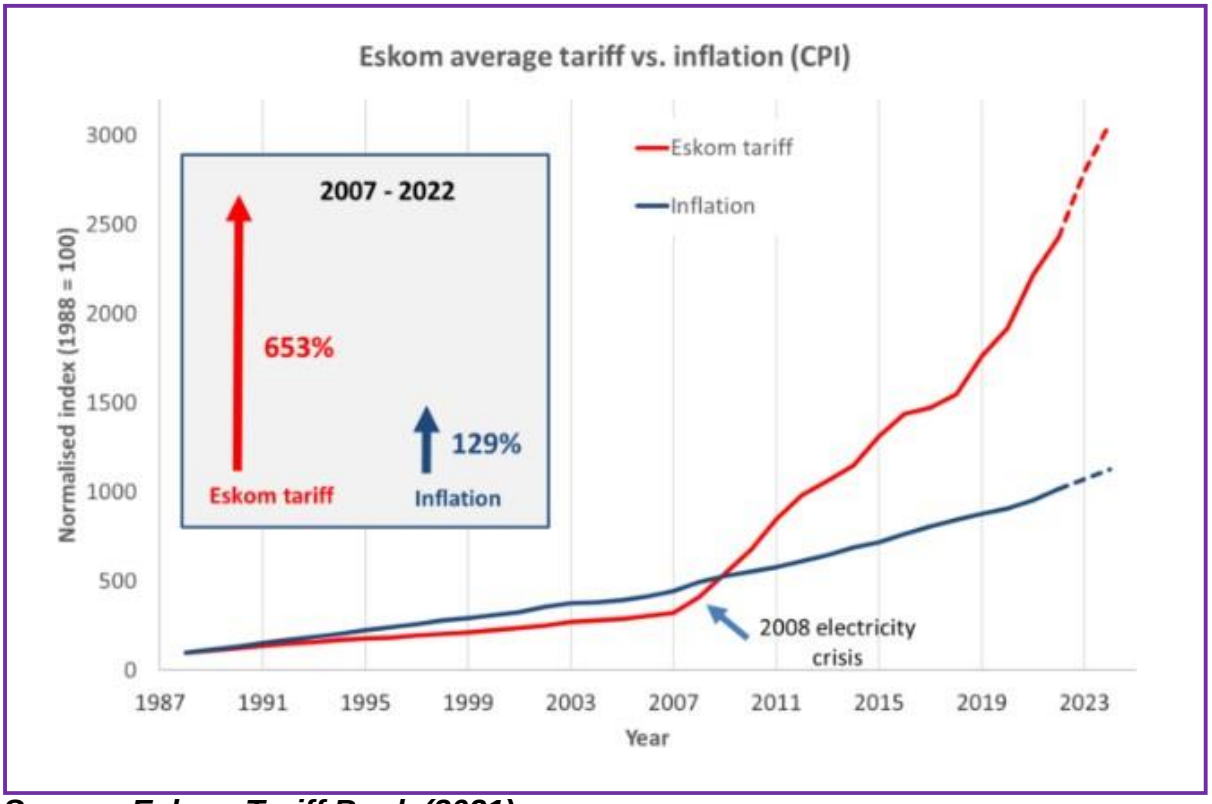
Figure 2.7 above depicts the stacks of yearly percentage increases compared to inflation for the exact same year. The red bar graph reflects the percentage price increase for Eskom, while the blue bar graph represents inflation.

Since 2008, electricity rates have been steadily increasing. This was the first time the country had experienced power interruptions because of lack of adequate supply to meet growing demand.

From 2013 to 2017, there was another significant increase (from 40 cents/kWh to 50 cents/kWh).

Eskom began approaching NERSA with requests for significant tariff rises. The price increases requested were so large that they exceeded inflation, raising questions about Eskom's management incompetence. They are now passing on the cost of their inability to provide sufficient electricity to fulfil growing needs of consumers through inflated prices (Fazil, 2012).

Figure 2.8: Eskom average tariff vs Inflation (CPI) from 1987 to 2023



Source: Eskom Tariff Book (2021)

Figure 2.8 above depicts the overall average electricity price increases; actual electricity price increases will vary between municipalities and depending on the kind of user; for instance, there are residential, commercial, and industrial electricity users.

From 1988 until the 2008 power crisis, inflation-adjusted electricity tariff hikes were not maintained. This was partly because of government policies that sought to maintain electricity rates as low as possible for low-income neighbourhoods, but it was also because Eskom had an excess of electricity in the 1990s and failed to invest in more capacity in the 2000s. Electricity rates climbed by 223% between 1988 and 2007, compared to a 335% increase in inflation during the same time (Eskom Tariff Book,2021).

Following the 2008 electrical crisis, South Africa's electricity pricing underwent a clear and sudden inflection point. Between 2007 and 2022, the cost of electricity jumped by 653%, whereas inflation rose by 129% during the same period.

Thus, in actual money terms, power tariffs grew four times (or quadrupled) in 14 years (Eskom Tariff Book,2021).

Given Eskom's current terrible financial situation and the likelihood that the nation cannot afford for Eskom to fail, consumers can certainly anticipate continued electricity price rises that are significantly greater than inflation over the coming few years.

Eskom has already requested a 32% tariff rise from NERSA for April 2023. The grid connection price for the Homepower tariff would rise from R218 per month to R938 per month; this fee is assessed even before you use a single kWh of electricity (Eskom Factor Report,2022).

Additionally, it has asked NERSA to reform residential pricing to better reflect cost drivers. For direct Eskom consumers, there will be two major alternatives in the restructured tariffs: Homepower and Homeflex (Eskom Factor Report,2020).

According to Eskom Factor Report (2020), Time-of-use charges, or a varying price for power based on the time of day, will be introduced under the Homeflex tariff. Time-of-use charges are common throughout the world and encourage the usage of electricity outside of peak times, balancing grid load. The government finally accepted and proclaimed Eskom's dire need for restructuring in 2019. This reform is still ongoing as of November 2022, but it has begun.

2.12 THE LINK BETWEEN ELECTRICITY PRICES AND FOREIGN DIRECT INVESTMENT

Electricity rates, which are regulated by the government and are often set below market levels, are crucial for IFDI projects. Although South Africa's long-term goal is to have a single market-based tariff for all consumers on each power grid by 2030, the country still has a complicated subsidy scheme in place today (Garsous et al., 2020). Pricing is determined by the age of the power plant as well as the type of customer.

For international investors, negotiating power rates is one of the most contentious and difficult components of project clearance (Inglesi-Lotz, 2021). Tariffs are normally subject to an annual review once they are set during the approval process, at which point modifications can be made for any increases in generating costs. This causes issues for investors, because price increases can take a long time to catch up to cost increases, and approval of price increases is not guaranteed.

Foreign investors have attempted to mitigate this problem by negotiating pre-approved methods for altering pricing to reflect cost fluctuations. The regulator sets the price of power, which is based on market demand and supply.

2.13 TRENDS IN ELECTRICITY PRICES IN SOUTH AFRICA

Electricity in South Africa was quite inexpensive up until 2007/2008. The 2008 rolling blackouts attracted the public's attention to the actual state of electrical supply (Altman, 2011). Since then, there have been discussions about rationing and electricity price. The concern with power prices was that they would not cover the cost of generating the electricity that South Africans use. Eskom started collaborating with NERSA, South Africa's national energy regulator, to increase electricity tariffs to a point where the company can charge customers the actual cost of electricity.

Table 2.3 Increases in average electricity prices in South Africa from 1994 to 2022

1994–2022 Eskom electricity rates				
Year	Average (c/kWh)	Average price increase	Inflation	Inflation-adjusted price(c/kWh)
1994	10.32	7.55%	8.84%	44.75
1995	11.15	8.04%	8.75%	44.18
1996	11.30	1.38%	7.35%	41.88
1997	11.85	4.87%	8.63%	40.28
1998	12.29	3.72%	6.98%	39.12
1999	12.44	1.19%	5.08%	37.81
2000	13.23	6.35%	5.39%	37.91
2001	13.76	4.06%	5.64%	37.47
2002	15.00	9.01%	9.15%	37.22
2003	16.09	7.27%	5.87%	37.96
2004	16.04	-0.03%	1.43%	37.31
2005	17.79	10.15%	3.35%	40.00
2006	18.70	5.10%	4.62%	40.01
2007	19.80	5.90%	7.15%	39.63
2008	25.24	27.50%	10.99%	44.55
2009	33.14	31.30%	7.12%	55.59

Year	Average (c/kWh)	Average price increase	Inflation	Inflation-adjusted price(c/kWh)
2010	41.57	24.80%	4.26%	67.18
2011	52.30	25.20%	4.99%	80.45
2012	60.66	24.80%	5.62%	88.90
2013	65.51	16.00%	5.76%	90.25
2014	70.75	8.00%	6.09%	91.65
2014	70.75	8.00%	6.09%	91.65
2015	76.41	8.00%	4.58%	94.30
2016	82.53	8.00%	6.34%	96.08
2017	89.13	8.20%	5.27%	99.23
2018	93.79	5.20%	4.62%	99.32
2019	106.80	13.90%	4.13%	108.79
2020	110.93	3.90%	2.43%	110.93
2021	133.64	9.61%	6.74%	133.22
2022	137.74	15.6%	7.42%*	138.74

Source: Eskom Tariff Book (2022)

For almost 10 years of the South African democracy, Eskom's average electricity prices were among the lowest in the world.

The annual price increases for electricity have never exceeded the yearly rate of inflation between 1994 and 1999, which meant that, as Table 2.3 illustrates, the actual cost of electricity was decreasing. According to Inglesi-Lotz and Pouris (2016), power costs are a component of electricity demand and as a result, a significant input cost of generation. High rises in power, according to Fazil (2012), could affect industry competitiveness.

Early in the year 2000, according to Table 2.3 above, prices stayed largely unchanged and even decreased somewhat in 2004. However, since the introduction of power disruptions in 2007, electricity prices skyrocketed. From 19.80 cents per kWh in 2008 to 25.24 cents in 2009, the average electricity price jumped by 27.5%.

Furthermore, the year 2009 saw the greatest gain to date, a jump of 31.30%. Additional increases of roughly 25% were seen during the next three years.

The nominal annual average energy cost from 1994 to 2022 is displayed in Table 2.3, along with the annual average price rise. In the table above, both the annual inflation rate and the real (inflation-adjusted) average electricity price are shown.

2.14 SUMMARY REMARKS

South Africa's foreign investment strategy has continued to progress, but despite the establishment of solid economic foundations, which has been widely praised, the nation did not attract nearly as much FDI as its market fundamentals demanded (TISA, 2011). Undisputed socioeconomic problems like high levels of unemployment and the COVID-19 pandemic have been used to shift responsibility.

Additionally, large investors such as the United States of America and the United Kingdom withdrew their portfolio investments from emerging nations considering the worldwide crisis and the COVID-19 epidemic. In this aspect, foreign investors suffered a setback.

The research uncovered concerns that investors need to consider before making investments abroad. For a market seeking FDI flows, the market size and investment return have been demonstrated as the most significant predictors of investment. Since most emerging economies lack a robust capital market, determining the rate of return on investment in countries like South Africa is challenging. One of the most desirable characteristics of FDI has been said to be labour skills. The chapter also discussed the 2008 power outages and the impact it had on foreign investors' confidence.

The repercussions of the power disruptions were also explored at length. The increase in the price of electricity was one of the drawbacks. Eskom requested substantial raises that were higher than inflation. This was done to reduce high electricity consumption while simultaneously raising funding to construct new power plants.

Building new generating stations has been one of the remedies for the issue of a lack of electricity. Renewable energy resources were also considered when determining the energy mix for power generation. Diversifying the energy sources used to generate power can assist a nation in achieving the best electricity production feasible.

Among the solutions to boost electricity supply, the reform of the electrical supply industry was explored. The State will save money on Eskom investments as more private electricity suppliers are allowed to enter the market and supply more energy.

CHAPTER 3

LITERATURE REVIEW

3.1 INTRODUCTION

Reviewing theoretical and empirical data on the impact of electricity/energy prices on inward foreign direct investment is the main objective of this chapter. This chapter is divided into five sections. Section 3.2 explores the theoretical review of foreign direct investment after this introduction, and section 3.3 reviews secondary theoretical literature on the law of thermodynamics (efficiency law) and the fundamental tariff structures used by NERSA. Section 3.4. discusses the empirical studies on how the cost of energy and electricity affects foreign direct investment. Selective empirical observations are summarized in Section 3.5. and Section 3.6 marks the chapter's conclusion.

3.2 THEORETICAL LITERATURE

The industrial organization theory and the eclectic dunning theory are two theories of foreign direct investment that are covered in this section.

Foreign direct investment theories which will be discussed are as follows: eclectic Dunning theory and industrial organization theory.

In the literature on foreign direct investment, various hypotheses have been created. Both macroeconomic theories and microeconomic theories apply to these FDI models. The features of a country that determine FDI inflows between and within host countries are primarily the subject of macroeconomic theories, for instance, the product cycle theory. While this is the case, the primary focus of microeconomic theories is on the characteristics that affect an establishment's decision-making process. These consist of market power, market imperfections, and investment location theories.

Because of this, the Dunning Eclectic theory and Hymer's industrial organization theory – two microeconomic explanations of FDI – will receive most of the attention in this study.

3.2.1 THEORY OF ECLECTIC

The theory is postulated by Dunning (1973) and seeks to offer a general framework for determining patterns of both foreign owned production undertaken by a country's own enterprises and also that of domestic production owned by foreign enterprises. According to Gray (1981), there are two types of investments that a company can choose to take. These types of investments are Foreign Portfolio Investment (FPI)and Foreign Direct Investment (FDI).

FPI, as it is known in the academic community, is the passive holding of financial assets and securities in which the issuer does not actively control such instruments. However, FPI is stimulatory impacted by high return rates and reduction of risk through geographical diversification. Williamson (1985) described FDI as the purchase of foreign assets with the intention of controlling them. Lundan (2008) goes on to say that determining whether investing in a country is lucrative is based on a series of sophisticated estimates that consider aspects of economics, society, and politics.

The Dunning Eclectic theory consists of three pillars of Ownership, Location, and Internalisation. The key inquiries that foreign investors must respond to are contained in the three pillars. The ownership pillar answers the question of why foreign multinationals are supposed to invest abroad, and it elaborates further on the advantages of investing abroad. According to Mundell (1957), this question assumes that foreign enterprises have more than one specific advantage that enables them to avoid operational costs in foreign countries. Core competency, brand recognition, and economies of scale are just a few of the benefits of ownership.

The L pillar is concerned with the issue of location. According to Williamson (1985) and Lundan (2008), a company's decision to go offshore is based on the company's unique benefit combined with the environment in a foreign nation. Human capital and land are essential elements in selecting where a Multinational Enterprise (MNE) should be situated to make positive returns on investments.

The internalization advantages of how to move overseas are represented by the I pillar. In terms of entry mode in a foreign country, MNEs have numerous possibilities to select from.

The I pillar comprises the internalization advantages in terms of going overseas. In terms of their entry mechanism into a country, multinational firms have numerous alternatives. A MNE running a factory in a foreign land may incur several additional expenses in comparison to their local peers under the company's particular advantage.

According to Lundan (2008), these expenditures include:

i. Differences in culture, law, institutions, and linguistics.
ii. Ignorance of regional and market dynamics.
iii. Operating a business and communication in a foreign nation are more expensive.

According to the eclectic theory, a foreign corporation needs to possess a unique advantage to help it surpass the expenses of doing business abroad to be competitive there. These advantages, sometimes referred to as firm-specific advantages (FSAs) or strategic capabilities, enable multinationals to outperform domestic ones in terms of returns for the same investment or cost-to-income ratio.

For international corporations, Dunning (1977) spotted three forms of ownership advantages and they are:

i) All types of inventive ideas are included in the definition of technology/knowledge.
ii) Large-scale economies are gained from economies of scale, learning, expanded availability of resources including finance capital and assets, as well as the diversification of business risk.
iii) Monopolistic benefits take the form of exclusive control of limited natural resources and preferential access to input and product markets via patent rights.

Boddewyn (1983) stated that ownership advantages alter over time and are dependent on the multinational enterprise's age and experience. To receive full benefit on the FSAs, the company must leverage some international variables in conjunction with its domestic Firm-Specific Advantages. Economic, social, and political benefits are the three types of country-specific benefits (CSAs) identified by Casson (1979).

Examples of economic benefits include the amount and quality of production inputs as well as the market's size and breadth, transportation costs, and telecommunications costs.

The psychological distance between the home nation and the host country, the general perception of immigrants, the language used in the host country, cultural diversity and general attitude toward free enterprise are all seen as societal benefits.

Political benefits consist of policies of the state that influence inward foreign direct investment. A multinational enterprise's attractive CSAs package would contain a huge and rising high-income market.

According to the eclectic idea, having unique know-how or core expertise is a valuable advantage that can help a foreign company make money.

Moreover, the theory postulates that when external markets are absent or imperfect, a hierarchy is implemented, and it can be horizontally or vertically integrated. As a result of the internalization advantages, MNEs prefer completely owned subsidiaries over arm's length deals.

However, Dunning (1977) noted the following challenges in establishing MNEs abroad:

i. Market failure due to natural causes.
ii. Lack of proper pricing on commodities.
iii. Moral hazard, risk and uncertainty, and adverse selection all increase transaction costs.
iv. Market structural collapse because of MNE-created flaws.
v. Monopolistic power is exercised through oligopolistic means such as cross-subsidization, predatory pricing, and market segmentation.
vi. Using tariffs, taxes, price restrictions, and non-tariff obstacles to circumvent and exploit the rules of the state.

Moreover, according to Gray (1981), foreign direct investment in developing nations is changing away from resource-seeking foreign direct investment and toward efficiency-seeking FDI. Due to price constraints produced by socioeconomic factors, MNEs are projected to transfer part of their manufacturing operations to low-cost emerging countries. Despite these changes, foreign direct investment in emerging nations is still focused on analysing natural resources in national or regional markets.

The eclectic hypothesis is like any framework; it has flaws. The OLI parameters are supposed to be independent of each other, according to the theory. International trade academics have slammed this view. It is acknowledged that, due to their interdependence, it is incredibly challenging to segregate these parameters.

The explanatory factors discovered by the eclectic theory under each pillar, according to Kojima (1982), are so diverse since their accuracy is almost zero. Moreover, according to Gray (1981), the eclectic idea does not adequately account for variability in businesses' strategic feedback to any compartment of OLI parameters. The hypothesis has been regarded in terms of being static or comparably static. It provides less advice on the fluctuations of the international process of enterprises and governments in this regard.

The eclectic theory is important to the research because it emphasizes that the elements the OLI parameters show affect MNEs' decisions to invest abroad. For example, foreign investors have the option of choosing the place where the firm would be established in the case of a strategic geographical location. For convenience of travel, these locations are frequently located close to ports and harbours. In terms of economies of scale, brand recognition, and technological advancements, foreign investors also have a competitive edge.

3.2.2 INDUSTRIAL ORGANISATION THEORY

Hymer created the Industrial Organizational Theory in 1960; it is regarded as a microeconomic-level theory of foreign direct investment. According to the idea, rather than the nation and national capital availability, as proposed by Dunning, the decision to establish a value-adding firm abroad is heavily influenced by the industry and specific characteristics of individual firms (Dunning,1973).

The Industrial Organizational Theory emphasizes two crucial principles, which are, according to Dunning (1973): - The first reason a corporation becomes a multinational enterprise (MNE) is because it has a competitive advantage and may use that advantage to boost production levels in a foreign country. Second, industries in some nations would be more inclined to internationalize than those in others due to the competitive structures of specific enterprises. The pros of several countries' geographical locations are crucial in deciding which country will host the multinational enterprises.

According to Hymer's industrial organization hypothesis of FDI, the profit rate in developed countries tends to fall. This is caused by domestic competition, which increases the proclivity of firms in developing countries to participate in foreign direct investment. The hypothesis saw tradeable ownership benefits and the elimination of competition as crucial prerequisites for a single company in each industry to invest worldwide and so become a multinational enterprise.

The micro-level FDI hypothesis consists of four assumptions, and they are:

i. FDI flowed both ways in the post-war years, between industrialized and developing countries. Other hypotheses indicated that capital flowed only in one direction, from rich to emerging nations.
ii. A nation was only permitted to receive or make external foreign direct investments. MNEs crossed boundaries in both directions in emerging economies, according to Hymer. This implies that nations both draw FDI from overseas and receive FDI domestically.
iii. According to the industry, different amounts of FDI are made. This suggests that if capital accessibility were what drove FDI, there shouldnot be any variations, because all multinational corporations would be equally capable and eager to invest in other nations.
iv. It was not possible to transfer funds from one country to another because of local funding of foreign businesses.

According to Aliber (1970; 1971), MNEs can only operate in a market with imperfections when enterprises have no financial ownership advantages over rival companies.

This shows that the determinants of multinational firms, as suggested by FDI eclectic theory, are individual enterprises rather than the country's availability of capital. With an emphasis on market dominance, entry barriers, and conflict resolution, in collusive agreements, Lall (1979) examines the nature of corporations' monopolistic tendencies and their oligopolistic relationship. According to Lall (1979), firms expand internationally to seize additional markets, increase profits, and establish more peaceful oligopolies. This suggests that the advantages of high ownership are only available to the biggest enterprises, such as those engaged in oligopolistic competition.

In line with Caves (1971), Hymer thought that MNEs engaging in international markets suffer greater costs and risks since they lack information on market knowledge, cultural, institutional, and linguistic obstacles, as well as communication and transportation costs when compared to domestic enterprises.

Advanced technology, superior managerial, research and development capabilities, improved marketing skills, currency rate, interest rate differentials, and low-cost capital are only a few of the benefits.

The world is dominated by monopolists, Hymer believed that merging two such businesses or acquiring one by the other will lead to the internalization of MNEs and externalities from the latter. As a result, Hymer was of the belief that that MNEs were incorporating externalities because of market rivalry for finished commodities.

In layman's words, this implies that as rivalry between two enterprises on final commodities marketplaces intensifies, consumer prices are decreased to the point where they lose their monopoly profits. Caves (1979) discovered a link between US business FDI and oligopolistic market arrangements.

The basic goal of a business, according to Nayak and Choudhury (2014), is profit maximization. Yamin (2000), on the other hand, stated that organizations actively buy and employ machinery to improve production levels and increase internal efficiency. Because oligopolies are designed to prevent conflict, it is mistakenly believed that their

success is due to their size rather than their inherent advantages. Assets promote competition and innovation.

Call (1979) claimed that only oligopolies could make foreign investments; however, this is not still accurate. This suggests that market dominance is losing significance as a locational strategy for multinational corporations. Another problem with the industrial organization theory is that it completely ignores the costs associated with carrying out international investment transactions and instead relies heavily on the market power strategy.

Because it explains why foreign investors decide to establish value-adding activities in other nations based on industry and particular company components, the industrial organization theory is crucial to this study.

3.2.3 ANALYSING THEORETICAL LITERATURE

In the analysis of FDI theories, research was done on the eclectic theory and the ideas of industrial organization. The ownership benefit is the eclectic concept's main component. According to the argument, a nation must provide some form of distinctive benefits to help it compete in an overseas market and offset the costs of doing business there. The eclectic theory is thought to be helpful in this regard for FDI discussions.

According to the industrial organization theory, eliminating rivalry and having tradable ownership advantages are necessary conditions before one company in each industry can make international investments.

Gray (1981) asserts that, contrary to Dunning's advice, the choice to locate value-adding operations overseas is based on the sector and unique elements of private organizations instead of the country and the availability of domestic capital. Two essential concepts are highlighted in the hypothesis. Companies first become MNEs when they have a competitive edge and the capacity to exploit that advantage in a foreign country to maximize their production. Additionally, as Boddewyn (1983) notes, this results in the idea of ownership benefits (Dunning,1973).

Second, some firm’s competitive dynamics would promote enterprises in particular countries to internationalize more than others.

Hymer's theory has primarily been criticized for addressing the idea of how and why businesses invest in foreign markets but ignoring how successful businesses operate in other countries, particularly how they leverage advantages.

In addition, the idea is mostly built on a market power method, which completely ignores the expenses of executing international investment transactions.

Despite its shortcomings, this research can benefit from the industrial organization theory because it clarifies why international investors decide to establish value-adding activities in other nations based on industry and business character.

In recent years, there has been increased focus on the effect of foreign direct investment (FDI) on energy intensity. Many emerging economies are fast expanding, and as their economies expand, so does their energy need. Energy is used in practically all goods and services, therefore understanding the factors that influence energy consumption is critical.

Furthermore, increasing energy efficiency is seen as a critical component of long-term development that will address both energy security and poverty. FDI will provide improved management techniques, advanced enterprise systems, and business philosophy to host countries, allowing them to increase energy consumption efficiency and lower energy intensity.

3.3 ENERGY THEORETICAL LITERATURE

3.3.1 INTRODUCTION

This section presents secondary theoretical literature which reviews the logical role that energy usage plays in boosting production process, which is necessary for economic expansion. Literature starts by investigating the Law of Thermodynamics (efficiency law). Thereafter follows a brief explanation on basic tariff structures approved by the National Energy Regulator of South Africa (NERSA) and which are applied by most licenced distributors.

3.3.2 ELECTRICITY AS A FACTOR OF PRODUCTION

The first law of thermodynamics, according to Boulding (1966), emphasized the immutable context in which economic activity must take place. According to the mass-balance principle, more or equal amounts of matter must be used as inputs to produce

a given amount of material output, with the leftover becoming a pollutant or waste item. As a result, any production process that generates material outputs only needs a limited amount of material inputs**.**

According to the efficiency law, which is part of the second rule of thermodynamics, a minimum amount of electricity is needed to move or modify matter to perform more precise physical work. Carrying out these needs more energy than just minimal requirements (Baumgartner, 2004).

According to Stern (1997), every type of production process entails different types of labour. Since electricity is necessary for all current economic operations, there must be restrictions on its ability to be replaced by other production elements to ensure that it always remains a crucial component of production. Information is regarded as another factor of production that could be seen as a non-reproducible production factor, just as energy is. Moreover, information is regarded as a primary concept of non-reproducible production factor in the same manner energy is, therefore it is imperative that ecological economists give the same attention to knowledge and information they give to energy. Energy is required to gather data from the environment, but it is impossible to employ energy actively without information and as much acquired knowledge as possible. Information and knowledge are difficult to quantify, unlike energy.

A biophysical basis for classifying energy, capital, land, information, and labour as production factors is the fact that these latter factors of production must be integrated into workers and machines to be helpful to them (Ruth,1995). Although it is simpler to evaluate labour and capital than knowledge and information, their measurement in the model's specification is still relatively inaccurate when compared to energy.

Electricity has recently attracted increasing attention on a worldwide scale and is thought to be among the key factors influencing foreign direct investment (Adom et al.,2019; Kivyiro and Armien,2014).

Contrary to earlier decades, the effect of electricity on foreign investment and economic growth has been the subject of numerous studies. These views can be categorized into two main groups, notably the perspectives of ecological economists and neoclassical economists. The ecological economists view labour and capital as

intermediate inputs and electricity as the main variable in the production function (Stern, 2004).

Maleki (2002) argued for the ecological economist's point of view, which is described above; to define the production function below, electricity (E) should be incorporated as a significant factor in addition to the traditional ones.

$Y = f\ (A, K, L, E\ (P_E), P_E)$ (3.1)

Equation (3) above suggests that capital, labour, electricity use, and electricity price all have an immediate effect on national output and foreign investment through the channelling of the influence of P_E on electricity use. Equation 3's total differential can be expressed as follows:

$$dy = \frac{\partial \mathrm{Y}}{\partial \mathrm{K}} \mathrm{dK} + \frac{\partial \mathrm{Y}}{\partial \mathrm{L}} \mathrm{dL} + \frac{\partial \mathrm{Y}}{\partial \mathrm{E}} \mathrm{dE} + \frac{\partial \mathrm{Y}}{\partial \mathrm{PE}} \mathrm{dP}_{\mathrm{E}} \quad (3.2)$$

It is anticipated that $\frac{\partial \mathrm{Y}}{\partial \mathrm{K}} > 0, \frac{\partial \mathrm{Y}}{\partial \mathrm{L}} > 0, \frac{\partial \mathrm{Y}}{\partial \mathrm{E}} > 0, \frac{\partial \mathrm{Y}}{\partial \mathrm{PE}} < 0,$ i.e., a rise in capital, labour, and electricity consumption, ultimately results in an increase in output, whereas a rise in the electricity tariff reduces output through the rising input cost channel.

The following are the results from considering equation 2's total derivative regarding P_E.

$$\frac{\mathrm{dY}}{\mathrm{dPE}} = \frac{\partial \mathrm{Y}}{\partial \mathrm{K}} \frac{\mathrm{dK}}{\mathrm{dPE}} + \frac{\partial \mathrm{Y}}{\partial \mathrm{L}} \frac{\mathrm{dL}}{\mathrm{dPE}} + \frac{\partial \mathrm{Y}}{\partial \mathrm{E}} \frac{\mathrm{dE}}{\mathrm{dPE}} + \frac{\partial \mathrm{Y}}{\partial \mathrm{PE}} \quad (3.3)$$

Equation 3.3 reduces to:

$$\frac{\mathrm{dY}}{\mathrm{dPE}} = \frac{\partial \mathrm{Y}}{\mathrm{dE}} \frac{\mathrm{dE}}{\mathrm{dPE}} + \frac{\mathrm{dY}}{\partial \mathrm{P}} \quad (3.4)$$

We assume that changes in electricity prices do not have an impact on capital and labour, i.e., $\frac{\mathrm{dK}}{\mathrm{dPE}} = 0$ and $\frac{\mathrm{dL}}{\mathrm{dPE}} = 0$; moreover equation 4 proposes that a rise in electricity tariff causes the production process to decrease through 2 channels, directly via rising input cost channel $(\frac{\partial \mathrm{Y}}{\partial \mathrm{PE}} < 0)$ and indirectly through the demand channel.

Furthermore, the rise in electricity tariff results in a decrease in consumption of electricity ($\frac{\partial \mathrm{PE}}{\mathrm{dPE}} < 0$).

In summary, this section discussed the theory of economic growth in connection with electricity from neoclassical and ecological perspectives. Ecological economists determined that electricity is a necessary input, making it a crucial component of the industrial process.

However, over time, the lack of electricity may make it difficult to draw in international investors. By contrast, neoclassical economists view electricity as an intermediary input with little impact on FDI expansion, hence economic growth pays little attention to electricity's role.

3.3.3 ELECTRICITY TARIFF THEORY

It is imperative to understand the electricity pricing structure as created by Eskom and, as such, it needs special focussed attention. It was evident from the inception of the study that the Eskom-created tariff structure had some bearing on the electricity prices of South African firms and business establishments of foreign multinationals. The complexity of Eskom's tariff structure was also noted, and it would help to have some information on how Eskom arrived at the tariff structure. This section is therefore dedicated to explaining the complex electricity tariff structure as developed by Eskom as this is a crucial aspect and hypothesis of the study.

Eskom splits the basic tariff structure into several categories, each of which has an impact on the price of electricity differently. According to NERSA (2019), Eskom categorises electricity tariff into five broad categories, which are the Inclining block tariff, Single energy rate tariff, Two-part tariff, Three-part tariff, and Two/Three-part-time-of-use (TOU) tariff. All these tariff structures as mentioned above have different purposes and serve different clients with different needs.

The following represents the basic tariff structures utilised by Eskom and used by most authorized distributors (NERSA, 2019).

i. Inclining Block Tariff – A tariff structure known as an escalating block tariff divides customers' consumption into several chunks. Every block has a price associated with each unit of power used in that block; the tariff is low in the first block and increases with each succeeding block, meaning it includes different

rates for different sorts of energy consumption levels. Therefore, the average electricity rate will increase the more you use.

ii. Single energy rate tariff – is a tariff structure that consists of an energy charge. Therefore, all costs that are associated with this tariff are expressed in a single c/kWh charge. Some tariffs may have varied rates depending on the time of the year.

iii. A two-part tariff is a mechanism for pricing energy that consists of a fixed/basic monthly fee and a variable fee for metering kWh use. The account's administrative expenses are covered by the fixed/basic charge. It is a contribution to ongoing costs including administration, billing, and meter reading. For all metered connections, the set amount is due each month regardless of whether electricity is utilized or not. Additionally, clients who use traditional metered domestic, residential, and commercial services should primarily use this type of pricing structure.

iv. An example of a three-part tariff is one that consists of a basic monthly set cost, a variable monthly fee based on metered kWh use, and a monthly network demand fee estimated in R/kVA. Three-part time-of-use (TOU) tariff structures are used to classify the electricity supply for the industrial and manufacturing sectors. To represent the structure of the licensees' long-term marginal cost of supply more accurately at different times, time-of-use (TOU) tariffs are divided into two or three portions and have unique time periods and seasons. For all metered connections, the fixed/basic price, which is charged in Rands per month regardless of whether power is utilized, is due every month.

3.4 EMPIRICAL LITERATURE

Empirical literature on energy costs and foreign direct investment will be divided as follows: section 3.4.1 concentrates on the empirical literature from developing nations, 3.4.2 on the empirical literature from developed nations, 3.4.3 on the empirical literature from the OECD countries, and 3.4.4 on the empirical literature from studies that were specifically focused on South Africa. As far as the researcher is aware, there are not many studies that have investigated how electricity tariffs affect foreign direct investment. As a result, the empirical literature of these studies will examine how the cost of alternative energy sources, such as crude oil and other fossil fuels, affects inbound foreign direct investment in addition to the price of electricity.

3.4.1 STUDIES ON DEVELOPING COUNTRIES

Muhammad (2021) evaluated the effect of rising energy prices on inbound foreign direct investment in Pakistan from the years 1970 to 2016 using the Auto Regressive Distributed Lag (ARDL) bound testing approach. The study's findings showed a short-term correlation between FDI and the prices of residential and commercial power. The direction of the variables was also determined in the study using the Granger causality test. Granger causality research indicates that Pakistan's home and industrial electricity tariffs have a one-way link with foreign direct investment. The model's stability was further examined using the cumulative test and cumulative square test, and the results revealed that both plots still had a 5% level of significance.

Fatine et al. (2018) employed the Granger causality test to analyse the causal link between oil prices and inward foreign direct investment in Saudi Arabia, using time series data from 1998 to 2014. The study determined that changes in oil prices have a significant impact on foreign direct investment (FDI) in Saudi Arabia and confirmed that there is a causal relationship that runs in both directions between oil prices and FDI. Using the exponential generalized autoregressive conditional heteroskedastic (EGARCH) model, Hanabusa (2009) found that the price of oil and foreign direct investment in Japan between 2000 and 2008 were causally related in both directions.

The Generalized Method of Moments (GMM) and Error Correction Model (ECM) were used by Anver and Archarya (2015) to analyse the effects of energy prices on foreign investment in a wide range of manufacturing facilities in India. Additionally, the study made use of time-series data from 1993 to 2013. The study's conclusions showed that an increase in energy prices had a detrimental impact on the manufacturing facility investments made by multinational corporations. The businesses experienced an unfavourable impact.

Tang and Tan (2011) investigated the relationship between Malaysian economic growth, power usage, energy prices, and technological innovation from international corporations. The Granger causality test was used in the study, which used time series data from 1970 to 2009. The study's results also showed that while money has a favourable impact on power usage, energy pricing and technology innovation transferred by international corporations have a negative impact over the long term.

Using economic data from the first quarter of 2002 to the third quarter of 2017, Restrepo-Angel (2018) employed structural vector autoregressive (SVAR) to analyse the sectoral and aggregate response to oil price shocks in the Colombian economy. The results of the study showed a negative correlation between the cost of oil and foreign direct investments.

Studies done in Africa have also revealed that the foreign direct investment of different nations is impacted by the price of oil. Using the statistical method of ordinary least squares, Broni-Bediako, Onyije, and Unwene (2018) determined the economic effects of oil price volatility on developing nations. Moreover, the study employed time series data from 1990 to 2015. It was discovered that the volatility of the oil price had a linear relationship with several macroeconomic factors, including interest rates and foreign direct investments, among others. The analysis supported more investment in domestic industry to promote exports from the nation and called for less reliance on oil money as a key source of foreign income.

The connection between energy prices and economic growth in emerging countries has been studied by numerous academics. Some looked at energy consumption and growth, while a few studies concentrated on energy prices and FDI. The GMM estimate approach was used by Frimpong et al. (2018) to investigate how energy prices affect foreign direct investment in West African countries. The results showed that from 2002 to 2015, energy prices significantly harmed foreign direct investment and growth. When Arshad et al. (2016) used the same methodology to look at the effect of energy price on Pakistan FDI from 1991 to 2011, they found similar results.

Antwi (2017) used the GMM estimating approach to analyse annual time series data from 2000 to 2015 to assess the effect of energy prices on foreign direct investment (FDI) among ECOWAS countries. According to the study's findings, energy prices had a negative effect on FDI.

To ascertain the effects of shocks from fluctuations in the price of crude oil on FDI inflow in Nigeria, Adejumobi and Julius (2017) undertook a study. The study demonstrated that while the price of oil significantly increased FDI inflow, it had a negative influence on the economy's growth momentum due to its sharp price swings They used data from 1980 to 2014 using the Structural Vector Autoregression model.

The study's conclusions indicate that the change in FDI inflow can be attributed to the price of crude oil up to 10.7% of the time.

In a 2015 study by Akinlo and Apanisile, a five-variable Structural Vector Auto Regression (SVAR) model was used to analyse monthly data series covering the years 1970 to 2011 to determine how Nigeria, the largest oil exporter in Africa, was impacted by changes in the global oil price and price volatility. Impulse response functions were constructed to investigate the links between the price of crude oil, inward foreign direct investment in Nigeria, the money supply (M2), domestic price levels (CPI), and the policy interest rate (Discount Rate). It was found that changes in the price of crude oil and variations in oil prices had a negative effect on Nigeria's inward foreign direct investment. The results indicated that M2 increases in reaction to an increase in oil prices, which shows that an increase in the worldwide price of oil produces a considerable increase in the amount of money supplied to the domestic market by both domestic and foreign oil businesses.

3.4.2 STUDIES FROM DEVELOPED COUNTRIES

Barteková and Ziesemer (2019) investigated how power costs affected FDI coming into European Union nations. The study used the Autoregressive Distributed Lag (ARDL) co-integration method from 2003 to 2013 to achieve this. According to their analysis, electricity costs should contribute significantly to net FDI, and that net FDI is strongly influenced by production costs. Their findings imply that power prices are among the most significant contributing factors to attracting FDI, along with unit labour costs and secondary education advantage translated into labour market skill availability.

Dagoumas et al. (2020) used the VECM and the Engle-Granger technique to estimate annual data to evaluate the link between energy price and foreign investment in Europe Union countries from 1990 to 2018. The cost of industrial electricity, the price of residential electricity, and the price of crude oil are all directly correlated with one another, the report claims. The results also suggest that rates of foreign direct investment into the European Union would not be negatively impacted by an increase in electricity prices.

He et al. (2015) conducted a study in China, which used a theoretical model and covered the years 2000 to 2010. The study discovered that, from a statistical perspective, low electricity prices frequently benefit foreign investors who make investments in foreign nations that host them to take advantage of comparative advantage. Yoshino and Taghizadeh-Hesary (2015), who utilized the Weighted Two-Stage Least-Squares approach to examine the effect that loose monetary policy played in Japan's development from Q2 1994 to Q2 2014, confirmed the findings. According to the report, the Japanese yen's devaluation caused the high cost of energy.

Ratti et al. (2011) developed a dynamic model of investment to investigate the effects of changes in relative energy costs on the levels of investment by multinational corporations in the manufacturing and non-financial sectors in 15 European countries. Data from 25 industries covering the years 1991 – 2006 were used in the study to examine variables such as the price of energy, investments, capital stock, sales, cash stock, and cash flow, among others.

According to the findings of individual country regressions, a rise in the relative price of energy has a statistically significant negative effect on the level of business investment in 14 out of 15 countries. The panel regression results show that when the price of energy increases by 1% relative to other prices in a country, multinational companies' investment decreases by 1.2%. According to the report, manufacturing enterprises' investment decreases by 1.9% for every 1% increase in energy prices. The negative effect of rising relative energy prices on investment is less obvious for larger companies.

Ciarreta and Zarraga (2010) examined the long-term causal link between energy price and foreign direct investment across 12 European nations using annual data from 1970 to 2007 using panel techniques. Measures for panel causality, cointegration into other panels, and the panel unit-root were all used. Less evidence is provided for a link between foreign direct investment and energy prices in the results, which indicate a two-way causal relationship between the price of oil and foreign direct investment.

3.4.3 EMPIRICAL STUDIES FROM OECD COUNTRIES

Garsous et al. (2020) studied the impact of energy price on outbound FDI using disaggregated business data for 24 OECD countries, considering the significance of costing structures associated with the energy and environmental profiles of the investors. Their findings showed that enterprises were encouraged to continue their FDI activities by the differential in energy prices between the home and the destination countries. The results also showed that enterprises only responded to increases in relative energy costs in respect of their international assets; firms did not respond to drops in relative energy prices. Asymmetric responses to changes in relative energy prices also occurred, according to the findings.

As an inverse proxy for energy costs, Gerlagh and Mathys (2011) examined the effects of energy abundance on trade in 14 OECD countries and 10 sectors. Using panel data from the years 1970 to 1997, Sato and Dechezleprêtre (2015) investigated how bilateral trade flows in 42 countries and 62 industries responded to energy price differences. These studies collectively demonstrate that variations in energy prices have statistically significant effects on the ability of countries and companies to compete internationally. They also show sectoral heterogeneity, with the most losses occurring in the energy-intensive, trade-exposed sectors. However, it appears that even less study has been done on the relationship between energy prices and foreign direct investment.

3.4.5 EMPIRICAL LITERATURE FROM STUDIES THAT ARE FOCUSSED ON SOUTH AFRICA

There was a dearth of research at the time the study was conducted on the connection between energy prices and foreign direct investment in South Africa. The effect of power availability and costs on luring foreign direct investment to South Africa was the subject of just one research. The impact of energy costs on economic performance and growth was a major research area.

The effect of power pricing and supply on luring foreign direct investment to South Africa was examined by Inglesi-Lotz and Amji in 2021. For the years 1985 to 2018, the study used the Autoregressive Distributed Lag Model (ARDL) cointegration method.

According to the study's empirical findings, electricity availability contributes positively to inbound foreign direct investment whereas electricity pricing has a negative impact, ceteris paribus.

Matekenya (2013) examined how variations in oil prices affected South Africa's economic development from Q4 1994 to Q4 2020 using the Vector Error Correction Model (VECM) methodology. The findings demonstrated a negative short-run and a favourable long-run association between these variables.

Chisadza et al. (2016) examined the effects of oil shocks on the South African economy using quarterly data from 1975 to 2011, and the vector autoregressive approach. Because a spike in price does not necessarily have a negative effect on the economy, the authors underlined the importance of recognizing the variables that contribute to changes in oil prices.

Balcilar et al. (2014) employed the Markov switching vector autoregressive approach to investigate the effects of oil price volatility on growth between 1960 Q2 and 2013 Q3. Despite the scale of the South African economy, they found that the country is still vulnerable to rises in the price of oil.

Kariuki (2015) conducted research on the variables affecting FDI inflow into African nations. South Africa was one of the 35 nations included in the study, which used annual data from 1984 to 2010. The parameters employed were infrastructure, trade openness and stock market performance in emerging economies, political risk, economic risk, and financial risk. It was discovered, using the least squares (OLS) dummy variable technique, that the commodity price index, bullish capital markets in emerged economies, infrastructural growth, and more liberalized trade are all factors that positively affect FDI inflow. In dynamic panel data models, dummy variables are added to the least squares method to explain the impact of each individual unit of a cross section that is unobserved yet accurately characterizes the relationship model.

The research of Kariuki (2015) is pertinent to this study because, even though it presents an insightful conclusion about how the index of global commodity prices affects FDI inflow in economies in Africa, it does not specifically address South Africa nor the price of oil, leaving a knowledge gap that is worth investigation.

The impact of power costs on economic growth in South Africa was examined by Mazambani (2015) using a Vector Error Correction Model (VECM) for the years 1986 to 2013. The results show a long-term inverse relationship between power prices and economic growth, which suggests that rising electricity costs will reduce GDP.

According to Mazambani (2015), firms that are just over break-even point cannot withstand a considerable increase in electricity costs, making this harmful to their operations. This can result in decreased output, layoffs of workers, and in the worst-case scenario, the closure of firms. To lessen the effects of rising electricity prices, Mazambani (2015) concluded that government policies should encourage competition in the electricity supply industry and offer targeted assistance to vulnerable sectors. These policies include "subsidies, gradual price increases, improved energy efficiency and demand side management."

This analysis draws attention to the paucity of studies on the link between energy prices and foreign direct investment. Dagoumas et al. (2020) and He et al. (2015) placed emphasis on electricity prices' effect on growth, whereas Chisadza et al. (2016), Chisadza, Dlamini, Gupta and Modise (2016), and Ogboru et al. (2017) studied how the price of oil affected economic expansion. Arshad et al. (2016) and Van Eyden et al. (2019) concentrated on elements including oil prices, and Adams et al. (2016) and Polat (2018) examined the effect of energy use on growth.

3.5 ASSESSMENT OF EMPIRICAL LITERATURE

Empirical studies on the impact of energy prices on foreign direct investment, notably in South Africa, are rare, even though many studies have been done elsewhere. Most of the research that was analysed about the effect of energy price on foreign direct investment showed a negative correlation between the two. The researchers used a variety of estimating methods, including ARDL, VECM, GARCH, GMM, EGARCH, SVAR, and OLS.

This study is different from other empirical literature the researcher reviewed, the rationale being that the research study conducted by Inglesi-Lotz and Amji (2021), which focused on South Africa, employed two variables which are electricity supply and electricity price, to show their impact on the attractiveness of foreign direct investment to South Africa.

The study employed the same research methodology (ARDL) as the current study; however, their study included dummy variables to use a single regression equation to represent multiple groups. In contrast, this study focuses on the costs of other sources of energy as well as electricity, and how they affect the foreign businesses that come to South Africa to benefit from the country's comparative advantage. The two studies also use various data sources and time frames for their research. By expanding the empirical work to the current period, the current study further adds to the scant empirical literature on the relationship between electricity price and FDI. Other research used panel data analysis to look at the factors under consideration, including those by Shahbaz et al. (2017) and Sarwar et al. (2017).

Bartekova and Ziesemer (2019) and Bah and Azam (2017) examined the impact of power prices on inward FDI in European Union countries, while other studies focused on the link between energy costs and growth (Mazambai, 2015; Khobai et al., 2017; Inglesi-Lotz et al., 2011). Another study (Gonese et al., 2019), used panel data analysis to look at the effects of power costs on sectoral output for South Africa from 1994 to 2015. None of these studies specifically examined the relationship between energy/electricity price and FDI link, especially in the South African context.

Additionally, they made use of various methodologies, various data sets, and various study periods in addition to various country’s case studies. To close the gap, this study integrated electricity and oil prices in an empirical literature analysis to ascertain how they each affected the attractiveness of foreign direct investment to South Africa.

3.6 CONCLUSION

The main aim of this chapter was to analyse and review both empirical and theoretical literature on foreign direct investment, electricity supply, electricity consumption, and electricity prices. The energy sector is essential in attracting foreign direct investment by host nations, as evidenced by the empirical review, albeit to varying degrees. Studies from developing, developed and OECD countries, and South Africa have proven helpful in determining the true impact of energy prices on foreign direct investment.

In this chapter, FDI ideas such as the Eclectic Dunning theory, Industrial Organization theory and electricity tariff theory were discussed. The primary takeaways from these ideas are that investors invest abroad for a variety of reasons, including location advantages, country-specific benefits, ownership, and internationalization.

The nation-specific advantages show that investing in a foreign country considers a variety of factors, including the political environment, raw material availability, language and cultural differences, state restrictions, and the country's success. Recognizing the unique ownership, internalization, and locational advantages of multinational enterprises contributes to a better understanding of how businesses behave when governments work to entice the right kind of foreign direct investment.

In addition, neoclassical economists view the demand for electricity as being comparable to the need for every other good and service, each of which has appropriate alternatives based on their level of significance and complexity. Enhancing the capacity of demand for electricity to react to electricity price changes could be advantageous for both consumers who wish to actively engage in the electricity market as well as the efficient operation of international markets.

The research methodology, model definition, and study's estimation methods are presented in the next chapter.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

The literature review from the preceding chapter serves as the theoretical underpinning for the empirical study of how energy costs affect foreign direct investment coming into South Africa. As a part of the study, the research methods are examined in this chapter. It is crucial to create a research plan to respond to the research questions provided in the preceding chapters. This is used to come up with useful responses to these questions.

Essentially, the goal of this study is to econometrically assess the empirical link between electricity tariffs and FDI coming into South Africa from 1988 to 2020. This chapter describes the methods used to investigate a subject, which is referred to as research methodology.

The strategies used to accomplish the study's goals and objectives are fully discussed in this chapter. These aims and objectives are to empirically explore the connection between energy consumption and foreign direct investment inflows in South Africa, as well as to investigate how power costs and supply have affected the attractiveness of FDI in South Africa. Investigating the long-term and short-term links is crucial between South Africa's FDI inflow and energy usage.

This type of study strives to advance knowledge of location-specific benefits, such as the distinctive characteristics of the nation that may affect the market's potential and risks, as well as the opportunity for quick profit maximizing. International investors prefer to make investments in regions with lower risk than other regions (Kiymaz,2009).

The primary goal of this chapter is to describe the model and estimation approach used to assess the impact of foreign direct investment using the ARDL framework in the power and energy industry in South Africa.

There are five sections in this chapter. Sections 4.2-4.4, which follow the 4.1 introduction, contains model specification, the data sources, and projected coefficient signs. Moreover, from 4.5 to 4.14 are the research methods. The chapter ends with Section 4.15.

4.2 MODEL SPECIFICATION

The conceptual model used in this study is built on the foundation of industrial organization theory, which is discussed in the previous chapter. Other factors are added to the model to account for important macroeconomic activity in South Africa. The framework also considers the reasons why multinational firms can only flourish in a market with flaws if they have no competitive financial advantages over companies in the same sector. This demonstrates that, rather than the country's capital availability, individual entrepreneurs are the ones that determine multinational firms, as predicted by the FDI eclectic theory.

The framework also considers the reasons why multinational corporations can only succeed in a market with flaws when they do not enjoy any financial advantages over other companies operating in the same sector. This shows that the determinants of multinational firms, as suggested by FDI eclectic theory, are individual enterprises rather than the country's availability of capital.

Hymer (1973) consequently held the view that MNEs were conceptualizing externalities because of market competition for finished commodities. In layman's words, this implies that as rivalry between two enterprises on final commodities marketplaces intensifies, consumer prices are decreased to the point where companies lose their monopoly profits. Several issues that impede inflow of multinational investment were emphasized in the theoretical and empirical research mentioned in the preceding chapters. Foreign direct investment, electricity supply, electricity prices, inflation rate, and currency rate will all be considered in this research.

Investigating the influence of foreign direct investment on the power and energy sector, the research adapts and builds upon the empirical work of Inglesi-Lotz and Amji (2021). Inglesi-Lotz and Amji (2021) conducted a study in South Africa to look at how power costs and availability affected the country's ability to draw foreign direct investment.

According to the study, electricity supply, ceteris paribus, contributes positively to inbound foreign direct investment, whereas electricity costs have a negative effect. The goal of this research is to investigate the long-term interaction amongst dependent and independent parameters using the Autoregressive Distributed Lag Model (ARDL).

The underlying model will be modified by employing foreign direct investment as a function of electricity supply (ES), electricity price (ELECTPR), an exchange rate (EXCHG), and inflation (INFL).

The following linear specifications are provided by the dissertation for the inbound foreign direct investment function model.

$$FDI = \beta 0+\beta_1 ES - \beta_2 ELECTPR + \beta_3 EXCHG-\beta_4 INFL+ \mu \text{.....} (4.1)$$

Where:

FDI=Foreign direct investment

ES=Electricity Supply

ELECTPR=Electricity Price

EXCHG= Exchange Rate

INFL= Inflation Rate

The model is described and estimated using the following logarithmic function.

$$Log\ FDI_t = Log\ (\beta_0 + \beta_1\ ES_t + \beta_2\ ELECTPR_t + \beta_3\ EXCH_t - \beta_4 INFL + \varepsilon_t) \text{ ……..} \quad (4.2)$$

The coefficients to be estimated are $\beta_1, \beta_2, \beta_3$, and β_4 and the error term is ε_t. The effect of missing parameters on data production is described by the error term.

4.3 DEFINITION & DESCRIPTION OF PARAMETERS

This section outlines the variables that were considered while estimating the effect of FDI on the energy and power sector, along with the justification of their use. It is intended to use approximations that have been used in the majority of FDI research, more especially in South Africa, when applying measurements on the effect of the power and energy sector on foreign direct investment. This gives a starting point for comparing results obtained from the study.

The model is based on foreign direct investment and currency rate, which have been demonstrated to be significant at 5% in earlier studies conducted in South Africa (Moolman et al., 2006). The base model was then expanded to include the variables for which data were available.

Table 4.1 below presents the description of data that will be adopted in the study.

Dependent Variable	*Explanation*
FDI	It is described as an investment made in a commercial interest in another nation by foreign corporations or individuals (Alege and Ogundipe, 2014).
Independent Variables	*Explanation*
ES	The process of transporting energy from its source, such as a power plant, to its destination, such as the mining and manufacturing industries. This is adapted from (Eskom Tariff Book 2020)
ELECTPR	is the per-kilowatt-hour price charged to mining and manufacturing industries when purchasing electricity (NERSA 2022).
EXCHG	A country's currency's value in respect to another country's currency is known as an exchange rate (Moolman et al,2013).
INFL	Inflation is described as a consistent rise in the average price level within an economy. This is adapted from (Boateng *et al.* 2015)

Table 4.2 summarizes the variables included their expected values in the equation, as well as a priori on the parameters.

Parameter	*Elucidation of Parameter*	*Expected Sign*
LFDI	Log of FDI	+ (positive)
LES	Log of Electricity supply	+ (positive)
LELECTPR	Log of Electricity price	- (negative)
LREXCH	Log of Real effective exchange rate	+ (positive)
LINFL	Log of Inflation	-(negative)

Source: Constructed by the Investigator

The variables used in this study were chosen for a variety of reasons. First is the critical function they play in an emerging country's economy like South Africa. Second, inconsistent results have been found in earlier studies that applied similar approaches.

Electricity supply was included as an independent variable in this study because it contributes positively toward foreign direct investment. The availability of electricity has a long-term impact on foreign direct investment, according to Moolman et al.'s (2006) investigation of the macroeconomic relationship between foreign direct investment and South Africa's level of energy supply.

The cost of energy was incorporated into the model as an independent variable because it is anticipated foreign direct investment by altering the weight of power expenses that are included in budgets and the allure of the nation as a location for business due to its low production costs. Barteková and Ziesemer (2019) investigated from 2003 to 2013 how power costs affected FDI inflows. Their research assumes that electricity costs should make up a sizable component of net FDI and that production costs have a major impact on net FDI.

Their findings show that electricity costs are indeed among the decisive contributing factors for attracting FDI along with unit labor costs and advantage in secondary education (translated into availability of skills in the labor market).

Real effective exchange rate has a favorable impact on foreign direct investment, the real effective exchange rate has been utilized as an independent parameter in most of the research. Foreign direct investment and the actual effective exchange rate have a long-term association, according to research by Ellahai (2011) and Gosh (2011). The research results are therefore anticipated to show that foreign direct investment is positively impacted by exchange rates.

Inflation has been employed in the model as an independent variable, because foreign direct investment is adversely affected by it. According to Valii et al. (2014), higher inflation lowers actual returns on investment, deterring multinational firms from investing in the country and lowering FDI levels. Therefore, it is anticipated that this study would show that inflation may have a long-run detrimental impact on foreign investment coming into the country.

4.4 DATA SOURCES

The study's variables are all based on yearly data spanning the years 1988 through 2020. The choice of starting and ending times was constrained by the information on electrical supply that was readily available. The data for foreign direct investment will be derived from Statistics South Africa and quantified as a proportion of GDP, while the empirical data for inflation (%) will originate from the IMF's statistics on global finance. Furthermore, electricity supply and electricity price will be obtained from ESKOM’s data base, although, electricity price will be expressed in terms of kilowatt per hour. Moreover, the empirical data for exchange rate (ZAR/US$) will be sourced from the South African Reserve Bank’s database.

4.5 RESEARCH EXAMINATION DIAGNOSTIC TESTS

4.5.1 UNIT ROOT TESTS

To ascertain whether the variables are steady, unit root tests are utilized. Boateng et al. (2015) define non-stationary series as those with auto-covariance, non-constant mean, and variance across time. As an illustration, if anything is differentiated d times while remaining constant, it is integrated of order d, indicated as I(d).

According to Boateng et al. (2015), non-stationary series with unit-roots have implications, hence finding the order of integration of the parameters is critical.

Dickey (1981) utilized the Augmented Dickey-Fuller test, while Phillips and Perron (1988) employed the Phillips-Perron test to study the unit root (Adebola, 2011). Several researches in the literature have criticized the traditional tests.

Tang (2008), demonstrated that the tests have modest power, making it challenging to detect if a unit root exists or if the process is close to the unit.

4.5.2 AUGMENTED DICKEY-FULLER TEST (ADF)

Using Augmented Dickey-Fuller (1981), the order of parameter integration is examined. The ADF test can be used to assess the null hypothesis of the ARIMA modelling procedure, which is compared against the alternative null hypothesis of stationarity. Augmented Dickey-Fuller makes extensive use of time series data and techniques. Also, the ADF test uses negative numbers because the more negative values it produces after the test, the higher the chance of rejecting the null hypothesis. The Dickey-Fuller test is improved by the ADF test. Moreover, it is intended to address the problem of the error term and is connected to white noise. To address issues of autocorrelation, ADF includes additional dependent variable lags as well as lag duration on additional terms, which is chosen using the Schwarz Information Criterion (Narayam, 2005).

ADF TEST IS CONDUCTED IN THREE STEPS AND THEY ARE AS FOLLOWS

- *Step 1 The model is tested without a constant*

$$\Delta Y_t = \beta_0 + \beta t_1 + \text{a}\, \overset{\delta}{Y}_{t-1} + \sum \varphi i + \Delta Y_{t-1} + \varepsilon_t \qquad (4.3)$$

Where: i= lag order

Explaining difference operators: $\Delta Y_t = \Delta Y_{t-1} - \Delta Y_{t-2}$

β_0 = *Constant*

βt_1= *a time trend's parameter*

- *Step 2 The model is tested with a constant*

$$\Delta Y_t = \infty_0 + \beta Y_{t-1} + \sum_{k=1}^{r} Y\, \Delta Y_{t-k} + \varepsilon_t \qquad (4.4)$$

- *Step 3 The model is tested with a constant and linear time trend*

$$\Delta Y_t = \infty_0 + \sigma t_1 + \beta Y_{t-1} + \sum_{i=1}^{r} Y\ \Delta Y_{t-k} + \varepsilon_t \qquad (4.5)$$

Where: r=*is the number of lags*

ε_t =*stochastic error term*

ΔY = *shift in a dependent parameter*

4.5.3 PHILLIPS PERRON (P-P) TEST

Non-parametric correlation is used in the Phillip and Perron's (1988) test to cope with any correlation that occurs in t statistics and error terms. Because it additionally deals with the problem of non-stationarity of variables, Phillips-Perron is more like an ADF unit root test. The sole difference between ADF and PP is that PP takes care of the model's heteroscedasticity.

The Phillip Perron regression model:

$$\Delta X_t = \mathrm{a}' \boldsymbol{R_1} + \pi y_{t-1} + \varepsilon_t \qquad (4.6)$$

Where $\boldsymbol{R_1}$ is either a trend or constant vector component.

4.6 GRAPHICAL ANALYSIS

Before using the recognized approaches for stationarity testing, it is necessary to test for stationarity by plotting time series data using a correlogram. As a result, it provides an intuitive sense of the nature of the variables that will be used in the research (Lin, 2007).

4.7 CO-INTEGRATION TESTS

According to Ramanathan (1995), co-integration is the underlying long-run link between two parameters. All variables must be non-stationary, according to the co-integration analysis tests' underlying assumption. It is crucial to verify that two or more parameters are co-integrated since the sort of model you employ may be influenced by whether a regressand parameter is co-integrated with regressor variables.

It makes no difference if it is asserted that the co-integration analysis is available in every situation and that all these characteristics are integrated in the same sequence.

"Multi co-integration" refers to a situation in which the parameters are not integrated into the same sequence.

In this case, stationarity, not time, determines whether the covariance among two parameters is zero or solely reliant on stationarity, as it is expected that random parameters have finite variance. When this occurs, it is said that the series satisfies the characteristics of stationary time series, or a sequence aggregated to degree zero, where the association among a series and its lagging number should only depend on how long the lag has been present rather than when the series started.

Any series that satisfies this criterion is time-invariant. The rationale is that if the variances of a random walk model or series that has a time trend increase with time, it is nonstationary because it has a linear or exponential time trend. The differencing method is used to convert variation to a stable series. The differenced series is either stationary or integrated of order 1.

Co-integration tests are essential for determining whether variables have a long-run relationship. This entails establishing whether there is a long-run connection among foreign direct investment, the availability of electricity, the cost of electricity, the exchange rate, and the rate of inflation. Using F statistics, the model's co-integration status will be evaluated. The estimated Bound Test F-statistic will be evaluated against both the upper critical bound (UCB) and lower critical bound (LCB) at a 5% level of significance (LCB). The alternative null hypothesis claims that the model has co-integration, whereas the null hypothesis claims that the model does not. If F-statistics is smaller than the lower critical bound, co-integration is assumed, and the null hypothesis is accepted. Yet, if F-stats exceed the higher critical bound, the null hypothesis cannot be accepted, showing that co-integration exists; however, if F-stats lie between the upper critical bound and lower critical bound, the results will not be definitive. Following Inglesi-Lotz's (2021) investigations, Autoregressive Distributed Lag (ARDL) model will be used in the study to check for co-integration. Pesaran (2001) developed this technique to address issues with the Johansen Julius (1990) and Engle and Granger (1987) methodologies.

Unlike the Johansen Julius (1990) technique, it examines the protracted relationship between the parameters using a system of equations. The ADRL method analyses the protracted link between the variables by using a single shortened version of the equation. The ARDL approach is powerful enough to overcome both the challenge of endogenous variables and the issue of serial correlation, giving it an advantage over other co-integration approaches.

ADRL econometrics techniques were chosen for this study for three reasons: it does not require the integration of factors, so because ADRL does not depend on the properties of unit root data sources, the ADRL method evaluates the long-term connection between the parameters, and hence it entails estimating an error correction model with no constraints (UECM).

4.8 REQUIREMENTS FOR EMPLOYING THE APPLICATION OF AUTOREGRESSIVE DISTRIBUTED LAG MODEL (ARDL).

i. Whether the parameters are integrated to order zero I (0), order one I (1), or a hybrid of both, the ARDL approach can be applied. This is beneficial to avoid having to retest the model.
ii. The challenges with pre-testing are tied to traditional co-integration methodology, which entails classifying the parameters that must be incorporated into orders I (0) and I(1) (Nkoro & Uko, 2016).
iii. If the Wald test's F-statistic critical value indicates that there are several causal relations in the long- run, then the ARDL model cannot be used (Nkoro & Uko, 2016).
iv. If the F-statistic critical value reveals that the model has only one long-run causality, the ARDL model can be used instead of the Johansen Julius tests.

4.9 THE CO-INTEGRATION METHOD FOR ARDL

The Co-Integration method for ARDL is carried out using the following steps. The following three phases check if the ARDL method's requirements are met.

i. *Step 1: Identify whether there is a protracted relationship amongst the variables.*

In this stage, the F-bound test is employed to check for a protracted connection between the parameters. Using the F-test, the significance of the lagged level of the parameters is investigated. For example, the model has co-integration if the F-statistic calculated value is greater than the upper bound critical value (Narayam, 2005). As a result, the model is not co-integrated if the lower bound critical value is greater than the critical value for the F statistic. Nevertheless, the model is deemed inconclusive if the F-statistic value lies between both the lower and upper bounds (Narayam, 2005).

ii. *Step 2: Selecting the best lag duration for the ARDL technique*

Nkoro and Uko (2016) claim that choosing the model's ideal lag length is critical for deciding the long-term equation, which can be done using model order selection criteria such as the HQC (Hannan-Quinn criterion), SBC (Schwarz-Bayesian criterion) or AIC (Akaike Information Criterion).

iii. *Step 3: Convert the ARDL Model to an Error Correction Model by parameterizing it.*

This stage involves deleting erroneous regression results and comparing the data to achieve stationary regression results in variables.

The ARDL regression model sometimes tends to produce short-term relationships among variables, i.e., it does not provide long-term relationships among the model's parameters. As a result, the Error Correction Model becomes critical in this situation because it reveals both short- and long-term information (Narayam, 2005).

4.10 ERROR CORRECTION MODEL

Another accepted contemporary time class model of distributed lag is the error correction model (ECM), which uses a partial adjustments method to account for adjustment costs and insufficient data (Ramanathan, 1995).

Through the ECM, unit-roots are mixed with parameter dynamics. It is theoretically possible for two economic variables, such as income and consumption, prices, and wages, to have a long-run equilibrium connection.

The error correction process is a method for balancing short-run and long-run behavioural patterns since there could be short-run disequilibrium.

The error correction process corrects the fraction of disequilibrium that occurred in one period and was fixed in the next.

4.11 DIAGNOSTIC TESTS

Diagnostic stability tests aid in determining whether the regression model was effectively implemented and whether it was correctly stated.

Normality tests, for example, are one type of diagnostic stability test that must be done to see if the regression model was correctly stated, using CUSUM and CUSUM square techniques, as well as heteroskedasticity tests and serial correlation (Narayam, 2005).

i. Heteroscedasticity tests

There are numerous technical heteroscedasticity tests, as outlined by Brooks (2002). The heteroscedasticity generic test developed by White (1980) was employed in this investigation. The test is beneficial since it considers multiple presumptions. It is assumed that the regression model estimated is linear.

Through regressing the residuals generated by regression, the combined significance of the regression is examined.

Homoscedasticity is shown by acceptance of the null hypothesis. Heteroscedasticity is shown by the rejection of the null hypothesis.

The LM tests conducted by Breusch-Pagan, White, Glesjer, Harvey-Godfrey, Goldfeld-Quandt, and Park LM test are a few diagnostic tests that can be used to evaluate heteroscedasticity. However, these tests produce different results when viewed in the context of economic time series. In data analysis, the Breusch-Pagan LM test is widely used to determine the homoscedasticity of the data. The heteroscedasticity test equation can be subsequently written as follows.

$$V(\varepsilon^2) = \sigma^2, i = 1 \ldots n \quad (4.7)$$

$$COV(\varepsilon_I \varepsilon_J) = 0, i \neq j = 1,2, \ldots n \quad (4.8)$$

ii. Serial correlation tests

Serial correlation happens when a time and a differentiation period are connected. There is no serial association, which is the null hypothesis, as indicated in this model. The null hypothesis is rejected, and serial correlation is strongly supported if the p-value is smaller than the significance level ($p<0.05$).

The study will determine whether there is serial correlation in the residuals using the Breusch-Godfrey Lagrange Multiplier autocorrelation test (Breusch & Godfrey,1978).

iii. Residual normality tests

The study employs the Jarque-Bera test to determine whether the data is normal. It makes use of the property of normally distributed random variables. The complete distribution is defined by the first two moments of the variance and mean.

The test has two decision-making hypotheses; the residuals' normal distribution is the test's null hypothesis. On the other hand, the alternative hypothesis is that the residuals are not evenly distributed.

The p-value must be less than or equal to the level of significance for the decision rule to apply, which indicates that the null hypothesis is rejected. The skewness and kurtosis assumptions underpinning the JB test are that they are equal to zero (Mlambo, 2013). This is how the JB test might be stated:

$$jb = \frac{R-K}{6} + (S^2 \frac{k-3}{6})^2 \quad (4.9)$$

Where*:*

R= observations values

K= Values of estimated variables

S = parameter skewness

K= Parameter of kurtosis

iv. Stability tests

The Model must be tested for stability using Pearson's proposed CUSUM and CUSUM square stability techniques (1997). CUSUM and CUSUM square tests will be used to determine whether the parameters are correct with a significance level of 5%. As a result, the blue line should not cross the two red lines at a 5% level of significance. For this test, the coefficient vector being the same throughout all periods is the null hypothesis.

v. Cumulative sum test

The statistics found in the structured form of the cumulative sum of recursive residuals (CUSUM) were evaluated using the null hypothesis of quintessential parameter stability (Brooks, 2014:240). As a result, since the expected interference value is typically zero, the CUSUM figures are commonly zero (Brown et al., 1975).

Therefore, the null hypothesis of the primary stability parameter in the CUSUM test is rejected when residuals do not fall inside the critical lines of standard error. The following is a presentation of the CUSUM equation (Brown et al., 1975):

$$W_{\boldsymbol{t}} = \sum_{\boldsymbol{k+t}}^{\boldsymbol{t}} 1 \; / \; S \qquad (4.10)$$

Where: $t = k + 1, \ldots, T$ and $s = S_T \, (T - K)$

In equation 4.10, $W\boldsymbol{t}$ is residual recursive, meanwhile s is used to indicate the calculated standard deviation and t is the amount of time needed for a constant to fluctuate. Therefore, δ indicates a constant, if held steady over time, ($W\boldsymbol{t}$) is going to be equal to 0.

vi. Cumulative sum square test

Furthermore, the stability test is assessed using the basic stability variable. The null hypothesis are the statistics discovered in the standardized form of the cumulative sum of squared residuals (CUSUMSQ) (Brooks, 2014).

Despite the parallels between CUSUM and CUSUMSQ, the CUSUM technique plots and indicates the cumulative sum of recursive square residuals, while the CUSUMSQ technique plots and indicates the cumulative sum of standardized residuals, which accounts for the differences of the two tests' key characteristics (Brown et al., 1975).

CUSUMSQ technique can be stated as follows and is built on the premise that crucial variable stability is the null hypothesis that was mentioned earlier (Brown et al., 1975).

$$S_t = S_t/S_T = (\sum_{j=k+1}^{t} w_j^2) \qquad (4.11)$$

Where: j $= k$ + 1, …, T is the anticipated value, $St\ E(St)$ = $(t - k)$ / $(T - k)$ is parameter stability, and t = k to join at t = T is the null hypothesis.

4.12 SUMMARY REMARKS

The research approach for this paper, ARDL, has been highlighted in this chapter. Moreover, model definition, mathematical methodologies, econometrics methods, error correction mechanism, integration tests and stationarity techniques were all presented in this section. Heteroscedasticity, serial correlation, normality, and stability were also discussed. The data analysis and interpretation are discussed in the following chapter. It provides, discusses, and elucidates each research question, as well as the outcomes of the research questions. To analyse possible correlations between variables, the requisite statistical or econometrics analysis is carried out where necessary.

CHAPTER 5

EMPIRICAL FINDINGS

5.1 INTRODUCTION

The first chapter discussed the dissertation's main objectives, which were to investigate the long- and short-term connection of the effect of power prices on inward FDI coming to South Africa. The second chapter explored the connection among these parameters as they affected South Africa and other nations. In Chapter 3, the theoretical and empirical literature on foreign direct investment and electricity/energy prices were reviewed and in Chapter 4, the estimation techniques that the dissertation employed to examine this connection were described. The analysis and estimates of the results are covered in this chapter.

There are two sections in this chapter: In the first section the chapter is focused on the model and ensuring that it gives reliable results by testing the stationarity of the variables. The possibility of a long-run association amongst the parameters is examined in the second section.

An overview of statistics on foreign direct investment, power supply, electricity pricing, inflation, and exchange rates is presented at the start of this chapter. The data that has been transformed into logarithm form is given with its summary statistics. The remainder of the chapter will cover variable stationarity utilizing ADF, Phillips and Perron, and conventional unit root tests.

The co-integration analysis starts after deciding the parameters' order of integration. Using the autoregressive distributed lags (ARDL) technique, this establishes whether there is a long-term connection among foreign direct investment, electricity supply, electricity price, inflation rate, and exchange rate. Lag order selection criteria will be considered before co-integration assessments due to the significance of choosing the proper lag length while running co-integration. Akaike Information Criteria (AIC) will be used to determine lag length as its main determinant in the study, along with HQ, LR, FPE and SC.

The model's diagnostic tests will be examined including serial correlation, normality, and heteroscedasticity tests. Furthermore, the study then applies the CUSUM and the CUSUM SQ techniques to assess the stability of the long-run variables.

5.2 DATA DESCRIPTION STATISTICS

According to William (2006), data descriptions are compiled to provide a summary of the nature of data, as well as a preview of measures and samples. The descriptive statistics for foreign direct investment, electricity supply, electricity price, inflation, and exchange rate are shown in Table 5.2. Wenger (2012) defines slight marginal skewness as coefficients that fall between +0.5 and -0.5. The skewness of the model is indicated by the sign of the coefficient. The distribution is skewed to the left if the skewness coefficient is positive, and to the right if the skewness coefficient is negative. Kurtosis measure the flatness (peakness) of a distribution of a series. A normal distribution has a kurtosis value of 3 (Wenger 2012).

Table 5.2 Summary Statistics of Foreign Direct Investment, Electricity Price, Electricity Supply, Inflation, and Exchange Rate.

	FDI	*EP*	*ES*	*INF*	*EXCH*
Mean	11.32012	10.07933	12.30140	1.876629	4.541690
Median	11.22636	10.01005	12.25157	1.806648	4.578724
Maximum	12.68153	11.91389	14.71411	2.721953	4.722953
Minimum	9.795178	8.216628	11.80794	0.354172	3.887115
Standard Deviation	0.364021	1.007154	0.632254	0.505028	0.163508
Skewness	1.017318	0.201363	3.217198	-0.448558	-2.214281
Kurtosis	1.552653	2.315166	1.561242	2.938315	1.066311
Jarque-Bera	2.882020	0.867881	4.625721	2.317221	3.566892
Probability	0.236689	0.647951	0.326612	0.313922	0.325819
Sum	373.5641	332.6180	405.9462	61.92874	149.8758
Sum Sq Dev	29.73874	32.45947	12.79183	8.161697	0.855514
Observations	33	33	33	33	33

Source: Data computed from E-views 12

In Table 5.2, the first row displays the mean, which represents the data's average values, while the values in the second row are the medians. The maximum and minimum values are displayed in the third and fourth rows, respectively.

By contrasting the standard deviations of 2 distinct distributions, the greatest standard deviation, which is displayed in the fifth row in real terms, is translated in relative terms.

Table 5.2 also shows that foreign direct investment is a more consistent series, with 0.364021 for the log ESS. The price of power has a bigger standard deviation. This means that the electricity price will be more volatile.

A normal distribution has a skewness of zero; inflation is closest to it, with a value of -0.448558, according to table 5.2, followed by exchange rate at -2.214281 and 0.201363 for the electricity price. The series for inflation and exchange rate are negatively skewed; this implies that the left tail of these parameters is wider than the right one. Meanwhile, for foreign direct investment and electricity supply, the right tail is longer than the left one.

A normal distribution is a distribution that follows a certain pattern, for which the kurtosis value is 3. Based on Table 5.3, the kurtosis values of foreign direct investment, electricity price, electricity supply and currency rate are all less than three, implying that the distribution is platykurtic. The only metric with a kurtosis closer to three is inflation. This means that inflation has a steep peak, known as leptokurtic, which is closer to the mean.

Jarque-Bera tests findings based on table above reveal the normal distribution null hypothesis of foreign direct investment, electricity price, electricity supply, inflation and exchange rate cannot be rejected because of their P-values being above the 5% level of significance. Therefore, based on the Jarque-Bera results, the null hypotheses for FDI, ES, EP, INF and EXC are accepted and conclude that the series is normally distributed.

5.3 UNIT ROOT TESTS

Data from time series are constant, according to Gujarati (2004), when the variance and mean remain constant over time. As a result, when non-stationary data is used in the model, spurious regression results occur.

A differencing approach can be used to change non-stationary data into stationary data if the data being used is not stationary. The study uses traditional unit root tests (ADF and PP) to test for stationarity.

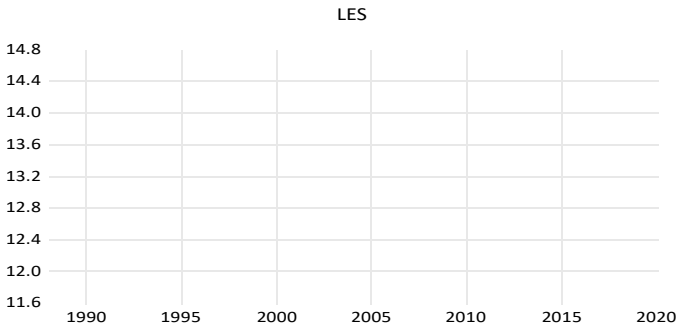
To make sure the empirical findings are reliable, the study uses both formal and informal methods to check and verify the stationarity of foreign direct investment, electricity supply, electricity price, inflation, and exchange rate.

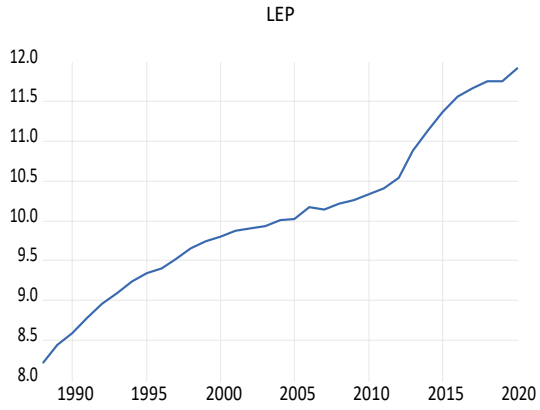
Consequently, the Augmented Dickey-Fuller and Phillips-Perron unit root tests are used to do formal model tests.

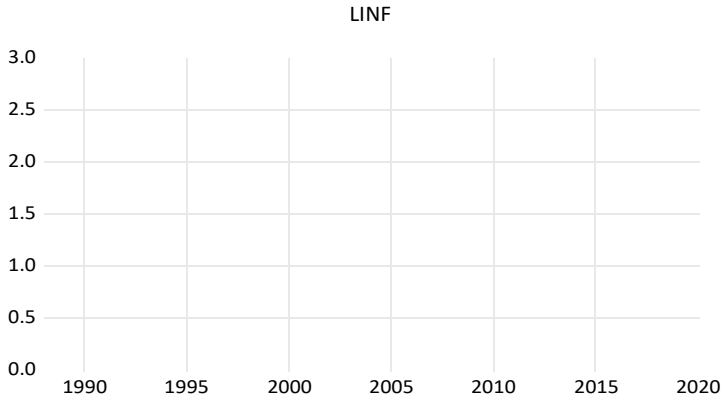
To show that all the parameters are stationary, first difference and level line graphs are plotted, as shown in figure 5.1, which shows that the variables LFDI, LES, LEP, LINF, and LEXCH are not stationary at level form, which means that the mean and variance are not equivalent to zero. As a result, foreign direct investment, electricity supply, electricity price, inflation, and currency rate are not stationary at the level form.

After differencing, the variables' stationarity is reported Figure 5.2. The first difference graphs show that the series mean, and variance are both zero. Because data is incorporated into order one, it is stationary, so the first order of integration ensures the data is static preventing spurious regression results. If data is integrated in order one, it is not moving; thus, the first order of integration ensures that data is stationary to avoid spurious regression results; moreover, it is not compulsory for the order of integration to exceed order one, i.e. I (1), for the Augmented Dickey-Fuller test to be applicable. Furthermore, the Augmented Dickey-Fuller tests, and Phillips-Perron tests are presented in 5.3.1 and 5.3.2, and they show that foreign direct investment, electricity supply, electricity price, inflation, and exchange rate are merged from all of order one.

Figure 5.1 Graphical representations of Parameters at level. Appendix 1.







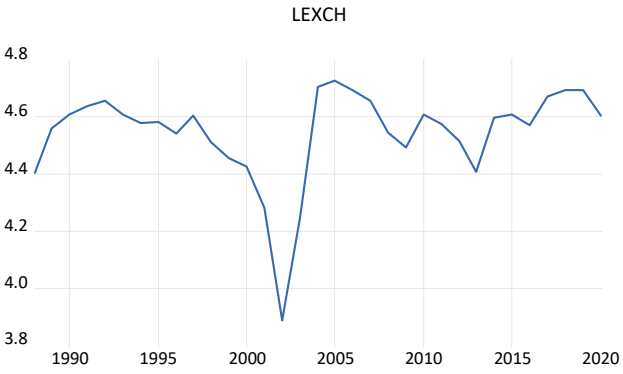
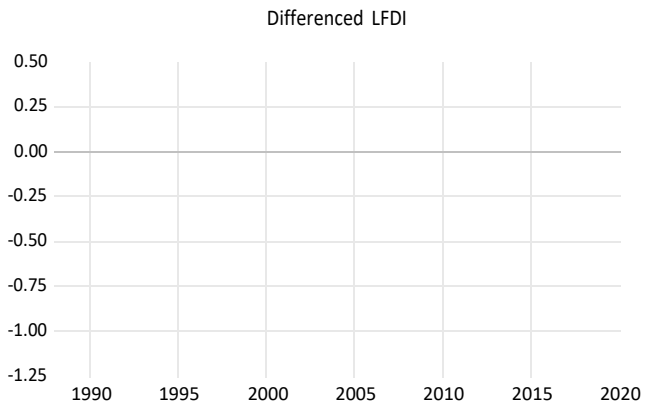
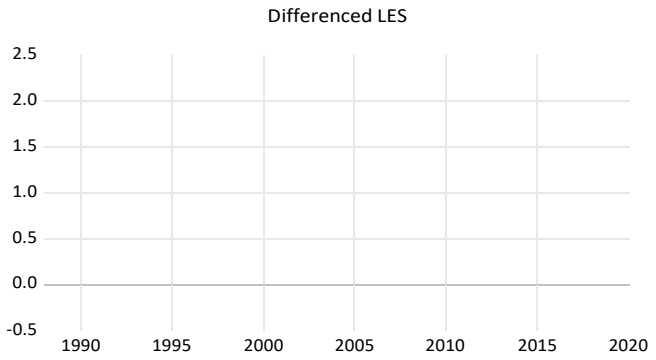
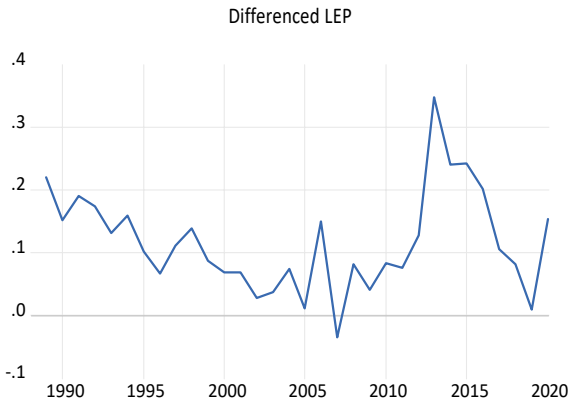
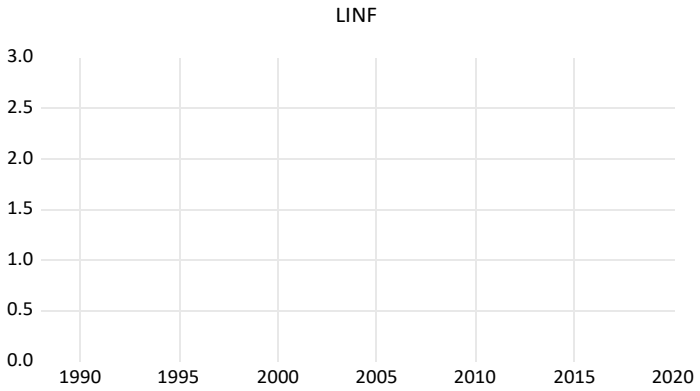


Figure 5.2 Graphical representations of Parameters after differencing. Appendix 2.









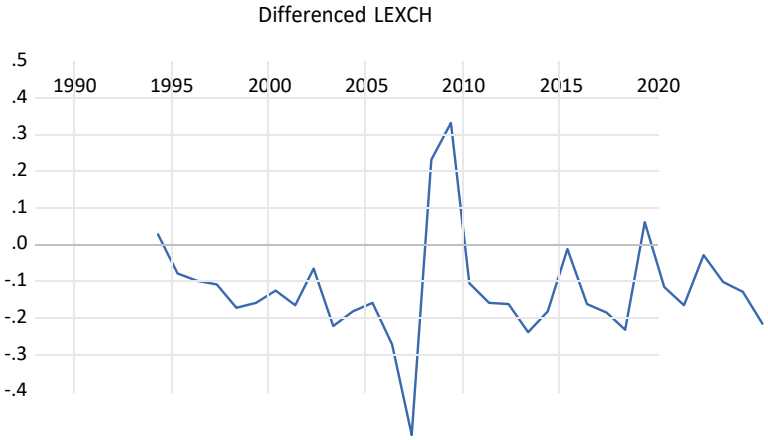


Table 5.3.1: The Augmented Dickey-Fuller unit root test

Variables	*Model*	*Level P-value*	*First difference P-Value*
LFDI	Intercept	0.3602	0.0233
	Trend and Intercept	0.9998	0.0492
	None	0.1283	0.0018
LEP	Intercept	0.9638	0.0231
	Trend and Intercept	0.2669	0.0956
	None	0.9969	0.1890
LES	Intercept	0.9686	0.0001
	Trend and Intercept	0.2644	0.0003
	None	0.9427	0.0000
LEXCH	Intercept	0.0116	0.0002
	Trend and Intercept	0.0450	0.0013
	None	0.7237	0.0000
LINF	Intercept	0.1652	0.0001
	Trend and Intercept	0.0599	0.0007
	None	0.2174	0.0000

Source: Own Construction

INTERPRETATION OF TABLE 5.3.1 RESULTS

Table 5.3.1 demonstrates the findings of the Augmented Dickey-Fuller unit root tests. Parameters have been examined for stationarity at the level form, then considering trend and intercept together, or just intercept. Schwarz information criteria are employed to identify how many lags there in the model. Using the p-value method of hypothesis testing at significance level 5%, the rejection rule specifies that if the p-value is strictly less than 0.05, the null hypothesis should be rejected. The conclusion would be that the observed variable is stationery.

According to the null hypothesis, the parameter contains a unit root, which means it is stationary. After observing and studying the findings of the ADF-Fisher Chi -square test, all the variables, LFDI, LES, LEP and LINF, at LEVEL form are non-stationary except LEXCH which is stationary at intercept and at trend and intercept.

At first difference, all parameters LFDI, LES, LEP, LEXCH and LINF are stationary. Therefore, for the ADF-Fischer Chi square test there is statistical evidence, and can be concluded, that the variables tested are integrated of order 1.

TABLE 5.3.2 PHILLIPS AND PERRON UNIT ROOT TEST

Variables	*Model*	*Levels-P value*	*First difference*
LFDI	Intercept	0.4613	0.0171
	Trend and Intercept	1.0000	0.0009
	None	0.8671	0.0406
LEP	Intercept	0.8904	0.0225
	Trend and Intercept	0.6822	0.0957
	None	1.0000	0.0893
LES	Intercept	0.9740	0.0001
	Trend and Intercept	0.9490	0.0003
	None	0.9431	0.0000
LEXCH	Intercept	0.0704	0.0000
	Trend and Intercept	0.0259	0.0000
	None	0.8189	0.0000
LINF	Intercept	0.2698	0.0000
	Trend and Intercept	0.1726	0.0000
	None	0.1218	0.0000

Source: Data computed from E-views 12

The stationarity test was advanced by using the Phillips and Perron unit root test. Table 5.3.2 summarizes the findings. In employing the PP test to the study parameters, the variables LFDI, LES, LEP, and LINF were revealed to be stationary at 5% after 1st difference, although LEXCH was found to be stationery at 1st difference and trend and intercept. These findings produced the same results as the ADF test.

Figures 5.1 and 5.2 illustrate the level form and first difference line graphs to demonstrate the stationary nature of the variables. Figure 5.1 displays the outcomes for stationarity of these variables at level form. The mean and variance are not constant in the graphs. This shows that foreign direct investment, electricity supply, electricity price, exchange rate, and inflation rate are all measured at the same degree.

Figure 5.2 displays the outcomes of the first parameter difference. The graphs demonstrate that there is a constant mean and variation for a set of numbers. This suggests that the variables are stationary at first difference. As a result, the variables are integrated of order one I (1), as demonstrated by the PP and ADF unit root tests.

5.5.1 SUMMARY OF THE AUGMENTED DICKEY-FULLER TEST (ADF) AND PHILLIPS-PERRON (PP) UNIT ROOT TESTS.

In this investigation, two-unit root tests were employed to establish whether or not each series was stationary. As a result, the Phillips-Perron test was employed to see if its results were compatible with the Augmented Dickey-Fuller tests.

According to Asteriou and Hall (2007), the Augmented Dickey-Fuller test does not contemplate cases of non-normality and heteroscedasticity often revealed in time series economic parameters. Moreover, because of failures associated with the Augmented Dickey-Fuller techniques, research adopts the Phillips-Perron technique, which is much preferred over the Augmented Dickey-Fuller test due to its relative strength and offering more stringent interim assurance.

By computing lagged conditional variance terms on the right-hand side, Phillips-Perron corrects for higher order serial correlation. Himalal (2008) argues that the Phillips-Perron technique provides superior performance to the ADF test when time series data has structural problems, which is relevant to this investigation, given the quantity of observations across time. The method provides for modest expectations in terms of error distribution (Asteriou & Hall, 2007).

In conclusion, the results of unit root tests show foreign direct investment, power supply, electricity price, inflation, and exchange rate are not stationary in level form, meaning the variables have a unit root. As a result, if the initial difference between these parameters is taken, they become stationary. This means that LFDI, LES, LEP, LINF, and LEXCH are all in the same order, I (1).

5.4 CO-INTEGRATION TEST

This section investigates if the parameters are co-integrated, or if they have a long - run link. The ARDL method is utilized. A series can be used because it has been found to be integrated of order 0 or 1, or I (0) or I(1). The ARDL model necessitates a careful selection of the variables' lag order (Muhammed et al., 2012).

As a result, the AIC is used to determine occurrences of lags. An optimal model is one that has the fewest lags and the lowest AIC value, hence the lower the AIC value, the better the model.

TABLE 5.4.1 LAG ORDER SELECTION CRITERIA

VAR Lag order Selection Criteria						
Lag	*Log L*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	79.33990	N/A	2.79e-09	-5.506659	-5.266690	-5.435304
1	226.1323	228.3437	3.50e-13	-14.52831	-13.08850	-14.10018
2	250.5862	28.98243*	4.51e-13*	-14.48786*	-11.84820*	-13.70295*
3	289.7626	31.92153	2.99e-13	-15.53797	-11.69845	-14.39628
4	345.2013	24.63943	1.77e13	-17.79269*	-12.75332	-16.29422

Source: Data computed from E-views 12

Table 5.4.1 lists several criteria for determining highest possible number of lags: LR, AIC, FPE, SIC, and HQ. A star, indicating the maximum number of lags that each criterion selects, denotes these outcomes. Table 5.4.1's lag order criteria all point to the ideal lag length as two.

As previously stated, the most effective tool is AIC for determining the number of lags. As a result, two lags were chosen as the most lags that might possibly be employed.

Checking for co-integration between the parameters was the next step. This requires figuring out whether there is a long-run connection between FDI, electricity supply, electricity price, inflation, and currency rate. The presence of co-integration will be determined using F-statistics.

This method compares the F-statistics against the upper and lower critical bounds at the 5% level of significance. The null hypothesis asserts that there is no co-integration, in opposition to the alternative hypothesis that it does.

The null hypothesis cannot be rejected if the F-statistic is less than the lower critical constraint, indicating that co-integration is not present.

If the F-statistic is greater than the upper critical constraint, suggesting co-integration occurs, the null hypothesis is dismissed. If the F-statistics range between the lower and higher critical boundaries, the findings become equivocal.

5.5 BOUNDS TESTING APPROACH FOR CO-INTEGRATION

TABLE 5.5 BOUND TESTING

T statistic	*Value*	*K*
F statistic	8.094933***	4
	Critical Value	
Bounds		
Significance	*I0 Bound*	*I1 Bound*
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37
Notes: I0 Bound=2.2 I1 Bound=4.01 ****, **, * 1%, 5%, and 10%, respectively, denote significance* *. Since the test calculated value (8.094933) is higher than the I1 Bound calculated values, the null hypothesis that there is no long-term link is rejected.*		

Source: Data computed from E-views 12

INTERPRETATION OF TABLE 5.5 RESULTS

The calculated Fisher statistic of 8.094933 is more than the upper bound of 4.37 at a 1% level of significance, as shown in Table 5.5. The findings show that foreign direct investment, power supply, electricity price, inflation rate, and exchange rate are co-integrated. The results are consistent with those of Lotz and Amjid (2021), who discovered co-integration exists when using foreign direct investment as a regressand variable.

Studies on mixed countries by Tuyen and Winai (2017), world Asian countries by Lin and Linh (2015), China by Han et al. (2017), and Portugal by Leito (2015) are among those that confirmed the presence of co-integration between energy price and foreign direct investment when the latter was utilized as a regressand variable.

Furthermore, these results answered study's secondary goal, which was to investigate the linkages throughout the long- and short-terms between foreign direct investment, electricity prices, power supply, inflation, and exchange rates.

A long-run model was estimated after cointegration was achieved, and the findings are provided in the next section.

5.6 ARDL RESULTS (LONG-RUN RELATIONSHIP)

Table 5.8 Results from the Model Selection Of (2, 0, 2, 2,0) For ARDL.

Regressand parameter: LFDI *Sample size:1988-2020* *Observations:33*			
Parameters	*Coefficient*	*t-statistic*	*Probability Value*
C	-39.30422	-5.383469	0.0000
LEP	-0.362096	-2.597889	0.0161
LES	3.730159	5.607562	0.0000
LINF	-0.155443	-1.039353	0.0309
LEXCH	0.341547	0.429529	0.0362

Source: Data computed from E-views 12

INTERPRETATION OF TABLE 5.8 RESULTS

Table 5.8 displays the long-run estimations outcomes for the selected ARDL model. Electricity price adversely affects foreign direct investment, according to the results, which have a 5% level of significance. Consequently, a 1% rise in LEP, ceteris paribus, will cause a -0.36% drop in LFDI and it is negatively and statistically insignificant. These outcomes are consistent with those of Inglesi-Lotz and Amji's (2021) study conducted on South Africa. In their analysis, Inglesi-Lotz and Amji (2021) discovered a link between South Africa's energy prices and foreign direct investment that is inverse. The impact of power prices as well as the prices of other energy sources, such as oil or petroleum, were examined by Bigili, Tulce and Dogan (2012), who found that power prices are unquestionably a deterrent to foreign direct investment (FDI) coming into the nation.

Bartekova and Ziesmar (2019) examined how power costs affected FDI into European nations from 2003 to 2013. According to the paper's assumption, total FDI is mostly determined by manufacturing costs, while electricity costs should contribute significantly to those costs. Their research suggests that among the most significant factors attracting FDI are power prices, human capital per capita, and the benefit of tertiary education, recognized as the abundance of abilities in the employment market.

Additionally, the results showed that the availability of power has a favourable direct impact on foreign direct investment and is statistically significant at 5%, meaning a 1% rise in electricity supply, ceteris paribus, will result in 3.73% increase in foreign direct investment. These findings correspond to the results obtained by Moolman et al. (2006), who looked into the overall connection between FDI and ES in South Africa, and their findings demonstrated that the availability of energy has a long-term beneficial effect on FDI.

Results on inflation revealed that inflation has an inverse connection with foreign direct investment, and at a 5% level of significance, it is statistically significant. This implies that foreign direct investment will decrease by 0.16 percent for every 1% increase in inflation. The dissertation findings are consistent with those of Valii et al. (2014), who found that higher inflation lowers real return on investment, deters international investors from investing in the economy, and consequently lowers the volume of FDI.

At 5% level of significance, the exchange rate has a statistically significant positive impact on foreign direct investment, implying 1% rise in the exchange rate will lead to a 0.34% increase in foreign direct investment. These findings concur with those of Ellahai (2011), who discovered a long-term connection foreign direct investment and exchange rate.

5.7 AVERAGE ERROR CORRECTION MODEL OUTCOMES

Dependent Variable: DLFDI			
Parameter	*Coefficient*	*T -stats*	*Prob*
D (LES)	0.006133	1.040609	0.3105
D (LINF (-1))	-0.745880	-9.499169	0.0000
D (LEXC)	2.138644	3.156489	0.0050
D (LEP (-1)	-1.295834	-1.886526	0.0738
*CointEq(-1)**	-0.102459	-7.933535	0.0000
R squared	0.943948		
DW statistic	2.009691		

Source: Data computed from E-views 12

INTERPRETATION OF TABLE 5.9 RESULTS

Error correction term in the dynamic model indicates how quickly adjustments are made to maintain equilibrium. ECM coefficient is a statistically significant negative coefficient that indicates how rapidly variables reach equilibrium. The relatively significant error correction term, according to Bannnerjee et al. (1998), further indicates the presence of a long-term connection that is steady.

According to Table 5.9, the ECM of -0.10 is significant. The above table displays the cointegration connection amongst the variables. In the short term, findings show that the energy price coefficient is inverse and insignificant, demonstrating that IFDI is negatively impacted by the power price in the short term. Short-term inflation rates are inversely correlated with IFDI. EXC and ES has an association that is both positive and statistically significant. ECM has an R-squared of 94% and adjusted R-squared of 93%; this shows that the model is effective in explaining the dependent variable, which is FDI.

5.8 DIAGNOSTIC VERIFICATION

By employing the t-stats and Fisher tests, diagnostic checks should be carried out to make sure that the model structure is sound, in the sense that the predicted coefficients have the right signs and are statistically significant (Gujarati, 2004:516).

TABLE 5.8.1 DIAGNOSTIC CHECK FINDINGS

Tests	*Null Hypothesis*	*F-Stats*	*Prob Value*
Serial Correlation: Breusch-Test Godfrey	Not serially correlated	2.872987	0.5072
Heteroscedasticity: Godfrey	No heteroscedasticity	0.867724	0.5757
Normality Test: Jarque-Bera	There is a normal distribution	0.183670	0.912256

Source: Data computed from E-views 12

INTERPRETATION OF TABLE 5.8.1 RESULTS

To indicate serial correlation on the residuals up to a given lag order, the Breusch-test Godfrey (LM) test is employed, as shown in table 5.8.1. The Breusch LM assumes there is no correlation, which is the null hypothesis, versus the contrasting assertion that serial correlation occurs in correlated residuals. According to the findings, the LM statistic is 2.872987 with a probability value of 0.5072, which surpasses the degree of significance of 0.05 percent, implying the absence of serial correlation. Since the framework does not contain serial correlation, we accept the null hypothesis in this analysis and draw that conclusion.

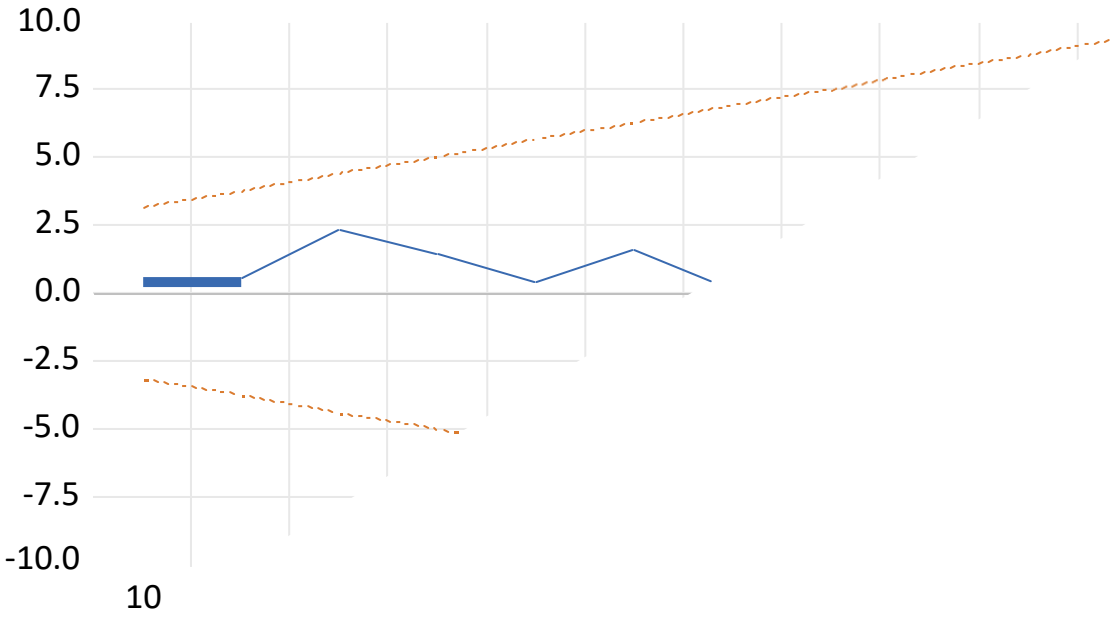
Heteroscedasticity test's F-statistic was 0.867724, and the probability value was 0.5757, exceeding the threshold of 0.05 percent significance, implying that there is no heteroscedasticity in the model. The Jarque-Bera test, which the model uses to determine that the residuals are normally distributed, produced an F-statistic of 1.294575 and a probability value of 0.523464, both of which are greater than a 5% threshold of significance. The model accepts the null hypothesis of the normality test.

Finally, diagnostic tests all passed, indicating that the model is stable.

5.9 STABILITY TESTS: CUSUM AND CUSUM SQUARE TESTS

Plots for both stability tests are presented below

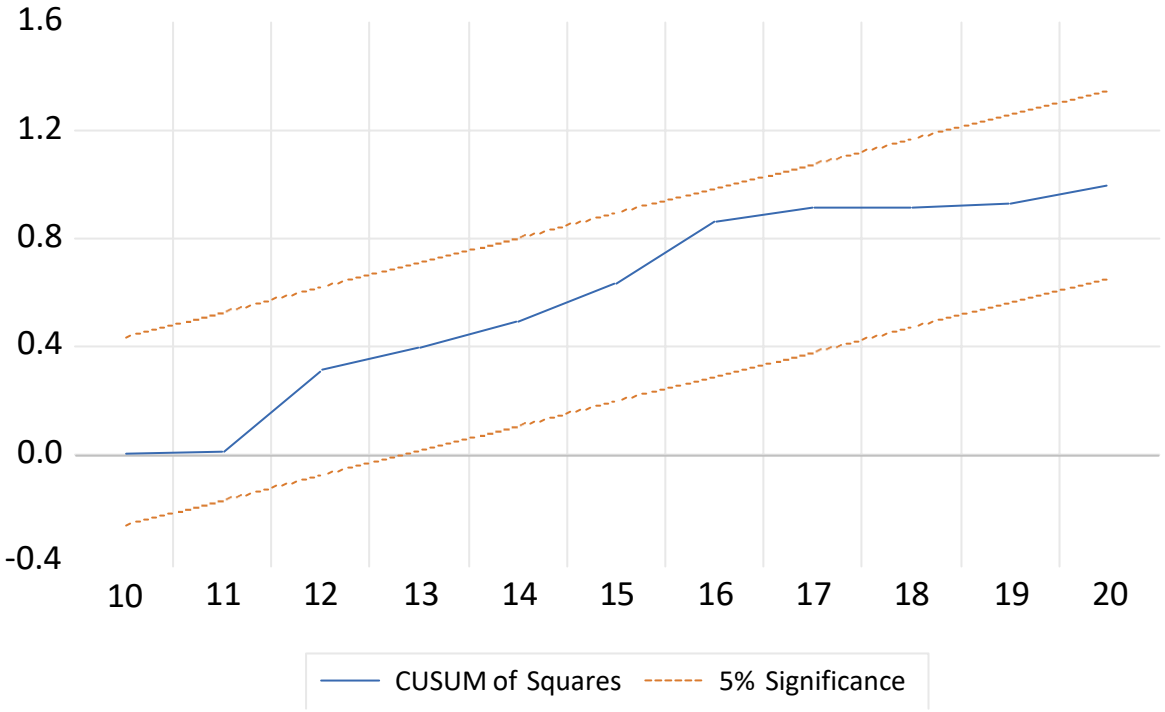
Figure 5.9.1 Cumulative sum stability test



Data was derived from Eviews-12 as a source

Figure 5.10 displays the outcomes of the cumulative sum stability test. When 5% significance is used, the blue line does not cross the red lines, indicating that the model is stable. This test is also used to examine the long-term dynamics of regression.

Figure 5.9.2 Cumulative sum square stability



Source: Data computed from E-Views 12

There was no evidence of the CUSUM SQ line crossing within 5% of significance, as shown in Figure above. As a result, the model suggests that both the CUSUM and CUSUM SQ stability tests are significant at the 5% level. As a result, this study verifies the ARDL model's stability.

5.10 CONCLUSION

Using E-views 12 statistical software properties, this chapter described the empirical analysis of the findings of this research endeavour. This chapter looked at the connection between foreign direct investment and power supply. Additionally, it looked into how foreign FDI is affected by South Africa's electricity and energy sources.

Descriptive statistics, which give an overview of the features of the data, were used to open the chapter. The chapter also used the Augmented Dickey-Fuller and Phillips-Perron test to assess the variables' stationarity. Foreign direct investment, electricity price, electricity supply, inflation, and exchange rate are stationary at the first difference but non-stationary at level form, according to findings of the two unit-root tests.

This means that the variables LFDI, LES, LEP, LINF, and LEXCH are integrated at the order I (1), resulting in a level form of graphs, with the first difference being the period.

For lag selection, information criterion such as AIC, LK, FPE, SC, and HQ were employed to establish the ideal Var leg length of variables. All criteria agreed that lag duration two was appropriate for the chapter.

ARDL was employed to look at the long-run connection amongst parameters. Findings were consistent with those of the ARDL model. Diagnostic tests were also performed to evaluate the stability and dependability of the series. This test included checks for serial correlation, residual normalcy, and heteroscedasticity. Finally, the study used stability tests such as the Cumulative sum and Cumulative square tests to determine the model's long-term stability, and the results confirmed that the parameters were stable.

CHAPTER 6

CONCLUSION AND POLICY IMPLEMENTATION

6.1 INTRODUCTION

In this chapter, the research is summarized, and policy adjustments are recommended considering the findings. There are three sections in this chapter. Section 6.1 provides a high-level overview of the research and an examination of the findings, while section **6.2** discusses policy implications and recommendations. Future research and limitations are discussed in Section 6.3.

6.2 SUMMARY OF THE STUDY

One of the essential components for South Africa's protracted steady and prosperous economic prognosis following the COVID-19 rebound has long been recognized as attracting FDI. The literature emphasizes that the host country's socio-economic, political, and geographical conditions are critical for investors to relocate. FDI is directed to markets that have the potential to gain a competitive advantage soon.

The availability of electricity supply as measured by generation is a signal to investors that one of the most important components of production in many businesses is still available. At the same time, the high cost of power will have an impact on their ability to maximize profits by affecting manufacturing costs.

This branch of the literature also alludes to the fact that environmental regulation and carbon prices are less strict than in other fields. These considerations are especially pertinent regarding South Africa’s economy, since the country encountered regular power outages and considerable billing increases since 2008.

The study's theoretical literature is divided into two sections: the first discusses foreign direct investment theories such as industrial organization theory and eclectic Dunning theory, and the second discusses energy theoretical literature.

In addition to these theories, different studies were reviewed that focussed on the connection between FDI and South Africa’s electricity supply.

However, since most of these empirical investigations concentrated more on the causal association among foreign direct investment and electricity consumption throughout developed and developing nations such as Nigeria, Egypt, Pakistan, Mexico, and Vietnam, the results generally indicated a positive association between these two variables. Researchers employed different estimation methods ranging from the ARDL Toda Yamoto approach, Granger causality test, ARDL bounds testing approach, VECM, and OLS techniques.

Using an ARDL cointegration method, this study looked at the power situation in the South African economy and how it influences the attraction of foreign direct investment. The study included the post-apartheid period by utilizing annual time series data for the period from 1988 to 2020.

Using a statistical estimate technique, the researcher identified macroeconomic variables for the econometrics model. First, the study looked at electricity prices, electricity supply, inflation, and the currency exchange rate as regressor variables that influence changes in the regressand variable, which is foreign direct investment.

The model analysis in Chapter 5 was checked for stationarity using the conventional unit root tests ADF and PP. Furthermore, it was discovered that the parameters were all in the same order and that they all turned stationary at the first difference I (1).

The ARDL cointegration approach was employed to evaluate the long-term connection among regressor and regressand variables. According to the findings, there is a long-run association between foreign direct investment, electricity prices, the supply of electricity, exchange rates, and inflation rates. These results were in line with what had been predicted.

Furthermore, utilizing the bound testing method, the empirical study's findings demonstrated a long-term connection with a significant association.

The findings demonstrated that foreign direct investment, electricity price, power supply, inflation, and the exchange rate are all co-integrated.

The robustness of the findings was shown by the fact that they were validated in the Error Correction Model for all possible model configurations.

In other words, it is proved that rising energy costs, especially starting in 2008, and frequent power disruptions in South Africa from 1988 to 2020 may discourage multinational investment. Finally, diagnostic testing and stability tests demonstrated a strong and stable model, justifying the use of the ARDL model.

6.3 POLICY IMPLICATIONS AND RECOMMENDATIONS

Looking at a policy making perspective, it practically goes without saying that policy formulators in the energy department should seek solutions to the problem of high electricity tariffs and power blackouts. Such disruptions have harmed the South African economy for more than a decade, as producers have lost revenue due to the above-mentioned issues.

(a) Firstly, regarding the negative effects of electricity tariffs on inward foreign direct investment, the study recommends that the state should ensure that it creates partnership such as pursuing innovative private-public partnerships. Private-public partnerships bring competition in the electricity sector whereby private investors will attempt to excel in order to dominate the market. By doing so, the private sector will participate in corporate social responsibility by giving back to their communities.

(b) Secondly, private investors will improve productivity through competitive prices, where privately owned electricity companies will resort to restricting electricity tariffs to entice customers. Based on economic theory, monopolist firms such as ESKOM charge higher electricity tariffs than their competitors. Therefore, it is imperative to change the electricity infrastructure from a monopoly to perfect competition, which will ultimately lead to lower energy prices.

(c) Thirdly, policymakers may pursue electrical subsidization programmes to entice investors to the country; India provides an example of such a strategy in its handling of pricing, network speed and availability of internet connection (BBC News,2019).

One more thought is for policymakers to push various technology channels for investors to acquire energy, as an alternative to buying electricity from the South African national grid.

(d) Fourthly, the state should advocate for tax breaks for using energy-efficient equipment to encourage sustainable and clean energy, as electricity tariffs negatively impact the foreign investment which contributes significantly towards South Africa's economic growth.

(e) Lastly, natural resources such as sunlight, wind, biofuel, and water abound in the country. South Africa can thrive in the renewable energy market by utilizing these environmentally friendly energy sources. These renewable energy sources will reduce the cost of imported energy sources such as coal, gas, and oil by a significant amount.

6.4 LIMITATIONS OF THE STUDY AND SCOPE FOR FURTHER RESEARCH

(a) This study focused on the relationship between foreign direct investment inflows and the energy sector in South Africa. This study was limited to the period 1988 – 2020. This study did not utilize a large sample which could have been advantageous to the study. The study selected four regressor coefficients and one regressand variable, thus the model could be inaccurate, and mis-specified due to trivial parameters that were left out of the study.

(b) The study might be broadened to include additional SADC nations to examine whether the national-level linkages found in South Africa also hold true in other African nations.

(c) Further investigation can be done of foreign direct investment effects using an endogenous growth model (this will include labour skills and political stability).

(d) The Granger causality technique can be used to verify the direction of causality in the model specification, according to the final piece of advice.

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EVIEWS OUTPUTS: APPENDICES

APPENDIX A: LAG LENGTH CRITERIA

VAR Lag Order Selection Criteria
Endogenous variables: FDI EP ES INF EXCH
Exogenous variables: C
Date: 07/23/22 Time: 17:37
Sample: 1988 2020
Included observations: 29

Lag	LogL	LR	FPE	AIC	SC	HQ
0	79.33990	NA	2.79e-09	-5.506659	-5.266690	-5.435304
1	226.1323	228.3437	3.50e-13	-14.52831	-13.08850	-14.10018
2	289.7626	28.98243*	4.51e-13*	-14.48786*	-11.84820*	-13.70295*
3	289.7626	31.92153	2.99e-13	-15.53797	-11.69845	-14.39628
4	345.2013	24.63943	1.77e13	-17.79269*	-12.75332	-16.29422

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX B: ARDL LONG RUN &BOUNDS TEST

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF	-0.155443	0.149558	-1.039352	0.3094
LEXCH	0.341547	0.367441	0.429529	0.3623
LES	3.730159	0.665202	5.607562	0.0000
LEP	-0.362096	0.139381	2.597889	0.0161
C	-39.30422	0.300908	-5.383469	0.0000

EC = LFDI - (0.1554*LINF + 0.3415*LEXCH + 3.7302*LES - 0.3621*LEP - 39.3042)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	8.094933	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	31		Finite Sample: n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
			Finite Sample: n=30	
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

APPENDIX C: ERROR CORRECTION MODEL

ARDL Error Correction Regression
Dependent Variable: D(FDI)
Selected Model: ARDL(2, 0, 2, 2, 0)
Case 2: Restricted Constant and No Trend
Date: 07/26/22 Time: 22:24
Sample: 1988 2020
Included observations: 31

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ES)	0.006133	0.005894	1.040609	0.3105
D(INF(-1))	-0.745880	0.078521	-9.499169	0.0000
D(EXC)	2.138644	0.677539	3.156489	0.0050
D(EP(-1))	-1.295834	0.686889	-1.886526	0.0738
CointEq(-1)*	-0.102459	0.004091	-7.933535	0.0000

R-squared	0.943948	Mean dependent var	1597.548
Adjusted R-squared	0.932737	S.D. dependent var	38400.77
S.E. of regression	9959.256	Akaike info criterion	21.42238
Sum squared resid	2.48E+09	Schwarz criterion	21.69992
Log likelihood	-326.0469	Hannan-Quinn criter.	21.51285
Durbin-Watson stat	2.009691		

APPENDIX D:NORMALITY TEST RESULTS