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Quantifying Fiscal Multipliers in South Africa: A Structural VAR Approach

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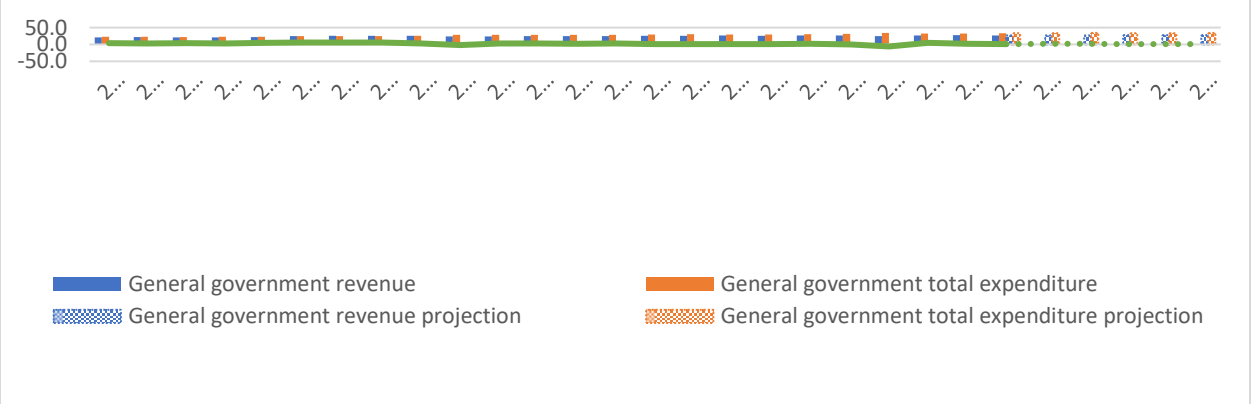
Abstract: Fiscal multipliers have deteriorated in South Africa since the global financial crisis in 2008 and 2009. Weakening fiscal multipliers to a record low of zero has constrained the government's ability to use fiscal policy measures to stimulate the economy, particularly in the aftermath of the COVID-19 pandemic and recent geopolitical risks affecting the global economy. The current paper quantifies fiscal multipliers in South Africa. The study employed the structural vector autoregressive to quantify government spending and government tax revenue fiscal multipliers in South Africa over the period 2000M01–2023M10. The control variables for the study are government total spending, total government tax revenue, and the production index as a proxy variable for economic activity. This is the first study to employ high-frequency monthly data, which increases the number of observations, thus yielding significant and robust results. The accumulated government expenditure and government tax revenue multipliers are 0.4 and 0.1, respectively. The empirical results are consistent with the Keynesian view that government spending, particularly investment spending, fosters economic growth. Structural reforms in logistics, the energy sector, and education to boost economic growth and improve fiscal multipliers that are currently less than one in South Africa must be adopted as a policy response.

Keywords: *Fiscal multipliers, structural vector autoregressive, government spending, government revenue.*

1. Introduction and Background

South Africa has posted consecutive budget deficits since the global financial crisis. The economy is characterized by sluggish growth and structurally high spending resulting from consistently above-inflation increases in the public wage bill, financial support for the ailing state-owned entities (SOEs), and high debt service costs. The International Monetary Fund (IMF) forecasts that the South African economy will grow, on average, by 1.5 percent between the period 2024 and 2028 (Figure 1). Moreover, the budget deficit is predicted to persist over the same period as the government expenditure as a ratio of GDP remains higher than the government tax revenue as a percentage of GDP. The underperformance of the economy and the resultant deteriorating fiscal metrics necessitate fiscal consolidation measures such as minimizing the acceleration of the growth of the public wage bill and restructuring and turning around the financial fortunes of SOEs. The global economic outlook is highly volatile and poses risks of economic shocks such as the conflicts in Ukraine and the Middle East. Consequently, the IMF is forecasting global economic growth to be 2.9 percent in 2024. The study quantifies government spending and tax revenue multipliers from 200M1 to 2023M10 in South Africa.

Figure 1: Fiscal Macroeconomic Indicators



Source: IMF World Economic Outlook (October 2023). Where: GDP=gross domestic product, TAX=total tax revenue, TGE= total government expenditure, PD= public debt.

Fiscal multipliers have been on a downward trend over the years in South Africa. (Kemp, 2020) postulates that they are almost zero. Fiscal multipliers measure the short-term impact of discretionary fiscal policy on output. They are usually defined as the ratio of a change in output to an exogenous change in government spending or tax with respect to their baselines (Dime, et al., 2021). Few studies have investigated fiscal multipliers in South Africa (Kemp, 2020; Merrino, 2021; Derkacza , et al., 2022). However, numerous studies have been conducted in developed countries on examining fiscal multipliers (Sheremirov & Spirovska, 2022; Hamer-Adams & Wong, 2018; Afonso & Leal, 2019; Gechert & Mentges, 2018). In contrast to South Africa, fiscal multipliers in most developed countries are significantly greater than zero. (Deleidi, et al., 2021) examine fiscal multipliers in Italy through the panel SVAR. The study found that fiscal multipliers are significantly higher than 1 in Italy, which aligns with other developed economies. Moreover, the study found that government investment spending multipliers were larger than government consumption multipliers. The study is consistent with the Keynesian theory that the government must foster and stimulate economic growth through government spending. This study contributes to the body of knowledge by estimating an SVAR to quantify government spending and government tax revenue fiscal multipliers in South Africa over the period 2000M01–2023M10. The study employs the production index as a proxy variable for economic activity, as gross domestic product is measured quarterly and annually. This will increase the number of observations and result in significant and robust coefficients.

2. Literature Review

Theoretical Framework: Theoretical perspectives on fiscal multipliers vary across Keynesian, New Classical, and New Keynesian Dynamic Stochastic General Equilibrium (NK-DSGE) frameworks. Each perspective provides insights into the effectiveness of fiscal policy in stimulating economic activity. According to the Keynesian theory, fiscal policy plays a pivotal role in stabilizing the economy, particularly during periods of deficient demand. According to Keynesian theory, government spending or taxation changes directly influence aggregate demand, affecting output and employment. The multiplier effect arises due to the induced changes in consumption and investment stemming from fiscal policy actions (Blanchard & Brancaccio, 2019). In the Keynesian framework, fiscal multipliers are typically larger in recessions or when monetary policy is constrained, as households and firms respond more robustly to government spending or taxation changes. The new Classical theory, on the other hand, argues that fiscal policy interventions have limited effectiveness in influencing aggregate output. Rational expectations and the neutrality of money are central tenets of the New Classical perspective. According to this view, individuals anticipate future tax increases to finance current government spending, leading to offsetting changes in private consumption and investment behavior (Barro, 1974).

Consequently, fiscal multipliers are often deemed close to zero in the New Classical framework, as any short-term stimulus is counteracted by forward-looking agents adjusting their behavior. The New Keynesian Dynamic Stochastic General Equilibrium (NK-DSGE) framework integrates insights from Keynesian and New Classical theories, incorporating price stickiness, imperfect competition, and forward-looking behavior. In this framework, fiscal multipliers are contingent on various factors, such as the degree of nominal rigidities, the effectiveness of monetary policy, and the intertemporal budget constraint (Woodford, 2003). Fiscal policy shocks may temporarily affect output and employment, particularly when accompanied by nominal rigidities or when monetary policy is constrained by the zero lower bound (Christiano, et al., 2011). However, the effectiveness of fiscal policy diminishes over time as agents adjust their expectations and behavior in response to policy changes. In summary, the theoretical framework for fiscal multipliers encompasses diverse perspectives, ranging from the Keynesian emphasis on demand management to the New Classical focus on rational expectations and policy neutrality. The NK-DSGE framework synthesizes these perspectives, highlighting the nuanced interactions between fiscal policy, monetary policy, and economic dynamics.

Empirical Literature: Numerous studies have quantified fiscal multipliers in South Africa and internationally. Some studies employed the structural vector autoregressive (SVAR) model, while others employed the dynamic stochastic general equilibrium (DSGE) model. Among recent studies that have quantified fiscal multipliers in South Africa (Kemp, 2020; Derkacza , et al., 2022; Makrelov, et al., 2018), quantified the government spending multipliers and tax multipliers in South Africa through three identification methods: the recursive, the Blanchard and Perotti, and the sign restriction techniques. According to the sign-restriction identification

methods, the government spending multipliers are one, whereas the tax multipliers are more than one in absolute value. (Van Rensburg, et al., 2022) examined fiscal multipliers after the global financial crisis from 2009 to 2019. According to the empirical evidence, there has been a significant decrease in the government expenditure multiplier since the global financial crisis. Fiscal multipliers during 2009 and 2010 were more than one and deteriorated over the years to 0.20 in 2014. During 2009 and 2010, the debt-to-GDP ratio was less than 32 percent, and there was a significant increase in capital flows induced by higher rates of return as the developed economies embarked on unconventional monetary policy; hence, there was no crowding effect on investment.

However, from 2015 to 2019, fiscal multipliers hovered in the zero lower bound, which means the government must consider economic reforms on SOEs and the structural economic burden on youth unemployment (Van Rensburg, et al., 2022). (Tendengu, et al., 2022) examine the impact of public sector expenditure and government tax revenue on economic growth in South Africa. The study employed the autoregressive distributed lag (ARDL) model from 1988 to 2018. The study found the tax and government expenditure multipliers to be less than one and positive. This signifies the importance of public expenditure, especially infrastructure investment, as a catalyst for stimulating economic growth. (Schroder & Storm, 2020) quantified input-output income and employment multipliers in 2018. The study found both income and unemployment multipliers to be more than one and positive. The income multiplier was found to be 1.68, while the employment multiplier was found to be significantly high at 6.9. This implies the importance of creating jobs and employment to support sustainable economic growth in South Africa. A growing number of studies have employed the DSGE model to ascertain fiscal multipliers in South Africa. (Jooste, et al., 2013) examine the impact of the government expenditure tax revenue multiplier through the DSGE and the structural vector error correction model. The findings of their study suggest that the government expenditure multiplier is less than one and has an insignificant effect on economic activity over the short and long run.

In contrast to (Kemp, 2020), the tax multiplier is less than one, locked at the zero lower bound, and has an insignificant impact on economic growth. (Leeper, et al., 2017) also employed the DSGE to quantify fiscal multipliers in Canada. Their study found government spending, wealth, and investment multipliers to be less than one in Canada. Small fiscal multipliers in Canada may indicate the crowding out of the private sector as the economy is near capacity. According to (Davig & Leeper, 2011), government expenditure impact and accumulated multiplier range from -0.26 to 1.0 and from -1.0 to 1.4, respectively. (Caggiano, et al., 2015) employed a structural VAR to estimate fiscal government expenditure multipliers. The control variables in the model are total government expenditure, tax revenue, and real gross domestic product over the period 1981Q3 to 2013Q1. The empirical estimates point to fiscal multipliers larger than one during a recession, such as the global financial crisis. The empirical investigation of fiscal multipliers in the United States is consistent with previous empirical literature (Forni & Gambetti, 2014). (Hamer-Adams & Wong, 2018) quantified fiscal multipliers in New Zealand and unlike in the United States, obtained them to be less than one through an SVAR over the period 1990–2017. According to the empirical investigation, the government expenditure multiplier was 0.24, whereas the total tax revenue multiplier had a larger effect of 0.76 to 1.29.

Moreover, the study quantified the public investment multiplier at -0.59, suggesting that more studies must be conducted to determine the real estimate, as it is not aligned with theory and empirical literature. (Deleidi, et al., 2021) investigated fiscal multipliers over the period 1995–2017 in Italy. The study employed the SVAR to calculate government expenditure multipliers and total tax revenue multipliers. It found that government investment multipliers are larger than government consumption multipliers. The empirical results align with Keynesian theory, implying that Italy should increase public spending on investment to stimulate and foster economic growth. A recent study, (Ficarra, 2024) also investigated the fiscal multiplier for Italian provinces. The paper found the government spending multiplier to be less than one, close to zero, and negative. Another study conducted in Italy found fiscal multipliers to be insignificant and close to zero (Cerrato, et al., 2023). However, there seem to be inconsistencies in the estimates of fiscal multipliers in Italy. Most empirical literature found the fiscal multipliers to range from 1.5 to 1.8 in Italy's municipalities, consistent with developed economies' literature (Brueckner, et al., 2023; Corbi, et al., 2019; Dupor & MacCrory, 2018). (Abdel-Haleim, 2024) measured fiscal multipliers through the Bucket approach SVAR model in Egypt from 2005Q1 to 2017Q4. The control variables in the model are total tax revenue, economic activity, government expenditures, and the real interest rate.

This study found that public spending multipliers are larger than tax revenue multipliers. (Dime, et al., 2021) employed the VAR to examine fiscal multipliers in some Asian economies. The study employed quarterly data to quantify government spending and tax multipliers. Government spending multipliers ranged from 0.73 to 0.88, in line with the Keynesian multiplier, and consisted of empirical evidence from developed economies. The government multipliers in Asian countries seem to be larger than those in other developing countries, which are close to zero. The tax revenue multipliers range between -0.41 and -0.62, notably smaller than those in developed countries but larger than those in developing countries. The reviewed literature demonstrates that developed economies' fiscal multipliers seem larger relative to South Africa's fiscal multipliers, which have declined over the years to the zero lower bound. Moreover, unlike in South Africa, in developing countries like Egypt, public spending multipliers are larger than tax revenue multipliers.

3. Methodology

Data: Data has been retrieved from secondary data sources. The methodology and data issues of the fiscal multipliers are discussed in this section. Data is obtained from the South African Reserve Bank (SARB) and International Financial Statistics, spanning from 2000M01 to 2023M10. The production index is used as a proxy variable for gross domestic product and is obtained from the IFS. The government's total spending and the government's total revenue have been log-translated so that they can be interpreted as elasticity. All the control variables have been tested for unit roots at the level form and differences at the first difference. The variable description, measurement, codes, and source are depicted in Table 1 below. Government total expenditure and government tax revenue are measured in million rands, while the production index, which is a proxy for economic activity, is an index.

Table 1: Data Sources

Variables Description	Measurements	Code	Source
Government tax revenue	R millions	KBP4582M	South African Reserve Bank
Government total expenditure	R millions	KBP4601M	South African Reserve Bank
Production index	Index		International Financial Statistics

Source: own estimation.

Model Specification: To examine the impact of fiscal multipliers on economic growth in South Africa over the period 2004–2023, the structural vector autoregressive (SVAR) is estimated. The endogenous variable is the gross domestic product (GDP), while the strictly exogenous variable is the tax revenue (TAX) and the total government expenditure (TGE). Secondary data sources, such as the National Treasury databases, have been utilized. The estimation of the SVAR pretest, such as unit roots, is performed through the Augmented Dicky-Fuller test and the Phillips Perroni test. The reduced VAR is estimated, followed by the lag selection criterion, and then the SVAR is estimated. Subsequently, the impulse response function and the variance decomposition are derived from the SVAR. Diagnostic tests, such as stability tests, are performed to determine the model's suitability. The reduced form SVAR is specified as follows:

$$\mathrm{A_t} = \sum_{t=1}^{k=2} \beta_i A_{t-i} + V_t \qquad (1)$$

Where K represents the number of lags, $\mathrm{A_t}$ is a three-vector variable consisting of total government expenditure (TGE), total government tax revenue (TAX), and gross domestic product (GDP). The vector denotes the reduced SVAR residuals $V_t = [\mu^{GDP}\mu^{TAX}\mu^{TGE}]$ and β_i is a 3 x 3 matrix of coefficients denoting the contemporaneous relationship between each structural shock.

The study adopted the estimation technique and the ordering of variables by (Blanchard & Perotti, 2002; Afonso & Leal, 2019). Variables are ordered from the most exogenous variable to the least exogenous variable. GDP is ordered as the endogenous variable, followed by total government tax revenue and total government expenditure as exogenous variables. The matrix of the reduced form VAR is shown in equation (2) below:

$$\begin{bmatrix} 1 & 0 & 0 \\ \beta_{GDP} & 1 & 0 \\ \beta_{TAX} & \beta_{TGE} & 1 \end{bmatrix} \begin{bmatrix} \mu^{GDP} \\ \mu^{TAX} \\ \mu^{TGE} \end{bmatrix} \qquad (2)$$

Where GDP represents gross domestic price, TAX denotes total government tax revenue, and TGE is the total government expenditure, the residuals are represented by the components of V_t, as explained in the previous

paragraph. The fiscal multiplier is derived by calculating the accumulated change in GDP divided by the change in total government tax revenue and total government expenditure over the period. The multiplier is computed as follows:

$$\frac{\sum_{0}^{t+3} \Delta GDP_t}{\sum_{0}^{t} \Delta (TAX/TGE)_t} \quad (3)$$

Calculating Fiscal Multipliers: In addition to estimating the SVAR and calculating the fiscal multipliers through impulse response, the government expenditure and tax multipliers are calculated from 2001 to 2022. Fiscal multipliers can be measured in several ways. They are defined here as the ratio of a change in GDP output (ΔY) to a discretionary change in government spending (ΔG) (Afonso & Leal, 2019; Spilimbergo, et al., 2009). Here, GDP is in real terms, so the multiplier means the effect of a one rand increase in spending on the real GDP level. There are two methods of quantifying fiscal multipliers that are considered:

$$Impact\ multiplier = \frac{\Delta GDP_t}{\Delta (TAX/TGE)_t}$$

$$Cumulative\ multiplier = \frac{\sum_{j=0}^{N} \Delta GDP_{(t+j)}}{\sum_{j=0}^{N} \Delta (TAX/TGE)_{(t+j)}}$$

Where ΔGDP_t is the change in gross domestic product, $\Delta (TAX/TGE)_t$ is the government expenditure shock or total revenue shock over the period 2001-2022.

4. Estimation Results

Data and Descriptive Statistics: Firstly, the descriptive statistics are computed through STATA 14 software. According to Table 2, the mean for total government tax revenue (TAX) is R18428.874 million, and the mean for total government expenditure is R49721.079 million. The mean of total government expenditure is more than the mean of total government tax revenue by R31292.205 million. This means the South African government has been operating with a budget deficit over the years since the global financial crisis of 2007-2009. The budget deficit is detrimental to sustainable economic growth and national savings (Devarajan, et al., 1996). Hence, the South African government relies on borrowing to finance the budget deficit, budget debt, and debt service costs over the period 2000M01–2023M10.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax	406	18428.874	15024.379	1584	63954
TGE	406	49721.079	43857.303	4433	216811
GDP	406	100.88	8.065	44.313	118.398

Source: own estimation.

Unit Roots Tests: The graphical unit roots test in Appendix A1 suggests that all the variables (gross domestic product, total government tax, and total government expenditure) are non-stationary at the level form and stationery at the first difference. According to the graphical unit root tests, all three variables have an upward trend in the level form. Whereas, in the first difference, the trends of the variables fluctuate around the steady state zero, reflecting the stationarity of the variables. A vector autoregressive model requires that all variables must be non-stationary at level form and stationery at first difference (Gujarati & Porter, 2021). Moreover, to confirm the validity of the graphical unit roots test, the unit roots tests were performed through the Dicky Fuller tests and the Phillips-Peroni tests. Both the Dickey-Fuller and the Phillips-Perroni tests found the variables to be non-stationary at level form and stationery at first difference. The summary of the unit root tests according to the Dickey-Fuller test and Phillips-Peroni tests is depicted in Table 3 below. The VAR estimation condition that all variables must be I(1) is satisfied, thus a reduced form of VAR was estimated.

Table 3: Unit Roots Tests

	Augmented Dickey-Fuller		Phillips-Perron		
Variables	**Levels**	**1st Difference**	**Levels**	**1st Difference**	**Conclusion**
LOGTAX	-1.358504	−14.60729***	-2.254364	−133.4264***	I(1)
LOGTGE	-1.982861	−6.194855***	-0.149428	−3.350911*	I(1)
GDP	-2.851257	−8.491761***	-1.601079	−7.627268***	I(1)

Notes: Asterisks ***, **, and *, denotes the statistical level of significance at 1%, 5% and 10% respectively.

Lag Length Selection Criterion: Following the performance of the unit roots tests, the reduced form VAR model was estimated, and the lag length was determined through the Akaike Information Criterion (AIC) and the Final prediction error (FPE). Lag length selection is important to reduce autocorrelations in the disturbance term while capturing the dynamic interrelationship among the variables in the SVAR model. According to (Liew & Hussain, 2003), it reduces the probability of underestimation and increases the probability of recovering the true lag length when estimating a model consisting of less than 60 observations. In Table 3, all the selection criteria (the AIC, the SIC, and another selection criterion) are selected in order 8. According to Table 4, lag eight is selected by all the selection criteria. Hence, a reduced SVAR is estimated using leg eight.

Table 4: Lag Selection Criterion

Lag	LogL	LR	FPE	AIC	SIC	HNQ
0	−1081.309	*NA*	0.504	7.829	7.868	7.845
1	−919.229	319.479	0.167	6.724	6.881	6.787
2	−698.999	429.329	0.036	5.199	5.473	5.309
3	−638.852	115.951	0.025	4.829	5.222	4.987
4	−582.125	108.129	0.018	4.484	4.995	4.689
5	−427.137	292.072	0.006	3.431	4.059	3.683
6	−406.657	38.151	0.006	3.348	4.093	3.647
7	−365.644	75.511	0.005	3.117	3.980*	3.463
8	−347.768	32.525*	0.004*	3.052*	4.034	3.446*

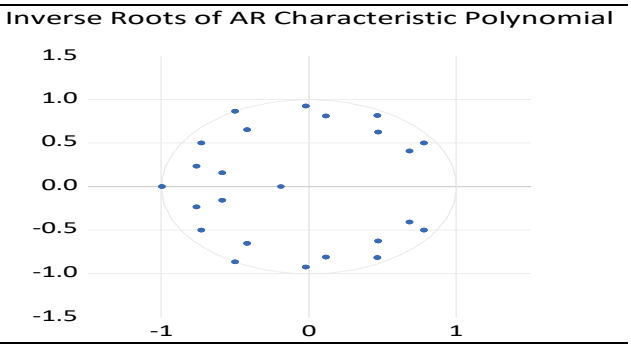
Source: own estimation.

Post-Diagnostic Tests: The Stability Tests: After the estimation of the SVAR model, post-diagnostic tests are performed to determine the stability of the model. According to Table 5, the modulus is less than one, and in Figure 2, the modulus lies within the circle; hence, the structural VAR model is stable. According to (Abrigo & Love, 2016) when the moduli are less than one and lie within the circle, the SVAR is assumed to be stable. After ascertaining the stability condition, a three-variable SVAR consisting of the fiscal variable total government tax revenue, the total government spending, and the gross domestic product is estimated.

Table 5: Modulus

Root	Modulus
-0.501358 - 0.863914i	0.998853
-0.501358 + 0.863914i	0.998853
-0.992991	0.992991
0.468581 + 0.814281i	0.939480
0.468581 - 0.814281i	0.939480
0.785308 + 0.501784i	0.931931
0.785308 - 0.501784i	0.931931
-0.017817 - 0.927583i	0.927754
-0.017817 + 0.927583i	0.927754
-0.729380 - 0.499910i	0.884254
-0.729380 + 0.499910i	0.884254
0.115616 - 0.810168i	0.818376
0.115616 + 0.810168i	0.818376
-0.763174 - 0.232878i	0.797914
-0.763174 + 0.232878i	0.797914
0.684404 - 0.408164i	0.796873
0.684404 + 0.408164i	0.796873
0.472376 + 0.624016i	0.782646
0.472376 - 0.624016i	0.782646
-0.415277 + 0.650828i	0.772031
-0.415277 - 0.650828i	0.772031
-0.587847 + 0.155270i	0.608007
-0.587847 - 0.155270i	0.608007
-0.186523	0.186523

Figure 2: Roots of Characteristic Polynomial

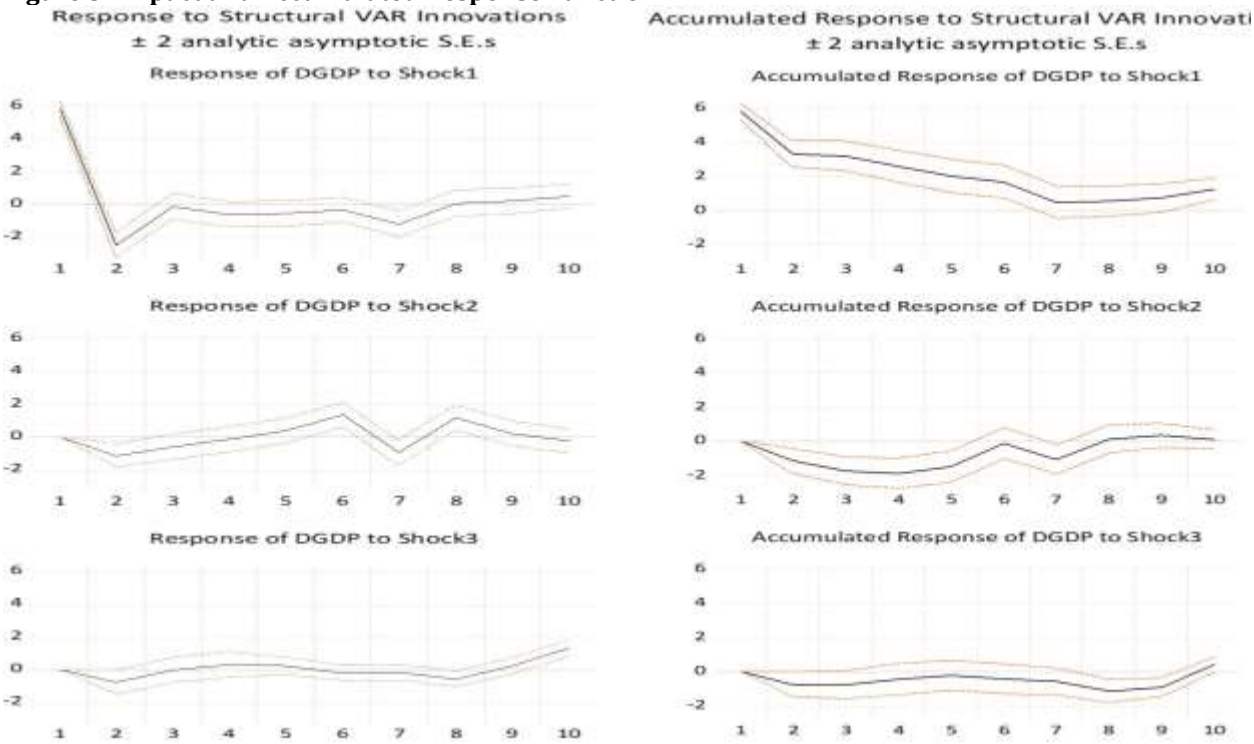


Source: own estimation.

Impulse Response Function: The impulse response function is derived from the structural VAR model. Impulse response functions are employed to examine how a one percent change in total government tax revenue or total government expenditure affects economic activity. The study examines two types of fiscal multipliers: the tax multiplier and the government spending multiplier. The impulse response function enables the interpretation of fiscal shocks to economic output as impact fiscal multipliers or accumulated fiscal multipliers.

Impulse Response of Total Government Expenditure: The impact and accumulated impulse response function have been derived from the SVAR. In Figure 3 the impact impulse response function reflects that the government expenditure multiplier is 1.3 over the period 2000M1-2023M10. The results do not align with previous empirical literature conducted in developing countries, which found the government expenditure multiplier to be less than one (Kraay, 2014; Jooste, et al., 2013). (Kraay, 2014) quantified the fiscal multipliers in South Africa and observed a decline in the fiscal multipliers from 1.5 to less than zero in 2019. The upsurge in gross domestic product in response to a one standard deviation shock of government expenditure is consistent with Wagner's Law of 1862 and the Keynesian theory of 1936.

Figure 3: Impact and Accumulated Response Function



Source: own estimation. Note: column 1is impact impulse response function, column 2 is accumulated response function, shock 2 is DLOGTAX, shock 3 is DLOGTGE.

The South African accumulated government expenditure multiplier is around 0.4, according to the accumulated impulse response function in Appendix A5. This means that a one percentage change in government expenditure induces a 0.4 upsurge in gross domestic product. The South African government expenditure multiplier is small, as it is less than one. The government expenditure is small due to the global financial crisis of 2008–2009 and the COVID-19 pandemic shocks that stimulated households' precautionary savings, resulting in a decline in the marginal propensity to consume and the size of the government expenditure multiplier (Spilimbergo, et al., 2009). Moreover, the poor performance of state-owned enterprises such as ESKOM and Transnet, the maladministration in municipalities, and the high government debt and high debt service costs negatively affect the government expenditure multiplier. The findings are consistent with (Kemp, 2020), who employed a VAR model over the period 1970–2019 to examine the fiscal multipliers in South Africa. He found the government expenditure multiplier to be less than one.

Impulse Response of Total Government Tax Revenue: The accumulated government tax revenue multiplier is 0.1 and is less than one. The results are consistent with (Kemp & Hollander, 2020), who found the tax multipliers to be less than one. Although the tax multipliers are positive, according to theory, they are significantly lower in magnitude and less than. The low tax multipliers are caused by the unsustainable surge in public debts since 2008 and the increase in debt service costs. The impact of the government tax revenue multiplier for South Africa is significantly low at -0.02, according to the impulse response function in Appendix A4. It is less than the government spending impact multiplier. Like the government expenditure multiplier, the tax revenue multiplier is less than one. The impact of the tax revenue multiplier in stimulating economic growth is compromised by the low economic growth and high rate of unemployment among the youth, which results in a shortfall in tax revenue collections. The accumulated government tax revenue multiplier is 0.1, which is less than one. The results are consistent with (Kemp & Hollander, 2020) who found the tax multipliers to be less than one. Although the tax multipliers are positive, according to theory, they are significantly lower in magnitude and less than. The low tax multipliers are caused by the unsustainable surge in public debt since 2008 and the increase in debt service costs.

Forecast Error Variance Decomposition: According to Table 5, shock 1 represents the lag DGDP disturbance term, shock 2 represents DLOGTAX, and shock 3 represents DLOGTGE. A one percent standard deviation shock of DLOGTAX causes a 3.14 percent increase in economic growth from period two to period four. As the number of periods increases over time, the one standard deviation shock of DLOGTAX induces an upswing of 11.87 in DGDP. This means that the National Treasury may increase the wealth tax to increase tax revenue that can be spent on infrastructure projects that will foster economic growth.

Table 5: Forecast Error Variance Decomposition

Period	S.E	DGDP	DLOGTAX	DLOGTGE
1	5.805	100.000	0.000	0.000
2	6.458	95.494	3.140	1.365
3	6.486	94.702	3.943	1.354
4	6.525	94.471	3.939	1.590
5	6.5.64	94.067	4.241	1.692
6	6.718	90.059	8.239	1.702
7	6.892	88.621	9.708	1.671
8	7.015	85.546	12.190	2.264
9	7.026	85.380	12.254	2.366
10	7.173	82.412	11.871	5.718

Source: own estimation.

However, an autonomous change in government spending causes a 1.36 percent upsurge in economic growth in the short run and a 5.7 percent increase in the long run. The positive impact of a one-standard-deviation shock on government spending highlights the importance of government spending, especially in infrastructure, to stimulate the economy. The South African economy grew at 1.6 percent in 2023, which was below the global economic growth of 2.9 percent, (Figure 1). Although government expenditure and total government tax revenue positively affect economic growth, fiscal policy has been ineffective in stimulating the economy, given the binding constraints to economic growth in South Africa. Moreover, the persistent youth unemployment, budget deficit, and high government debt call for structural restructuring of the two major SOEs, Transnet and ESKOM which are primarily responsible for the logistics and energy sectors, respectively. The turnaround in these institutions will contribute to stabilizing the weakened fiscal balance.

5. Conclusion and Policy Recommendations

The study has explored the fiscal multipliers, especially the government expenditure and tax revenue multipliers, in the South over the period 2000M1-2023M10. The SVAR model has been estimated, and the control variables include total government spending and total government tax revenue. According to most empirical literature, the fiscal multipliers have been declining in South Africa to almost zero, comprising austerity measures to stabilize the budget deficit and the runaway public debt. The findings suggest that the accumulated government spending multiplier and the total government tax revenue multiplier are 0.4 and 0.1,

respectively. The estimated results are consistent with other empirical literature, as fiscal multipliers are less than one. Unlike in South Africa, fiscal multipliers in Asian and developed countries are more than one. The research findings support Keynesian theory that the government must support the economy during recession periods.

In the South African context, this can be achieved through strategic investments in logistics, energy, and education, which are likely to improve macroeconomic indicators considerably. This well-targeted government spending is instrumental for the economy's efficiency and productivity, which could lead to higher fiscal multipliers and sustainable economic development. The findings of this research point to some key policy recommendations to improve the fiscal multipliers and economic growth in South Africa. First, there is a very urgent need to reorient government spending towards long-term investment in productive sectors, such as education and infrastructure, to boost economic growth and development. Second, the government has to be more effective and efficient in spending to impact economic growth positively. Third, it is crucial to implement targeted structural reforms in the logistics, energy, and educational sectors. This is necessary to remove existing obstacles and constructively address policies to increase productivity and create the appropriate environment to attract investment. These reforms should aim to create a business-friendly setting that promotes job growth and innovation, thus improving the various impacts on economic growth and fiscal policy.

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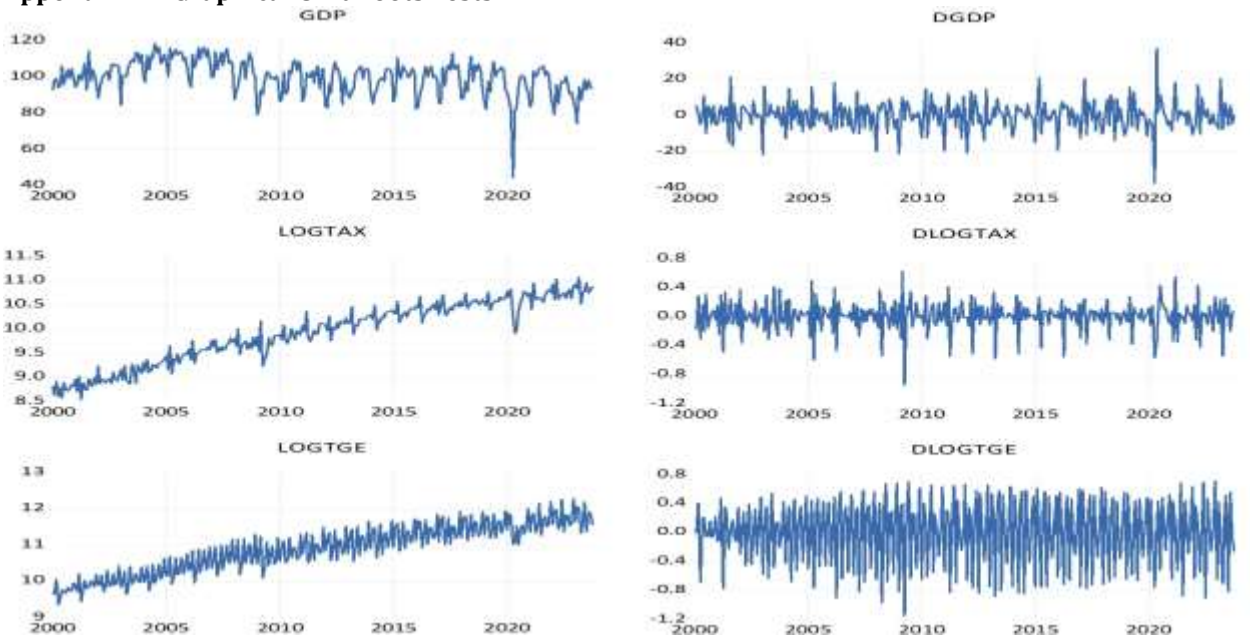
Appendix A1: Graphical Unit Roots Tests



Appendix A2: The Structural VAR Model

Structural VAR Estimates
Date: 04/04/24 Time: 11:45
Sample (adjusted): 2000M10 2023M10
Included observations: 277 after adjustments
Estimation method: Maximum likelihood via Newton-Raphson (analytic derivatives)
Convergence achieved after 26 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I

A =

1	0	0
C(1)	1	0
C(2)	C(3)	1

B =

C(4)	0	0
0	C(5)	0
0	0	C(6)

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	-0.001619	0.001222	-1.324851	0.1852
C(2)	0.001121	0.000868	1.291519	0.1965
C(3)	-0.611920	0.042563	-14.37677	0.0000
C(4)	5.804908	0.246627	23.53720	0.0000
C(5)	0.118044	0.005015	23.53720	0.0000
C(6)	0.083621	0.003553	23.53721	0.0000

Log likelihood -387.0693

Estimated A matrix:

1.000000	0.000000	0.000000
-0.001619	1.000000	0.000000
0.001121	-0.611920	1.000000

Estimated B matrix:

5.804908	0.000000	0.000000
0.000000	0.118044	0.000000
0.000000	0.000000	0.083621

Estimated S matrix:

5.804908	0.000000	0.000000
0.009397	0.118044	0.000000
-0.000760	0.072233	0.083621

Estimated F matrix:

1.731602	-0.659371	-0.431307
0.011699	0.024672	0.001374
0.010317	0.019387	0.019381