AL-ARBAH: Journal of Islamic Finance and Banking
Vol. 6 No. 2 (2024), 139-164; DOI: 10.21580/al-arbah.2024.6.2.23068
E-ISSN: 2716-2575, P-ISSN: 2716-3946

Asymmetric Impact of Stokvel and Banking Sector Efficiency in South Africa: Evidence from Non-Linear ARDL Approach

Lindiwe Ngcobo[1]

[1]University of South Africa

lngcobo@unisa.ac.za

Abstract

Purpose - This study examines the impact of stokvel savings and banking sector efficiency in South Africa.

Method - This Study using the non-linear autoregressive distributed lag (NARDL) bound testing approach technique with economic time series data ranging from 2009Q4 to 2020Q2.

Result - The result of this research undicated the NARDL results shows that positive and negative shocks on banking sector efficiency exhibited a positive influence on stokvel savings. An improvement in banking sector efficiency would result in an increase in stokvel savings of approximately 0.33%, while a decline in banking sector efficiency would lead to increase in *stokvel savings* albeit at a marginally reduced level of approximately 32%. The results are statistically significant at 1% and 5% for a positive shock and a negative shock respectively. Insignificant results obtained when using gross domestic product growth as dependent variable.

Implication - This implies that the NARDL is not an appropriate model for estimating GDPG. Statistically significant results were found at 5% when using money supply.

Originality - This study examines the impact of stock market savings and banking sector efficiency in South Africa using the non-linear autoregressive distributed lag (NARDL) bound testing approach technique.

Keywords: Stokvels Savings, Banking Sector Efficiency, Asymmetry, NARDL, South Africa.

Introduction

Amidst South Africa's high levels of racial inequality, middle-income households are complicated by the low average and median income levels and broad income distribution on the country's income ladder (Visagie, 2013). However, low-income households earn no more than R5 000 per month (US$296,25), while middle-income households with a modest living standard earn R5001 to R40 000 (Visagie, 2013). Oji (2015) observed that in many African countries, most households in the lower- and middle-income brackets use informal or semi-formal savings clubs, associations and co-operatives to save money and access CR when necessary. This view is similar to those of Ngcobo and Chisasa (2018a), who found stokvels to play a significant role in the provision of credit, among other financial services, which are not easily accessible from formal financial institutions. Despite the growth and expansion of formal financial institutions, many households prefer using informal savings and credit schemes to support poverty alleviation (Chineka and Mtetwa, 2021; Shuaib, 2018; Mashigo and Kabir, 2016).

The financial system pools together the savings generated in the household sector. (Levine, 1997). In the banking sector, this task is primarily performed by banks' local branches, which, being close to savers, can create stable relationships with savers based on trust and on the repeated provision of financial services (Giovannini, Lacopettaand Minetti, 2013). Banks create a relationship with household savers, and the financial systems pool together savings by households. An increase in savings leads to output growth by allowing an increase in INVs. The BS induces the mobilisation of low- and middle-income households' savings, resulting in an increase in output growth (Gurley and Shaw, 1960). Savings equal gross private savings (Bayoumi and Masson, 1995).

Due to the crucial role of savings in promoting sustainable economic growth, many economists explored the subject of explaining the determinants of savings (Chipote and Tsegaye, 2014:184; Ogbokor, 2014:52). However, stokvels and banking sector development low- and middle-income

households' savings are limited, and less is empirically known about its factors. Therefore, the study's general objective was to explore whether stokvel savings has an asymmetric impact on banking sector efficiency in South Africa.

An overview of stokvel savings and banking sector in South Africa

Stokvel savings (STOKVSAV)

In South Africa, the term 'stokvel savings' denotes informal household finance clubs. While, worldwide, stokvel savings are commonly known as rotating savings and credit associations (ROSCAs) (Bophela and Khumalo, 2019:26, Mashigo and Schoeman, 2012:50, Verhoef, 2001a:259). With the ever-deteriorating economic situation, poverty and unemployment in South Africa are significant reasons for households to participate in stokvel savings (Chineka and Mtetwa, 2021). According to Sambo (2019:1), unemployment is the number one leader in poverty and inequality in the country. In 2006, more than two out of every five (42,2%) households in South Africa lived below the upper-bound poverty line. While the poverty level was similar in 2009 at 42,7%, there was a decline in households living in poverty in 2011, with approximately a third (32,9%) of all households below this level. This shows a significant reduction in the proportion of poor households in the country from 2006 to 2011. However, given the results of the 2011 Census, this still translates into approximately 4,75 million households in South Africa living below the poverty line (Stats SA, 2014).

Access to and the use of financial institutions by low- and middle-income households is complicated because the majority of stokvel savings members cannot provide valid Identity documents (Landman and Mthombeni, 2021). Additionally, a lack of education influences member preference to communicate in their mother language when being served in financial institutions (Verhoef, 2001b; Beck, Kibuuka and Tiongson, 2010; Moliea, 2007; Mashigo, 2012; Damodaram, 2013). These are also the main reasons low- and middle-income households do not use formal financial institutions (Burkett and Sheehan, 2009; De Cock, Fitchett and Volkmann, 2005). Many South Africans are not part of the formal financial system; hence, they save, invest and

use credit from stokvel savings (Kumarasinghe and Munasinghe, 2016; Kaseke and Olivier, 2008).

Stokvel savings are community-based savings schemes aimed at improving the lives of low- and middle-income earners (Van Wyk, 2017; Floro and Seguino, 2002). Stokvel members prefer saving with stokvel savings because of the transparency of transactions and the control it brings to their money (Bophela and Khumalo, 2019; Storchi, 2018). Money in this pool is then paid in full or partially to every member participating in the stokvel, either on a rotational basis or in times of financial need (Verhoef, 2008; Matuku and Kaseke, 2014; Nyandoro, 2018). Low- and middle-income households often use precautionary savings for stokvel savings, which are meant to safeguard against any possible future unexpected income shocks, often referred to as "rainy days" or "emergency savings" (Simleit, Keeton and Botha, 2011; Floro and Seguino, 2002:1). Stokvel savings provide an alternative for low- and middle-income households which cannot meet the requirements of the BS (Nyandoro, 2018; Mboweni, 1990). This view is supported by Oji (2015), who observed that African countries have a proportion of financially excluded people, which reflects a lack of access to financial resources.

Banking sector

Banks are vital institutions in any society, as they significantly contribute to the development of an economy through business facilitation. Banks also facilitate the development of saving plans and are instruments of the government's monetary strategy, among others. According to Freixas and Rochet (2008), the term 'bank' is derived from the Greek word trapeze and the Italian word banco, meaning money changing. Households deposit money in the bank, which goes into a big savings pool (Aidoo-Mensah, 2018; Bashir and Faridi, 2011). The account is credited with the deposit amount (Ewa, Adebisi, David and Arikpo, 2020). The bank's role is to provide a safe place to keep money and, sometimes, the opportunity to earn interest on deposits. A government monopoly ran the first banks, and banking operations were market-driven (Jones and Verhoef, 2006). The efficiency of banks is determined by their ability to facilitate savings and allocate CR optimally for

INV purposes (Sulaiman and Aluko, 2015; Bannour and Labidi, 2013). Access to financial services (savings and CR) is important for growth and poverty reduction (Jibrin, Danjuma and Blessing, 2014; Demirgüç-Kunt and Levine,2008). All over the world, the BS provides banking services to cater to their customers' needs (Anandalakshmy, Hamsini Aathreya, Keerthana, Nanhini and Dhanyasree, 2019; Chinweoke, Onydikachi and Elizabeth, 2014).

Literature Review

Savings can be considered one of the crucial tools households utilise to accomplish their financial expectations in order to improve their financial well-being (Kumarasinghe and Munasinghe, 2016). In addition, Kumarasinghe and Munasinghe (2016:367) used factor analysis to examine the most important purpose for savings among predetermined savings motives of bequest, precautionary and life cycle. The most significant savings motive of households in Kalutara District was the precautionary savings motive, suggesting that households are aware of the uncertain future and the financial and social challenges it may pose. Thus, it can be inferred that households demand savings facilities to hedge themselves against the uncertain future. As in previous studies (Ngcobo and Chisasa, 2018a), informal saving institutions are observed to be efficient and the preferred suppliers of these saving instruments.

While *stokvel savings* are the vehicles for informal household savings in South Africa, similar informal arrangements exist globally. For instance, Cheruiyot, Cheruiyot and Yegon (2016:871) examined the operations and impact of ROSCAs on the lives of middle-income earners. The study's results indicated that ROSCAs impacted middle-income earners' lives and enabled them to acquire financial, physical, human, and social assets. The research also showed that the organisations also impacted money management since members used the funds to meet current expenditure needs.

The level of banking sector development has been widely heralded as a condition necessary for savings; however, Sawuyah (2018:312) failed to identify it as such. Rather, the study examined the micro-level determinants of household savings in Uganda and using household-level cross-sectional data; evidence revealed that income was the main determinant of variation of household savings in Uganda. Additionally, household income, the education level of the household head, the spouse's education, gender, age and household location (living in urban areas) are factors that influence household savings significantly. On the other hand, household size, marital status, age of the household head and regional differences negatively and significantly affect household savings. Similarly, Ahmad and Asghar (2004:73) used the ordinary least square method in Pakistan for the period 1998–1999 to examine the savings behaviour of households. The study's results showed that various factors, including wealth, employment status, education, age and dependency ratio, influence saving behaviour. However, the most important factor influencing savings behaviour is household income. The authors do not refer to the link between savings and banking sector development.

Pitonáková (2018:1) studied the savings rate of the private sector in Slovakia. The results suggest that inflation, the real interest rates on bank deposits, public savings, the level of private disposable income, growth of income per capita and the dependency ratio of the elderly are determinants of private savings. Higher-income stimulates the private sector to increase their savings and to build a buffer to cover expenditures in the future. The outcomes suggest a negative impact of public savings on private savings. However, the relationship between savings and the RIR is positive. Furthermore, a rising dependency ratio pushes private savings up, both in the short- and long-run, showing savings for the bequest. Since most household savings in Slovakia are in bank accounts, the findings have implications for banking institutions for managing deposit policy from non-banking subjects.

Molopo (2017) used the ARDL cointegration approach model, drawing on quarterly time series data in Lesotho for the period 2005–2014, to investigate the effects of various factors on the supply of crediy to the private sector. The study's empirical results revealed that both short- and long-run indicate a significant relationship between the supply of credit to the private sector and bank deposits. In addition, Chandra (2020) used the ARDL model in Bangladesh from 1976–2017 to examine the causal relationship between private sector credit growth and economic growth. The empirical results show that the annual growth rate of private sector credit and industrial production index has a positive and significant effect on the annual growth rate of GDP in both the long- and short-run.

Samantaraya and Patra (2014:1) used the ARDL approach in India to analyse the role of various determinants of household savings. The estimated results revealed that GDP dependency ratio, interest rate and inflation have a statistically significant influence on household savings, both in the long- and short-run, suggesting that the BS should be ready to absorb these household savings by developing suitable products for households. Similarly, at a micro level, ur Rehman, Faridi and Bashir (2010:17) used data obtained from 293 respondents drawn through a field survey conducted in the Multan District of Pakistan for the period 2009–2010 to investigate the determinants of households' savings. It was concluded that spouse participation, total dependency rate, household income and size of properties significantly raise household savings. On the other hand, the educational level of the household head, children's educational expenditures, family size, liabilities to be paid, marital status and value of the house significantly reduce the savings levels of households. Their study also supports the existence of the life cycle hypothesis.

Wamuyu (2016) investigated the potential of using mobile money accounts as a money management platform to help promote a savings culture and establish and nurture financial discipline among poor households in

Kenya. The study's results indicated that a lack of awareness of the available and affordable mobile money savings products, low-interest rates on mobile money fixed deposit savings accounts and high transaction costs when making mobile money payments negatively impacts mobile money fixed deposit savings accounts usage. In contrast, the availability of microcredit on mobile money savings accounts positively affects usage

Methods

This study used quarterly time series secondary data ranging from 2009Q4 to 2020Q2 collected from the South African Reserve Bank and Old Mutual South Africa.

Variables, proxies', researchers and data sources

Table 1 presents the main variables used in this study, their proxies, researchers and data sources.

Table 1: Variables and proxies

Variable	Proxy	Data source
Dependent variables: Banking sector development proxies		
Banking Sector Efficiency (BSE)	The ratio of domestic credit to the private sector by banks as a percentage of GDP and The ratio of domestic credit by banks to all	Djalilov and Hölscher (2016); Tsaurai (2018)

	economic sectors as a percentage of GDP	
Independent variable: Stokvel savings proxy		
Stokvel Savings (STOKVSAV)	*Stokvel savings* deposits as a ratio of GDP	Chandio, Wei and Yuansheng (2015); Kafayat (2013)
Control variables		
Gross Domestic Product Growth (GDPG)	Savings/Gross income	Ribaj and Mexhuani (2021); Mogale, Mashamaite and Khoza (2018); Zwane, Greyling and Maleka (2016); Jagadeesh (2015)
Money Supply (M3)	M3 = M1 + TD (Broad Money); TD – Time Deposits with banks includes fixed deposits, recurring deposits, and time liability of savings accounts	Tenenbaum (2021); Omodero (2019); Mierau & Mink (2018)

The literature extensively demonstrated, from both empirical and theoretical angles, that stokvel savings play a significant role in the development of the BSE. Equation 1 below is illustrative.

$$\mathrm{BSE} = f(STOKSAV, GDPG, M3) \qquad (1)$$

The following general econometric model represents the impact of STOKVSAV on BSS in South Africa (see equation 2).

$$\Delta \mathrm{BSE}_t = \beta_0 + \beta_1 \Delta \mathrm{LnSTOKVSAV}_t + \sum_{j=1}^{n} \mathrm{X}_{jt} + \mathrm{u}_t \qquad (2)$$

Where: STOKVSAV = *stokvel savings,* X_{jt} *is the vector of control variables*

If $\beta_1 \neq 0$ and have significance, meaning there exists a break-point and the impact of STOKVSAV on BSS is the difference between the two periods. The minimum stokvel savings is β_0 in the period before the break-point is ($\beta_0 + \beta_1$) in the period after the break-point. If $\beta 3>0$ and have significance, this implies the impact of stokvel savings on BSD in the period after the break-point is bigger than the effect in the period before the break-point.

Autoregressive Distributed Lag (ARDL) approach

The study employed the ARDL approach proposed by Pesaran, Shin and Smith (2001) and long- and short-run estimations econometric approaches postulated by Engle and Granger (1987), Johansen and Juselius (1990), and Johansen (1996). The ARDL models are presented in equation [3] as follows:

$$\begin{aligned} \Delta LnBSE_t = {} & \alpha_0 + \beta_1 InBSE_{t-1} + \beta_2 STOKVSAV_{t-1} \\ & + \beta_3 GDPG_{t-1} + \beta_4 M3_{t-1} \\ & + \sum_{k=0}^{m2} \alpha_{1k} \Delta InBSE_{t-k} \\ & + \sum_{k=0}^{m3} \alpha_{2k} \Delta STOKVSAV_{t-k} \\ & + \sum_{k=0}^{m4} \alpha_{3k} \Delta GDPG_{t-k} + \sum_{k=0}^{k} \alpha_{4k} \Delta M3_{t-k} \\ & + \omega_t \end{aligned} \qquad (3)$$

Where: Δ *= first difference,* β1, β2, β3 and β4 *=coefficients of the long-run impacts,* **α**1, **α**2, **α**3 and **α**4 *=coefficients of the short-run impacts,* ***ω****= error*

The cointegration relationship is estimated as follows:

The long-run and short-run parameters of the equations are estimated once the cointegrating relationship has been detected. The cointegration relationship is estimated as follows:

$$\Delta BSE_t = \beta_{0+} \beta_1 BSE_{t-1} + \beta_2 STOKVSAV_{t-1} + \beta_3 GDPG_{t-1} + \beta_4 M3_{t-1} + \mu_t \quad (4)$$

$$STOKVSAV_t = STOKVSAV + STOKVSAV_t^{+} + STOKVSAV_t^{-} \quad (5)$$

$$GDPG_t = GDPG + GDPG_t^{+} + GDPG_t^{-} \quad (6)$$

$$M3_t = M3 + M3_t^{+} + M3_t^{-} \quad (7)$$

Where stokvel savings control variances are partial sum processes of positive and negative changes in independent variables obtained as follows:

$$NEG(STOKVSAV_t) = \sum_{s=0}^{t} STOKVSAV_s^{-} = \sum_{S=0}^{t} MIN(\Delta STOKVSAV_s, 0) \quad (8)$$

$$POS(STOKVSAV_t) = \sum_{s=0}^{t} STOKVSAV_s^{+} = \sum_{S=0}^{t} MAX(\Delta STOKVSAV_s, 0) \quad (9)$$

$$NEG(GDPG_t) = \sum_{s=0}^{t} GDPG_s^{-} = \sum_{S=0}^{t} MIN(\Delta GDPG_s, 0) \quad (10)$$

$$POS(GDPG_t) = \sum_{s=0}^{t} GDPG_s^{t} = \sum_{S=0}^{t} MAX(\Delta GDPG_s, 0) \quad (11)$$

$$NEG(M3_t) = \sum_{s=0}^{t} M3_s^{-} = \sum_{S=0}^{T} MIN(\Delta M3_s, 0) \quad (12)$$

$$\mathrm{POS}(\mathrm{M3}_t) = \sum_{s=0}^{t} \mathrm{M3}_s^{+} = \sum_{S=0}^{t} \mathrm{MAN}(\Delta \mathrm{M3}_s, 0) \quad (13)$$

Therefore, the non-linear asymmetric long-run equilibrium relationship can be expressed as:

$$\mathrm{BSE}_t = \mathrm{POS}^{+}\,\mathrm{STOKVSAV}_s^{+} + \mathrm{NEG}^{-}\,\mathrm{STOKVSAV}_s^{-} + u_t \quad (14)$$

$$\mathrm{BSE}_t = \mathrm{POS}^{+}\,\mathrm{GDPG}_s^{+} + \mathrm{NEG}^{-}\,\mathrm{GDPG}_s^{-} + u_t \quad (15)$$

$$\mathrm{BSE}_t = \mathrm{POS}^{+}\,\mathrm{M3}_s^{+} + \mathrm{NEG}^{-}\,\mathrm{M3}_s^{-} + u_t \quad (16)$$

NARDL model is introduced through partial sum or cumulative sum concept included in generating the new variables POS (+) and NEG (-), where all variables (STOKVSAV, GDPG and M3) are lag orders.

$$\begin{aligned}\Delta \mathrm{BSE}_t = \alpha_0 + + \sum_{i=0}^{p} \alpha_{1i}\Delta \mathrm{BSE}_{t-i} + \sum_{i=0}^{p} \alpha_{2i}\Delta \mathrm{NEG}(\mathrm{STOKVSAV})_{t-i} + \sum_{i=0}^{p} \alpha_{3i}\Delta \mathrm{POS}(\mathrm{STOKVSAV})_{t-i} + \sum_{i=0}^{p} \alpha_{4i}\Delta \mathrm{NEG}(\mathrm{GDPG})_{t-i} + \sum_{i=0}^{p} \alpha_{5i}\Delta \mathrm{POS}(\mathrm{GDPG})_{t-i} + \sum_{i=0}^{p} \alpha_{6i}\Delta \mathrm{NEG}(\mathrm{M3})_{t-i} + \sum_{i=0}^{p} \alpha_{7i}\Delta \mathrm{POS}(\mathrm{M3})_{t-i} + \\ \alpha_{8i}\mathrm{BSS}_{t-i} + \alpha_{9i}\mathrm{NEG}(\mathrm{STOKVSAV})_{t-1} + \\ \alpha_{10i}\mathrm{POS}(\mathrm{STOKVSAV})_{t-1} + \alpha_{11i}\mathrm{NEG}(\mathrm{GDPG})_{t-1} + \\ \alpha_{12i}\mathrm{POS}(\mathrm{GDPG})_{t-1} + \alpha_{13i}\mathrm{NEG}(\mathrm{M3})_{t-1} + \\ \alpha_{14i}\mathrm{POS}(\mathrm{M3})_{t-1} + \omega_t\end{aligned} \quad (17)$$

.

Results and Discussion

Unit root test with breakpoints

The study applies the structural break method for determining the time series properties of the variables investigated by the ADF test. The results of unit root tests in levels and at intercept are presented in Table 2. The variable tests were employed for this study to see whether the data was stationary. The

test is more robust to heterogeneity and unit roots when under a non-standard distribution. The variables were found to be I(0) and I(1), thus confirming that variables that are I(2) were not present. The presence of I(2) variables in the model would result in spurious F-statistics since the F-statistics computed by Pesaran, Shin and Smith (2001) and Nayaran (2005) have their root in the presumption that the variables are I(0) or I(1). The results of the study suggest that the variables are mutually integrated in the order of either zero or one, or both, which supports the conditions for the use of the ADF unit root test.

Table 2: Stationarity tests of variables using Augmented Dickey-Fuller (ADF) unit root

Variable	Trend	Intercept	Trend and Intercept	Diagnosis
Stationary tests of variables using Augmented Dickey-Fuller (ADF) test:				
Trend Specification: Intercept only				
BSE	-	- 7.498067***	-	I(0)
STOKV	-	- 4.600730***	-	I(0)
GDPG	-	- 6.394021***	-	I(0)
M3	-	- 7.126778***	-	I(1)
Stationary tests of variables using Augmented Dickey-Fuller (ADF) test:				
Trend Specification: Trend and Intercept				
BSE	- 6.649438***	- 7.428240***	- 6.728109***	I(0)
STOKV	- 7.763481***	- 6.578931***	- 5.978431***	I(0)

GDPG	-17.42696***	-6.441841***	-8.182452***	I(0)
M3	-4.210961**	-5.328696***	-4.307545**	I(0)

*Source: Author's own compilation from E-Views ***; **; * indicates that we reject the null hypothesis of unit root tests at 1%, 5% and 10%, respectively*

Nonlinear ARDL results

In table 3. the BSE was used as the proxy for BSD, the F-statistic (10.19779) was found to be above the upper-bound critical value of 3.24 and was significant at 5%. Thus, the hypothesis of no cointegration was rejected. Similarly, when *STOKVSAV* was used as the dependent variable, the F-statistic of 12.24480 was also significantly higher than the upper bound (4), implying the null hypothesis of no cointegration when GDPG and M3 were dependent variables was rejected. The results that there is a long-run relationship between BSE and the selected explanatory variables.

Table 3: Bounds F-test for non-liner cointegration.

Dependent variable	Independent variables	F-test statistic	Lower and Upper Bounds
BSE	STOKVSAV GDPG M3	10.19779***	2.04-3.24
STOKVSAV	BSS GDPG M3	12.24480***	2.87-4
GDPG	BSS STKVSA M3	3.053067***	2.16-3.86
M3	BSS STKVSA GDPG	2.896999***	2.04-3.24

Non-linear ARDL Long-run Results: Bounds F-test for cointegration

When using banking sector efficiency as the proxy for banking sector development, none of the explanatory variables produce a significant impact

after either a positive or negative shock. Suffice to say that a positive shock on *stokvel savings* yields an improvement in the banking sector efficiency albeit insignificant. Similarly, a negative shock in stokvel savings results in a negative impact on banking sector efficiency, however, the impact is insignificant. Both positive and negative shocks on banking sector efficiency exhibited a positive influence on stokvel savings. An improvement in banking sector efficiency would result in an increase in stokvel savings of approximately 0.33%, while a decline in banking sector efficiency would lead to increase in *stokvel savings* albeit at a marginally reduced level of approximately 32%. The results are statistically significant at 1% and 5% for a positive shock and a negative shock respectively. Insignificant results obtained when using gross domestic product growth as dependent variable. This implies that the N-ARDL is not an appropriate model for estimating GDPG. Finally, a positive change in banking sector efficiency would result a decrease in money supply, a reaction that can be attributed to changes in monetary policy, especially in a contractionary monetary regime. This result is statistically significant at 5%. The detailed results are in Table 4

Table 4: N-ARDL Long Run Form and Bounds Test (4.4.3.4.3.3.4)

ARDL Long-Run Coefficients Result

Variable	Coefficient	St.Error	t.Statistic	Prob
STOKVSAV_POS	58.40049	33.50104	1.743244	0.1562
STOKVSAV_NEG	-16.10032	39.55266	-0.407060	0.7048
GDPG_POS	724.4166	372.9853	1.942212	0.1241
GDPG_NEG	488.4672	208.8498	2.338845	0.0795
M3_POS	-6.008077	5.187173	-1.158257	0.3112
M3_NEG	3.436723	2.312259	1.486305	0.2114
STOKVSAV Unrestricted Constant and Unrestricted Trend				
BSE_POS	0.326370	0.068852898	4.736978	0.0091
BSE_NEG	0.318658	0.0731474.	4.356426	0.0121

GDPG_POS	8.694139	5.078528	1.711941	0.1621
GDPG_NEG	10.02232	4.421396	2.266778	0.0860
M3_POS	0.134149	0.027010	4.966688	0.0077
M3_NEG	-0.031828	0.012402	-2.566368	0.0622
GDPG restricted Constant and NoTrend				
BSE_POS	0.057577	0.062565	0.920271	0.4253
BSE_NEG	0.057201	0.060739	0.941752	0.4158
SOKVSAV_POS	-0.335603	0.334145	-1.004364	0.3892
STOKVSAV_NEG	-0.578521	0.607508	-0.952286	0.4112
M3_POS	0.002286	0.002831	-0807643	0.4784
M3_NEG	0.005933	0.008495	0.698488	0.5351
C	0.223914	0.192059	1.165864	0.3279
M3 No Constant and No trend				
BSE_POS	-4.712041	1.487207	-3.168383	0.0249
BSE_NEG	-3.247857	1.577917	-2.058320	0.0946
STOKVSAV_POS	-32.28835	22.34255	-1.445151	0.2080
STOKVSAV_NEG	-32.54617	27.21291	-1.182942	0.2900
GDPG_POS	137.3785	214.6569	0.639991	0.5503
GDPG_NEG	63.52196	181.6346	0.349724	0.7408

Diagnostic test results

Table 5 reports the results of the diagnostic test in which the null hypothesis (H_0) of no serial correlation was tested. The decision rule states that the null hypothesis (H_0) should be rejected if the p-value of the observed R-squared is less than the 0.05 level of significance. In the long-run, the probability value of the Chi-square results showed that there is no presence of serial correlation in the estimated model since the p-values of the observed R-

squared for all three models are greater than the 0.05 level of significance. The test fails to reject the null hypothesis of constancy of variance among the residuals in the model and, thus, is deemed to be homoscedastic.

Table 5: Diagnostic statistics for N-ARDL

Obs* R-square/F-statistic

Variable	Breusch-Godfrey Serial Correlation LM Test	Heteroskedasticity Test Breusch-Pagan-Godfrey	Jarque-Bera test of Normality
BSE	0.669324 (prob. = 0.60)	0.6812901 (prob. = 0.76)	2.517513(prob. =.0.28)
STOKVSAV	0.497180 (prob. = 0.53)	0.878060 (prob. = 0.64)	0.365409 (prob. = 0.83)
GDPG	0.058306 (prob. = 0.95)	0.178686 (prob. = 0.99)	4.499489 (prob. = 0.11)
M3	2.833292 (prob. = 0.17)	0.510472 (prob. = 0.88)	1.424536 (prob. = 0.49)

Notes: Normality test using the Jarque-Bera test of Normality; Serial correlation using the Breusch-Godfrey test; Heteroscedasticity using the Breusch-Pagan-Godfrey Test

Dynamic multiplier graphs

For the asymmetric relationship, the non-linear ARDL model was applied that decompose partial sum of *stokvel savings* positive and negative changes to show the asymmetric effect. The results are presented in Table 3. The dynamic short-run and long-run multipliers graphs for the variables for banking sector efficiency are plotted in Figure 2. are used to check the asymmetry that is due to the positive and y portray adjustment to a new equilibrium after positive and negative shocks.

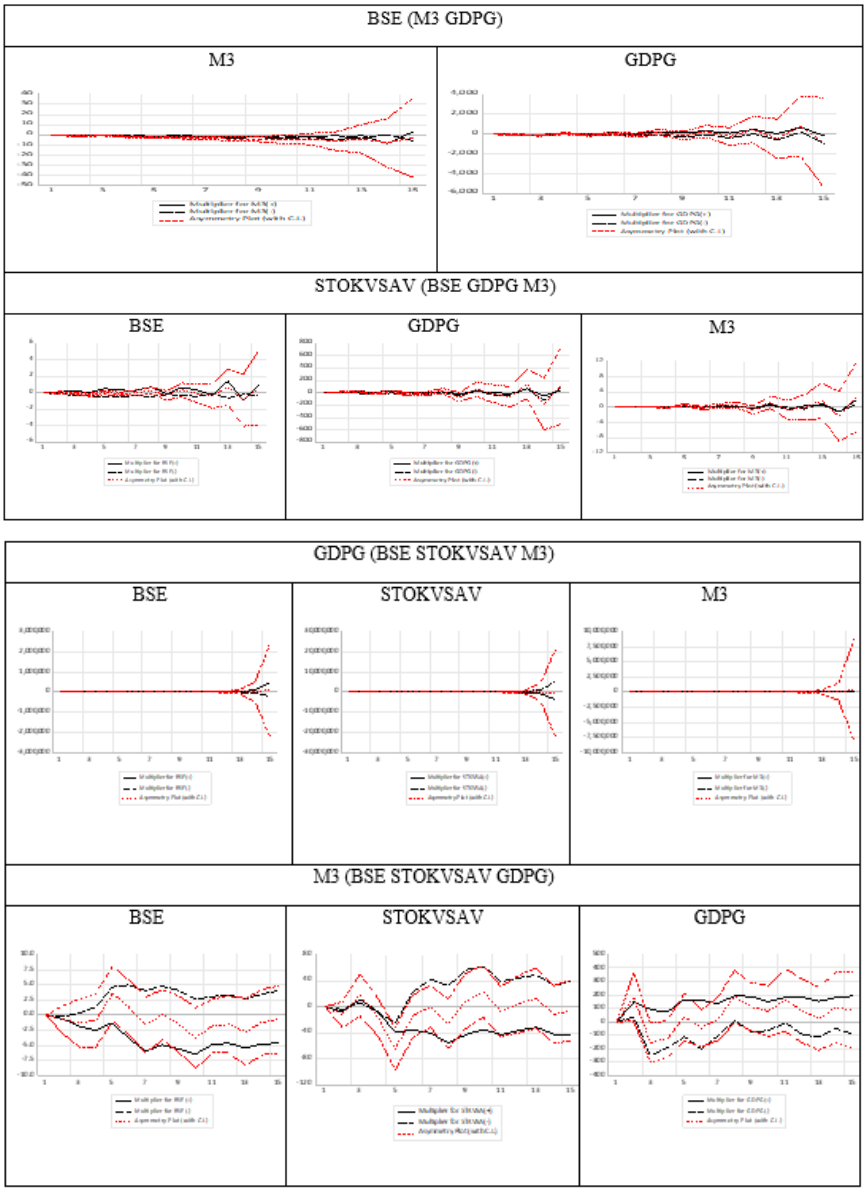

Figure 2: Plot of dynamic multiplier graphs

Conclusion

This study examines the impact of stokvel savings and banking sector efficiency in South Africa using the non-linear autoregressive distributed lag (NARDL) bound testing approach technique with economic time series data ranging from 2009Q4 to 2020Q2. The results are statistically significant at 1% and 5% for a positive shock and a negative shock respectively. Insignificant results obtained when using gross domestic product growth as dependent variable. This implies that the NARDL is not an appropriate model for estimating GDPG. A positive change in banking sector efficiency would result a decrease in money supply, a reaction that can be attributed to changes in monetary policy, especially in a contractionary monetary regime. This result is statistically significant at 5%. The limitations of the study were difficulty choosing the proxy of *stokvel savings* since most data on the investment vehicle remains unknown globally. In addition, *stokvel savings* offer financial services outside of the domain of the banking sectors of South Africa and are not governed by their regulations, and terminology varies among countries. A similar study can be recommended with the inclusion of all banks that make up the banking sector and their impact on South Africa's economic growth.

Acknowledgments

This research paper is a product of my unpublished Doctor of Philosophy's degree 2023 thesis entitled: "The role of *stokvels* in banking sector development in South Africa". This thesis may be found in the UNISA repository but is unpublished material

References

Ahmad, M., & Asghar, T. (2004). Estimation of saving behaviour in Pakistan using micro data. *Lahore Journal of Economics*, 9(2), 73–92.

Aidoo-Mensah, D. (2018). Savings and income relationships among households: A review of the literature. *Agricultural Social Economic*

Journal, 18(3),133–143. https://doi.org/10.21776/ub.agrise.2018.018.3.6

Anandalakshmy, A., Hamsini Aathreya, S., Keerthana, M., Nanhini, B., & Dhanyasree, A. (2019). Retail banking and services. *Pramana Reserch Journal*, 9(6), 1691–1699.

Bannour, B., & Labidi, M. (2013). Efficiency of the Tunisian Trade Banks: Study by the Stochastic Frontier Approach. *Panoeconomicus*, 60(1),103–132. https://doi.org/10.2298/PAN1301103B

Bashir, F., & Faridi, M.Z. (2011). Saving behavior among different income groups in Pakistan: A micro study. *International Journal of Humanities and Social Science*, 1(10), 268–277.

Bayoumi, T., & Masson, P.R. (1995). Fiscal flows in the United States and Canada: Lessons for monetary union in Europe. *European Economic Review*, 39(2), 253–274. https://doi.org/10.1016/0014-2921(94)E0130-Q

Beck, T., Kibuuka, K., & Tiongson, E. (2010). Mortgage finance in Central and Eastern Europe: Opportunity or burden? *World Bank Policy Research Working Paper 5202*, 1–90.

Bophela, M.J.K., & Khumalo, N. (2019). The role of stokvels in South Africa: A case of economic transformation of a municipality. *Problems and Perspectives in Management*, 17(4), 26–37. https://doi.org/10.21511/ppm.17(4).2019.03

Chandio, A.A., Wei, F., & Yuansheng, J. (2015). Role of savings in economic growth of Pakistan. *Asian Journal of Empirical Research*, 5(12), 243–251.

Cheruiyot, P.K., Cheruiyot, J.K., & Yegon, C.K. (2016). A study on operations and impact of rotating savings and credit associations: Case of middle income earners in Embakasi Nairobi, Kenya. *International Journal of Economics, Commerce and Management*, 4(5), 871–897.

Chinweoke, N., Onydikachi, M., & Elizabeth, N.C. (2014). Financial intermediation and economic growth in Nigeria (1992–2011). *The*

Macrotheme Review, 3(6), 124–142.

Chineka, T. S., & Mtetwa, E. (2021). Savings and credit schemes (SCSs): Towards an informal sector poverty alleviation strategy for Zimbabwe. *African Journal of Social Work*, 11(6), 403–411.

Chipote, P., & Tsegaye. A. (2014). Determinants of household savings in South Africa: An econometric approach (1990-2011). *Mediterranean Journal of Social Sciences*, 5(15), 183–190. https://doi.org/10.5901/mjss.2014.v5n15p183

Damodaram, A. (2013). Financial Inclusion: Issues and Challenges. *AKGEC International Journal of Technology*, 4(2), 54-59.

Demirgüç-Kunt, A., & Levine, R. (2008). Finance, financial sector policies, and long-run growth. *Policy Research Working Paper Series*, 4469. The World Bank. https://doi.org/10.1596/1813-9450-4469

Djalilov, K., & Hölscher, J. (2016). Comparative analyses of the banking environment in Transition Countries. *Ekonomski Anali* , 7(25), 1–20. https://doi.org/10.2298/EKA1608007D

Ewa, U., Adebisi, A.W., David, O.M., & Arikpo, O.F. (2020). Deposit money banks services and economic growth in Nigeria. *International Journal of Finance and Accounting*, 9(2), 31–41. https://doi.org/10.5923/j.ijifa.20200902.02

Floro, M.S., & Seguino, S. (2002). Gender effects on aggregate saving. *Policy Research Report on Gender and Development. Working Paper Series*, 23.

Freixas, X., & Rochet. J. (2008). Microeconomics of banking. Cambridge, MA: MIT Press.

Giovannini, A., Lacopetta, M., & Minetti, R. (2013). Financial markets, banks and growth: Disentangling the links. *Revue de I'OFCE, Presses de Sciences-Po*, 0(5), 105–147.

Gurley, J.G., & Shaw, E.S. (1960). *Money in a theory of finance*. Washington DC: Brookings Institution.

Jagadeesh, D. (2015). The impact of savings in economic growth: An empirical study based on Botswana. *International Journal of Research in Business Studies and Management,* 2(9), 10–21.

Jones, S., & Verhoef, G. (2006). Financial intermediaries in settler economies: the role of the BSD in South Africa, 1850-2000. *Paper presented in Session 97: Settler Societies in World History,* International Economic History Association, Helsinki, University of the Witwatersrand and University of Johannesburg. South Africa, 1–40. August.

Landman, M., & Mthombeni, M. (2021). Determining the potential of informal savings groups as a model for formal commitment saving devices*. South African Journal of Economic and Management Science*s, 24(1).

Kafayat, A. (2013). Savings and economic growth in South Africa: A multivariate analysis. *Journal of Economic and Financial Sciences,* 7(1), 73–88. https://doi.org/10.22610/jebs.v5i4.395

Kaseke, E., & Matuku, S. (2014). The role of stokvels in improving people's lives: The case in Orange Farm, Johannesburg, South Africa. *Social Work/Maatskaplike Werk*, 50(4). https://doi.org/10.15270/50-4-388

Kaseke, E., & Olivier, M.P. (2008). Informal social security. *International Conference on Social Security organized by the National Department of Social Department. South Africa*, 10-14 March, Cape Town.

Kumarasinghe, P.J., & Munasinghe, S.C. (2016). The savings motives: With special reference to households in Kalutara District. *13th International Conference on Business Management*, University of Sri Jayewardenepura, 367–377.

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature*, 35, 688–726. Mashigo, M.P. (2012). The lending practices of township micro-lenders and their impact on the low-income households in South Africa: A case study for Mamelodi township. *New Contree*, *65 (12).*

Mashigo, P., & Kabir, H. (2016). Village banks: A financial strategy for developing the South African poor households. *Banks and Bank Systems*, 11(2), 8–13. https://doi.org/10.21511/bbs

Mashigo, M.P., & Schoeman, C. (2012). Stokvels as an instrument and channel to extend credit to poor households in South Africa. *Journal of Economic and Financial Sciences*. 5(1), 49–62. https://doi.org/10.4102/jef.v5i1.305

Mashigo, P., & Kabir, H. (2016). Village banks: A financial strategy for developing the South African poor households. *Banks and Bank Systems*, 11(2), 8–13. https://doi.org/10.21511/bbsMboweni, T.T. (1990). *Stokvels in South Africa: Informal savings schemes by blacks for the black community*. Johannesburg: Amagi Books.

Mierau, J. O., & Mink, M. (2013). Are stock market crises contagious? The role of crisis definitions. *Journal of Banking and Finance*, 37(12), 4765–4776.

Mogale, I.P., Mashamaite, T., & Khoza, N. (2018). Household savings, financing and economic growth in South Africa. *Business and Economic Horizons*, 14(1), 105–116. http://doi.org/10.15208.beh.2018.9

Moliea, H. (2007). Stokvels as alternative microfinance institutions: Conversions with women from Venda. *Master of Business Administration. University of Pretoria,* Pretoria, South Africa. Available from: http://hdl.handle.net/2263/23463 (Accessed 14 June 2018)

Molopo, S., & Damane, M. (2017). An econometric approach to private sector credit in Lesotho. *Journal of Business in Developing Nations*, 15(1), 32–54.

Ngcobo, L., & Chisasa, J. (2018a). Characteristics of credit instruments issued by stokvels in South Africa. *Journal of Economics and Behavioural Studies (JEBS)*, 10(6), 240–250.

Nyandoro, M. (2018). Defying the odds, not the abuse: South African women's agency and rotating savings schemes, 1994-2017. *Journal of International Women's Studies*, 19(5), 177–192. https://vc.bridgew.edu/jiws/vol19/iss5/12

Ogbokor, C.A (2014). A time series analysis of the determinants of savings in Namibia. *Journal of Economics and Sustainable*

Development, 5(8), 52–63.

Oji, C.K. (2015). Promoting financial inclusion for inclusive growth in Africa. Occasional paper 210. Economic Diplomacy Programme. February. *SAIIA*. https://www.saiia.org.za/occasional-papers/promoting-financial-inclusion-for-inclusive-growth-in-africa/

Omodero, C.O. (2019). Effect of money supply on economic growth: A comparative study of Nigeria and Ghana. *International Journal of Social Science Studies,* 7(3), 16–23. https://doi.org/10.11114/ijsss.v7i3.4137

Pesaran, M.H.; Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326.

Pitonáková, R. (2018). Private sector savings. *DANUBE: Law, Economics and Social Issues Review*, 9(1), 1–17. https://doi.org/10.2478/danb-2018-0001

Ribaj, A., & Mexhuani, F. (2021). The impact of savings on economic growth in a developing country (the case of Kosovo). *Journal of Innovation and Entrepreneurship,* 10(1), 1–13. https://doi.org/10.1186/s13731-020-00140-6.

Samantaraya, A., & Patra, S.K. (2014). Determinants of household savings in India: An empirical analysis using ARDL approach. *Economics Research International*, 454675, 1–8. http://doi.org/10.1155/2014/454675

Sambo, I. (2019). IEB Essay-unemployment, inequality and poverty in South Africa. *Conference: IEB CLASS University of Western Cape*, 1–6. https://doi.org/10.13140/RG.2.2.18812.39040

Sawuyah, N. (2018). Micro analysis of the determinants of household savings: Empirical evidence from Uganda. *International Journal of Innovative Research and Development*, 7(1), 312–322. http://doi.org/10.24940/ijird/2018/v7/i1/JAN18078

Shuaib, S.N. (2018). Informal financial institutions: A source of soft loans to individuals and small business owners. *Master of Business*

Administration Research proposal. Ibrahim Badamasi Babangida University, Lapai-Niger State. 1-13. https://doi.org/10.131140/RG.2.2.19876.73609

Simleit, C., Keeton, G., & Botha, F. (2011). The determinants of household savings in South Africa. *Journal for Studies in Economics and Econometrics*, 35(3), 1–20. https://doi.org/10.1080/10800379.2011.12097228

Storchi, S. (2018). Impact evaluation of savings groups and stokvels in South Africa. The economic and social value of group-based financial inclusion. *Fin Mark Trust*, October. www.finmark.org.za/wp-content/uploads/2018/11/fmt-

Sulaiman, L.A., & Aluko, O.A. (2015). Financial intermediation and economic growth: A test for causality in Nigeria. *Banks and Bank Systems*, 10(4), 69–74.

Tenenbaum, H. (2021). What is hiding behind the money accumulating in Utah? *Environment and Planning A: Economy and Space*, *53*(8), 1879–1895. https://doi.org/10.1177/0308518X211041371

Tsaurai, K. (2018). An empirical study of the determinants of BSD in the SADC countries. *The Journal of Developing Areas*, 52(1), 71–84.

ur Rehman, H., Faridi, M.Z., & Bashir, F. (2010). The savings motives: With special reference to households in Kalutara District. *Pakistan Journal of Social Sciences (PJSS),* 30(1), 17–29.

Van Wyk, M. (2017). Stokvels as a community-based saving club aimed at eradicating poverty: A case of South African rural women. *The International Journal of Community Diversity*, 17(2), 14–26.

Verhoef, G. (2001a). Savings and survival in a modern African economy: Informal savings organisations and poor people in South Africa. *Historia*, 46(2), 519–542.

Verhoef, G. (2001b). Informal financial service institutions for survival: African women and stokvels in urban South Africa, 1980-1988. *Enterprise and Society*, 2(2), 259–296.

Verhoef, G. (2008). Social capital in voluntary savings organisations in

South Africa in historical perspective. *New Contree*, 56(1), 51–79.

Visagie, J. (2013). Who are the middle class in South Africa? Does it matter for policy? *Econ 3x3.* Available from: www.econ3x3.org

Wamuyu, P. (2016). Promoting savings among low income earners in Kenya through mobile money. *IST-Africa 2016 Conference Proceedings, IIMC International Information Management Corporation.* Available from: https://www.ist-africa.org/Conference2016

Zwane, T.T., Greyling, L., & Maleka, M. (2016). The determinants of household savings in South Africa: A panel data approach. *International Business & Economics Research Journal (IBER)*, 15(4), 209–218. https://doi.org/10.19030/iberv15i4.9758