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REVISITING THE EFFECTIVENESS OF FISCAL POLICY ON ECONOMIC GROWTH IN SOUTH AFRICA: A MARKOV SWITCHING MEANS VAR APPROACH

ABSTRACT

This study examines the effectiveness of fiscal policy on economic growth in South Africa, aiming to identify transitions between economic states and assess the impact of key fiscal policy instruments on economic growth using a Markov Switching Means VAR (MSM-VAR) approach. This study covers the period 1994Q1 to 2024Q1. There are two economic regimes identified in the study: economic expansion (Regime 1) and economic recession (Regime 2). The analysis considers fiscal variables such as tax revenue, gross fixed capital formation, government expenditure, government deficit, and government debt. Results indicate that fiscal policy affects economic growth depending on the economic environment. In Regime 1, government expenditure and government deficits have a positive impact on economic growth, while tax revenues and government debt have a negative impact. However, in Regime 2, tax revenues and government deficits have a positive impact on economic growth, while government expenditure and government debt have a negative impact. Other results show that in both regimes, gross fixed capital formation has a positive impact on economic growth. Therefore, policymakers should consider current economic conditions when implementing fiscal policy instruments to maximize their impact on economic growth. These findings highlight the importance of tailoring fiscal policy measures to suit the specific economic regime.

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RIASSUNTO

L'efficacia delle politiche fiscali sulla crescita economica in Sud Africa: una rivisitazione tramite il modello di Markow Switching Means VAR

Questo articolo esamina l'efficacia delle politiche fiscali sulla crescita economica del Sud Africa, cercando così di identificare i momenti di transizione dell'economia da uno stato all'altro e valutare l'impatto degli strumenti chiave di politica fiscale. Si utilizza a questo fine il modello Markov Switching Means VAR applicato al periodo compreso tra il primo trimestre 1994 e il primo trimestre 2024. I regimi economici individuati sono due: la fase espansiva (regime 1) e la fase recessiva (regime 2). L'analisi include variabili quali il gettito fiscale, la formazione lorda di capitale fisso, la spesa pubblica, il deficit di bilancio e il debito pubblico. I risultati mostrano che la politica fiscale influisce in maniera diversa sulla crescita a seconda della situazione economica. Nella fase espansiva (regime 1), la spesa pubblica e il deficit di bilancio hanno un effetto positivo sulla crescita economica, mentre il gettito fiscale e il debito pubblico la influenzano negativamente. Invece nella fase recessiva (regime 2), il gettito fiscale e il deficit di bilancio hanno un impatto positivo sulla crescita, mentre la spesa pubblica e il debito pubblico la influenzano negativamente. Secondo altre evidenze, in entrambe le fasi la formazione lorda di capitale fisso ha un effetto positivo sulla crescita. Quindi l'adozione di politiche fiscali intese ad aumentare la crescita dovrebbe tenere conto delle condizioni economiche nelle quali tali politiche si inseriscono. Questi risultati evidenziano l'importanza di adattare le misure di politica fiscale affinché siano efficaci nel regime economico al quale si applicano.

1. INTRODUCTION

Economists and policymakers in South Africa have debated the effectiveness of fiscal policy in promoting growth and addressing economic challenges (Hlongwane *et al.,* 2018; Pamba, 2022; Zungu *et al.,* 2022; Buthelezi *et al.,* 2023). The country faces various economic issues, including high unemployment, inequality, and sluggish growth (Pamba, 2022; Pasara and Garidzirai, 2020). Since the end of apartheid, the South African government has implemented macroeconomic strategies to reduce poverty and foster inclusive growth (Pamba, 2022). An expansionary fiscal strategy has been followed since 1994 to consolidate and recover the economy (Tendengu *et al.,* 2022). From 1994 to 1995, a Reconstruction and Development Program (RDP) was introduced to address the historical imbalances created by apartheid. From 1996 to 2004, the Growth,

Employment and Redistribution (GEAR) strategy was implemented in response to the RDP's limitations. From 2005 to 2009, the Accelerated and Shared Growth Initiative for South Africa (ASGISA) addressed structural constraints hindering economic growth. From 2010 to 2012, a New Growth Path (NGP) focused on job creation in key sectors such as manufacturing, the green economy, and tourism to tackle unemployment and inequality. From 2013, the National Development Plan (NDP) was introduced to promote investment in a more inclusive economy. Despite these interventions, South Africa continues to face significant challenges. Zungu *et al.* (2022) argue that South Africa's public debt-to-GDP ratio has increased in the past decade despite attempts to control the economy following financial crises, without achieving higher growth rates. This raises doubts about the effectiveness of these economic policies in promoting sustainable growth.

Previous studies in South Africa have produced diverse findings regarding the effects of fiscal policy on economic growth. Research by Tendengu *et al.* (2022) indicates that fiscal policy positively influences growth, while Chipaumire *et al.* (2014) argue that government expenditure can be detrimental. Zungu *et al.* (2022) and Buthelezi *et al.* (2023) emphasize the negative consequences of debt and expenditure, highlighting the importance of fiscal prudence, contrasting with Keynesian perspectives that advocate for increased spending. However, studies by Tendengu *et al.* (2022) and Zungu *et al.* (2022) rely on relatively narrow datasets, potentially overlooking long-term structural trends or short-term volatility. Nuru and Gereziher (2021) point out the asymmetric effects of fiscal policy. Additionally, researchers including Burger and Calitz (2020) and Buthelezi *et al.* (2023) note that the impact of fiscal policy instruments varies depending on the economic context – specifically between growth and recession – an insight not thoroughly examined in other studies. Buthelezi *et al.* (2023) reveal that government expenditure can be harmful in low-growth states but may have positive effects in targeted short-term scenarios. International studies also reflect mixed outcomes. Some research indicates a positive relationship between government expenditure and economic growth (Ahuja and Pandit, 2020; Wandeda *et al.,* 2021; Gara *et al.,* 2024), while others, such as Diyoke *et al.* (2017) and Ayana *et al.* (2023), find negative effects. Ali *et al.* (2024) argue that there are asymmetric long- and short-term impacts of government expenditure on economic growth, with reductions having a more significant positive effect over the long run. This underscores the need for context-specific fiscal policies, as the impact of fiscal policy on economic growth is not uniform across regions.

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Despite existing South African studies revealing a complex relationship between fiscal policy and economic growth, there is a gap in utilizing Markov Switching Means Vector Autoregression (MSM-VAR) to explore how fiscal policy effectiveness shifts across different economic regimes or phases. Although Nuru and Gereziher (2021) address asymmetries, the broader nonlinear responses to fiscal policy under MSM-VAR are underexplored. While some studies (e.g., Burger and Calitz, 2020; Buthelezi *et al.,* 2023) use Markov-switching models to capture regime changes, they often focus more on debt sustainability and government expenditure rather than on fiscal policy's effectiveness across economic states. For example, Markov-switching dynamic regression (MSDR), as applied by Buthelezi *et al.* (2023), focuses on a single dependent variable with regime-switching parameters (see Okafor *et al.,* 2024). In contrast, MSM-VAR models multiple interdependent time series with regime-switching dynamics, as demonstrated by Lebari and Wiri (2021). This MSM-VAR would offer a more comprehensive understanding of fiscal policy dynamics, accounting for transitions between economic states (e.g., growth, recession, or fiscal consolidation periods).

This study makes significant contributions to the literature in several ways. First, it addresses literature gaps by responding directly to the research objective and filling gaps in both international and South African studies. The study investigates the regime-dependent effectiveness of fiscal policy on economic growth in South Africa, identifying transitions between economic states and evaluating the impact of key fiscal policy instruments (such as tax revenue, gross fixed capital formation, government expenditure, government deficit, and government debt) under varying macroeconomic conditions from 1994Q1 to 2024Q1. Second, it contributes methodologically by capturing the non-linear, regime-dependent effects of fiscal policy on growth using an MSM-VAR model. For instance, during economic downturns (regime 2), increased government expenditure may be necessary to stimulate growth, whereas in periods of economic expansion (regime 1), reducing the government deficit could help prevent economic overheating. Third, the study reveals that the impact of specific fiscal policy instruments on economic growth varies across business cycle phases, demonstrating the regime-dependent nature of these effects. Fourth, the findings underscore the importance of flexible fiscal policies that can adapt to changing macroeconomic conditions, providing actionable insights for policymakers aiming to design measures that promote sustainable economic growth. As a final note, this research contributes to the literature on fiscal policy-growth nexus. To the best of the author's knowledge, it is the first study to apply the MSM-VAR model to this topic. Both scholars and policymakers can

benefit from these insights, advancing their understanding of fiscal policy's role in sustainable growth.

Following the introduction, Section 2 presents the literature review, Section 3 discusses the methodology and data, Section 4 provides estimation techniques, while results and discussions are presented in Section 5, and Section 6 presents the conclusions.

2. LITERATURE REVIEW

2.1 Theoretical Literature Review

Keynesian Theory of Fiscal Policy – Keynesian economics emphasizes the role of expansionary fiscal policy in responding to economic downturns, particularly recessions. Tax cuts or increased government spending stimulate aggregate demand, which is essential for stabilizing economic cycles and promoting growth (Keynes, 1936). Keynes noted that insufficient demand can lead to a cycle of declining profits, layoffs, and reduced production, worsening economic stagnation (Fazzari *et al.,* 1998). He also pointed out that monetary policy becomes ineffective in a liquidity trap, where near-zero interest rates do not encourage investment (Hassett and Hubbard, 2002). Keynes proposed that the solution lies in fiscal deficits to stimulate demand. As a result of increased government spending, income and consumption increase. Tax cuts also increase disposable income, driving consumer demand (Saleh, 2003).

However, the Keynesian approach to fiscal policy faces challenges from the Neoclassical perspective. This school of thought argues that government intervention has minimal or negative effects on long-term economic growth and income distribution, positing that market forces are more efficient at allocating resources and ensuring economic stability. Notable neoclassical researchers, including Auerbach and Kotlikoff (1987), Diamond (1965), and Taylor (2009), provide both theoretical and empirical support for this viewpoint.

The South African government has been following an expansionary fiscal strategy since 1994 for the purposes of consolidating and recovering its economy (Tendengu *et al.,* 2022). South Africa has implemented Keynesian principles through infrastructure initiatives like the National Infrastructure Plan, designed to stimulate demand during periods of slow growth. This policy involved increased public spending on infrastructure projects, education, and healthcare to

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promote economic growth and reduce unemployment. It remains a matter of controversy whether fiscal policy works, since multipliers can vary based on sectors and economic conditions. Structural challenges such as unemployment, inequality, and inefficient spending have limited the impact of these interventions. However, Keynesian theory remains an essential framework for addressing South Africa's economic challenges, emphasizing the needs for efficient and transparent fiscal policies.

New Growth Theory (NGT) – NGT emphasizes innovative technologies, human capital, and technological advancement for long-term economic growth. Investing in human capital, innovation, and knowledge contributes significantly to economic growth (Barros, 1993; Jones, 2019). Developed by scholars such as Paul Romer and Robert Lucas in the late 1980s and early 1990s, NGT asserts that economic growth is primarily a result of endogenous factors rather than simply capital accumulation and a growing labor force. To promote sustainable long-term growth, fiscal policy should prioritize investments in education, healthcare, and research and development (R&D). These NGT principles can guide developing countries like South Africa in influencing their long-term growth rates. By investing in education and R&D, nations such as South Africa can enhance their economic performance while reducing inequality and improving the overall quality of life for their citizens. Implementing policies that support these objectives can help bridge the gap between developed and developing countries, making sustainable growth achievable for all. However, the quality of education and R&D investment in South Africa has underperformed. The labor market has many individuals with limited skills and work experience (Bhorat *et al.,* 2016). A shift in fiscal policy toward human capital development could effectively address skill mismatches and enhance economic competitiveness.

2.2 Empirical Literature Review

International Studies – The literature on the effectiveness of fiscal policy on economic growth in various regions has produced diverse findings, with several studies examining the interaction between fiscal policy, governance, and growth. A synthesis of the international studies reveals both commonalities and discrepancies in results, with notable gaps regarding the application of the Markov Switching Means VAR approach.

Positive Impact of Fiscal Policy – Several studies, including those by Ahuja and Pandit (2020), Ayana *et al.* (2023), and Gara *et al.* (2024), highlight a positive relationship between fiscal policy and economic growth, though the strength of this relationship varies by region and the type of public spending (e.g., health and education vs. military spending). Ahuja and Pandit's (2020) study analyzed panel data from 59 developing countries from 1990 to 2019 and found that government spending positively impacted economic growth, supporting the Keynesian hypothesis. However, the study had limitations, including insufficient control for endogeneity, exclusion of variables, and insufficient consideration of different sectors' effects. Despite these limitations, the study suggests that government spending significantly drives economic growth in these countries. Using data from 36 Sub-Saharan African (SSA) countries from 2011 to 2021, Ayana *et al.* (2023) studied the relationship between fiscal policy, governance indicators, and economic development. The investigation employed a two-step generalized method of moments (GMM) estimation. According to the findings, SSA economies are negatively affected by fiscal policy, while the relationship between fiscal policy and governance metrics positively influences economic growth. From 2010 to 2021, Gara *et al.'s* (2024) panel study examines the impact of fiscal policy on Southeast European nations' economic growth. The study employs various econometric models and techniques, including OLS, OLS Robust fixed and random effects models, and GMM. The study reveals that fiscal policy tools positively impact the economic growth of Southeast European nations, with government efficiency, rule of law, and corruption significantly affecting their prosperity. Using panel data from 1985 to 2011, Ubi-Abai and Ekere (2018) found that public spending had an insignificant positive impact on economic growth in West African Economic and Monetary Union (WEAMU) member states.

Negative or Mixed Impact – Studies like Diyoke *et al.* (2017) and Daoudi (2023) show a negative or diminishing impact of fiscal policy, particularly in the long term. The variation in results suggests that the effectiveness of fiscal policy is context-dependent and may change under different economic regimes. For example, Diyoke *et al.* (2017) discovered a significant long-term correlation between government spending and economic growth in low-income sub-Saharan African nations using GMM and statistical panel data estimation models from 1980 to 2015. Their research also showed a negative correlation between government spending and regional economic growth. The study focuses on examining the breakdown of all public spending after prioritization, which is heavily influenced by each country's fiscal policies. Limitations include a sample size that may not accurately represent all low-income nations in sub-Saharan Africa and

the period analyzed may not fully capture government spending's impact on long-term economic growth. Daoudi (2023) examined Algeria's fiscal policies and economic growth using the Autoregressive Structural Vector (SVAR). The study found that while public expenditure in Algeria has a short-term positive effect on economic growth, this benefit is limited and has a negative medium- and long-term impact. The presence of a fuel tax and the direct impact of price shocks on government revenues and spending suggest that regular taxes are ineffective at accelerating Algeria's economic growth.

Asymmetry and Nonlinearity – Studies like Yusuf and Mohd (2021) and Ali *et al.* (2024) emphasize the asymmetric impacts of fiscal policy on economic growth, providing evidence of different effects under varying conditions. For example, using the NARDL model, Yusuf and Mohd's study of Nigeria's fiscal policy reveals a nonlinear, co-integrated link between fiscal policy variables and economic growth. Changes in recurrent spending, petroleum profit tax, customs, and excise levies had a symmetrical effect on economic growth in both the short and long terms. The link between domestic and external debt and growth was balanced in the short term but became unequal in the long run. Using the NARDL model, Ali *et al.* (2024) studied the impact of fiscal policy on Somalia's economic growth using annual data from 1970 to 2019. They found that both increases and decreases in government expenditure had a significant positive effect on economic growth, with a more pronounced effect on decreases in public expenditure. In the short run, both increases and decreases in government expenditure had a positive effect on economic growth, with an increase in government spending having a stronger impact.

South Africa Studies – The South African studies provide insights into fiscal policy dynamics but are limited in addressing nonlinearities, regime shifts, and asymmetric effects.

Positive Relationship between Fiscal Policy and Growth – Tendengu *et al.* (2022) and Pamba (2022) highlight a positive relationship between fiscal policy instruments and economic growth, particularly through public sector expenditure and gross fixed capital formation. In their study of South African growth from 1988 to 2018, Tendengu *et al.* (2022) used the ARDL regression model to analyze the impact of fiscal policy on economic growth. Their findings indicate that fiscal policy tools, such as public sector expenditures, public consumption expenditures, and taxes, are positively associated with economic growth. A limitation of the study is its inability to differentiate between the pre- and post-apartheid eras in South Africa, which may affect the

results. Using VAR, Pamba's 2022 study on South Africa's fiscal policy impacts between 1980 and 2020 found that government spending and gross fixed capital formation positively affect growth. Although this study does not differentiate between pre- and post-apartheid periods, analyzing data from both eras can enhance our understanding of the impact of fiscal policy tools on economic development. Ocran (2011) similarly found that government consumption and gross fixed capital formation positively impact growth, although the magnitude of the impact varies, based on quarterly data from 1990:1 to 2008:4 and VAR.

In contrast, Hlongwane *et al.* (2018) employed a cointegrated vector autoregression technique to examine the impact of fiscal policy on South Africa's economic growth between 1960 and 2014. The long-term estimates indicate that government gross fixed capital formation and the budget deficit negatively affect real GDP in South Africa.

Role of Government Debt – Buthelezi *et al.* (2023) highlighted the negative long-run impacts of high government debt on economic growth. Similarly, Burger and Calitz (2020) argue against excessive government spending, linking it to unsustainable fiscal policies.

Negative Impact of Public Expenditure – Zungu *et al.* (2022), Buthelezi *et al.* (2023), and Chipaumire *et al.* (2014) report that public expenditure, particularly unproductive spending and escalating public debt, negatively impacts growth. For example, Zungu *et al.'s* (2022) study examined the impact of fiscal policies on South Africa's economy from 1972Q1 to 2020Q2. Using a Bayesian Vector Autoregression (BVAR) model, the study found that unexpected public debt and spending shocks negatively affected South Africa's economic growth, while investment shocks had a positive impact. However, the study's limitations include its inability to distinguish between the pre- and post-apartheid eras. Buthelezi *et al.'s* (2023) study, using the two-stage least squares method and the autoregressive threshold regime model, found a U-shaped relationship between domestic government debt and GDP *per capita* in South Africa, despite fiscal consolidation. They also found an S-shaped relationship at high thresholds, suggesting that fiscal consolidation is ineffective due to high domestic government debt. The study's findings could be improved by examining data from both the pre- and post-apartheid eras to better understand the impact of fiscal policy tools on South African economic growth. Molefe and Choga (2017) also indicate that government expenditure detrimentally affects economic growth, contrasting with studies advocating increased public spending.

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Asymmetry in Fiscal Policy Impact – Nuru and Gereziher (2021) and Buthelezi *et al.* (2023) highlight the asymmetric effects of fiscal policy, noting that government expenditure impacts different economic states variably. Nuru and Gereziher (2021) use a NARDL to examine the effects of fiscal policy, specifically government spending, on economic growth in South Africa from 2004Q2 to 2018Q1. Their findings indicate that government expenditure negatively impacts economic growth more than positively. They also found that the real effective exchange rate significantly and positively influences economic growth in both the short and long terms, while inflation consistently has a negative and significant impact. Buthelezi *et al.* (2023) reveal a U-shaped relationship between domestic government debt and GDP *per capita*, indicating that high domestic government debt hinders effective fiscal consolidation.

2.3 Research Gaps

While some studies incorporate Markov-Switching (e.g., Burger and Calitz, 2020; Buthelezi *et al.,* 2023), the MSM-VAR model's ability to capture regime changes and transition probabilities remains unexplored in the South African context. While studies like Buthelezi *et al.* (2023) examine fiscal consolidation, the broader integration of fiscal shocks and policy effectiveness in dynamic states is underexplored. Although Nuru and Gereziher (2021) address asymmetries, the broader nonlinear responses to fiscal policy (e.g., under MSM-VAR) are also underexplored. Most studies rely on linear ARDL models (Tendengu *et al.,* 2022; Odhiambo, 2015) and VAR approaches (Ocran, 2011; Hlongwane *et al.,* 2018). Zungu *et al.* (2022) used BVAR, while Pamba (2022) and Odhiambo (2015) utilized ECMs or threshold models, potentially missing dynamic shifts in economic states. Models used by studies like Chipaumire *et al.* (2014) and Molefe and Choga (2017) do not adequately account for structural breaks or shifts in fiscal policy. These studies could benefit from a Markov Switching approach to model these regime-dependent effects in more detail.

3. Methodology

3.1 Model Specification and Variable Definitions

To understand the relationship between fiscal policy and economic growth in South Africa, precise model specification and clear definitions of variables are essential. This will provide a

comprehensive evaluation of the effectiveness of fiscal policy in stimulating economic growth, ensuring the study's findings are reliable.

Model Specification – This paper models the effects of fiscal policy instruments on economic growth in South Africa. To meet the study's research objective, a regression model is used, as shown below:

$$GDP_{it} = \alpha + \beta_1 (TR)_{it} + \beta_2 \ln(GFCF)_{it} + \beta_3 (GE)_{it} + \beta_4 (GD)_{it} + \beta_5 (GDT)_{it} + \mu_{it} \quad (1)$$

Where

GDP is the gross domestic product growth rate, TR is tax revenue as a percentage of GDP, GFCF is gross fixed capital formation as a percentage of GDP, GE is government expenditure as a percentage of GDP, GD is government deficit as a percentage of GDP, and GDT is government debt as a percentage of GDP, i is the i^{th} banks, t is the period, β_1, β_2, β_3, β_4, and β_5, are the coefficients for each explanatory variable in the model, μ_{it} is the error term.

Economic Growth (GDP) – The GDP growth rate measures the percentage increase in a country's GDP over a specific time (Buthelezi *et al.,* 2023; Pamba, 2022). It indicates the overall health and performance of the economy, with higher growth rates suggesting a stronger economy (see Zungu *et al.*, 2022; Nuru and Gereziher, 2021). In South Africa, the GDP growth rate is a vital metric for evaluating the effectiveness of fiscal policies in driving economic growth and prosperity (see Buthelezi *et al.,* 2023; Tendengu *et al.,* 2022).

Tax Revenue (TR) – Tax revenue is the government's revenue collected through taxes (Pamba, 2022), crucial for funding public services and initiatives. In South Africa, it is a significant portion of the government's funding, used for infrastructure projects, healthcare, and education. Factors like economic activity, tax rates, compliance levels, and tax administration effectiveness influence tax revenue. It is expected that tax revenue impacts economic growth differently based on the economic climate.

Gross Fixed Capital Formation (GFCF) – GFCF is a crucial factor impacting GDP growth rates (Pamba, 2022). GFCF refers to the total value of investments in fixed assets, such as machinery, equipment, and infrastructure, made by both the public and private sectors. These investments increase productivity, create jobs, and stimulate economic activity, driving economic growth.

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Monitoring GFCF alongside GDP growth rates provides policymakers with insights into the level of investment in the economy and its impact on overall performance. Gross Fixed Capital Formation is expected to impact economic growth differently based on the economic conditions.

Government Expenditure (GX) – GX includes total government spending on products and services, transfers, and subsidies (Zungu *et al.,* 2022; Buthelezi *et al.,* 2023). This encompasses public services, defense, social programs, and infrastructure projects. Government spending is crucial for driving aggregate demand and economic growth (Odhiambo, 2015). Increasing government expenditure can boost demand for products and services, leading to higher output and job levels. On the other hand, reducing government expenditure can result in higher unemployment and lower economic growth. The impact of government expenditures is expected to vary depending on the conditions.

Government Deficit (GD) – When a government spends more than it earns, it creates a deficit. This imbalance requires borrowing, which can have lasting effects on the economy (see Nkrumah *et al.,* 2016). Excessive public debt can impede growth, discourage private investment, and increase interest rates. Therefore, managing deficits is crucial for a stable and sustainable economy. During recessions, governments can use deficits to boost demand and promote growth by increasing spending (see Eminer, 2015). Government deficits are expected to have varying impacts based on economic conditions.

Government Debt (GDT) – The total amount of money a government owes its creditors is called its debt (see Buthelezi *et al.,* 2023). This obligation can take the form of bonds, Treasury bills, or other financial instruments. High government debt levels can burden the economy, typically expressed as a proportion of the countr's GDP. Governments must manage their debt carefully to prevent it from hindering economic growth (Burger and Calitz, 2020). It is expected that government debt will impact economic growth differently based on the conditions.

3.2 The Markov Switching Mean Vector Autoregressive (MSM-VAR) Model

An MSM-VAR approach combines Markov switching models with vector autoregression (VAR) to analyze time series data (Lebari and Wiri, 2021). It is useful when the data exhibit different regimes over time. An MSM-VAR model analyzes the relationship between fiscal policy instruments (such as tax revenue, gross fixed capital formation, government expenditure, mean

government deficit, government debt, and economic growth) and how these relationships change during different business cycle phases (such as recession versus expansion). This model enhances understanding of the dynamics and interactions between these variables (Lebari and Wiri, 2021) and how different policy instruments affect economic growth under various conditions. By identifying the specific regime under which the economy is operating, policymakers can adjust their fiscal strategies to stabilize the economy and promote sustainable growth. This approach provides insight into the relationship between fiscal policy and economic performance, allowing for more effective and targeted policy interventions.

MSM-VAR Model Formula – Let S_t represent the state of the unobservable Markov chain at time t and let y_t be an n-dimensional vector representing the time series at that point. The MSM-VAR model is expressed as follows:

$$y_t = \mu s_t + \sum_{i=1}^{p} \Phi\, S_{t,i} Y_{t-i} + \epsilon_t \qquad (2)$$

Where

- μs_t is the regime-dependent mean (intercept) of state S_t which is represented by an n-dimensional vector.
- $\Phi S_{t,i}$ is an n x n matrix of autoregressive coefficients at lag i for state S_t.
- The VAR model's number of lags is denoted by p.
- ϵ_t is an n-dimensional vector representing error terms. It is commonly assumed that these error terms follow a multivariate normal distribution with a mean of zero. Additionally, ΣS_t is a covariance matrix that changes depending on the regime.
- S_t is a discrete random variable that represents the state at time t. It follows a first-order Markov process with transition probabilities $P(S_t = j \mid S_{t-1} = i) = p_{ij}$.

The following yields the transition probabilities between regimes:

$$\mathbf{P} = \begin{pmatrix} p_{11} & p_{12} & \cdots & p_{1m} \\ p_{21} & p_{22} & \cdots & p_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ p_{m1} & p_{m2} & \cdots & p_{mm} \end{pmatrix}$$

where m is the number of regimes.

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3.3 Data Sources

A secondary time series analysis of the impact of fiscal policy on economic growth in South Africa is conducted using secondary time series data from 1994Q1 to 2024Q1. The dataset was obtained from the South African Reserve Bank (SARB).

4 ESTIMATION TECHNIQUE

4.1 Stationarity

Time series analysts use the Dickey-Fuller (ADF) (1981) and Phillips-Perron (PP) (1988) tests to determine if a series is stationary or has a unit root, indicating it is non-stationary.

Augmented Dickey-Fuller (ADF) Test – A variant of the Dickey-Fuller test, the Augmented Dickey-Fuller test examines the hypothesis that an autoregressive model has a unit root. By including lagged difference terms in the dependent variable, the ADF test accounts for higher-order autocorrelations. This is the basic form of the ADF test equation:

$$\Delta_{yt} = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + + \delta_2 \Delta y_{t-2} + \ldots\ldots + + \delta_p \Delta y_{t-p} + \epsilon_t \quad (3)$$

- Null Hypothesis (H_0): The time series is non-stationary (has a unit root).
- Alternative Hypothesis (H_1): The time series is stationary (it does not have a unit root).

Phillips-Perron (PP) Test – The Phillips-Perron (1988) test is another method of testing unit roots. Unlike the ADF test, it addresses heteroskedasticity and serial correlation differently. While the ADF test uses a parametric autoregressive model, the PP test employs non-parametric statistical techniques.

As a basis for the PP test, we use the following regression:

$$\Delta_{yt} = \alpha + \beta t + \gamma y_{t-1} + \epsilon_t \quad (4)$$

- Null Hypothesis (H_0): Non-stationary time series have a unit root.
- Alternative Hypothesis (H_1): A stationary time series does not possess a unit root.

Cointegration Test – Cointegration refers to the phenomenon of two or more time series moving together consistently over a long period. Even if the individual series are not stable, a stable long-term connection can exist between them through a stationary linear combination. Cointegrated series do not disintegrate over time, indicating a fundamental relationship between them (Engle and Granger, 1987). The Johansen test (Johansen, 1988) can determine the number and identity of cointegration vectors, which is crucial when studying the impact of fiscal policy on economic growth in South Africa. Cointegration can provide insights into the long-term link between GDP growth and government spending. By applying the Johansen test, this study can identify consistent, long-term correlations between these variables, allowing for a more detailed examination of the long-term effects of the country's fiscal policy on economic growth.

Determine the rank of the cointegration matrix – The Johansen test determines the rank of the cointegration matrix (Π), indicating the number of cointegrating relationships present. The rank is crucial for understanding long-term equilibrium relationships between variables in the model. If the rank is lower than the number of variables, it suggests fewer cointegrating relationships than expected. This could affect the effectiveness of fiscal policy in promoting economic growth in South Africa, indicating a lack of long-term connections between certain variables.

Trace Test – This test determines if the number of cointegrating vectors is less than or equal to r (where r is the number of cointegrating relationships). If the trace test rejects the null hypothesis, it suggests more cointegrating relationships than expected, providing insights into the interdependencies between variables and identifying areas where fiscal policy can enhance economic growth. Policymakers in South Africa need to understand the results of both the rank and trace tests to make informed decisions about promoting sustainable economic development.

Maximum Eigenvalue Test – The null hypothesis tests the number of cointegrating vectors as r against the alternative hypothesis of $r + 1$. The maximum eigenvalue test is a key tool for policymakers to identify the number of long-term relationships between economic variables. By rejecting the null hypothesis and accepting the alternative, policymakers can identify additional cointegrating vectors. This understanding of economic interdependencies can help guide targeted fiscal policies to drive sustainable economic growth in South Africa.

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Making a Decision – To determine the number of cointegrating relationships, compare the test statistics with the critical values. If the test statistic exceeds the critical threshold, reject the null hypothesis. This indicates a long-term relationship between the economic variables under analysis. By accepting the alternative hypothesis, policymakers can gain insight into the impact of different economic factors on each other, in turn allowing them to develop targeted fiscal policies.

5. Data and empiritical analysis

5.1 Descriptive Statistics

Table 1 shows South Africa's economic growth, tax revenue, gross fixed capital formation, government expenditure, government deficit, and government debt. The mean economic growth rate is 2.51, indicating moderate growth. Tax revenue, gross fixed capital formation, and government expenditure have stable means. However, the negative government deficit of -3.52 raises concerns about fiscal health, and the significant government debt of 38.87 indicates a burden on the government. These statistics provide a snapshot of key variables in the study. The standard deviations for economic growth, tax revenue, gross fixed capital formation, government expenditure, government deficit, and government debt reveal significant variability in these indicators. Government debt has the highest level of variability, suggesting uncertainty surrounding deficits and debt levels. This variability could indicate potential risks to the country's economic stability and future fiscal health. Policymakers must monitor and manage these variables to ensure sustainable economic growth. Effective fiscal policies, such as controlling spending and increasing revenues, can mitigate risks associated with high debt levels. Investing in initiatives that promote economic growth and reduce borrowing dependency can improve the country's fiscal health in the long run.

The skewness values for various variables in South Africa reveal negative skewness for economic growth, while tax revenue, gross fixed capital formation, government expenditure, and government debt are positively skewed. The high skewness of the government deficit suggests potential issues with fiscal policy management. These values provide insights into the distribution of these variables and can help policymakers understand the current state of the South African economy. Additionally, the study shows that economic growth and government deficits have a higher degree of kurtosis, indicating a more dispersed distribution with heavier tails and potentially greater volatility. Tax revenue and gross fixed capital formation have lower

kurtosis values, indicating a more peaked distribution and potentially less variability. Understanding these variables' kurtosis can offer insights into their distribution characteristics and potential impact on fiscal policy effectiveness. The study emphasizes the importance of understanding these distribution characteristics for effective fiscal policy.

TABLE 1 - *A Summary of Descriptive Statistics*

Description	GDP	TR	GFCF	GX	GD	GDT
Mean	2.512397	21.90579	16.29504	25.24545	-3.521488	38.86694
Median	2.900000	21.50000	16.00000	24.70000	-2.900000	38.90000
Maximum	5.600000	27.90000	23.30000	36.10000	3.700000	71.40000
Minimum	-6.300000	17.20000	12.80000	17.70000	-25.00000	19.60000
Std. Deviation	2.085608	2.482213	1.986909	3.629394	3.891491	12.87991
Skewness	-1.249051	0.348115	0.750350	0.624694	-1.797148	0.743428
Kurtosis	5.765085	2.571166	3.616114	3.452049	10.21422	3.080516
Jarque-Bera (JB)	70.00965	3.371032	13.26814	8.900143	327.5262	11.17849
Probability	0.000000	0.085349	0.001315	0.011678	0.000000	0.003738
Observations	121	121	121	121	121	121

Source: Authors' Estimation using Eviews 14.

5.2 Stationarity Tests Results

Table 2 shows the results of the ADF and PP unit root tests. These tests determine whether the variables in the model are stationary or non-stationary. Stationarity tests are crucial in time series analysis, ensuring that the data is reliable for further analysis.

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TABLE 2 - *ADF and PP Unit Root Test Results*

Variables	ADF Test			PP Test		
	Critical Value (1%)	t-statistic	Status	Critical Value (1%)	t-statistic	Status
lnRGDP	-3.487550	-6.170410***	I(1)	-3.486064	-12.08576***	(1)
lnTR	-3.489117	-5.743131 ***	I(1)	-3.486064	-25.99479***	I(1)
lnGFCF	-3.486064	-8.471412 ***	I(1)	-3.486064	-8.489852 ***	I(1)
lnGX	-3.487550	-6.057397***	I(1)	-3.486064	-67.47193***	I(1)
lnGD	-3.487016	-17.00916***	I(1)	-3.486064	-32.91876***	I(1)
lnGDT	-3.487550	-7.779816***	I(1)	-3.486064	-9.419577***	I(1)

Note: (***), (**), and (*) indicate significant at 1%, 5% and 10%. All the variables are log linearized.
Source: Authors' Estimation using EViews 14.

For all variables, the calculated t-statistics are more negative than the critical value at the 1% significance level. The ADF and PP Unit Root Test results show that all variables are integrated into I(1), implying that they are non-stationary at their levels but become stationary after first differencing. This is crucial in time series analysis, particularly when assessing relationships between variables, such as fiscal policy and economic growth. The fact that all variables are I(1) suggests that we can proceed to test for a long-term relationship, or cointegration, between them.

5.3 Cointegration Test Results

Cointegration analysis determines if there is a stable, long-term relationship between variables that may seem unrelated in the short term. It tests whether changes in one variable have a lasting impact on another over time. This provides insights into the economic system, aiding better-informed policy decisions. For example, finding a co-integrating relationship between fiscal policy and economic growth suggests that changes in fiscal policy can have a sustained effect on economic growth in the long run. This information can be used to develop more effective policy measures that promote economic stability and growth.

The Johansen-Cointegrating test results are presented in Table 3. The trace test confirms the presence of three cointegrating equations at the 0.05 significance level, and the max-eigenvalue test also indicates three cointegrating equations at the same level. These findings suggest a long-term relationship between the variables in the model and provide evidence of a stable equilibrium

within the system. The existence of cointegrating equations implies the influence of underlying economic forces that drive the relationships between the variables.

TABLE 3 - *Johansen Cointegration Test*

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prop** Critical Value
None*	0.350752	148.9833	95.75366	0.0000
At most 1*	0.282214	98.44623	69.81889	0.0001
At most 2*	0.259263	59.65098	47.85613	0.0027
At most 3	0.108279	24.53818	29.79707	0.1786
At most 4	0.054849	11.12982	15.49471	0.2037
At most 5*	0.037976	4.529773	3.841465	0.0333
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prop** Critical Value
None*	0.350752	50.53708	40.07757	0.0024
At most 1*	0.282214	38.79525	33.87687	0.0119
At most 2*	0.259263	35.11279	27.58434	0.0045
At most 3	0.108279	13.40837	21.13162	0.4154
At most 4	0.054849	6.600042	14.26460	0.5375
At most 5*	0.037976	4.529774	3.841465	0.0333

Note: Trace test indicates 3 cointegrating equation(s) at the 0.05 level. Max-eigenvalue test indicates 3 cointegrating equation(s) at the 0.05 level.
Source: Authors' estimation using EViews 14.

5.4 MSM-VAR Regression Results

This study analyzes two regimes like Mahmoudi and Ghaneei (2022) and Shahrestani and Rafei (2020). Regime 1 is characterized by economic expansion or recovery, while regime 2 is characterized by recession or uncertainty. The MSM-VAR approach enables a dynamic analysis of how fiscal policy instruments impact economic growth in South Africa across these two distinct regimes. The regression results indicate that the effectiveness of fiscal policy on economic growth is highly dependent on the current state of the economy, as shown in Table 4.

In regime one, the relationship between tax revenue (TR) and GDP is negative (-0.059880), while in regime two, it is positive (0.203603). This suggests that during economic expansion (Regime 1),

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an increase in tax revenue may dampen economic growth in South Africa. This finding aligns with previous studies by Adeyemi and Awogbade (2022) and Ukangwa *et al.* (2023), which found a negative relationship between tax revenue and economic growth in Nigeria. However, Adeyemi and Awogbade (2022) used the ARDL model, while Ukangwa *et al.* (2023) used OLS. In regime two, tax revenue has a positive relationship with economic growth. These findings correspond to those of Hlongwane *et al.* (2018) and Tendengu *et al*. (2022), who found a positive correlation between taxation and economic growth in South Africa, although they used the ARDL model. Our choice of the MSM-VAR model may have contributed to a nuanced understanding of the relationship between tax revenue and economic growth in South Africa. By utilizing the MSM-VAR model, we captured dynamic interactions and feedback effects between tax revenue and economic variables in different economic regimes, uncovering potential non-linear and asymmetric effects of tax revenue on economic growth. Additionally, our findings provide insights for policymakers and researchers seeking to understand the impact of tax policies on economic performance in South Africa. The results of this study are consistent with the expectation that tax revenue impacts economic growth differently depending on the regime.

In regime 1, the relationship between gross fixed capital formation (GFCF) and GDP is positive (0.107876), while in Regime 2, the link is also positive (0.126704). This suggests that during periods of economic growth (Regime 1), an increase in GFCF can lead to higher GDP growth. However, during economic recessions (Regime 2), the impact of GFCF on GDP may be even more significant. These findings align with those of Kong *et al.* (2020) and Pasara and Garidzirai (2020), who concluded that GFCF positively impacts economic growth in Africa and South Africa, respectively. Kong *et al.* (2020) used Augmented Mean Group and Common Correlated Effects Mean Group techniques, while Pasara and Garidzirai (2020) employed a Vector Autoregressive (VAR) framework. The use of different estimation techniques demonstrates the robustness of the relationship between GFCF and economic growth in South Africa. Based on the consistent findings, increasing the investment in fixed capital in South Africa is crucial to fostering economic growth. By using the MSM-VAR model, we can better understand the impact of fixed capital investments on the economy. Policymakers can use insights from these studies to inform decisions about resource allocation and policies that support long-term sustainable development in South Africa. The results contradict the expectation that the impact of GFCF is regime dependent.

TABLE 4 - *Markov Switching Means VAR Results*

Variables	Coefficient	Std. Error	z-Statistics
Regime 1: Expansion			
C	1.247009	3.40842	0.36586
TR	-0.059880	0.02936	-2.03931
GFCF	0.107876	0.13235	0.81505
GX	0.028097	0.02066	1.36016
GD	0.002665	0.01630	0.16351
GDT	-0.001351	0.05531	-0.02442
Regime 2: Recession			
C	0.813361	4.08809	0.19896
TR	0.203603	1.50555	0.13523
GFCF	0.126704	0.16503	0.76778
GX	-0.277417	1.54697	-0.17933
GD	-0.548812	1.52972	-0.35877
GDT	0.036872	0.06093	0.60512
Common			
GDP(-1)	1.43194	0.08682	16.4922
GDP(-2)	-0.528361	0.08528	-6.19574
SIGMA-GDP	0.383090	0.05511	6.95187
Transition Matrix Parameters			
Variable	Coefficient	Std. Error	z-Statistics
P11-C	2.056058***	0.371289	5.537615
P21-C	1.440980*	0.752360	1.915279
Determinant resid covariance		1.692466	
Log likelihood		-145.2757	
Akaike info criterion		2.727322	
Schwarz criterion		3.124340	
Number of coefficients		17	

Source: Authors' Estimation using EViews 13.

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In regime 1, the relationship between government expenditure (GX) and GDP is positive (0.028097). This implies that during times of economic growth, increased government spending may help boost economic growth, aligning with Ukangwa *et al.* (2023) in Nigeria, which used an OLS model. In contrast, Regime 2 revealed a negative (-0.277417) link between government expenditure and economic growth, suggesting that policymakers may need to reassess their fiscal strategies to effectively promote sustainable growth and stability. These results are consistent with Adeyemi and Awogbade (2022) in Nigeria and Hlongwane *et al.* (2018), Zungu *et al.* (2022), and Buthelezi (2023) in South Africa. While Adeyemi and Awogbade (2022) and Hlongwane *et al.* (2018) used the ARDL model, Buthelezi (2023) used vector error correction (VEC) and Markov switching dynamic regression. The negative relationship between government expenditure and economic growth in Regime 2 suggests inefficiencies or misallocation of resources in current fiscal policies. For South Africa's economy to grow sustainably, policymakers should implement measures to improve government spending efficiency. Moreover, the consistency of these results across different studies underscores the importance of reevaluating fiscal strategies to achieve long-term economic stability and development.

In regime 1, there is a positive relationship (0.002665) between government deficit (GD) and GDP. During economic expansions, increasing government deficits positively impact GDP, suggesting that fiscal stimulus can promote economic growth. This supports a study by Cinar *et al.* (2014), which also found a positive impact of deficits on economic growth in certain European countries. However, unlike Cinar *et al.* (2014), the current study used the MSM-VAR model. In regime 2, this relationship becomes negative (-0.548812), indicating that during economic downturns, the relationship between government deficits and GDP is negative, implying that fiscal austerity may be more appropriate in recessionary periods. The findings are in line with those in another study by Nkrumah *et al.* (2016), which found that government deficits negatively affected economic growth in Ghana. However, Nkrumah *et al.* (2016) used the ARDL model, while the current study used the MSM-VAR model. The differing results in regime 1 and regime 2 indicate that the impact of government deficits on economic growth varies depending on economic conditions in South Africa. These results emphasize the need to tailor fiscal policy to prevailing economic conditions to maximize effectiveness in promoting sustainable growth. By considering different regimes and potential nonlinear effects, the MSM-VAR model allows for a more detailed analysis of the relationship between government deficits and economic growth.

In regime 1, there is a negative relationship (-0.001351) between government debt (GDT) and GDP. In this regime, increasing government debt may hinder economic growth, and policymakers should focus on reducing deficits and improving fiscal sustainability. The results are consistent with Ukangwa *et al.* (2023) findings in Nigeria; however, their study utilized OLS. In regime 2, the relationship becomes positive (0.548812). These contrasting relationships highlight the complexity of fiscal policy and its impact on economic growth. This implies that, in regime 2, government debt can stimulate economic activity, giving policymakers more flexibility to use expansionary fiscal policies to support growth. This nuance emphasizes the need for adaptive and responsive fiscal policy to navigate economic cycles and promote sustainable growth. The findings align with Adi's (2019) study in Ghana; nevertheless, Adi's study relied on the OLS model. Overall, the results of this study suggest that government debt can have both positive and negative impacts on South Africa's economic growth, contingent upon the specific economic context and regime. By using the MSM-VAR model, this study offers a more nuanced understanding of the relationship between these variables compared to previous research that employed OLS models.

According to the data, GDP (-1) has a value of 1.43194, RGDP (-2) has a value of 0.528361, and SIGMA-RGDP has a value of 0.383090. These results indicate that fiscal policy significantly impacts economic growth in South Africa. GDP (-1) and GDP (-2) indicate a strong correlation between past and current growth. In addition, fiscal policy decisions may influence RGDP volatility, as indicated by SIGMA-GDP. Overall, these findings suggest that policymakers should utilize fiscal policy measures to stimulate economic growth in South Africa.

The transition matrix parameters are P11-C 2.056058 and P21-C 1.440980. The probability of transitioning from regime 1 to regime 2 is statistically significant at the 1% level, while the probability of transitioning from regime 2 to regime 1 is significant at the 10% level. This suggests a strong relationship between the two regimes, with regime 1 having a greater influence on the transition to regime 2. The study reveals that fiscal policy impacts economic growth in South Africa more during periods of economic expansion (Regime 1), as indicated by the higher probability of transitioning from regime 1 to regime 2. This implies that effective fiscal policies during economic expansion have a greater effect on GDP compared to periods of economic contraction. The results indicate that South African policymakers should prioritize implementing effective fiscal policies during economic expansion to stimulate growth and development.

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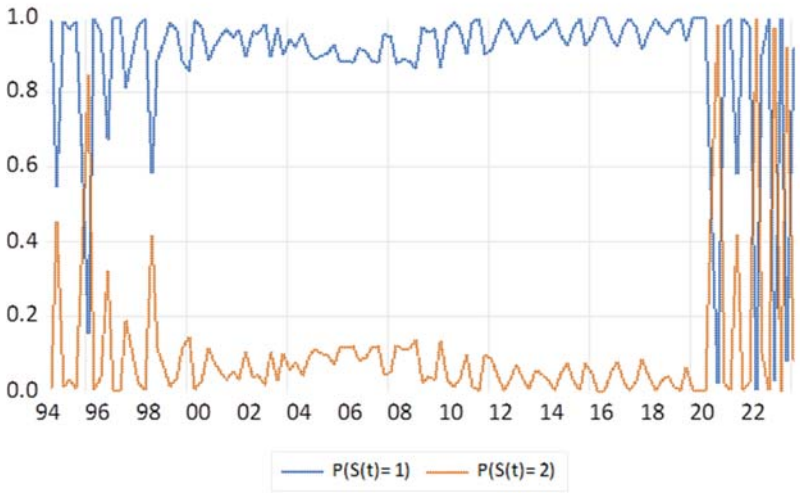
The results indicate that fiscal policy significantly impacts economic growth in South Africa. The determinant residual covariance value of 1.692466 suggests that the model fits well. The negative log-likelihood value of -145.2757 confirms that the model represents the data effectively. The Akaike info criterion and Schwarz criterion values of 2.727322 and 3.124340, respectively, support the role of fiscal policy in driving economic growth in the country. In summary, statistical analysis confirms the crucial role of fiscal policy in shaping economic outcomes in South Africa. The strong model fit and low log-likelihood value reinforce the significance of this relationship. The Akaike and Schwarz criteria values imply that fiscal policy is an effective tool for promoting economic growth. These findings underscore the importance of implementing sound fiscal policies to achieve sustainable development in South Africa.

5.5 Diagnostic Test

The use of Markov switching smoothed regime probabilities, one-step-ahead predicted regime probabilities, and filtered regime probabilities enables a more accurate assessment of the impact of fiscal policy on economic growth in South Africa. Analyzing these regime probabilities allows policymakers to understand fiscal policy's impact on economic growth and adjust strategies to current economic conditions, promoting sustainable growth in South Africa.

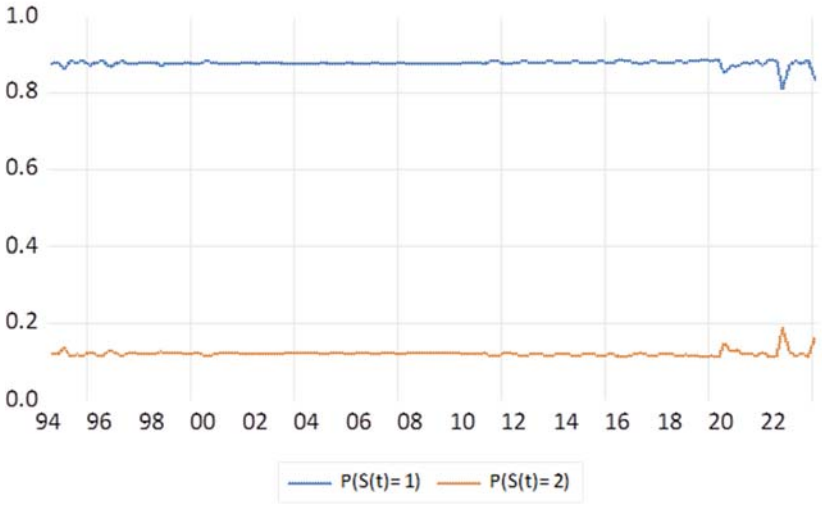
In Figure 1, the Markov Switching Smoothed Regime Probabilities for economic growth (GDP) in South Africa are as follows: P(S(t)=1) mean is 0.891927 and P(S(t)=2) mean is 0.108073. These probabilities indicate a high likelihood (89.2%) that the economy is in a stable growth regime (S(t) = 1), while there is a lower probability (10.8%) that it is in a more volatile or contracting regime (S(t) = 2). This information is valuable for policymakers as it helps them make informed decisions about the economic outlook for South Africa. Understanding growth scenarios helps stakeholders prepare for potential economic fluctuations. Policymakers should focus on sustaining stable growth while considering volatility to mitigate downturns and stabilize the economy.

FIGURE 1 - *Markov Switching Smoothed Probabilities*



Source: Authors' estimation using EViews 14.

FIGURE 2 – *Markov Switching One-Step Ahead Predicted Regime Probabilities*



Source: Authors' estimation using EViews 14.

In Figure 2, the Markov Switching One-step ahead Predicted regime probabilities for economic growth (GDP) in South Africa are as follows: P(S(t)=1) mean is 0.878230, indicating a high

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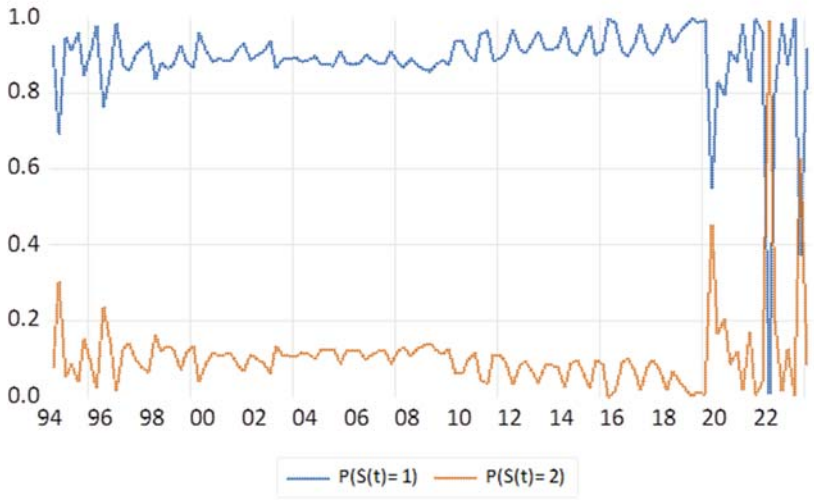
likelihood (87.82%) of strong economic growth; P(S(t)=2) mean is 0.121770, indicating a lower probability (12.18%) of slower growth or a recession. By analyzing these predicted regime probabilities, policymakers can better anticipate potential shifts in the economy. For instance, if policymakers observe a decrease in the predicted probability of being in regime 1 and an increase in the predicted probability of being in regime 2, they may consider implementing stimulus measures to prevent a potential economic downturn. Conversely, if the predicted probabilities consistently show a high likelihood of being in regime 1, policymakers may focus on promoting sustainable economic growth and development.

The Markov Switching Filtered Regime Probabilities for economic growth (GDP) in South Africa show that P(S(t)=1) has a mean of 0.893482, while P(S(t)=2) has a mean of 0.106518 in Figure 3. This indicates that the South African economy is predominantly in state 1, with a probability of approximately 0.89, suggesting stable economic growth. Conversely, state 2 has a probability of around 0.11, indicating slower or negative growth. These regime probabilities provide insights for policymakers to respond to changes in the economy. For example, if the probabilities indicate that the economy is in state 2 with a probability of 0.11, policymakers may consider implementing stimulus measures to boost growth. If the probabilities suggest a high likelihood of being in state 1, policymakers may prioritize maintaining stability and continuing growth-supporting policies.

FIGURE 3 – *Markov Switching Filtered Regime Probabilities*

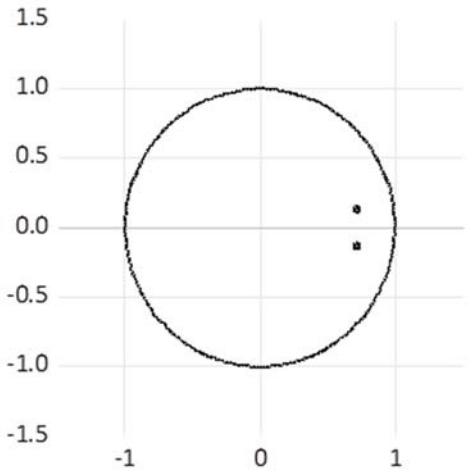


Source: Authors' estimation using EViews 14.

5.6 VAR Model Stability Tests (AR Root Circle)

Based on the stability tests in Figure 4, the AR root circle is within the unit circle, indicating the model is stable. This means the VAR model is a reliable tool for analyzing the impact of fiscal policy on economic growth in South Africa. The Markov Switching Means approach accounts for the time-varying nature of the relationship between fiscal policy and economic growth, leading to a clearer understanding of the dynamics involved.

FIGURE 4 - *Inverse Roots of AR Characteristic Polynomial*



Source: Authors' estimation using EViews 14.

These findings suggest two different patterns in the data, with the model transitioning between them over time. The inverse roots of the AR characteristic polynomial provide insights into the stability and dynamics of the included endogenous and exogenous variables. The modulus values indicate the strength of these roots, with values closer to 1 signifying greater stability in the system. Additionally, analyzing the inverse roots can help identify potential oscillatory behavior or explosive dynamics in the model. In this case, the modulus values of 0.726885 for both roots indicate a relatively stable system. Consequently, it can be inferred that the endogenous and exogenous variables in the model are not experiencing significant fluctuations or unpredictable behavior.

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5.7 Transition Probability

Table 5 shows the mean probabilities for economic growth (GDP) in South Africa as follows: P(1 | 1) has a mean of 0.886558 and P(2 | 1) has a mean of 0.113442, while P(1 | 2) has a mean of 0.808606 and P(2 | 2) has a mean of 0.191394. The expected durations for these probabilities are approximately 8.815102 and 1.236696 quarters, respectively. These findings suggest that the South African economy has two distinct regimes with different probabilities of transitioning between states. The first regime, with a higher probability of staying in state 1, is associated with higher economic growth. Conversely, the second regime, with a higher probability of transitioning to state 2, is associated with lower economic growth. The expected durations of each regime indicate the persistence of each state, with the first regime lasting about 8.8 quarters on average and the second regime lasting about 1.2 quarters. These results indicate that the South African economy experiences periods of stability and growth, as well as periods of instability and contraction. Understanding the factors that influence the transitions between these regimes can help policymakers implement targeted interventions to promote economic stability and growth. Additionally, analyzing the duration of each regime can provide valuable information for forecasting future economic trends and planning for potential challenges.

TABLE 5 - *Transition Probability*

South Africa	Regime 1	Regime 2
Regime 1	0.886558	0.113442
Regime 2	0.808606	0.191394
Durations	8.815102	1.236696

Source: Authors' Estimation using EViews 13.

6. CONCLUSION

The purpose of this study was to examine the regime-dependent effectiveness of fiscal policy on economic growth in South Africa. We used a Markov Switching Means VAR approach from 1994Q1 to 2024Q1. The analysis focuses on tax revenue, gross fixed capital formation, government expenditure, government deficit, and government debt, considering different phases of the business cycle. The findings indicate that fiscal policy in South Africa has a regime-dependent

effect on economic growth. For instance, certain policies are more effective at specific points in the business cycle. During economic expansions (Regime One), government expenditures and deficits positively impact economic growth, while tax revenues and debt have a negative effect. However, during economic contractions (Regime Two), tax revenues and deficits contribute positively to economic growth. Throughout both regimes, gross fixed capital formation emerges as a key driver of economic growth, highlighting the importance of investing in infrastructure and productive capacity for sustainable economic development. In general, government policies shape the economy, especially during various business cycles.

POLICY RECOMMENDATIONS

To foster sustainable economic growth, governments should prioritize investments in infrastructure and productive capacity. This can be accomplished by implementing fiscal policies that encourage public-private partnerships and incentivize businesses to invest in new technologies and innovation. In addition, policymakers should prioritize reducing government deficits during economic expansions to prevent inflation and overheating. By balancing fiscal policies and investments in crucial sectors, governments can navigate the business cycle and promote long-term economic growth.

LIMITATIONS OF THE STUDY

One limitation of the study is its failure to consider external factors like global economic trends or geopolitical events that could affect the effectiveness of the proposed fiscal policies. Moreover, the study does not discuss potential obstacles to implementing these policies, such as resistance from special interest groups or the need for regulatory changes. Future research should explore these areas to provide a comprehensive analysis of the implications of targeted fiscal policies on economic growth, offering a better understanding of the potential outcomes and limitations associated with their implementation.

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