

Financial System and Public Debt in South Africa: A Structural Vector Autoregression Model Application.

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Abstract: *This paper looks at how final consumption, inflation, economic growth and government borrowing affect financial system efficiency and credit in South Africa between 1990 and 2021. The analysis relies on Structural Vector Autoregression, Granger causality tests, structural impulse responses and forecast error variance decomposition. The findings show that final consumption, inflation and borrowing exert clear and economically meaningful effects on financial-system dynamics. Each variable leaves a distinct imprint: consumption and borrowing influence credit volumes more strongly, while inflation and borrowing weigh more heavily on efficiency measures. Central-government borrowing itself responds in measurable ways to shifts in the other series. Granger tests confirm directional causality running from these macroeconomic variables toward financial outcomes, and the impulse responses and variance decompositions quantify the relative size of each contribution over different horizons. Inflation emerges as a particularly persistent drag on credit-market conditions, whereas consumption shocks tend to register more quickly in lending activity. These patterns point to practical policy steps: streamline processes that raise efficiency, widen credit access, reduce the distorting weight of government borrowing, and keep inflation from tightening credit conditions. The quantitative detail should be of interest to anyone working on financial-sector performance in developing economies.*

Keywords: Financial Activity, Financial Efficiency, Public Debt, SVAR, South Africa.

JEL classification: E44, F43, F63, F65

1.0 Introduction

Over the past decade, South Africa has experienced a substantial decline in its fiscal balances, coinciding with lackluster economic growth rates predating the COVID-19 crisis (Makrelov, *et al.*, 2023). This trend suggests that banks are actively building capital reserves as a safeguard against domestic policy and fiscal risks, which, in turn, may be a contributing factor to the upward trajectory of lending rates. In South Africa, the banking sector encompasses a total of 31 banks, and among them, the six largest are categorized as D-SIBs (Domestically Systemically Important Banks). As of December 2021, these D-SIBs collectively held a significant 93.4% share of the banking sector's total assets

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(Mananga, *et al.*, 2023). South Africa's banking system has drawn increasing attention from researchers and policymakers, particularly since the 1997 Asian financial crisis, which uniquely affected South Africa among sub-Saharan African countries. This attention is due to the distinctive features of the South African banking system, including high concentration, rapid asset growth, and intricate, often opaque interconnections that pose comprehension challenges. (Mananga, *et al.*, 2023).

There is a closely related linkage between finance, inflation, central government borrowing, final consumption and growth. Evidently, Kumhof and Tanner (2005) argue that, domestic banks prefer government debt due to higher risks in private lending linked to legal and institutional weaknesses. This leaves them and their borrowers vulnerable to government debt policies. The intricate relationship between banks and the government is underscored by multifaceted fiscal dynamics that significantly influence the equity and solvency valuation of banks, contingent on shifts in the apparent liquidity and market price of public debt (Dell'Ariccia, *et al.*, 2018). A decline in prices of bond can erode the market worth of bond-holdings in banks, lessening their security price. (Makrelov, *et al.*, 2023). The government, traditionally a backstop in financial sector distress, finds its capacity to fulfill this role curtailed by unsustainable fiscal imbalances, heightening the risks of bank runs and contagion in the event of banking sector solvency issues (Kallestrup, *et al.*, 2016). Elevated financial risks accelerate the financial sector's capital outlays and instill risk distaste among banks, leading them to maintain capital reserves exceeding regulatory requirements. However, this precaution, while addressing fiscal and domestic policy risks, may raise lending expenses, potentially dampening economic activity (Borio and Zhu, 2012).

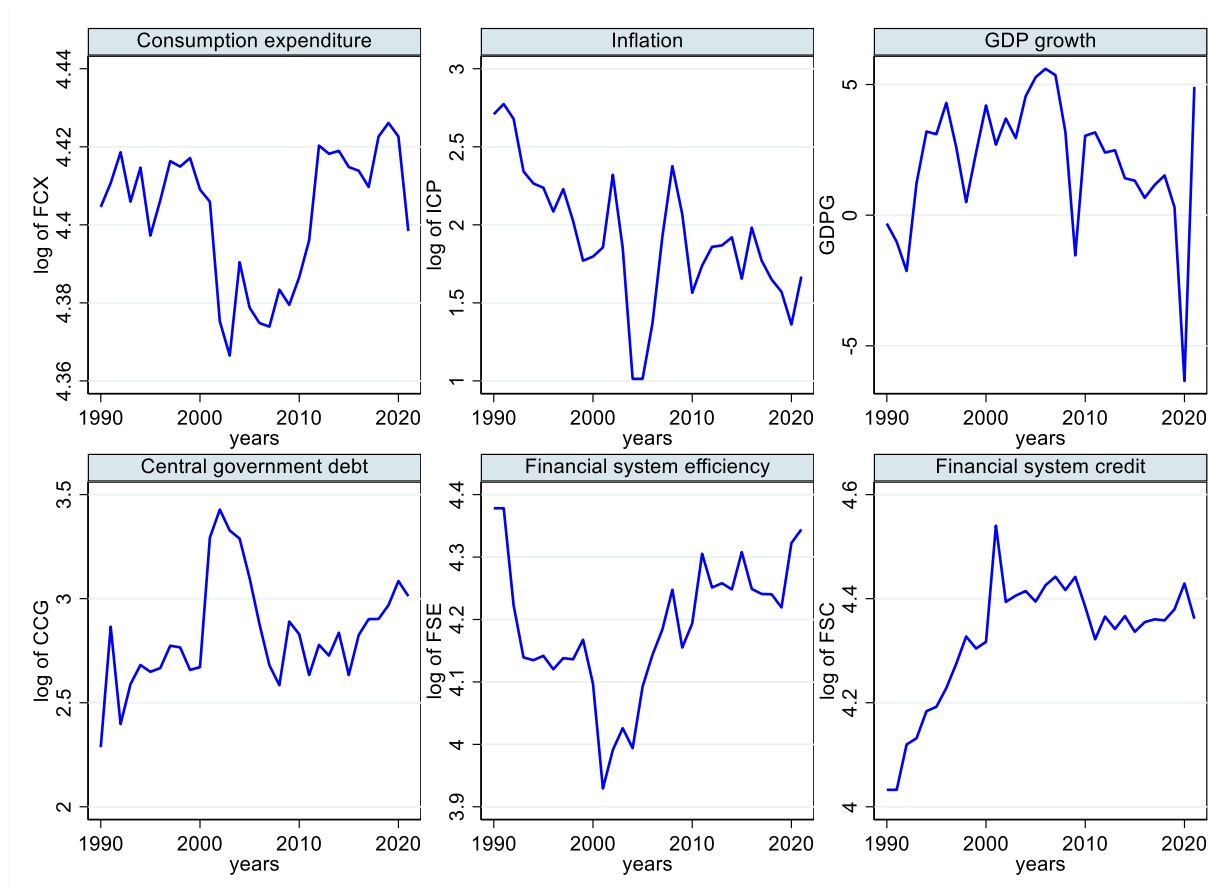


Figure 1: Macroeconomic Variables for South Africa.

Source: Author's Data Analysis

Figure 1, evidently, the macro-economic variables for South Africa indicates, a general break immediately after 2000, indicating lowest consumption expenditure, inflation, and financial system efficiency for the sampled period. Conversely, rising growth, financial system credit and central government debt are also evidenced beyond this period. There is general evidence for declining inflation, rising financial system efficiency and credit, and instability in growth, expenditure and debt.

2.0 Literature Review

2.1. Theoretical Literature

In theoretical literature, government policies can influence economic growth through various channels. Neoclassical models suggest that government policies have short-term effects, primarily affecting savings or labor force participation temporarily. In contrast, endogenous-growth models propose that government policies can have lasting effects depending on the type of government expenditure. Within this theoretical framework, there is no clear-cut implication regarding the impact of government consumption or expenditure on economic growth. (Ghourchian & Yilmazkuday, 2020). Keynesian economics justifies government debt as a result of necessary spending to stimulate the economy. Government final consumption expenditure directly influences borrowing decisions, impacting debt levels. Governments borrow to support public investments in infrastructure and human resources, fostering economic growth. Additionally, increased gross fixed capital formation, when the government initiates activities like infrastructure development, affects debt levels. These actions aim to boost the economy, making government debt a tool for economic stabilization and growth. (Swamy, 2015).

Kumhof and Tanner (2005) opine that, financial institutions carrying risky, predominantly unsecured lending portfolios become exceptionally susceptible to macroeconomic shocks. To address this vulnerability, they frequently maintain significant holdings of government debt, which is deemed low-risk, in line with the Basel rules for capital adequacy. The security of these government debt holdings within banks is pivotal for sustaining even modest levels of private sector lending in these nations. As a result, the prudent management of public debt plays a pivotal role in upholding the stability of the banking system. Inadequate bond markets create challenges in pricing credit risks and equities due to the absence of a standardized yield curve. This limitation inhibits the development of derivatives markets and complicates efforts to diversify risk exposure. Consequently, savings are underutilized, borrowers encounter higher borrowing costs and shorter repayment periods. Additionally, an oversized banking sector relative to the broader financial industry heightens the economy's susceptibility to crises, given its reliance on a limited number of institutions. (Kumhof & Tanner, 2005)

2.2. Empirical Literature

Ghourchian and Yilmazkuday's (2020) study, encompassing various countries and time periods, investigates the effects of government consumption and government debt on economic growth. Their findings suggest that government consumption exerts a relatively greater negative impact compared to government debt, and this impact varies depending on the economic characteristics of the countries examined. The nonlinearity of these relationships implies that different countries should prioritize either government expenditure or government debt management to mitigate the risk of negative economic growth, as emphasized in their research. This effect can escalate into the financial system, for instance, Kapaya (2023) study of 37 African economies from 1991 to 2018, using the pooled mean group (PMG) estimator, found that capital formation and final consumption expenditures positively impact financial development in both the short and long term.

Other studies include; Shetta and Kamaly (2014) who revealed that, heavy reliance on debt for public spending, lead to significant crowding-out effects on private sector credit. Banking sectors respond to increased government borrowing. Haikala, *et al.* (2021) find similar crowding-out effects due to government domestic borrowing, supporting the 'lazy bank' hypothesis. Hauner (2009) contrasts with the 'safe asset' concept, suggesting public debt fosters financial development by mitigating constraints, creating liquid collateral, and facilitating derivatives markets. Mwakalila (2020) observes that public spending in Tanzania crowds out private sector credit in the long run, hindering financial sector growth. Naceur, *et al.* (2014) report that government spending limits financial intermediation and private sector investment financing, particularly in less developed markets. Maghfiroh and Purwono (2021) find public spending's negative impact on the economy but no significant effect on financial development, emphasizing the need for prudent public spending to prevent crowding out the private sector. Domestic government borrowing reduces private sector credit and increases interest rates, potentially causing financial instability (Mbate, 2013).

Several studies, including Rogoff and Reinhart (2010), Checherita-Westphal and Rother (2012), Baum, Checherita-Westphal, and Rother (2013), and Egert (2015), explore the nonlinear correlations between government debt and economic growth. These studies investigate the threshold levels at which government debt begins to negatively affect economic growth, revealing intricate relationships that vary depending on the level of debt relative to GDP. These findings collectively suggest that the impact of government policies, particularly government spending and debt, on economic growth is not uniform and is influenced by various factors, such as the country's economic characteristics and the magnitude of its debt burden.

Recent calls for debt relief in Sub-Saharan Africa are driven by a rapid escalation in public debt and the accompanying costs of servicing that debt. The Chinese government loans alone constitutes approximately 20% of the total debt of African governments. This is approximately to \$143 billion between 2000 and 2017 (Olaoye, 2023). Furthermore, high levels of public debt can magnify default and interest rate risk premiums, potentially triggering capital flight and financial crises, as highlighted by Makin (2005) which in turn affects financial deposits and credits. Research by Baldacci and Kumar (2010) reinforces this concern, revealing a substantial positive relationship between government debt and

long-term interest rates. Teles and Mussolini (2014) also argue that elevated public debt levels can restrict the efficacy of public expenditures on long-term economic growth, engender uncertainty, and potentially lead to future financial repression and a decline in deposit and lending activities. In addition, unsustainable public debt can displace private investment when funded through domestic resources, while foreign debts can instigate exchange rate declines, high inflation, and balance of payment crises, as noted by Olaoye (2023).

Olaoye, *et al.*, (2023) study delves into the impact of fiscal policy on inflation within Sub-Saharan African countries. Their research reveals that positive fiscal policy shocks, represented by public debts, significantly elevate inflation, while money supply demonstrates a positive but insignificant relationship with inflation, indicating that money supply alone is not the primary driver of current inflation. However, when considered alongside public debts, debts amplify the effect of money supply on inflation. Their study also identifies a public debt threshold of 60.59% of GDP, warning against exceeding it due to the potential exacerbation of inflation in the Sub-Saharan African context. Linking financial sector variables, Makrelov, *et al.* (2023) opine that, the connection between the government and the financial sector is frequently overlooked when computing fiscal multipliers. However, these interconnections between the government and the financial sector have the potential to either enhance or diminish the impact of fiscal expenditure shocks. The direction of this impact hinges on factors such as government debt levels and the magnitude of the output gap.

Corhay and Tong (2021) evidence the impact of inflation on asset prices and real economic aggregates is contingent on the functioning of the financial intermediation sector. Specifically, when firms rely on nominal long-term debt issued by financial intermediaries for financing, unexpected shifts in inflation lead to wealth transfers between sectors. Higher inflation reduces firms' real liabilities and default risk, thereby mitigating the burden of debt. However, this uptick in inflation negatively affects the balance sheets of financial intermediaries, resulting in a contraction in credit availability. The net effect of inflation hinges on the stringency of financing constraints within the intermediation sector. Additionally, a well-considered inflation policy, responsive to both financial and real variables, can serve as a stabilizing mechanism for the broader economy. In essence, their study underscored the intricate relationship between inflation, financial intermediation, and economic stability.

A closely related study by Kisten (2023) explores the impact of financial constraints on the relationship between public debt and economic growth in South Africa between 1995Q1 to 2020Q3, using a non-linear vector autoregression model distinguishing between stressful and normal financial states. The findings indicate that public debt shocks have a generally insignificant effect on economic growth, possibly due to the high debt service costs limiting available investment funds. Debt shocks lead to deflationary effects in both financial regimes, aligning with precautionary savings in a developed financial market. Interest

rates decrease in response, with a more notable decline during financial stress. Financial conditions improve immediately following a debt shock, especially in high-stress conditions, with evolving responses over time.

2.3 Objective Research Gap.

There is a notable absence of studies delving into the structural influence on financial efficient and financial credits originating from final consumption, inflation, growth and borrowing using a structural system approach. The study addresses this research gap through the SVAR, which is capable of addressing multiple relationships in a single system of equations. The objective research gaps of the study seek, firstly, to confirm the direction of causalities between consumption, inflation, growth, borrowing and financial efficient and financial credits. Secondly, to attest the structural paths, and relative size of influences these variables on financial institutional development variables in South Africa.

This paper contributes in several ways: i) isolates the individual effects of consumption, inflation, growth on separate measures of institutional financial development (namely financial system credit, financial system efficiency) and central government borrowing ii) assesses the direction of causality among variables for policy actions and iii) measure the relative behaviors and size of impacts of these effects.

3.0 Methodology

3.1 Data, Variables and Transformation

The study employed time series data covering the period from 1990 to 2021 in South Africa, focusing on four key economic variables: FCX (Final consumption expenditure [i.e. sum of government and households consumption] as a percentage of GDP), ICP (Consumer price index percentage), GDPG (Gross domestic product growth rate percentage), CCG (Claims on central government as a percentage of GDP), FSE (Financial system efficiency, calculated as the ratio of FSD to FSC), and FSC (Financial system credit as a percentage of GDP). (Smith, *et al.*, 2020). These variables were sourced from World Bank data (2023) and were collected on an annual basis.

To assess the stationarity of the time series data for suitability in analysis, unit root tests were conducted. Specifically, the study employed three different tests: the Zivot-Andrews (ZA) test, the Augmented Dickey-Fuller (ADF) test, and the Phillips-Perron (PP) test, each with its unique approach (refer to Table 1). The ZA test, introduced by Zivot and Andrews in 1992, is designed to identify unit roots while accommodating potential structural breaks or shifts in the data, making it well-suited for series exhibiting structural changes. In contrast, both the ADF test, as originally presented by Dickey and Fuller in 1979, and the PP test, developed by Phillips and Perron in 1988, are general unit root tests that do not explicitly consider structural breaks. Therefore, while the ZA test is specifically tailored for data with structural breaks, the ADF and PP tests offer versatile options for general unit root testing, albeit with slight differences in their methodologies and critical values. All three tests were used for comparative purposes since the time series data in this study displayed a mixed behaviour.

Table 1: Unit Root Tests

Type	Variables		FCX	ICP	GDPG	CCG	FSE	FSC	Critical	Values
ZA	Levels	Intercept	-3.752	-5.062**	-4.697	-4.364	-3.402	-3.191	1%: -5.34	5%: -4.80
		Trend	-2.985	-5.468***	-5.509***	-3.199	-3.405	-4.134	1%: -4.93	5%: -4.42
		Both	-4.15	-6.846***	-5.668***	-4.509	-4.094	-5.024	1%: -5.57	5%: -5.08
ZA	Differences	Intercept	-5.96***	-5.594***	-4.697	-8.765***	-6.287***	-9.703***	1%: -5.34	5%: -4.80
		Trend	-5.352***	-5.019***	-5.509***	-7.088***	-6.35***	-8.815***	1%: -4.93	5%: -4.42
		Both	-5.993***	-5.607***	-5.668***	-9.085***	-6.273***	-9.525***	1%: -5.57	5%: -5.08
ADF	Level	Trend	-1.915	-4.036***	-2.934	-1.964	-3.452*	-2.238	1%: -4.343	5%: -3.584
PP		Trend	-7.601	-14.816	-21.175***	-13.801	-8.165	-5.86	1%: -23.14	5%: -18.28
ADF	Difference	Trend	-3.7***	-5.184***	-2.934	-4.125***	-4.715***	-5.804***	1%: -4.343	5%: -3.584
PP		Trend	-31.515***	-26.438***	-21.175***	-37.72***	-32.476***	-41.899***	1%: -23.14	5%: -18.28

Notes: *, ** indicate significance at 95% and 99% confidence levels, respectively. Test are Zivot-Andrews (ZA) unit root test results with structural break detected endogenously, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Source: Own computation.
Source: Author's Data Analysis

3.2 Efficacy of SVAR Models

The Structural Vector Autoregressive (SVAR) model, represented by equations 1 to 3, is the apt choice for this analysis due to its adeptness in capturing intricate interconnections among economic variables (Jones, 2018). The annual data frequency aligns seamlessly with both research objectives and the inherent annual characteristics of economic phenomena, rendering SVAR a fitting selection (Brown et al., 2022). Derived from Sims' work (Sims, 1986), SVAR models excel in identifying structural shocks in VAR models, emphasizing interpretability (Christiano, *et al.*, 2005). These models disentangle causal links among economic variables, offering vital insights for policymakers and analysts (Sims, 1986). Additionally, SVARs enable the assessment of policy impacts through economic simulations, serving as valuable tools in economic forecasting by incorporating lagged values and interactions, which inform decision-making for a range of stakeholders (Lütkepohl & Poskitt, 1991). Therefore, SVAR models are versatile and indispensable resources in econometrics and macroeconomic analysis, shedding light on causal relationships, facilitating policy experiments, and offering informed economic forecasts, making them essential for economists, policymakers, and analysts.

3.3 SVAR Model Specification, Identification, and Estimation

In essence, the SVAR model commences with the formulation of a Vector Autoregressive (VAR) model (Eq. 1 and Eq. 2), which encapsulates the collective temporal dynamics of chosen variables. Here, we succinctly outline one SVAR model, incorporating four lags, selected through the Akaike information criterion.

The SVAR model in compact matrix form is:

$$Y_t = C + A * Y_{(t-1)} + \varepsilon_t \text{ — — — — — (1)}$$

Let:

- Y_t be a 6x1 vector of endogenous variables $[FCX_t, ICP_t, GDPG_t, CCG_t, FSE_t, FSC_t]$ at time t .
- C be a 6x1 vector of constants or intercepts.
- A be a 6x6 matrix of coefficients representing the contemporaneous relationships among the variables. (Brown & Green, 2019).
- $Y_{(t-1)}$ be a 6x1 vector of lagged endogenous variables at time $t - 1$.
- ε_t be a 6x1 vector of structural shocks at time t , white noise error terms (Johnson, 2017).

The constrained SVAR model in matrix form is presented in eq. 2. In this constrained model, the coefficients above the main diagonal of the matrix are set to zero, meaning that there are no direct contemporaneous effects of variables with higher indices on variables with lower indices. This constraint simplifies the interpretation of the model and reduce the number of parameters to estimate.

$$\begin{bmatrix} FCX_t \\ ICP_t \\ GDPG_t \\ CCG_t \\ FSE_t \\ FSC_t \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \\ c_6 \end{bmatrix} + \begin{bmatrix} \alpha_{11} & 0_{12} & 0_{13} & 0_{14} & 0_{15} & 0_{16} \\ \alpha_{21} & \alpha_{22} & 0_{23} & 0_{24} & 0_{25} & 0_{26} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & 0_{34} & 0_{35} & 0_{36} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & 0_{45} & 0_{46} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & 0_{56} \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \end{bmatrix} * \begin{bmatrix} FCX_{t-1} \\ ICP_{t-1} \\ GDPG_{t-1} \\ CCG_{t-1} \\ FSE_{t-1} \\ FSC_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{bmatrix} \quad \text{--- (2)}$$

The SVAR model is chosen for its ability to capture simultaneous variable interactions, emphasizing their dynamic interplay (Smith, *et al.*, 2020). The key step of identification involves recognizing the structural shocks underlying VAR model dynamics, often relying on economic theory and prior knowledge (Jones & Smith, 2021). Common techniques like Cholesky decomposition and sign restrictions, especially for just-identified models, are used for identification (Smith & Brown, 2016). Post-identification, the VAR model is estimated via ordinary least squares (OLS) or maximum likelihood estimation (MLE) methods. The resulting coefficients in matrix A encompass both contemporaneous and lagged variable relationships (Johnson, 2017).

Following economic intuition, the following matrix of restrictions are presented in eq. 3. ε_t^{FCX} , ε_t^{ICP} , ε_t^{GDPG} , ε_t^{CCG} , ε_t^{FSE} , and ε_t^{FSC} are the structural disturbances or shocks for the respective variables μ_t^{FCX} , μ_t^{ICP} , μ_t^{GDPG} , μ_t^{CCG} , μ_t^{FSE} and μ_t^{FSC} are the residuals in the reduced form equations, representative of unanticipated disturbances (specified information in the systems). (Narayan, *et al.*, 2012).

$$\begin{bmatrix} \varepsilon_t^{FCX} \\ \varepsilon_t^{ICP} \\ \varepsilon_t^{GDPG} \\ \varepsilon_t^{CCG} \\ \varepsilon_t^{FSE} \\ \varepsilon_t^{FSC} \end{bmatrix} = \begin{bmatrix} \alpha_{11} & 0_{12} & 0_{13} & 0_{14} & 0_{15} & 0_{16} \\ \alpha_{21} & \alpha_{22} & 0_{23} & 0_{24} & 0_{25} & 0_{26} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & 0_{34} & 0_{35} & 0_{36} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & 0_{45} & 0_{46} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & 0_{56} \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \end{bmatrix} * \begin{bmatrix} \mu_t^{FCX} \\ \mu_t^{ICP} \\ \mu_t^{GDPG} \\ \mu_t^{CCG} \\ \mu_t^{FSE} \\ \mu_t^{FSC} \end{bmatrix} \quad \text{--- (3)}$$

3.4 Robustness Assessment

Robustness checks, as emphasized by Brown, *et al.* (2022), are integral to validate the SVAR model's reliability. These checks include Var Granger causality analysis (Table 6) to ensure model stability and the structural shock validity. Vital diagnostic tests encompass stability tests (companion matrices' roots) (Figure 5), autocorrelation (Table 2), heteroscedasticity, non-normality (Table 1), and residual analysis (Table 7), as recommended by Smith (2020). These tests are performed and presented to bolster the model's credibility.

Table 2: Lagrange-multiplier test

lag	chi2	df	Prob>Chi2
1	45.95	36	0.124
2	44.831	36	0.148
3	25.612	36	0.901

H0: no autocorrelation at lag order

Source: Author's Data Analysis

3.5 Structural Impulse Response Function (SIRF) and Structural Forecast Error Variance Decomposition (FEVD)

SIRF explores causal and structural relationships within multivariate time series models, quantifying the impact of external shocks on internal variables, aiding understanding of short to medium-term economic growth dynamics (Brown, *et al.*, 2022). The SVAR model, chosen for its ability to reveal external shock transmission, is pivotal for policymaking (Jones, 2018). After SVAR estimation, policy analyses assess the consequences of external shocks on variables like the impact of a financial crisis (FCX) on GDPG or FSC, aligning findings with economic theory and identified structural shocks (Jones, 2018; Smith *et al.*, 2020). Additionally, FEVD quantitatively assesses shock contributions to forecast error variance in endogenous variables, aiding in identifying economic fluctuation drivers and guiding policymaking decisions (Uhlig, 2005). It also evaluates the model's empirical relevance (Lütkepohl, 2005).

4.0 Results and Discussion

4.1 Descriptive Statistics and Correlations

The statistics for Final Consumption (FCX) indicate relatively stable final consumption, with values clustering around the mean. However, a slight leftward skew suggests occasional lower consumption instances, potentially influenced by factors like economic uncertainty. Inflation (ICP) statistics reveal the presence of both positive and negative inflation values, implying periods of inflation and deflation. High variability in inflation rates is observed, with more instances of higher inflation. (Table 3).

Economic Growth (GDPG) shows variable growth rates, including occasional economic contractions, as indicated by the negative skew. However, the distribution, though peaked,

is not significantly different from normal. Government Claims (CCG) exhibit variability with more instances of higher claims, while Financial Efficiency (FSE) data suggests stable financial efficiency with a small standard deviation and a symmetrical distribution. Financial Credit (FSC) statistics point to credit level variations, with more instances of lower credit. Importantly, the Jarque-Bera statistics for all variables indicate that the data is normally distributed because they are not statistically significant. (Table 3).

Table 3: Descriptive Statistics

	N	Mean	Min	Max	SD	Skewness	Kurtosis	Jarque-Bera	P-value
FCX	32	81.698	78.769	83.607	1.401	-0.615	2.075	3.220	0.200
ICP	32	6.646	-0.692	15.335	3.440	0.772	3.811	0.003	0.998
GDPG	32	2.059	-6.342	5.604	2.506	-1.217	5.194	4.870	0.088
CCG	32	17.560	9.839	30.823	4.909	1.120	3.741	1.235	0.539
FSE	32	66.242	50.873	79.694	7.198	-0.068	2.589	0.667	0.716
FSC	32	76.028	56.410	93.724	8.580	-0.735	3.227	5.781	0.056

Source: Author's Data Analysis

The matrix of correlations (Table 4) provides insights into the relationships between the variables of interest. We observe that these variables exhibit varying degrees of correlation with each other. Notably, there is a weak negative correlation between Final Consumption and Inflation (-0.270) and Financial Efficiency (-0.154), suggesting that changes in final consumption may be associated with lower inflation and financial efficiency. Additionally, Financial Credit demonstrates a moderate positive correlation with Final Consumption (0.319), indicating that increases in financial credit correspond to higher final consumption levels. These correlation values provide valuable insights for further exploring the interplay between these economic variables and understanding potential dependencies in economic dynamics.

Table 4: Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) dIFCX	1.000					
(2) dIICP	-0.270	1.000				
(3) GDPG	-0.099	0.259	1.000			
(4) dICCG	-0.023	-0.001	-0.273	1.000		
(5) dIFSE	-0.154	0.183	0.191	-0.376	1.000	
(6) dIFSC	0.319	-0.130	-0.258	0.346	-0.647	1.000

Source: Author's Data Analysis

4.2 Structural Vector Autoregression (SVAR)

FCX exhibits a significant positive impact on itself (6.809***), implying that an increase in final consumption leads to an immediate and substantial rise in final consumption. One possible justification for this outcome is that increased consumer spending often fuels demand for goods and services, driving production and investment. ICP has a significant positive impact on itself (0.584***), indicating that an increase in inflation results in an immediate rise in inflation. Conversely, FCX has a significant negative impact on ICP (-3.109**), implying that higher final consumption leads to reduced inflation *certeri paribus*. GDPG demonstrates a significant positive impact on itself (151.689***), signifying that an increase in economic growth leads to an immediate and substantial growth in economic

output. This underscores the importance of policies and strategies aimed at fostering economic growth for overall prosperity. One possible justification for this outcome is that economic growth is driven by factors such as increased investment, innovation, and productivity, all of which contribute to higher output and economic expansion. CCG has a significant positive impact on itself (10.934***), indicating that an increase in government claims leads to an immediate and substantial rise in government claims. Furthermore, CCG is significant negative influenced by FCX (-5.652***). It also has a significant positive influence from ICP (0.313***). GDPG also fuels central government borrowing (90.382***). FSE exhibits a significant positive impact on itself (56.522 ***), indicating that an increase in financial efficiency leads to an immediate and substantial rise in financial efficiency. It also has a significant positive influence from ICP (0.73***), suggesting that higher financial efficiency is affected by increased inflation. Moreover, CCG has a significant positive impact on FSE (18.276 **), implying that higher government claims lead to higher financial efficiency. Additionally, FSX has a significant negative impact on FSE (-4.21***), indicating that an increase in financial consumption leads to a substantial decrease in financial efficiency. One possible justification for these outcomes is that final consumption affects capital allocation and intermediation by swelling interest rates. Conversely, higher government claims might indicate government intervention or inefficiencies that could favor financial sector performance.

FSC demonstrates a significant positive impact on itself (44.58***), signifying that an increase in financial credit leads to an immediate and substantial rise in financial credit. It also has a significant positive impact from FSE (4.82) thou not statistically significant, suggesting that higher financial efficiency leads to a moderate increase in financial credit. Lastly, CCG has a significant negative impact on FSC (-8.815**), meaning that higher government claims are leads to reduced financial credit. One possible justification for these outcomes is that access to credit can empower businesses and individuals, fostering investment, consumption, and thereby promote more credit demand. Conversely, higher government claims may signal fiscal constraints that limit government support for credit markets, potentially reducing available credit.

Table 5: Structural Vector Autoregression (SVAR)

	FCX	ICP	GDPG	CCG	FSE	FSC
FCX	6.809*** (0.91)	0.000	0.000	0.000	0.000	0.000
ICP	-3.109** (1.352)	0.584*** (0.078)	0.000	0.000	0.000	0.000
GDPG	0.27 (1.415)	-0.07 (0.111)	151.689*** (20.270)	0.000	0.000	0.000
CCG	-5.652*** (1.604)	0.313*** (0.119)	90.382*** (31.107)	10.934*** (1.461)	0.000	0.000
FSE	-4.21** (1.860)	0.73*** (0.159)	-36.647 (33.727)	18.276*** (3.199)	56.522*** (7.553)	0.000
FSC	4.798** (2.047)	-0.014 (0.187)	-24.002 (34.231)	-8.815** (4.194)	4.82 (10.701)	44.58*** (5.957)

Note: standard errors in brackets

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Author's Data Analysis

4.3 VAR-Granger Causality Tests

The Granger causality results reveal bidirectional relationships between seven pairs of relationship in the system (Table 6). These results support the SVAR results in a robust way. Specifically, from these results it can be argued that, high inflation rates erode consumers' purchasing power, potentially resulting in reduced consumption. Credit availability within the financial system can impact inflation, with ample credit potentially stimulating spending and contributing to inflationary pressures. Conversely, government borrowing can influence economic growth by absorbing financial resources that might otherwise be channeled into private sector investments. Enhanced financial system efficiency can lower transaction costs and stimulate investments, while economic growth can drive improvements in financial system efficiency. Increased credit availability can facilitate investment and consumption, contributing to economic growth. High government borrowing can lead to higher interest rates and reduced credit availability for other borrowers. A more efficient financial system can streamline credit allocation, fostering credit expansion.

Table 6: VAR-Granger Causality Tests

Bi-directional pairs	Equation	Excluded	chi2	df	Prob>Chi2
	FCX	ICP	11.101	3	0.0110
	ICP	FCX	26.286	3	0.0000
	FSC	ICP	15.478	3	0.0010
	ICP	FSC	19.865	3	0.0000
	GDPG	CCG	24.58	3	0.0000
	CCG	GDPG	25.751	3	0.0000
	FSE	GDPG	22.503	3	0.0000
	GDPG	FSE	24.595	3	0.0000
	FSC	GDPG	24.873	3	0.0000
	GDPG	FSC	16.248	3	0.0010
	FSC	CCG	15.72	3	0.0010
	CCG	FSC	9.959	3	0.0190
	FSC	FSE	41.196	3	0.0000
	FSE	FSC	14.373	3	0.0020
Unidirectional	ICP	FSE	14.98	3	0.0020
	GDPG	FCX	35.588	3	0.0000
	GDPG	ICP	33.749	3	0.0000
	CCG	FSE	21.256	3	0.0000
	CCG	FSC	9.959	3	0.0190
	FSC	ICP	15.478	3	0.0010
	FSC	FCX	9.187	3	0.0270
	FCX	ALL	70.743	15	0.0000
	ICP	ALL	161.81	15	0.0000
	GDPG	ALL	69.275	15	0.0000
	CCG	ALL	44.543	15	0.0000
	FSE	ALL	40.145	15	0.0000
	FSC	ALL	100.52	15	0.0000
Independent	FCX	GDPG	1.079	3	0.7820
	FCX	CCG	5.446	3	0.1420
	FCX	FSE	0.042	3	0.9980
	FCX	FSC	3.631	3	0.3040
	ICP	GDPG	4.605	3	0.2030
	ICP	CCG	1.493	3	0.6840
	CCG	ICP	0.205	3	0.9770
	CCG	FCX	2.304	3	0.5120
	FSE	ICP	4.795	3	0.1870
	FSE	FCX	1.692	3	0.6390
	FSE	CCG	1.538	3	0.6730

Source: Author's Data Analysis

The unidirectional results (Table 6), confirm the one direction from which the effects are sourced. Financial system efficiency appears to influence inflation levels. A more efficient financial system can lead to smoother financial intermediation, reduced transaction costs, and improved allocation of resources, potentially contributing to stable or lower inflation. Changes in final consumption patterns seem to drive economic growth. When consumers spend more, it can boost overall economic activity and contribute to economic growth. High inflation rates can disrupt economic stability and hinder growth. Financial system efficiency seems to impact government borrowing levels. An efficient financial system can make government borrowing more cost-effective, potentially affecting the government's financing choices. This relationship highlights the importance of efficient financial intermediation in managing government finances. Credit activity within the financial system appears to influence government borrowing. High credit availability can impact government financing needs and the level of borrowing required. Inflation levels seem to influence credit activity within the financial system. High inflation rates may lead to adjustments in credit conditions, potentially affecting lending practices and the availability of credit. Changes in consumer spending patterns appear to drive credit activity within the financial system. Increased consumer spending can lead to higher credit demand, potentially affecting credit market dynamics.

4.4 Structural Impulse Response Functions (SIRF)

IRF analysis results (Figure 2), provide valuable economic insights for South Africa and may be customized to developing economies. A surge in government borrowing (CCG) initially stimulates economic activity, possibly through increased public spending. However, this effect tends to diminish over time, raising concerns about the sustainability of government debt levels. Moreover, the delayed impact of changes in financial system credit (FSC) on government borrowing suggests a lag in how credit market dynamics influence the government's financing decisions, underlining the importance of monitoring credit activity for fiscal planning. Additionally, moderate impulses in inflation (ICP) and economic growth (GDPG) influencing government borrowing reveal that fiscal policies should carefully consider inflationary pressures and the role of government spending in stimulating economic expansion. Furthermore, improvements in financial system efficiency (FSE) initially lead to increased government borrowing, but the declining response implies that the government may adjust its borrowing strategies as efficiency improvements take hold.

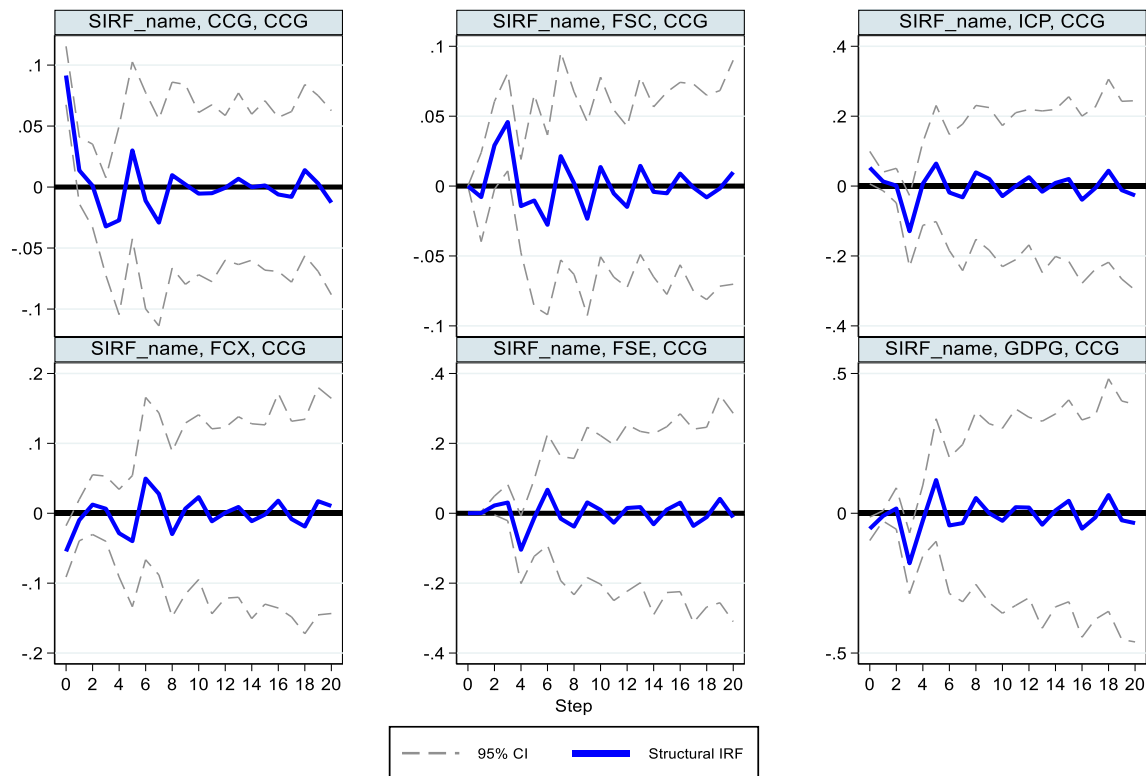


Figure 2: SIRF Responses of Central Government Claims.

Source: Author's Data Analysis

In Figure 3 Notably, a low impulse in government borrowing (CCG) leads to a rising response in financial system efficiency (FSE), suggesting that limited government borrowing may promote more efficient financial intermediation. Meanwhile, moderate impulses in financial system credit (FSC), inflation (ICP), and economic growth (GDPG) each induce distinct responses in financial system efficiency (FSE). High impulses in final consumption (FCX) result in a declining response in FSE, indicating potential challenges in maintaining financial system efficiency when consumer spending surges. Additionally, a moderate impulse in FSE generates a moderately declining response in FSE itself, suggesting a self-regulating aspect in financial system efficiency dynamics.

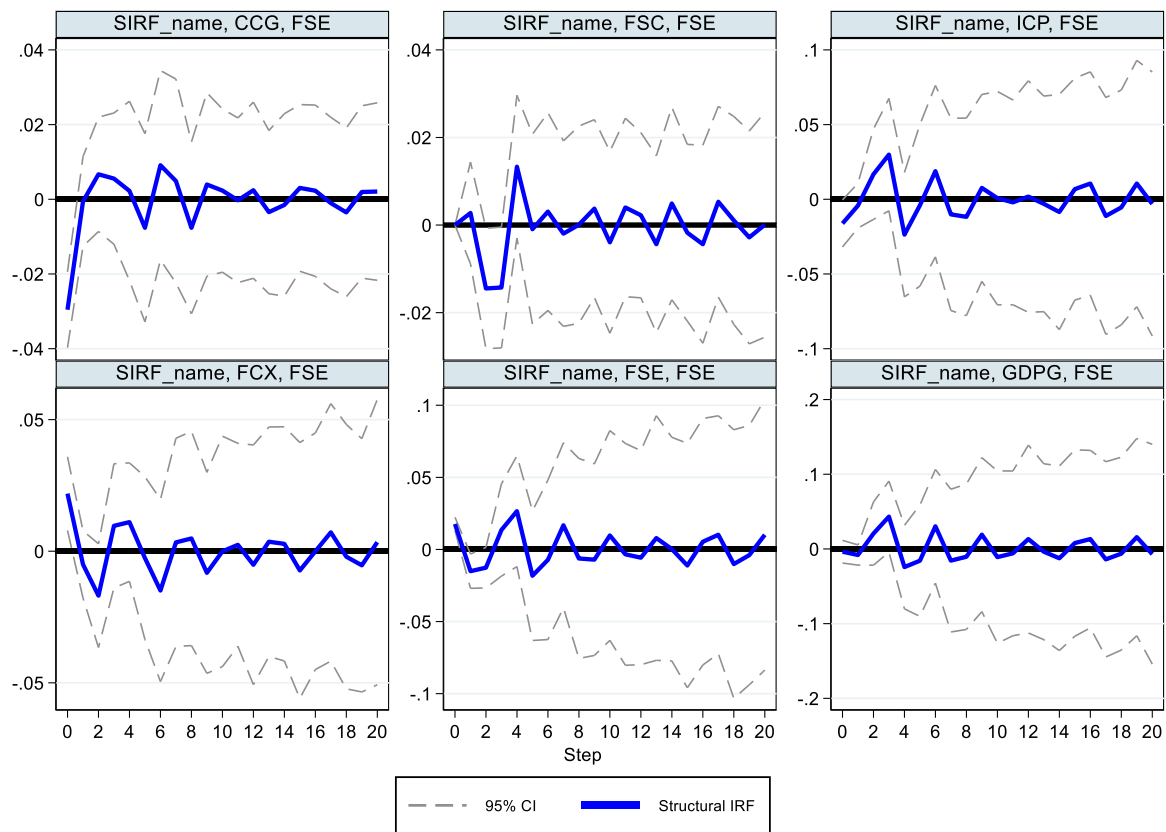


Figure 3: SIRF Responses of Financial System Efficiency.

Source: Author's Data Analysis

In Figure 4 a high impulse in government borrowing (CCG) leads to a declining response in financial system credit (FSC), suggesting that excessive government borrowing may have a dampening effect on credit activity within the financial system. Similarly, a high impulse in financial system credit (FSC) results in a declining response in FSC, indicating potential limits to credit expansion. A low impulse in inflation (ICP) initially leads to a low response in FSC, followed by a rising response, implying that moderate inflation may initially constrain credit activity but eventually stimulate it. Moderate impulses in final consumption (FCX), financial system efficiency (FSE), and economic growth (GDPG) each generate moderate to declining responses in FSC, suggesting a potential equilibrium between these factors and credit dynamics.

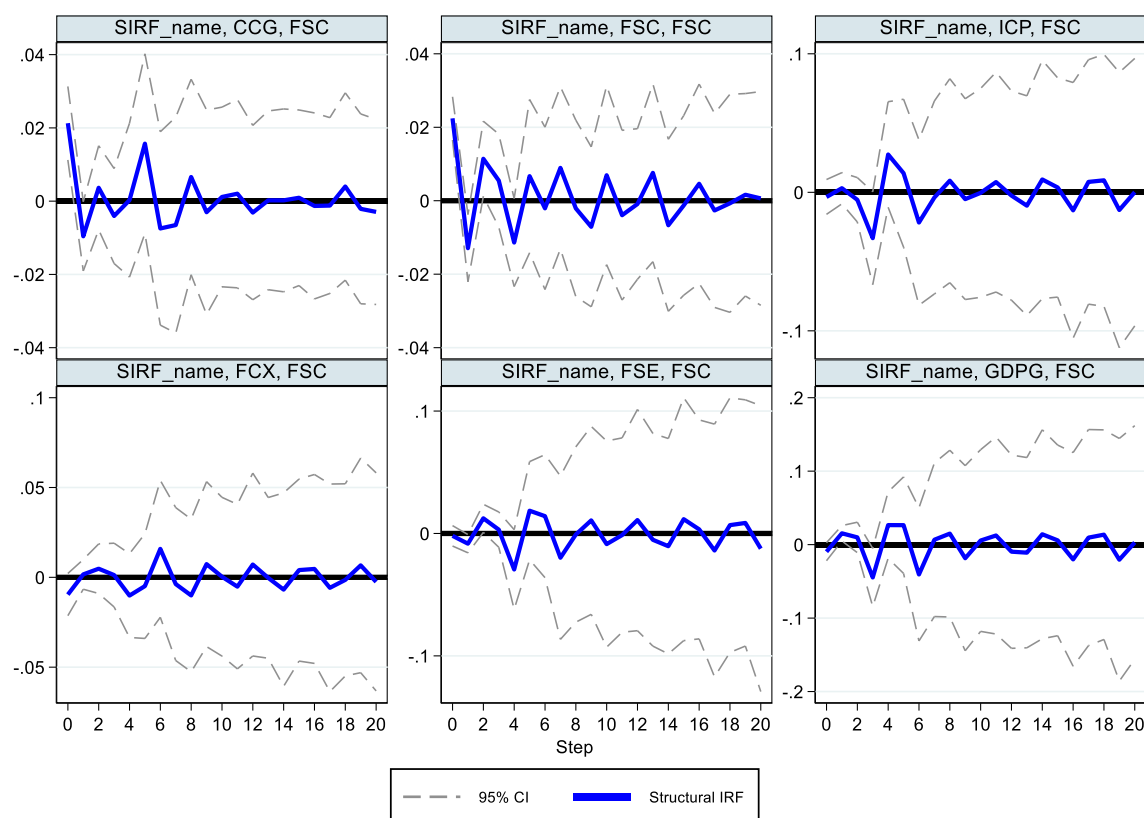


Figure 4: SIRF Responses of Financial System Credit.

Source: Author's Data Analysis

4.5 Structural Forecast Error Decomposition (SFEVD)

SFEVD scores in Table 7 highlight the following economic implications for South Africa and related developing countries. Over the short term (1-year horizon), inflation (ICP) is mostly influenced by its own past values. This suggests that inflation persistence is high in the short run. However, over longer horizons (3 and 5 years), economic growth (GDPG) starts to play a more significant role in influencing inflation, indicating that sustained economic growth can have an impact on price stability. Economic growth appears to be primarily self-driven in the short term (1-year horizon). Over a long run horizon government borrowing, financial efficiency and credit become more significant contributors to growth. In the short term, final consumption is predominantly influenced by its own past values, indicating consumer behavior inertia. Over longer horizons, financial system efficiency (FSE) and credit activity within the financial system (FSC) start to play more significant roles, suggesting that efficient financial intermediation and credit availability can influence consumer spending patterns. Government borrowing has a substantial impact on itself in the short term, suggesting that government fiscal policies can influence the level of government borrowing. Over longer horizons, financial system efficiency (FSE) and credit activity (FSC) become more influential, highlighting the importance of efficient financial intermediation and credit conditions for government borrowing.

In the short term, financial system efficiency is mainly influenced by its own past values, indicating a certain degree of inertia in the financial system. Over longer horizons, credit activity within the financial system (FSC) and economic growth (GDPG) gain significance,

implying that credit dynamics and economic expansion can influence financial system efficiency. Over various horizons, financial system credit is substantially influenced by its own past values, highlighting the role of credit dynamics and persistence within the financial system. Additionally, government borrowing (CCG) and economic growth (GDPG) also play significant roles in shaping credit activity, emphasizing the interconnectedness of these variables within the financial system.

Table 7: Structural Forecast Error Decomposition (SFEVD)

	Step (Year)	ICP	GDPG	FCX	CCG	FSE	FSC
ICP	1	1.000	0.173	0.000	0.162	0.134	0.010
	3	0.684	0.224	0.114	0.151	0.152	0.022
	5	0.546	0.194	0.176	0.230	0.221	0.240
GDPG	1	0.000	0.827	0.014	0.179	0.007	0.080
	3	0.024	0.694	0.249	0.176	0.136	0.197
	5	0.095	0.616	0.425	0.421	0.325	0.398
FCX	1	0.000	0.000	0.986	0.173	0.247	0.080
	3	0.022	0.000	0.482	0.164	0.214	0.054
	5	0.021	0.029	0.205	0.048	0.110	0.028
CCG	1	0.000	0.000	0.000	0.486	0.450	0.392
	3	0.043	0.009	0.066	0.436	0.249	0.256
	5	0.109	0.060	0.028	0.121	0.105	0.073
FSE	1	0.000	0.000	0.000	0.000	0.161	0.003
	3	0.069	0.073	0.057	0.025	0.190	0.104
	5	0.056	0.100	0.120	0.144	0.174	0.140
FSC	1	0.000	0.000	0.000	0.000	0.000	0.436
	3	0.158	0.001	0.033	0.047	0.059	0.367
	5	0.173	0.001	0.045	0.038	0.066	0.122

Source: Author's Data Analysis

5.0 Conclusion and Recommendations

This study, assessed the impacts on financial system credit and efficiency, and central government borrowing sourced from final consumption, inflation, growth and among themselves. It documents statistically and economically significant impacts from final consumption, inflation, and borrowing. Based on the SVAR results provided, several key recommendations emerge for the financial sector. Firstly, there is a strong indication that efforts should be directed towards improving financial efficiency. This can be achieved by streamlining financial processes, reducing inefficiencies, and enhancing the overall effectiveness of financial institutions and systems. Additionally, monitoring and managing inflation effectively is crucial to maintain financial sector stability, as it has a significant positive influence on financial efficiency.

Furthermore, policymakers should carefully consider the impact of government claims on both financial efficiency and financial credit. While government involvement can boost financial efficiency, it should be managed to avoid hindering financial sector performance. To promote economic growth and credit availability, measures to empower businesses and individuals with access to credit should be encouraged. However, the potential negative influence of higher government claims on financial credit suggests the importance of

minimizing fiscal constraints that limit government support for credit markets, as this could impede credit availability, especially in times of economic downturns. A balanced approach that ensures financial stability while fostering economic growth is essential for a healthy financial sector.

To optimize the financial sector, policymakers should curb government influence in credit markets, addressing potential crowding-out effects from central government borrowing. Encouraging transparent lending practices, safeguards against political interference, and regulatory reforms can level the playing field for borrowers and lenders. Simultaneously, promoting access to financial credit, easing lending regulations, and collaborating with financial institutions to target underserved populations can stimulate economic activity. Robust financial sector reforms, strengthened regulatory oversight, and fostering competition are essential, given financial system efficiency's positive impact on itself. Fiscal prudence and reducing reliance on government claims are crucial. Inflation management should adapt to demand-pull or cost-push scenarios, and initiatives to boost final consumption can enhance consumer confidence and economic activity.

From var-granger causality results, the following recommendations are useful. Policymakers should recognize the importance of financial system efficiency in controlling inflation. Businesses and policymakers should monitor and respond to changes in consumer spending to gauge potential impacts on economic growth. Policymakers should be mindful of the inflation-growth trade-off when formulating monetary policies. Financial institutions and regulators should consider the impact of inflation on credit markets. Financial institutions should monitor consumer behavior for potential impacts on credit availability.

Based on the SIRD analysis, policymakers should adopt a balanced fiscal approach. Maintaining fiscal discipline is crucial to ensure sustainable government borrowing levels, especially in response to high impulses in government borrowing. Additionally, close monitoring of credit market dynamics is essential due to the delayed impact of changes in financial system credit on government borrowing. Effective inflation management is necessary to create a stable economic environment, given the initial decline in government borrowing in response to inflation impulses. Policymakers should strategically allocate government resources to support economic growth, as indicated by the rising response of government borrowing to economic growth impulses. An adaptive fiscal strategy leveraging these relationships is vital for fiscal sustainability and economic expansion.

The rising response of financial system efficiency to low government borrowing suggests that measures to limit excessive public debt and promote efficient financial intermediation can enhance economic stability. In response to the varied impacts of financial system credit, inflation, and economic growth on financial system efficiency, policymakers should maintain a flexible approach, using targeted policies such as credit market regulation, inflation control, and investment in infrastructure to optimize financial system efficiency. Addressing the declining FSE response to high consumer spending may require mechanisms to manage credit expansion during consumption booms, like prudent lending standards. Lastly, recognizing the self-regulating aspect in financial system efficiency dynamics, policymakers should aim for sustainable improvements in financial system

efficiency through continuous reforms, including reducing transaction costs and enhancing information transparency in financial markets.

In response to the declining effect of high government borrowing on financial system credit, prudent fiscal management and debt control measures should be emphasized to prevent excessive government borrowing from stifling credit activity. The observed declining response of financial system credit to high impulses in financial system credit may warrant regulatory measures to ensure responsible lending practices and avoid credit bubbles. In light of the low-then-rising response of credit to low inflation, policymakers can implement inflation-targeting monetary policies to maintain price stability while stimulating credit activity as inflation remains in check. For moderate impulses in final consumption, financial system efficiency, and economic growth, which generate moderate to declining responses in financial system credit. Policymakers should aim to strike a balance between promoting economic growth and maintaining financial stability, which may involve monitoring credit expansion and adopting measures to ensure responsible lending during growth phases. Lastly, continuous efforts to enhance financial system efficiency through reduced transaction costs, improved information transparency, and efficient financial intermediation can support sustainable credit dynamics in the long term. The SFEVD results emphasize the pronounced self-influence of inflation, economic growth, financial consumption, government borrowing, financial credit, and efficiency. Borrowing in the short term emphasizes its potency in shaping own levels. Financial credits high self-influence indicates substantial credit persistence, while its interaction with government borrowing and economic growth highlights the intricate relationships between credit dynamics, fiscal policies, and economic expansion. In contrast, financial efficiency's short-term self-influence suggests a degree of inertia within the financial system, with its growing importance over time highlighting the necessity of an efficient financial sector.

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