Financial Inclusion and Macroeconomic Stability in South Africa

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ABSTRACT

While financial inclusion has been largely considered to play an important role to eradicate poverty and boost economic prosperity, some empirical literature has shown differing sentiments, suggesting that vast access to finance may potentially bring about market instability to the economy. This relationship between financial inclusion and macroeconomic stability is in greatly under researched, from a global and local perspective. This paper utilizes a VAR model to analyse the relationship between financial inclusion and macroeconomic stability in South Africa, using quarterly time series data from 2004 to 2019. To measure macroeconomic stability, the study used two macroeconomic factors, namely output and inflation, and commercial bank branches per 100,000 adults (CBB) was used as a measure of financial inclusion. The results find a positive relationship between financial inclusion and output, a 1% increase in CBB causes output to increase by 0.04%. Financial inclusion is also found to have a positive impact on inflation in the long run. Important policy implications point to the importance of financial inclusion in impacting output, and the need to find a balance between financial inclusion and inflation control. As such, Macroeconomic policy maker can use financial inclusion as a tool to retain macroeconomic stability.

Keywords: Financial Inclusion; Macroeconomic Stability; South Africa
JEL Classifications: B22, G10, G20

1. INTRODUCTION

Macroeconomic stability has seen considerable changes over the years from time of the dominance of the Keynesian school of thought, where macroeconomic stability meant a mixture of external and internal forces with the latter implying full employment and economic growth stability coupled with low inflation, to a period when fiscal balance and price stability took the spotlight and thereby ousting the Keynesian thinking on real economic activity. Overtime, however, it has since been recognised that macroeconomic stability is multidimensional in its nature, with indicators ranging from price stability and efficient fiscal policy to a functional real economy, sustainable debt rates as well as a healthy domestic financial system and private sector (Ocampo, 2008).

While financial inclusion fundamentally implies the provision of equal opportunities to access financial products and services by all participants of the economy, high inclusivity levels in the financial system greatly translate to an increased overall economic participation. Existing evidence indicate that people experience financial problems due to the unavailability of financial services in economies with low financial inclusiveness (GPFI, 2011).

South Africa has also not lagged behind in the race for a financially inclusive economy. In 2012, the South African government scheduled in its National Development Plan to have 90% of the population financially included by 2030. The country has since seen considerable progress with 91% of the adult population having been included in the financial system, of which about 81% were considered as being banked by 2019, while 78% make use of other non-bank channels and 61% still using the informal financial channels (Finscope, 2019). There is also evidence, however, that while there is a clear increase in indicators of financial inclusion, a large portion of consumer transactions remain cash based (Delloit, 2019).

The South African economy is seen as one that is more favourable to take the financial inclusion agenda forward, compared to its counterparts' economies. This is due to the country's advanced and well-regulated financial sector, which boast with a variety of financial services and products that are well supported and availed through a wide range of access service points (Ardington et al., 2004). Moreover, the South African government has developed and strengthened regulatory structures aimed at advancing the efficiency, safety, and stability of the country's financial sector, so it meets global standards and better financial inclusion in the country (National Treasury, 2020).

The relationship between financial inclusion and macroeconomic stability is in greatly under researched both from a global and local perspective. Existing empirical literature has shown quite differing sentiments, with some scholars suggesting that vast access to finance may potentially bring about market instability to the economy. For instance, Garcia (2016) raises the concern that the results of financial inclusion, such as rapid growth in credit and an unregulated financial system, may inherently bring about even greater risks in the financial markets. Opposing arguments, however, present evidence that financial inclusion hardly leads to systemic risks, this is because low-income economic participants are less likely to change their financial behaviour, even in the event of financial crashes, that is, savers are likely to keep their deposits and borrowers are likely to keep paying their loans (Hannig and Jansen, 2010).

In the South African context, there is no study that explores how financial inclusion relates to macroeconomic factors. This study aims to fill up that gap and contribute to the body of empirical literature on the subject, by analysing the relationship between financial inclusion and macroeconomic stability in South Africa. Understanding the macroeconomic effects of financial inclusion is crucial, as existing literature from developed economies shows that, financial inclusion increases economic growth and improves the standard of living of individuals (Sahay et al., 2014; Sarma and Pais, 2011; Demirgüç-Kunt et al., 2017). Therefore, this study is threefold. First, how financial inclusion affects macroeconomic stability. Second, examining the causal direction between financial inclusion and macroeconomic stability and third, determining the response of macroeconomic stability to shocks in financial inclusion.

The remainder of the study will be structured as follows: Section 2 provides a literature review pertaining the relevant theoretical and empirical studies on the subject. Section 3 describes the data and research methodology to be utilised in the study. In Section 4, the descriptive analysis will be conducted, and the empirical results will be presented, while Section 5 will be the conclusion of the study.

2. LITERATURE REVIEW

The varying definitions of financial inclusion stems from the reason that financial inclusion is a multidimensional concept in its nature, with several nuanced factors used differently based on the specific research subject matter or country agenda. The Alliance

for Financial Inclusion (2010) outlines four key dimensions of financial inclusion, namely: Access, Quality, Usage and Welfare. As it is the case of financial inclusion, there is no single straight forward definition of macroeconomic stability because of the fact that it also involves multiple dimensions. For example, Fischer (1992) states that a stable macroeconomic framework is one that is associated with a low and predictable inflation, an appropriate interest rate, stable and sustainable fiscal policy, competitive and predictable real exchange rate, as well as a perceived balance of payments situation. On the other hand, Serven and Montiel (2004) argue that macroeconomic stability is a phenomenon that causes a country's macroeconomic structure more unpredictable. In this study, output growth and inflation will be used as indicators of macroeconomic stability.

There are various theoretical approaches to this subject matter. Adam Smith, with the Classical 1776 Wealth of Nation, brought about the introduction to the concepts of free market economy discussions. Smith outlined the concepts of the invisible hand where he advocates that the economy is such that, if left alone, can achieve an equilibrium state through the interaction of the demand and supply forces. The classical economic theory stems from the idea that free market requires little or no interference by the government, which is a concept of a laissez-faire economic market. Through this concept, individuals can make economic decisions to serve their own interest, such that, resources are distributed according to what individuals and businesses desire in the marketplace.

According to Schumpeter (1912), the services that financial institutions provide, such as savings mobilization, risk management, facilitating transactions and evaluation projects, play a crucial role in technological progress and economic development. Similar findings are expressed by king and Levine (1993), showing that financial development measures and real GDP per capita growth are strongly associated. The authors also find that components of financial development lead to increased physical capital accumulation rate and the efficiency of employing that physical capital.

Another theory that best fit this subject matter in the theory of asymmetric information was developed by Stiglitz (1981) to plausibly explain market failures. The theory states that, information asymmetry occurs in a scenario whereby one participant possesses more information about a product, service, or transaction than the other party. This then leads to markets becoming inefficient, because the participants lack the appropriate information needed in making decisions. Inclusive financial institutions or an inclusive financial sector is more likely to contribute to growth by reducing asymmetric information that would potentially distract financial service providers from intermediating resources efficiently.

There is too little existing literature on the link between financial inclusion and macroeconomic stability globally and it does not exist locally. The lack of macroeconomic evidence links to financial inclusion is largely due to the, until very recent, shortage of consistence financial inclusion data on macroeconomic level. The existing body of empirical work that studies the

macroeconomic link with financial inclusion is mainly conducted at an international level and it is mostly observed in comparison with other countries and there is no study that looks at the subject from a South African point of view.

Sahay et al. (2015) investigated whether financial inclusion can meet multiple macroeconomic goals using a cross country survey for two years (2011 and 2014), a long-time series across five countries and firm-based data on access to finance. The study found financial inclusion to increase economic growth up to a certain point. They indicated that firms and household greater access to a variety of banking services, and an increasing use of these services by women, tends to lead to higher economic growth. Furthermore, countries with higher levels of financial inclusion tend to have their external finance dependent sectors grow more rapid. However, the results also show decreasing marginal returns on growth, as financial inclusion and depth increases.

In a more related study, Vo et al. (2009) examined the linkage between financial inclusion and macroeconomic stability for 22 emerging and frontier economies. The study focused on a potential optimal level for these countries during the 2008-2015 period, using the panel threshold estimation technique. They measure financial inclusion as an approximate of the growth rate in the number of bank branches over 100 000 account holders and they find it to positively impact on financial stability under a certain threshold. The authors also find that financial inclusion enhances the maintenance of stable inflation and growth.

While a recent study by Nizam et al. (2020) investigated the effect of financial inclusiveness on economic growth, with a focus on 63 developing and developed economies, from 2014 to 2017. The study shows that, the connection between financial inclusion and growth has a threshold effect, which suggests that financial inclusion display a non-monotonic positive relationship with economic growth. According to the study, raising financial inclusion to a higher level than low, stimulates sustainable economic growth. Cumming et al. (2014) provides a compelling supportive narrative for the impact of financial inclusion, highlighting that access to finance is important in encouraging entrepreneurs to take risk, invest more and subsequently contribute positively on economic growth.

Dabla-Norris et al. (2015) developed a micro-founded general equilibrium with heterogeneous agents to examine the pertinent constraint to financial inclusion using firm-level data from the World Bank Enterprise Survey for six countries of different economic prospects. The study shows that a country's specific characteristics play a key role in determining the relationship and trade-offs between financial inclusion, economic growth, inequality and the distribution of gains and losses. The authors further find that lowering monitoring costs, relaxing collateral requirements and subsequently increasing the access to credit for firm increases economic growth.

Some existing empirical literature bring differing finding to this relation, for instance Mehrotra and Yetman (2015), indicated that too much access to credit could negatively impact the credit quality and result to an increase in unregulated credit growth. While Khan (2011) brings a differing view, indicating that financial inclusion brings about a broader spectrum of economics agents, through their great asset diversity and also provides better economic resilience for financial service providers.

Neaime and Gaysset (2018), makes an empirical assessment of the impact of financial inclusion on income inequality, poverty, and financial stability, and the study also found that mixed conclusions can be drawn from the existing empirical literature on the subject. It shows that, while financial inclusion decreases income inequality, it has no significant effect on poverty. These findings are contrary to the vast existing empirical literature that associated financial inclusion with reduced levels or poverty (Honohan, 2008; Imai and Annim, 2010; Jabir, 2015; Levine, 2001).

Demirgüç-Kunt et al. (2017) conducted an overview of financial inclusion globally and review of recent empirical evidence on how usage of financial products may contribute to inclusive growth and economic development. The evidence suggests that financial inclusion allows individuals to efficiently and safely conduct their daily transactions and broadens their investment and options of financial risk management through the use of formal financial system. In addition, use of certain financial products such as digital payment and inexpensive savings account was more effective in reaching development goals (e.g., reducing poverty and inequality), as compared to other financial products. The importance of digitalization and technology is emphasized by Andrianaivo and Kpodar (2012), who investigate whether mobile phones impact economic growth through better financial inclusion in a sample of African countries, from 1988 to 2007. The results of the study reveal that indeed greater financial inclusion creates a conducive environment for the development mobile phone to impact economic growth positively.

The general observation of empirical literature is that there is too little existing body of work done on the macroeconomic correlates with financial inclusion; moreover, no existence of such knowledge from a South African point of view. Furthermore, the existing literature on the subject is getting somewhat outdated. This study addresses the shortage of research on the link of financial inclusion and macroeconomic stability in South Africa.

3. METHODOLOGY AND DATA

3.1. Estimation Technique

The following regression models, partially adopted from the study by Sahay et al. (2015), are proposed to explore the relationship between financial inclusion and macroeconomic stability. The study uses the vector autoregressive (VAR) model to analyse the relationship between financial inclusion and macroeconomic stability in South Africa.:

$$Y_t = \beta_0 + \beta_1 FI_t + \beta_2 X_t + \varepsilon_t \qquad (1)$$

Where Y_t represents the dependent variable, Macroeconomic stability. The Proxies that we use to measure macroeconomic stability are, Output and Inflation.

FI_t represent the first independent variable Financial inclusion, which is measured using the growth rate of the number of bank branches with account holders over 100 000.

X_t represents the control variables, which includes exchange rate volatility, real GDP, per capita GDP growth, exchange rate regime, private credit to GDP or broad financial development index, liquid assets to GDP and financial openness.

ε_t = random error term, t = Time period and β = Parameter estimates

As one of the highly flexible, user friendly and most successful models for analysing multivariate time series data, the VAR model will be used to examine the possible complexity of the interrelationship between our observed endogenous variables. The following VAR model is specified for this study:

$$Y_{1,t} = \alpha + \sum_{i=1}^{k} \theta_i Y_{1,t-i} + \varepsilon_{1t} \tag{2}$$

α represents the constant vector, θ_i represent the matrices and $Y_{1,t}$ is the vector of the endogenous variables. The vector of residual is represented by ε_{1t}.

The problem with time series data is that the independent variables can appear to be more significant than they actually are, if they tend to have the same underlying trend as the dependent variable in the model. To avoid a spurious relationship and form a meaningful one, all the variables must all meet the condition of stationarity. A series is said to be stationary when its mean and variance do not change overtime (Studenmund, 2006). In this study variables are subjected to the Augmented Dicky-Fuller test so as to investigate the time series data's unit root properties. In addition, the study is also subjected to VAR stability test which is one of the most crucial characteristics of a VAR (p)-process (Pfaff, 2008). The necessary and sufficient condition for stability is that all characteristic roots lie outside the unit circle.

Among the crucial practices of conducting empirical analysis using the VAR models is determining the lag order of the autoregressive lag polynomial, and this is due to the correct model specification being the determinant for all inferences in the VAR model. The model selection criteria may be used to determine the lag length for the VAR (p) model. One of the important issues is that if some or of some or all the variables in the VAR (p)-process are integrated of order 1, that is I(1). There may be a possibility that, there is cointegration between the variables. Hence, cointegration is an analytic technique for testing for common trends in multivariate time series and modelling long-run and short-run dynamics. In this regard, the Johansen method tests for multiple cointegrating relationships, and estimate parameters in the corresponding vector error-correction models (VECM). In the same vein, the Johansen methods test linear restrictions on both error-correction speeds and the space of cointegrating vectors, and estimate restricted model parameters (Studenmund, 2006). Since the study aims to discover a relationship between multiple variables, the Johansen Cointegration is the appropriate technique to utilize.

Further analysis such the impulse response functions will be employed to trace out the effects of a shock from the dependent variable on the explanatory variables. This will be complemented by the forecast error variance decomposition, to examine the importance of each individual shock over all other variables (Enders, 2004). Lastly, the Granger causality test will be conducted to determine any causal relationship amongst the variables.

3.2. Data
Due to the limited macroeconomic data on financial inclusion, the study employs quarterly time series data from 2004 to 2020 to analyse the impact of financial inclusion on macroeconomic stability. For the financial inclusion indicator, the study makes use of the Financial Access survey (FAS). The FAS launched in 2009, is a financial inclusion survey conducted by the International Monetary Fund (IMF), which provides supply-side data on the access to and use of financial services aimed at supporting policymakers to measure and monitor financial inclusion and benchmark progress against peers. The table below nine FAS indicators have been endorsed as the G20 Financial Inclusion indicators, as shown in Table 1.

For the Macroeconomic Stability indicators, Output, Inflation, and Exchange rate, the study makes use of data from the South African Reserve Bank (SARB). The SARB provides high-quality economic and financial data based on international best practice. The SARB compiles rich data on the instruments of macroeconomic for the South African economy.

The model regresses the relationship between financial inclusion and macroeconomic stability. The macroeconomic variables used in the study are output (OUT), inflation (CPI) and exchange rate (EXC), and commercial bank branches per 100,000 adults (CBB) is used as a measure of financial inclusion. The data used in this study is measured in percentages except for output, as such, this variables are converted into natural logarithm. LNOUT and CPI represent output and inflation in variables in the natural logarithm and they are the selected two representatives for macroeconomic stability as per literature, amongst the many variables.

There are some limitations that come with the use of existing data on macroeconomic correlates with financial inclusion, in particular the fact that, until very recent, there has been a large shortage of financial inclusion data on macroeconomic level, especially time series data. Hence, the study cannot be conducted covering years prior to 2004.

Table 1: G20 Financial inclusion indicators

1. Number of ATMs per 100,000 adults
2. Number of commercial bank branches per 100,000 adults
3. Number of mobile money transactions per 100,000 adults
4. Number of deposit accounts at commercial banks per 1,000 adults
5. A. Number of life insurance policy holders per 1,000 adults
   B. Number of non-life insurance policy holders per 1,000 adults
6. Deposit accounts of SMEs at commercial bank (as % of non-financial corporations)
7. Loan accounts of SMEs at commercial banks (as % of non-financial corporations)
8. Number of registered mobile money agent outlets per 100,000 adults
9. Number of loan accounts with commercial banks per 1,000 adults

4. EMPIRICAL FINDINGS

4.1. Unit Root Test

As reported in Table 2, the ADF test shows that the LNOUT and CBB variables are only stationary at second difference for both intercept and, trend and intercept. As such, the null hypothesis that, there is a presence of unit root for LNOUT and CBB, is rejected after testing the ADF at second difference. Furthermore, the ADF test reject the null hypothesis that there is unit root for CPI after conducting the test at level for both intercept and, trend and Intercept, since the variable is stationary at level I(0). The EXC variable, on the other hand, is only stationary after taking first difference for intercept I(1), while under trend and intercept, we can only reject the null hypothesis after conducting the ADF test on second difference as the variable is integrated of order I(2).

4.2. VAR Stability, Lag Length and Cointegration Test Results

The results showed that the VAR model satisfy the stability condition. Hence, all characteristic roots lie outside the unit circle. Moreover, the optimal lag length criteria suggested a lag of 2. Lastly, the Trace statistic test confirms that there is at least one cointegrating equation. Thus, this warrant a VECM estimation. All these tests were applied when both macroeconomic stability indicators namely, output and inflation were used.

4.3. Vector Error Correction Model (VECM)

Table 3 show results for the relations between Output (LNOUT), Commercial bank branches (per 100,000 adults) (CBB), Inflation (CPI) and Exchange Rate (EXC), where

Output is the dependent variable, while in Table 3 Inflation is the dependent variable.

The long run relation results are represented in the upper part of Table 3, while the short-run results are represented on second part in the lower section on the table. According to the long-run results, Commercial bank branches are associated with an increase in economic output. An increase, by 1%, of Commercial bank branches per 100,000 adults causes output to increase by 0.04%. This positive relationship between Commercial bank branches, as a measure of financial inclusion, and economic output is in line with most existing empirical literature, also reviewed in this study (Sahay et al., 2015; Vo et al., 2009; Nizam et al., 2020; Demirgüç-Kunt et al., 2017).

The long-run results further show that increases in inflation and exchange rate are associated with a decrease in output. A 1% increase in inflation causes output to decrease by 0.06%, while a 1% increase in exchange rate negatives impacts output by 0.03%. These findings concur with key Economic theories on these relations. The Philips curve indicates the negative relationship between inflation and output, and an increase in exchange rate, especially when unexpected, will impact the goods market making exports more expensive and imports less expensive. This will result to a decrease in demand for domestic products by competition from foreign markets and eventually to a fall in domestic output.

The second part of Table 3 depicts the estimated loading matrices or α coefficients. The results show that log output, which is the coefficient of the error correct model, is negative and statistically and statistically significant. As such, output plays a role in bringing itself to equilibrium, with an adjustment speed of 0.95%. That is,

Table 2: Unit root tests: ADF in levels, first and second difference

Variable	ADF test							
	Intercept				**Trend and intercept**			
	Level	**1st Diff**	**2nd Diff**	**OI**	**Level**	**1st Diff**	**2nd Diff**	**OI**
LNOUT	−2.45	−1.89	−8.51***	I (2)	−1.02	−2.91	−8.48***	I (2)
CBB	−1.98	−1.78	−7.01***	I (2)	−0.63	−2.45	−7.05***	I (2)
CPI	−3.99***	−3.20**	−5.56***	I (0)	−3.97**	−3.18*	−5.47***	I (0)
EXC	−0.83	−2.88*	−8.49***	I (1)	−2.51	−3.03	−8.46***	I (2)

*,** and *** rejecting the null hypothesis at 10%, 5% and 1% level

Table 3: Long-run and short-run VECM results for model LNOUT=f (CBB, CPI, EXC)

Cointegrating equation:	Cointegrating Equation 1			
LNOUT(−1)	1.0000			
CBB(−1)	−0.0418			
	(0.0118)			
	[−3.53253]			
CPI(−1)	0.0669			
	(0.0141)			
	[4.7459]			
EXC(−1)	0.0346			
	(0.0130)			
	[2.6637]			
C	−28.9460			
Error correction:	**D (LNOUT)**	**D (CBB)**	**D (CPI)**	**D (EXC)**
Coint Eq. 1	−0.0095	0.1135	−1.3684	−0.4362
	(0.0022)	(0.1679)	(0.4828)	(0.2302)
	[−4.2595]	[0.6763]	[−2.8346]	[−1.8946]

should there be a shift from equilibrium, only 0.95 % is corrected in each quarter as equilibrium becomes restored. Inflation and exchange rate both also play a role in bring output to equilibrium, while commercial bank branches variable is the only one that moves output away from equilibrium.

Table 4 below contains the long and short run results after modelling inflation against commercial bank branches, output, and exchange rate. The long run results show that the increase in the measure of financial inclusion (commercial bank branches per 100,000 adults) is associated with an increase in inflation. A 1% increase in increase in commercial bank branches per 100,000 adults causes inflation to increase by 0.65%. The positive relationship between financial inclusion and inflation is consistent with the findings of other scholars, such as Vo et al., (2009).

The long-run results further show that increases in economic output and exchange rate are associated with a decrease in inflation. An increase in output, by 1%, will cause inflation to fall by 14.96%. This negative relationship between inflation and output is expected, as supported by economic theory. A 1% increase in exchange rate cause inflation to decline by 0.52%. This relationship is in contrast to economic literature on the subject, which depicts a positive relationship between inflation and exchange rate (Agenor and Montiel, 1996; Dornbuch, 1976; Monfared and Akın, 2017).

The results from the second part of Table 4 shows that the coefficient of the error correction model (CPI) is negative and statistically significant. This suggests that inflation plays a role in bring itself to equilibrium. Since the coefficient is –0.091, in the event that there is a shift from equilibrium, only 9.1% is corrected in each quarter as equilibrium becomes restored. Exchange rate volatility plays a role in bringing inflation to equilibrium. Output, on the other hand, appears to be weakly exogenous, and as such does not play a role in bringing inflation to equilibrium. Lastly, the commercial bank branches coefficient is positive and almost exogenous. This tells us that, even though commercial bank branches move output away from equilibrium, its impact is very weak.

4.4. Granger Causality Test
In the top part of Table 5, the causality test is mainly aimed at output (LNOUT) and financial inclusion (CBB). The results show

that, there is a unidirectional causality running from output to financial inclusion because the p-value of 0.0237 which is <0.05 level of significance. Therefore, can only reject the null hypothesis that output does not granger cause financial inclusion and cannot reject the opposite. Additionally, the causal relation between output and inflation is only on one direction, from inflation to output since, inflation does Granger-cause output. With regards to the relation with the rest of the variables, the results show that there are no further causal relationships.

With the second part of the table, the main interest is on the causality between inflation rate (CPI) and the other variables. The results show that there is a unidirectional causality running from inflation to output as shown by the probability 0.0033 which is <0.05 level of significance. Additionally, there is also a unidirectional causality running from output to financial inclusion, while there is not causal relationship between inflation and financial inclusion seen in the results.

4.5. Impulse Response Functions
Figure 1 shows the how output reacts to exogenous shocks in financial inclusion, inflation and exchange rate. The figure shows that output has a positive yet diminishing response to itself. It shows a gradient that increase continuously at a decreasing rate until around the 20th term, then it starts to show a rather constant horizontal trend throughout the remaining period. Furthermore, the response of output (LNOUT) to financial inclusion (CBB) proves to be transitory in nature, as the effect die out over time. It starts with a decreasing negative behaviour for the first 6 periods, then it starts increasing until it reaches the steady state around the 10th period. From there onwards the response increases at a decreasing rate above the steady state until it reaches a stand still just before the 20th period, where it continues constantly at uniform horizontal trend until the end of the observed period. This suggest that, in the long run, financial inclusion will impact output positively for some time until it reaches a certain point, then the output growth rate will fall down to zero, indicated by the horizontal trend.

The shocks in inflation and exchange rate both show a transitory decreasing effect on output below the state for the whole duration of the observed time period. The effect of the shock in exchange

Table 4: Long-run and Short-run VECM Results for Model CPI=f (CBB, LNOUT, EXC)

Cointegrating equation:	Cointegrating Equation 1			
CPI(–1)	1.0000			
CBB(–1)	–0.6256			
	(0.4686)			
	[–1.3351]			
LNOUT(–1)	14.9584			
	(7.4240)			
	[2.0149]			
EXC(–1)	0.5173			
	(0.1936)			
	[2.6719]			
C	–432.9836			
Error correction:	**D (CPI)**	**D (CBB)**	**D (LNOUT)**	**D (EXC)**
Coint Eq. 1	–0.0915	0.0076	–0.0006	–0.0292
	(0.0323)	(0.0112)	(0.0002)	(0.0154)
	[–2.8346]	[0.6763]	[–4.2595]	[–1.8946]

Table 5: Pairwise granger causality tests

Model: LNOUT=f (CBB, CPI, EXC)				
Null hypothesis:	Observation	F-Statistic	Prob.	Outcome.
CBB does not Granger Cause LNOUT	75	1.1284	0.3294	No causality
LNOUT does not Granger Cause CBB		3.9506	0.0237	Causality
CPI does not Granger Cause LNOUT	75	6.2198	0.0033	Causality
LNOUT does not Granger Cause CPI		0.2731	0.7618	No causality
EXC does not Granger Cause LNOUT	75	1.3659	0.2619	No causality
LNOUT does not Granger Cause EXC		2.3045	0.1073	No causality
CPI does not Granger Cause CBB	75	0.1466	0.8639	No causality
CBB does not Granger Cause CPI		0.4758	0.6234	No causality
EXC does not Granger Cause CBB	75	0.1078	0.8980	No causality
CBB does not Granger Cause EXC		2.5009	0.0893	No causality
EXC does not Granger Cause CPI	75	1.0086	0.3700	No causality
CPI does not Granger Cause EXC		2.8223	0.0663	No causality
Model: CPI=f (CBB, LNOUT, EXC)				
Null Hypothesis:	Observation	F-Statistic	Prob.	Outcome.
CBB does not Granger Cause CPI	75	0.4758	0.6234	No causality
CPI does not Granger Cause CBB		0.1466	0.8639	No causality
LNOUT does not Granger Cause CPI	75	0.2731	0.7618	No causality
CPI does not Granger Cause LNOUT		6.2198	0.0033	Causality
EXC does not Granger Cause CPI	75	1.0086	0.3700	No causality
CPI does not Granger Cause EXC		2.8223	0.0663	No causality
LNOUT does not Granger Cause CBB	75	3.9506	0.0237	Causality
CBB does not Granger Cause LNOUT		1.1284	0.3294	No causality
EXC does not Granger Cause CBB	75	0.1078	0.8980	No causality
CBB does not Granger Cause EXC		2.5009	0.0893	No causality
EXC does not Granger Cause LNOUT	75	1.3659	0.2619	No causality
LNOUT does not Granger Cause EXC		2.3045	0.1073	No causality

Figure 1: Impulse response function - LNOUT = f (CBB, CPI, EXC)
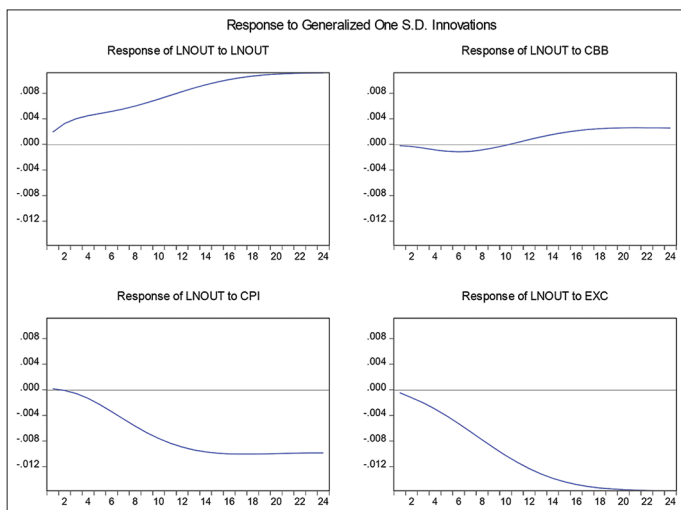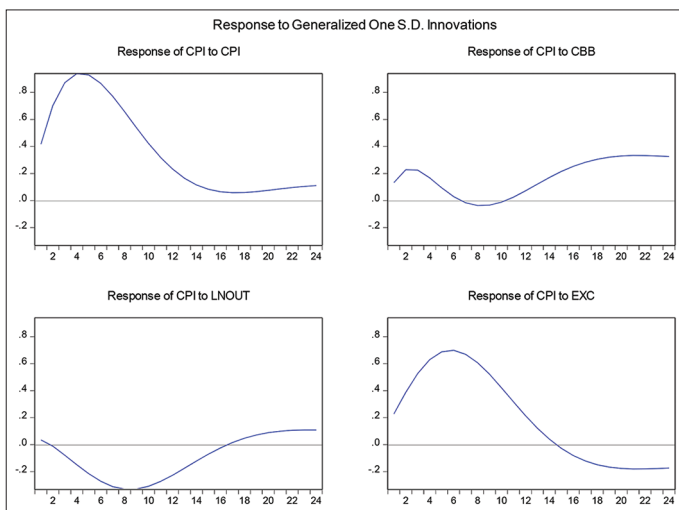

Figure 2: Impulse response function - CPI = f (CBB, LNOUT, EXC)

rate on output seems to wear out earlier than that of the shock in inflation. While the response to inflation shock curve tends to reach a constant horizontal trend earlier than that of exchange rate, the shock in exchange rate only has an impact on output for the first 20 terms of the observed period. The negative impact of both inflation and exchange rate comes expect, as indicted by economic theory.

In Figure 2 the response of inflation to shocks in inflation starts off a decreasing rate above the steady state for the first 6 periods of the term, in which it drastically falls until around the 17th period, however still remaining above the steady state. From that point, it shows a gradual increasing trend for the remainder of the period.

Moreover, the impact of shocks in financial inclusion on inflation shows a rather fluctuating behaviour for most of the early parts of the observed term. For the first two terms, the trend shows an increasing behaviour, until it starts falling just around the 4th term. The negative behaviour continues until the curve reaches a point below the steady state at around the 8th term. From that point onwards, the response line starts increase until it reaches a constant horizontal trend above the steady state and the point where it began at around the 20th term, in which it continues for the remainder of the period. This effect is permanent, and tells us that, while there is a negative relationship between the two variables in the short run, financial inclusion will have a positive impact on inflation in the long run.

The shocks to output also show a permanent effect on inflations, indicated by the fluctuating behaviour. A shock in output leads to a sharp decrease in inflation above the steady state equilibrium for the first 3 terms. The fall continues gradually below the steady state equilibrium until 8th term, where the relationship disappears and appears again in term 10, from which it starts increase reaching the steady state equilibrium at a round the 17th term. From that point, the increase continues above the steady state equilibrium until it takes a flat trend from around the 22nd period. The overall observation from this relation is that, output has a negative impact on inflation in the short run and a positive impact in the long run. This is in line with macrocosmic theory/models, depicted by the AS-AD model.

The response to shocks in exchange rate shows that, in the short run, exchange rate has a positive impact on inflation, hence the response starts off with and increasing trend above the steady state period for the first six terms of the observe period, from which it starts falling reaching the steady state equilibrium around the 15th term. The fall continues bellow the steady state equilibrium up until it reaches a point where it maintains a horizontal trend from the 20th period. The shocks in exchange rate shows to have a permanent impact on inflation. The behaviour is such that in the medium term, exchange rate proves to have a negative impact on inflation, and in the long run the relationship disappears.

4.6. Forecast Error Variance Decomposition
Table 6 presents the FEVD result for specifically the dependent variables, output and inflation, regressed in the two models.

Looking at the variance decomposition of inflation from Table 5, the results depict that, while the variance error for inflation decreases throughout the 24 terms included here, inflation remains substantially strongly endogenous in every term. By term 24, inflation accounts for over 66% variance forecast error variance in itself, from 100% in the first term and 78% in term 12. In the last term, the second largest contributor to inflation variance is output and CBB with 15.6 and 14.7%, respectively. Exchange rate remains weekly influential to inflation throughout the period, only contributing 3% forecast error variance to the variation in inflation by term 24.

The results from Table 6 shows that in the first term, 100% of forecast error variance in output (LNOUT) is explained by itself,

hence the other observed variables do not have an influence on output, during this term. While CBB, CPI and EXC continue to exhibit strong exogeneity for most of half the observed term, their influence in predicting output increases substantially as the terms progress, with inflation having the most influence, followed by exchange rate and CBB being the least influential. In fact, by term 10 inflation and exchange rate, together, have over 50% influence on output, with inflation being the strongest predictor by 42%, and exchange rate contributing 10% forecast error variance. CBB still remains insignificant with an influence of <1%. Moving further into the future, the forecast error variance of output on itself keeps decreasing and inflation continues to account for most of the forecast error variance in output, surpassing output as early as term 11. By term 24, inflation accounts for 49% forecast error variance in output, proving to be the strongest contributor output volatility, followed by output itself with over 35% and then exchange rate by over 12%. CBB remains strongly exogenous throughout the observed period, contributing only 2.9% by the last term.

5. CONCLUSION

This study set out to examine the relationship between financial inclusion and macroeconomic stability in South Africa, using quarterly time series data from year 2004 to 2019. The relation of financial inclusion with macroeconomic factors is greatly under researched globally. In fact, from a local point of view, this is the first study that investigates the relationship between financial inclusion and macroeconomic stability, with a specific focus on South Africa.

To measure macroeconomic stability, the study used two macroeconomic factors, namely output and inflation, and commercial bank branches per 100,000 adults (CBB) was used as a measure of financial inclusion. Two VEC models were observed in this study, one with output as the dependent variable and CBB, inflation and exchange rate as the explanatory variables, and in the other model inflation was the dependent variable, and financial inclusion (CBB), output and exchange rate were used as the independent variables. Among other analysis, the study investigated the long and short run relationship between the variables and determined their causal relationship thereof. In doing so, the Johansen cointegration approach and the VEC model were employed to establish the long and short run relationship.

The Johansen cointegration test results confirmed that a long run relationship exists among the variables. The VECM results indicated a positive relationship between financial inclusion and output in the long run, while inflation and exchange rate were found to negatively impact output. In the short run, the results found that inflation and exchange play a role in bring output to equilibrium, while CBB moves output away from equilibrium. After regressing the model with inflation as the dependent variable, the results found financial inclusion to have a positive impact on inflation in the long run, and output and exchange rate are found to have a negative long run impact on inflation.

Important policy implications from this study points to the importance of financial inclusion in impacting output and

Table 6: The forecast error Variance decomposition (FEVD) Results

LNOUT = f (CBB, CPI, EXC)					
Period	**S.E.**	**LNOUT**	**CBB**	**CPI**	**EXC**
1	0.001940	100.0000	0.000000	0.000000	0.000000
6	0.011725	72.97275	0.718035	18.81380	7.495412
12	0.030771	40.79532	0.571077	47.52113	11.11247
18	0.052165	35.70774	2.141470	50.32314	11.82765
24	0.069315	35.49850	2.923044	49.05084	12.52762
CPI = f (CBB, LNOUT, EXC)					
Period	**S.E.**	**CPI**	**CBB**	**LNOUT**	**EXC**
1	0.418118	100.0000	0.000000	0.000000	0.000000
6	2.101793	88.84769	3.065272	7.850044	0.236996
12	2.670916	78.11367	4.989353	16.31242	0.584554
18	2.755522	74.16686	8.570940	16.08093	1.181271
24	2.919686	66.65026	14.70210	15.61083	3.036811

inflation. As such, Macroeconomic policy maker can use financial inclusion as a tool to retain macroeconomic stability. Policymakers should find a balance between financial inclusion and inflation control. They should also be mindful of the relationship between financial inclusion and output, and identify innovative measures to efficiently deliver financial services to the great population, in the pursuit of increase economic output. Apart from having a great benefit in retaining macroeconomic stability, the impact of financial inclusion could be extended to other aspects of the economy and development. These include boosting economic growth, increasing the standard of living of individuals and eradicating poverty.

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