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Analysis of Media Penetration and Economic Growth
Nexus in South Africa

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Abstract

Media penetration, significantly shaped by advancements in digital technologies, has transformed communication modes and information dissemination methods. Literature suggests that countries with more open economies typically exhibit higher rates of media penetration. Furthermore, extant studies have emphasised the role of media as a catalyst for economic growth in developed economies. This study explores the interplay between media penetration and economic growth in South Africa, a nation experiencing both increased media engagement and economic expansion. Rooted in the endogenous growth theory, which posits that output growth is directly related to aggregate capital and technology levels, this study employed the generalised method of moments and the Toda-Yamamoto Granger causality test to analyse these dynamics. The findings indicate that while media penetration in South Africa does not directly promote economic growth, it does exert a positive influence. Significant drivers of economic growth include domestic investment, particularly gross fixed capital formation, and labour force participation, which significantly promote progress in South Africa's economy. In South Africa, the study, furthermore, found no indication of causality amid media penetration alongside economic growth or vice versa. Consequently, the study concludes that media penetration in its current state is relatively nascent and insignificantly contributes to growth in South Africa's economy.

Keywords: *Media Penetration; Economic Growth; Generalised Method of Moments; Toda-Yamamoto; South Africa*

I. Introduction

United Nations Conference on Freedom of Information during 1948, established information access as a fundamental freedom, essential for underpinning all other freedoms. However, according to a UNESCO survey, in 1962 over 70 per cent of the global population lacked adequate information access. Information accessibility assists as a fundamental proportion of freedom expression as well as a central means for enhancing the rule of law and other rights alongside trust build. It is an aid for sustainable development in areas such as environment, health, addressing poverty and fighting corruption. In response, the United Nations (UN) urged all nations to integrate media development strategies into their economic development plans, emphasising that media acts a critical role in education, social, as well as economic progress (Africa Freedom of Information Centre, 2017; UNESCO, 2008; Schramm, 1964). Therefore,

advancements in communication through media are pivotal for economic, social, and political development, which are critical for national growth (Muswede & Lubinga, 2018; Morule, 2015; Okoro, 2012; Mowlana, 1967). According to Paul and Rai (2020), media includes both more recent technology for mediated human contact as well as conventional mass communication networks and content producers. This covers print media such as books, magazines, and newspapers; digital media like cable, satellite, broadband, and broadcasting; and adaptations of various media formats for the internet, video games, motion films, recorded music, and advertising (Hoag, 2008). The proliferation of the internet and new media has addressed many limitations of traditional media related to time and space constraints (Paul & Rai, 2020). Consequently, media penetration (MP) is globally recognised as a powerful tool for social and structural change, fostering industrialisation, urbanisation, and improving literacy levels through the dissemination of information in every country (UNESCO, 2008; Emery & Emery, 1988; Delia, 1987).

Since the late 1990s, there has remained a noteworthy shift in the media landscape with the integration of advanced digital technologies and computerisation into mainstream media. This shift, marked by a shift away from traditional platforms such as newspapers, television, and radio, has transformed how media influences economic growth (Gambaro, 2005; Bourreau & Doğan, 2001; Chan-Olmsted & Jamison, 2001). Key drivers of this influence include a government-provided, enabling environment that allows media practitioners and firms to operate with minimal interference, and the quality of media content, which hinges on the delivery of accurate, timely, and relevant information. This facilitates informed decision-making and impacts economic agents through advertising and information dissemination (Chaudhary et al., 2022).

Since its rapid adoption of information and communication technology, Africa has seen not only economic growth but also an increase in MP and social media usage, making it a burgeoning market for digital technologies (Solomon & van Klyton, 2020; Asongu et al., 2019; Bongomin et al., 2018; Gosavi, 2018; Murphy & Carmody, 2015; Oginni & Moitui, 2015; Dalberg, 2013). This trend suggests that MP in Africa correlates directly with economic prosperity and modernisation (Lerner, 2015).

South Africa as a foremost economy in Africa is with 4,9 per cent economic growth rate (WDI, 2022) and a social MP rate of 46,4 per cent, the highest in sub-Saharan Africa (Statista, 2022). A study by von Abrams (2021) found that approximately 83 per cent of internet consumers in

South Africa aged 16 to 64 have used the internet to view television programmes at some point, highlighting the significant role of media in shaping communication and information dissemination among citizens, governments, and within international economic relations. This transformation has been fuelled by substantial investments in and development of digital technologies (El-Darwiche et al., 2013; Dal-Zotto, 2005).

Besides the challenges of underdevelopment, imperfect markets, and a lack of information availability which render developing countries particularly vulnerable, these issues are exacerbated by inadequate investment, failing communication infrastructure, and underdeveloped media systems. These factors contribute to keeping consumers and citizens under-informed about economic activities and market opportunities (Gillwald et al., 2018; Bandyopadhyay, 2009). Research has shown that countries with more open economies typically experience higher MP rates (Yang & Shanahan, 2003; Pennings et al., 2005). Similarly, numerous studies have highlighted the role of media as a catalyst for economic growth in developed economies (Cui, 2021; Vitenu-Sackey, 2020; Su, 2008; Gambaro, 2005; Pennings et al., 2005) and as a promoter of inclusive and sustainable development in developing countries (Chaudhary et al., 2022; Asongu & Odhiambo, 2020; Melkote, 2005).

Prior research has explored various dimensions of the impact of social media in Africa, such as its effects on human development, tourism, governance, and socioeconomic growth (Amrouche & Hababou, 2022; Asongu et al., 2019a, b; Asongu & Odhiambo, 2018a, b). However, these studies often treat African countries as a homogeneous group, overlooking the unique, country-specific characteristics of social media usage and its penetration rates. Despite the growing importance of MP and economic growth in South Africa (WDI, 2022; Muller, 2022; World Bank, 2018; Mtimde, 2014; Rummey, 2014), there is a notable scarcity of research exploring the dynamics of their relation (see Anabbarja, 2013), expressly in an emerging economy for instance South Africa.

Therefore, this study aims to deepen understanding of the interplay amid MP and South Africa's economic growth. Specifically, it seeks to assess the impression of MP on economic growth and ascertain the directionality of the causation amid these two variables in the South African setting. The subsequent sections of this study include a literature review, methodology, results, and conclusions.

II. Literature Review

Literature indicates that conventional mass media has evolved meaningfully with the advent of the internet alongside technological innovations, giving rise to the increasing prevalence of new media usage that transformed countries on several fronts (Hall et al., 2021; Tang et al., 2019). Bandyopadhyay (2009) explored the relation amid mass media alongside certain economic development outcomes via the OLS procedure. The discovery of the study suggests that mass media variables such as newspapers, radios, and TVs significantly reduce corruption and inequality, acting as effective channels for disseminating information and addressing societal issues.

An early study on MP in Africa by Yang and Shanahan (2003) investigated the relationship between economic openness and MP across several continents, including Africa, North America, Asia, Oceania, and South America. The study highlighted that the main indicators of MP – usage of personal computers, internet, newspapers, radios, and telephones in daily business life – are increasingly prominent. It found that countries with more open or globalised economies tend to have higher MP rates and posited a strong correlation between economic openness and MP.

Furthermore, Anabarra (2013) argued that the relevance of media in developing institutions which is economic progress only newly began to obtain deserved consideration. Chitkoor (2019) analysed the impression of mass media on economic advancement through a literature survey, concluding that mass media, including ‘new media’, plays a decisive role in educating the public and facilitating the mobilisation of human resources for national development. The study emphasised that media speeds up and eases social transformation necessary for economic development, particularly noting that the level of economic development significantly influences the spread of mass media in underdeveloped countries. Additionally, Chaudhary et al. (2022) examined the role of the media in the economic development of Pakistan using a desktop review approach. Their findings directed that media has a slight positive impression on economic development and acts as a catalyst in the economic development process in Pakistan.

Jennex and Bartczak (2015) and Hall et al. (2021) describe new media as both formal as well as informal channels that facilitate the transference of knowledge. According to Jenkins-Guarnieri et al. (2013), the extent of new media’s integration into daily routines influences its usage within a country. Notably, while high and upper-middle-income economies (with

high gross domestic product per capita) enjoy broader internet access, developing economies like South Africa see higher usage rates of both conventional and new media (Muller, 2022; Gillwald et al., 2018; Poushter et al., 2018).

Current studies have shifted focus towards the transformative effects of new media on the social and economic landscapes. For example, Batumalai and Sahid (2022) explored the impression of social media on SMEs in Sepang, Malaysia, through descriptive and regression analyses. Their findings highlight that, although the usage of social media is moderately high, it significantly benefits the business sector, especially SMEs, by opening up numerous opportunities. Similarly, Jagongo and Kinyua (2013) analysed the influence of social media on SMEs in Nairobi using qualitative data analysis. The outcomes validate that social media significantly enhances market accessibility and speeds up communication in Nairobi, which in turn supports SME growth. However, they noted that social media has a minimal impact on innovation and pricing strategies within these businesses.

Asongu and Odhiambo (2018b) examined the connection between tourism and social media across 138 countries. Employing various regression models (OLS, negative binomial and quantitative regressions), their study concluded that social media, particularly Facebook penetration, positively correlates with tourism activities, serving as an effective promotional tool, particularly in regions with either low or high tourist attractions.

Additionally, Madondo et al. (2019) investigated how MP, including online and traditional media like television, radio, and newspapers, influences tourism promotion in South Africa. Their study found that using online (social) media and traditional media as strategic marketing tools not only enhances tourism promotion but also facilitates efficient communication between customers and businesses, corroborating findings by Nzeku & Duffett (2021). These studies collectively highlight the pivotal role of media, both new and traditional, in reshaping economic sectors and promoting growth in dynamic ways.

Asongu et al. (2019b) conducted a study examining the relationship between homicide rates and social media usage across 148 countries, including South Africa. Employing OLS, Tobit, and quantile regressions, the study found that social media, particularly Facebook, generally reduces homicide rates by raising public awareness about conflict resolution and the productive use of information. However, the impact of social media on

reducing homicide was found to depend significantly on a country's initial homicide rate and its economic development level.

Tang et al. (2019) explored how social media influences corruption and the interplay with cultural values using OLS and random effect models across 62 countries. The findings indicated a relation between social media usage alongside perceived corruption control, which varied depending on the cultural tightness or looseness of the countries. Specifically, social media decreased corruption in countries with more relaxed cultural norms, whereas it increased corruption in more rigid cultural environments.

Jha and Kodila-Tedika (2019) evaluated the impact of social media on democracy in 125 countries using OLS and two-stage least square methods (2SLS). Their research highlighted a stronger correlation between social media usage, particularly Facebook penetration, and democracy in low-income economies in contrast to high-income ones. This underscores the importance of infrastructure investment and internet accessibility in developing countries to bolster democratic engagement.

The relationship across social media as well as governance dynamics in 49 African countries was examined by Asongu and Odhiambo (2018a) using quantile and OLS regressions. Facebook penetration was found to have a beneficial and noteworthy connection with a number of governance aspects, which includes general governance (rule of law with corruption regulator), institutional governance (corruption control alongside political stability), and political governance (effectiveness of government). However, the impact of these relationships varied.

Wilson and Wiysonge (2020) utilised a large-n cross- nation regression background to study the effects of social media as well as virtual foreign misinformation campaigns on vaccination rates and attitudes toward vaccine safety. Their findings revealed a significant correlation between social media organisation and public scepticism about vaccine safety, as well as a notable relation amid foreign disinformation campaigns as well as a decline in vaccination coverage.

Lastly, Salahuddin and Gow (2015) analysed the long-term relationships and effects of internet consumption, trade openness as well as financial development on growth in South Africa's economy using the ARDL procedure. A causal association between internet usage along with financial development and economic growth was also established by the study, which also proved the substantial favorable effects of these factors on growth.

In 83 nations, Dell'Anno et al. (2016) looked into the connection between social media (which includes sites like LinkedIn, Facebook,

Google+, and Twitter) and economic growth. They found that social media has a sizable detrimental effect on economic growth. According to the study, social media acts as a distraction and reduces labor productivity by raising transaction and communication expenses. Similar to this, Fokam et al. (2019) used the generalized method of moments (GMM) to examine the influence of social media on economic expansion in a panel of 29 African nations and found a downstream adverse impact mediated through labor productivity. Mohale (2020) also highlighted the detrimental effects of social media on development in Africa, while acknowledging its role in significant advancements across education, culture, health, religious beliefs, and politics.

In contrast, studies like those by Solomon & Klyton (2020) have presented a more positive view, suggesting that MP fosters economic growth. However, Vitenu-Sackey (2020) provided a nuanced perspective, arguing that social media platforms like YouTube, Pinterest, Facebook, and Twitter have dual effects on economic growth. This study, which examined 198 countries, found that factors like fixed broadband, internet users, and technology infrastructure have a resultant effect on economies. It also pointed out the negative impact of social media due to leisure-labour substitution and its marginal input to GDP.

Applying a pooled OLS model, fixed effect, as well as random effects with time, Amrouche and Hababou (2022) investigated the impact of social media (Facebook penetration) on socio as well as economic progress in 160 countries. Research revealed that social media, specifically Facebook, had a favorable impact on a nation's degree of socioeconomic development. But the income status of the nation (high, upper middle, low middle alongside poor income) also had an impact on this outcome.

A weighty gap acknowledged in the literature is the dearth of focus on the ongoing transformations within the traditional media sector, which encompasses the adoption and integration of digital technologies. This is a pertinent catalyst for economic growth in an emerging economy like South Africa's, where traditional media is evolving to enhance information dissemination.

III. Methodology

This research is founded on the endogenous growth hypothesis, that output growth is a function of aggregate capital and technology levels, incorporating both physical and human capital (Romer, 1994). The model

assumes a competitive economy like South Africa, characterised by stable externalities and a static population size. Within this framework, the economy produces a single good that is either consumed or invested, utilising the composite capital in the context of existing technological capabilities (Romer, 1994). To explore the relation amid MP and economic growth, this research utilised the traditional simple AK model, where aggregate output is directly proportional to aggregate capital stock:

$$Y = AK \dots\dots\dots(1)$$

where Y represents the aggregate output, A denotes the level of technology often referred to as the efficiency of production, and K symbolises the volume of capital stock. To further analyse productivity, the variable L , representing labour, is introduced to normalise equation (1), allowing us to compute output per effective labour as demonstrated in equation (2).

$$\frac{Y}{L} = A \cdot \frac{K}{L} \dots\dots\dots(2)$$

Equation (3) represents the intensive form of equation (2) which is given as follows:

$$y = Ak \dots\dots\dots(3)$$

The average and marginal product of capital in equation (3) is assumed constant at the level where $A > 0$. Consistent with the frameworks proposed by Romer (1986) and Lucas (1988), capital (k) is decomposed into physical capital (k_P^δ) and human capital (k_H^φ). Therefore,

$$k = (k_P^\delta, k_H^\varphi) \dots\dots\dots(4)$$

Physical capital is further categorised into domestic capital, represented by gross fixed capital formation (GFCF), and foreign capital, primarily in the form of foreign direct investment (FDI).

$$k_P^\delta = f(GFCF, FDI)^\delta \dots\dots\dots(5)$$

If δ is the component of the power of k (physical capital) while θ and ω are the elasticities of GFCF and FDI. Therefore, $\theta, \omega \in \delta$; then,

$$k_p^\delta = (GFCF^\theta, FDI^\omega) \dots \dots \dots (6)$$

Correspondingly, integrating equations (5) alongside (4) into equation (3) and substituting for k_p^δ as presented in equation (6) yields:

$$y = A(GFCF_p^\theta FDI_p^\omega) k_H^\varphi \dots \dots \dots (7)$$

Equation (7) is expanded to obtain equation (8):

$$y = AGFCF_p^\theta FDI_p^\omega k_H^\varphi \dots \dots \dots (8)$$

where θ, ω , and φ are elasticities of GFCF, FDI, and human capital. Linearising equation (8) generates the following dynamic production function:

$$\ln y_t = \ln A + \theta \ln GFCF_p + \omega \ln FDI_p + \varphi \ln k_H \dots \dots \dots (9)$$

The production function is considered endogenous because the residual component, A , is itself endogenous, reflecting technological advancements and improvements in communication and information dissemination. MP extends beyond traditional access to television, radio, and newspapers. It encompasses the integration of advanced digital technologies and computerisation, including secure internet servers, fixed broadband subscriptions, and widespread internet usage into mainstream media. This integration facilitates effective information dissemination and fosters technological innovation within the media sector (Vitenu-Sackey, 2020). The underlying assumption is that MP becomes effective through the utilisation of efficient internet services as a technological tool. Therefore, A is described as:

$$A = f \text{ (Household with Television, Fixed broadband subscript and Internet usage)} = \text{Media Penetration (MP)} \dots \dots \dots (10)$$

This is detailed in line with Dell'Anno, Rayna and Solomon (2016), Fokam et al. (2019), Solomon and Klyton (2020), and Vitenu-Sackey (2020). Equation (9) is transformed to obtain equation (11):

$$\ln y_t = \ln MP + \theta \ln GFCF_p + \omega FDI_p + \phi \ln k_H, \dots \dots \dots (11)$$

where y is the GDP, MP the media penetration, GFCF the gross fixed capital formation, FDI the foreign direct investment, and k_H the human capital represented by the labour force participation (LFP) within the economy. Therefore, the baseline model for the study is presented as

$$\ln GDP_t = \alpha_0 + \alpha_1 \ln MP_t + \alpha_2 \ln GFCF_t + \alpha_3 \ln FDI_t + \alpha_4 \ln LFP_t + \alpha_5 \ln TRN_t + \varepsilon_t, \dots \dots (12)$$

where α_0 represents the intercept and $\alpha_1 \dots \alpha_5$ represent the coefficients of the various explanatory variables. Trade openness (TRN) is included in the model because the literature suggests that countries with more open economies generally exhibit higher rates of MP (see Vitenu-Sackey, 2020; Pennings et al., 2005; Yang & Shanahan, 2003). Thereafter, the research designates the model demonstrating the path of causation amid MP with economic growth in South Africa:

$$GDP_t = \alpha_0 + \alpha_1 MP_t + \varepsilon_{1t}, \dots \dots \dots (13)$$

$$MP_t = \beta_0 + \beta_1 GDP_t + \varepsilon_{2t}, \dots \dots \dots (14)$$

where α_1 and β_1 represent the coefficients of the causation and ε_{1t} and ε_{2t} represent the error terms.

To examine the causal relation amid MP as well as South Africa's economic progress, this study employed the Toda-Yamamoto Granger (T-YG) test for causation (1995), following the approaches outlined via Aratuo and Estienne (2019) as well as Osinubi and Osinubi (2020). The T-YG test for causality is preferred due to its ability to handle variables at their levels regardless of their integration orders, offering a robust alternative to traditional Granger causality tests. This methodology involves determining the optimal lag length (k) for the vector autoregression (VAR) model based on selected information criteria and establishing the maximum order of integration (d_{max}) through unit root testing before performing the Granger test for causality. Toda and Yamamoto (1995) demonstrated that this procedure follows an asymptotic χ^2 spread whilst estimating $VAR(k + d)_{max}$ method, providing reliable results for causality testing:

$$GDP_t = \alpha_0 + \sum_{j=1}^{k+d_{max}} \alpha_1 GDP_{t-j} + \sum_{p=1}^{k+d_{max}} \alpha_2 MP_{t-p} + \varepsilon_{1t}, \dots \dots \dots (15)$$

$$MP_t = \beta_0 + \sum_{j=1}^{k+d_{max}} \beta_1 MP_{t-j} + \sum_{p=1}^{k+d_{max}} \beta_2 GDP_{t-p} + \varepsilon_{2t},$$

where the supreme lag length stands as k , d_{max} is the supreme integration order, $\alpha_{1,2}$ and $\beta_{1,2}$ are the coefficients of the VAR model, ε_{1t} and ε_{2t} are the random terms of the framework, which are non-associated across as well as inside equation models, as well as d_{max} represents the variables' supreme order of integration.

Consequently, this study is founded on the succeeding null hypotheses:

$$H_0 : \alpha_1 = \alpha_2 = \dots = \alpha_{2(k+d_{max})} = 0 \text{ (MP does not Granger cause GDP),}$$

$$H_0 : \beta_1 = \beta_2 = \dots = \beta_{2(k+d_{max})} = 0 \text{ (GDP does not Granger cause MP).}$$

IV. Results

The principal component analysis (PCA) is the chosen method for synthesising into a singular index, variables, capturing essential information from variables to create a composite index (Osinubi & Osinubi, 2020). In this context, MP is represented as a weighted index composed of fixed telephone subscriptions (FTS), the percent of the populace utilising internet (IUIPOP), and the number of pay TV households (NTVH) in South Africa. The PCA results displayed in Table 1 reveal that FTS is the most significant component of MP, as evidenced by its Eigenvalue. This significance is further supported by the variance proportions explained by the principal components. The first principal component (PC1), corresponding to FTS, accounts for over 75 per cent of the total variance. IUIPOP follows, explaining approximately 16 per cent of the variance, while NTVH contributes the least, accounting for about nine per cent of the total variance. This distribution highlights the differing impacts of each component on the overall MP index.

Table 1: Principal component analysis

PC	Share explained by PC	Eigen Values	Factor Loadings		
			FST	IUIPOP	NTVH
PC1	0,75	2,25	0,56	-0,57	0,60
PC2	0,16	0,47	0,73	0,68	-0,03
PC3	0,09	0,27	-0,39	0,46	0,79

Source: Author's computation

Additionally, the data underwent preliminary tests using the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) to examine the unit root properties, with results obtainable in Table 1. The stationarity tests directed that the variables’ order of integration were equally one and zero, $I(1)$ and $I(0)$.

Table 2: Unit root technique

ADF				PP			KPSS		
Variable	Status	Level	1 st Diff.	Status	Level	1 st Diff.	Status	Level	1 st Diff.
ln(GDP)	I(1)	-1,51	-3,67*	I(1)	-1,48	-3,44**	I(1)	0,65	0,16*
MP	I(1)	-0,59	-3,44**	I(1)	0,35	-3,27**	I(0)	0,41***	0,52**
ln(GFCF)	I(1)	-1,24	-3,70*	I(1)	-1,09	-3,70*	I(0)	0,56**	0,13*
FDI	I(1)	-1,02	-3,67*	I(1)	-0,97	-3,57**	I(0)	0,27	-
ln(LFP)	I(1)	-1,98	-5,57*	I(1)	-2,28	-5,58*	I(1)	0,73	0,27*
ln(TRN)	I(1)	-1,10	-5,50*	I(1)	-0,45	-8,88*	(1)	0,68	0,48**
Critical Values									
1%*	-3,67	-3,67		-3,66	-3,67		0,74	0,74	
5%**	-2,96	-2,96		-2,96	-2,96		0,46	0,46	
10%***	-2,62	-2,62		-2,62	-2,62		0,35	0,35	

Source: Author’s computation

Correspondingly, the supreme lag length for the variables was evaluated via Akaike, Schwarz as well as Hannan-Quinn Information Criterion. These equally proposed three as the supreme lag length. Therefore, the GMM estimate of the relation amid MP as well as economic progress in South Africa is founded on this supreme lag length.

Table 3: Lag length selection criteria

Endogenous variables: ln(GDP) ln(LFP) MP FDI ln(GFCF)						
Time Span: 1990 2021						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-651,22	NA	1,95	45,32	45,60	45,41
1	-502,45	225,71	8,66	37,54	39,52	38,16
2	-435,34	74,05	1,44	35,40	39,08	36,55
3	-362,94	49,92	36578743*	32,89*	38,26*	34,57*
* designates selected lag order by information criterion						

Source: Author’s computation

Johansen cointegration procedure specifies a rejection of the no cointegration amid the variables ($lnGDP$, MP , $lnGFCF$, FDI & $lnLFP$), that is, the null hypothesis. As presented in Table 2, at least four cointegrating

equations exist amid the variables, hence validating the long-run nexus existence amid the model's variables.

Table 4: Johansen cointegration technique

Series: MP ln(GDP) FDI ln(LFP) ln(GFCF)					
Unrestricted Co-integration Rank Technique (Trace)					
Hypothesised CE(s)	Engen-Value	Trace Stat.	0,05 Value	Critical	Prob.
None*	0,92	227,08	95,75		0,00
At most 1*	0,91	151,61	69,81		0,00
2*	0,81	80,26	47,85		0,00
3*	0,50	31,90	29,79		0,02
4	0,26	11,58	15,49		0,17
5	0,09	2,90	3,84		0,08
Trace test designates at least four-some co-integrating equations at 0,05 level					

Source: Author's computation

Having confirmed the long-run cointegrating relation amid the variables through the Johansen test, the study estimated the long-run regression using the GMM approach. The GMM approach was chosen for its superiority over OLS in addressing potential endogeneity issues in the explanatory variables (Arellano & Bond, 1991).

The coefficient of MP in South Africa demonstrates a positive relationship with economic progress, though its impact remains statistically insignificant ($t = 0.17$; $p > 0.05$). This suggests that while MP contributes positively, it is a non-significant driver of economic growth in South Africa. This outcome is in consonance with Diler (2018) as well as Su (2008), who argued that MP does not lead to economic growth. However, scholars such as Amrouche and Hababou (2022), Badesi (2020), Bahrini and Qaffas (2019), Camba and Camba (2020), Dell'Anno et al. (2016), Guerriero (2015), Minges (2016), Mohale (2020) and Yang and Shanahan (2003) argue that media penetration and its linked elements (such as internet consumption, phones, broadband subscription and social media platforms) significantly impact economic growth in developed economies. This contrast suggests that the media sector in South Africa may still be relatively underdeveloped compared to those in more developed economies.

Additionally, the findings from this study reveal that GFCF ($\ln GFCF$) significantly enhances South Africa's economic progress ($t = 13.26$; $p < 0.05$), suggesting that a unit upshot in GFCF leads to approximately a 0,7

per cent increase in economic growth. This underscores the critical role of domestic investment in shaping the country's economic trajectory. This is consistent with observations from previous studies including Dritsakīs et al. (2006), Lach (2010), Octavia (2010), Oladunjoye and Akinbobola (2018). Parasa & Garidzirai's (2020) study emphasised that domestic investment in the form of GFCF significantly promotes the economic growth of a country. However, this finding is contrary to that made by Mayer and Sanusi (2019), who only observed a feedback effect of growth GFCF in South Africa.

Furthermore, the analysis reveals that LFP ($\ln LFP$) significantly boosts economic growth ($t = 5,58$; $p < 0,05$), with each unit increase in LFP leading to about a 0,5 per cent rise in economic growth. This underscores a direct correlation between labour supply and economic expansion, aligning with findings from studies in other developing countries, which also noted positive effects from increased LFP on economic growth (Bryant et al., 2004; Haque et al., 2019; Oladunjoye & Akinbobola, 2018; Yakubu et al., 2020).

The R-squared coefficient from the long-run regression analysis is approximately 97 per cent. This suggests that fluctuations in South Africa's economic growth can be attributed to variations in MP, GFCF, FDI, LFP, and trade openness. This high R-squared value suggests a strong fit for the regression equation, as it accounts for more than 97 per cent of the variation in economic growth, with less than three per cent attributed to factors not included in the model. The adjusted R-squared also supports this, affirming that over 97 per cent of the disparity in South Africa's economic growth is explained by the included variables. This outcome underscores the robustness of the model.

Furthermore, the J-statistic confirms the overall significance of the model, indicated by a high F-value (4,66; $p < 0,05$), validating that the regression model is statistically significant and different from zero. These findings affirm that the model is highly reliable and provides a dependable basis for evaluating the relationship between MP and economic growth in South Africa.

Table 5: GMM Estimates

Explained variable ln(GDP)	Coeff.	S.E	t – Stat.	Prob.
MP	0,00	0,01	0,17	0,86
ln(GFCF)	0,74	0,06	13,26	0,00
FDI	-1,68	4,54	-0,37	0,71
ln(LFP)	0,48	0,08	5,57	0,00
ln(TRN)	0,02	0,17	0,09	0,92
R-Sqd	0,97			
Adj.R ²	0,97			
F-Stat.	4,66; prob. (0,04)			

Source: Author's computation

The selection of the T-YG causality test is based on the premise that both variables MP and economic growth are not of order two, $I(2)$, integration, indicating that they are either of $I(0)$ or $I(1)$, as evidenced by the unit root test results shown in Table 2. Additionally, lag length selection method indicates one as a suitable lag length, as displayed in Table 6, which is incorporated as the supreme lag span in $(k + d_{max})$ order VAR model.

Table 6: Lag length outcome

Explained variable(s): ln(GDP) MP						
Time Span: 1990 2021						
Lag	LR	LogL	FPE	AIC	HQ	SC
0	NA	-60,66	0,36	4,64	4,67	4,74
1	118,15*	5,78	0,00*	0,01*	0,10*	0,30*
2	4,57	8,60	0,00	0,10	0,24	0,58
3	1,77	9,80	0,00	0,31	0,51	0,98
4	2,94	12,00	0,00	0,44	0,70	1,31
5	3,75	15,17	0,00	0,51	0,82	1,56
* indicates lag order selected by the criterion						

Source: Author's computation

The T-YG test for causality was utilised to ascertain the causal relationship between MP and economic growth in South Africa. The results indicate a lack of causation between MP and economic growth, with no feedback effect from economic growth to media penetration observed. This finding aligns with Diler (2018) and Su (2008), who noted that media development does not necessarily promote economic growth. However, this result contradicts other studies, such as those by Amrouche and Hababou (2022), Badesi (2020), Camba and Camba (2020), Bahrini and Qaffas (2019),

Dell’Anno et al. (2016), Minges (2016), Guerriero (2015), and Yang and Shanahan (2003), which suggest that MP and its components, including internet usage, broadband subscriptions, and social media platforms, significantly influence economic growth. Consequently, given the absence of causation amid MP and South Africa’s economic progress, this study rejects the hypothesis of causation and accepts the neutrality hypothesis between the two variables, attributing this to the relatively nascent stage of the media industry in South Africa compared to the more developed media sectors in advanced economies.

Table 7: Toda-Yamamoto bivariate Ganger technique for causality amid media penetration and economic growth in South Africa

Explained Variable	Exogenous Variable	Chi-Squared	Lag Length	P-Value	Path of Causation	Remarks
ln(GDP)	MP	1,33	1	0,72	No Causality	Neutrality Hypothesis
MP	ln(GDP)	2,46	1	0,48	Absence of Causation	Neutrality Hypothesis

Source: Author’s computation

V. Conclusion

The study concludes that while MP does not significantly drive economic growth in South Africa, it does have a minor positive influence. In contrast, significant drivers of economic growth in South Africa include domestic investment, notably in the form of GFCF, and LFP. Additionally, the research finds no evidence of causation between MP and economic growth, nor any feedback effect from economic growth to MP in South Africa. While the usage of the internet, broadband, mobile phones, and social media platforms substantially aids information dissemination within the country, South Africa’s media sector is still in its developmental stages compared to the more mature media industries in developed economies. Consequently, it is suggested that the government provides a supportive environment that fosters the acquisition of necessary equipment, technology, and human capital development to enhance the effectiveness of media penetration and, consequently, its impact on the country’s economic growth.

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