The Impact of Stokvel and Banking Sector Efficiency: an Econometrics Model using (ARDL) Approach to Cointegration

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Abstract

Background: Despite playing second fiddle to formal banking institutions, stokvel are community-based savings schemes aimed at improving the lives of low- and middle-income earners.

Aim: The aims are to attempts to capture the relationship between stokvel and banking sector development across its proxy of banking sector efficiency. The aim is to determine the relative attractiveness of the needs of low- and middle households saving with banking sector/financial institutions.

Methods: Using Autoregressive Distributed-lag (ARDL) Bounds Testing Approach using quarterly time series secondary data ranging from 2009Q4 to 2020Q2 collected from the South African Reserve Bank and Old Mutual South Africa.

Results: The Bounds F-tests integration statistics of the combined cointegration test revealed a long-run association between stokvel and banking sector efficiency. Additionally, using the error correction model, a short-run relationship was observed between stokvel savings and banking sector efficiency. The negative and statistically significant coefficient of the error correction model (ECM) also confirmed the prevalence of a causal relationship between stokvel and banking sector efficiency. The standard diagnostics tests confirmed that ARDL results are significant and serially correlated. Stability tests were carried out using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of the squares of recursive residuals (CUSUMSQ) measures of model stability and the results showed that the models were highly stable over the sample period. Thus, it can be said that including stokvel in the banking system does not help with the development of the banking sector.

Recommendation: A similar study can be conducted with the inclusion of all banks that make up the banking sector and their impact on South Africa's economic growth.

Keywords

Stokvel, Banking Sector Efficiency, Gross Domestic Product Growth; ARDL, South Africa

JEL Codes

C01, D14, G23

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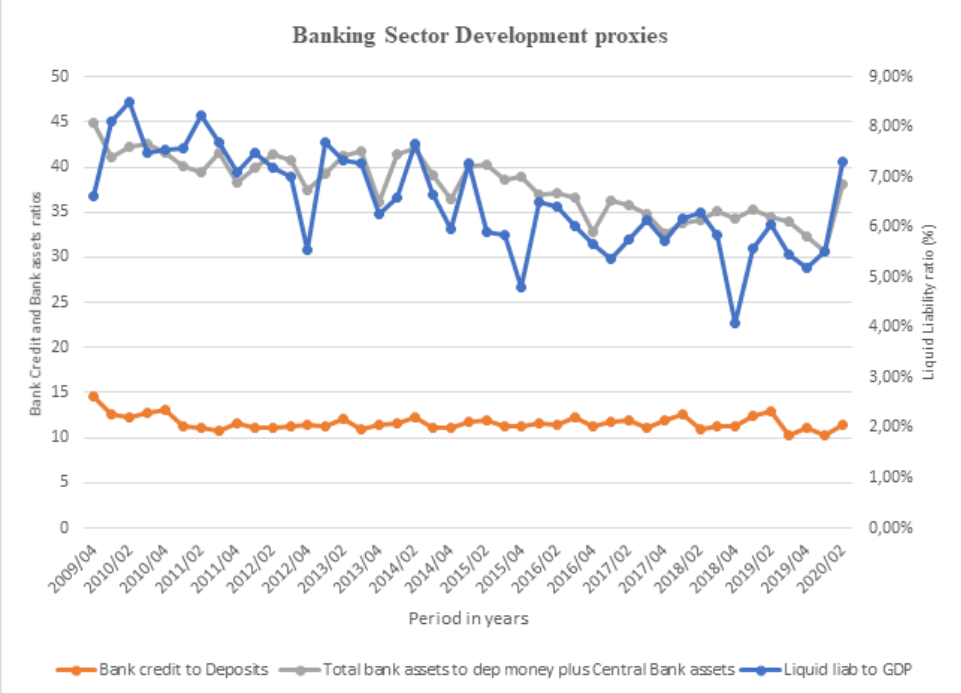
Introduction

Stokvel are community-based savings schemes aimed at improving the lives of low- and middle-income earners (Van Wyk, 2017; Floro and Seguino, 2002). Worldwide, stokvel are commonly known as rotating savings and credit associations (ROSCAs) (Bophela and Khumalo, 2019, Mashigo and Schoeman, 2012, Verhoef, 2001). Apart from conducting common banking functions, banks play a paramount role in the economic development of South Africa, a country characterised by low- and middle-income households. South Africa is home to various types of banking institutions. These include locally controlled banks, mutual banks, co-operative banks, international banks and foreign banks. Banks in South Africa hold a total of around R6 trillion in deposits. Yet, despite its size, low- and middle-income households deeply mistrust the banking sector, which is rooted in fears of exploitation (Duvendack and Mader, 2019).

Low- and middle-income households prefer saving with stokvel 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, 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 provide an alternative savings for low- and middle-income households which cannot meet the requirements of the banking sector (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.

Figure 1 provides a trend analysis of the proxies for Banking Sector Development based on data obtained from the South African Reserve Bank (SARB) and Old Mutual SA from 2009Q4 to 2020Q2.

Figure 1: Trends of banking sector development proxies in South Africa



Source: Authors' Analysis, data from SARB and Old Mutual SA, 2020

When using the ratio of bank credit to total deposits (Banking Sector Efficiency), the results show that Banking Sector Development slowed down, especially from 2009Q4 to 2011Q4. This decline may be attributed to the global financial crisis of 2008/2009, which resulted in the introduction of restrictions on credit growth in response to a steep rise in defaulting debtors (Verick & Islam, 2010). However, since then, relative stability has been observed. On 1 March 2020, the SARB cut the repo rate by 25 basis points. Bureau information from the National Credit Regulator notes that consumers with impaired credit records increased as of 2019Q3 (GCR Ratings, 2020). However, banking sector financing conditions for low- and middle-income households remain uncertain, contributing to currency weakness. Furthermore, the banking sector experienced stress and was forced to reduce the supply of credit to the economy. This could impact low- and middle-income households (GCR Ratings, 2020). The advent of the Covid-19 pandemic has caused a negative impact on asset quality for the banking sector in South Africa (GCR Ratings, 2020).

This research is different from prior similar empirical studies because using the multiple regression model is that its results are more likely to be accurate because of its completeness. This is because it includes all the important variables in a single study, for example, the dependent variable banking sector efficiency (BSE), independent variable stokvel (STOKV) and the control variables gross domestic product growth (GDPG) and money supply (M3). The objective of this study was to attempt to capture the relationship

between stokvel and banking sector efficiency using the autoregressive distributed lag (ARDL) bounds testing approach to cointegration developed by Pesaran, Shin and Smith (2001). The remainder of the paper is structured as follows: A relevant review of literature is presented in section 2 while explain data and methodology in section 3. In section 4, results are analysed and section 5 concludes the paper.

1 Literature Review

1.1 Conceptual Review

1.1.1 Background

Landman and Mthombeni (2021), Hossein (2017), and African Response Research (2012) showed that stokvel members pool their savings together and are effective vehicles for encouraging saving among low- and middle-income households. Similarly, Maseng (2022), Matuku and Kaseke (2014), and Gugerty (2007) argued that stokvel contribute to social cohesion when people frequently assist each other financially within their communities. Moreover, Oranu, Onah and Nkhonjera (2020:23) and Naong (2009:248) asserts that stokvel foster a savings culture in South Africa. Furthermore, Matuku and Kaseke (2014:513), Anderson, Baland and Moene (2009:15) sought to determine if stokvel savings improve the lives of stokvel members and showed that savings enable stokvel members to meet their basic needs by participating in stokvel. Finally, money-saving was observed to be the main economic factor contributing to the formation and growth of stokvel in South Africa (Landman and Mthombeni, 2021:1; Bophela and Khumalo, 2019:35). The following characteristics of stokvel are explained in detail.

1.2 Save and invest

Despite low saving rates in the banking sector, stokvel have significantly participated in informal saving schemes which have now been legalised (Mishi, 2012:8, Irving, 2005). Stokvel provide opportunities to low- and middle-income households to save, invest and accumulate assets (Landman and Mthombi, 2021:3; Matuku and Kaseke, 2014:503). However, Aidoo-Mensah (2018:133), Kumarasinghe and Munasinghe (2016:367) noted that savings could be considered one of the crucial tool´s households utilise to accomplish their financial expectations in order to improve their financial well-being.

Using primary data, Haider (2018:1) examined the likelihood of household savings in relation to their characteristics. The author sought to determine whether households move to the upper level in the hierarchy of saving motives as described in Maslow's Hierarchy of Needs Theory. The results indicated that households with different characteristics save for different motives, and a change in household characteristics causes movement in the hierarchy of saving motives. For example, lower-income households save for lower-level needs, i.e., daily expenses, while high-income households save for higher needs, such as investments. Conversely, Kumarasinghe and Munasinghe (2016:367) examined the most significant savings motive among households in the Kalutara District. Their study

identified the most effective savings motive of households in the Kalutara District as the precautionary savings motive.

1.2.1 Credit

South African banks exclude most low- and middle-income households from access to formal credit finance (Biyase and Fisher, 2017:50; Kajimo-Shakantu and Evans, 2006:23). However, stokvel provide easy access to credit and small loans from their savings to facilitate income-generating ventures of all-inclusive economic activities (Shuaib (2018); Ngcobo and Chisasa, 2018b).

Owusu-Bempah, Bennet, Amoako and Frempong (2013:108) examined the benefits of the informal sector to savings and loan companies. The research found that the informal sector is significant to savings and loan companies as the benefits of doing business with them far out-weighs the associated costs. Zondi (2016; ii) investigated why stokvels prevail as a credit and savings mechanism despite access to commercial financial services. The study found that there are interactions between stokvel groups and commercial banks in the form of monetary flow.

1.2.2 Women empowerment

Around the 1930s, there was an influx of rural-urban migration, particularly among women, as they arrived in the cities and towns to join their husbands who were working in the mines (Matuku and Kaseke, 2014; Camlin, Snow and Hosegood, 2014). However, Schulze (1997) observed in the 19th and early 20th centuries, women carried the burden of maintaining their families without income or where income was irregular. Moreover, Burger and Fourie (2019), and Buijs (2002) noted that most women participated in stokvel because they were unemployed. Those employed and earned lower income supplemented it with being involved in stokvel and regarded themselves as bankable (Nyandoro, 2018:177; Mboweni, 1990). Similarly, Verhoef (2020:109), Van Wyk (2017:13) and Addai (2017) referred to stokvel as the most significant industry in the informal sector and rural and urban areas for black women's survival strategies. Furthermore, the most critical aspect is that women increasingly rely on stokvel to fulfil their responsibilities towards their families (Nyandoro, 2018:177, Matuku and Kaseke, 2014:510). They integrated stokvel through social networks to smooth their income (Mashigo and Schoeman, 2010:2).

Women created opportunities for independent earnings and displayed remarkable entrepreneurial spirit in undertaking informal economic activities as they moved out of the traditional sector to urban centres (Verhoef, 2001a:259). Similarly, in their study, Matuku and Kaseke (2014:510) revealed that stokvel promote women's empowerment. Moreover, Ngcobo and Chisasa (2018b:217) examined the success factors of stokvels and observed that women lead with the participation in stokvels more than men. Contrary to Ngcobo and Chisasa (2018b:217), Nuhu, Donye, Bzugu and Ani (2015:479) contend that in rural areas, rural informal savings have been primarily designed, crafted and implemented with the male heads of households as the intended clients. They failed to recognise that women are active, productive and engaged in different livelihood activities with their own financial needs and constraints.

1.2.3 Limitations

People with low- and middle-income have limited or no access to the banking sector services and form stokvel to save, invest and access credit (Verhoef, 2001a:540). Through an interpretive-narrative-based inquiry research paradigm, Van Wyk (2017:13) discussed the experience of a stokvel. The research findings revealed that to circumvent the lack of access to formal financial services, stokvel help their members by supplementing limited earnings, guaranteeing access to credit when needed, and, recently, by providing start-up capital for entrepreneurial enterprises. In their study, Mashigo and Schoeman (2012:58) "noted compared to formal financial services, informal financial services or social connections embedded in stokvel generally make it possible to incur very low transaction costs, require less documentation for approving claims, no proof of employment, and no traditional collateral to secure loans."

2 Research Methodology

This study used quarterly time series secondary data ranging from 2009Q4 to 2020Q2 collected from the South African Reserve Bank (SARB) and Old Mutual South Africa. The main variables of this study include the proxies for banking sector development and stokvel. The measure of banking sector development used in this study is banking sector efficiency. The measures of stokvel used in this study is a percentage of income. The data on all these variables were taken from the South African Reserve Bank (SARB) and Old Mutual SA (2020).

List of Abbreviations and acronyms

BSE	Banking Sector Efficiency
GDPG	Gross Domestic Product Growth Rate
M3	Money Supply
STOKV	Stokvel

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

$$BSE = f(STOKV, GDPG, M3) \quad (1)$$

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

$$\Delta BSE_t = \beta_0 + \beta_1 \Delta LnSTOKV_t + \Sigma^n_{j=1} X_{jt} + u_t \quad (2)$$

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

If $\beta_1 \neq 0$ and have significance, meaning there exists a breakpoint and the impact of STOKV on BSE is the difference between the two periods. The minimum stokvel savings is β_0 in the period before the breakpoint is $(\beta_0 + \beta_1)$ in the period after the breakpoint. If $\beta_3 > 0$ and

have significance, this implies the impact of stokvel savings on BSD in the period after the breakpoint is bigger than the effect in the period before the break-point.

2.1 Autoregressive Distributed Lag (ARDL) approach

Following Pesaran, Shin and Smith (2001) long- and short-run estimations econometric approaches postulated by Engle and Granger (1987), Johansen and Juselius (1990), and Johansen (1996), study used the following ARDL framework in equation 3:

$$\Delta LnBSE_t = \alpha_0 + \beta_1 InBSE_{t-1} + \beta_2 STOKV_{t-1} + \beta_3 GDPG_{t-1} + \beta_4 M3_{t-1} + \sum_{k=0}^{m1} \alpha_{1k} \Delta InBSE_{t-k} + \sum_{k=0}^{m2} \alpha_{2k} \Delta STOKV_{t-k} + \sum_{k=0}^{m3} \alpha_{3k} \Delta GDPG_{t-k} + \sum_{k=0}^{m4} \alpha_{4k} \Delta M3_{t-k} + \omega_t \quad (3)$$

where:

Δ = first difference

β1, β2, β3 and β4 = coefficients of the long-run impacts

α1, **α**2, **α**3 and **α**4 = coefficients of the short-run impacts

ω = error

2.2 Error correction method

After confirming that there exists cointegration among the variables in the long-run, the short-run relationship between stokvel and banking sector liquidity was estimated in equation 4 and 5 using the ECM as follows:

$$\Delta LnBSE_t = \alpha_0 + \lambda_1 ECM_{t-1} + \sum_{k=0}^{m1} \alpha_{1k} \Delta BSE_{t-k} + \sum_{k=0}^{m2} \alpha_{2k} \Delta STOKV_{t-k} + \sum_{k=0}^{m3} \alpha_{3k} \Delta GDPG_{t-k} + \sum_{k=0}^{m4} \alpha_{4k} \Delta M3_{t-k} + \omega_t \quad (4)$$

where:

m1, m2, m3 and m4 = optimal lag length of the variables calculated by the ARDL model to choose the lag order using measures such as LR, final prediction error (FPE), Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) and Hannan-Quinn information criterion (HCQ).

$$\Delta LnBSL_t = \alpha_0 + \beta_1 InBSL_{t-1} + \beta_2 STOKVSAV_{t-1} + \beta_3 GDPG_{t-1} + \beta_4 M3_{t-1} + \sum_{k=0}^{m1} \alpha_{1k} \Delta InBSL_{t-k} + \sum_{k=0}^{m2} \alpha_{2k} \Delta STOKVSAV_{t-k} + \sum_{k=0}^{m3} \alpha_{3k} \Delta GDPG_{t-k} + \sum_{k=0}^{m4} \alpha_{4k} \Delta M3_{t-k} + \omega_t \quad (5)$$

3 Data analysis and findings

3.1 ARDL long-run form

The estimated results of long-run relationship between BSE (dependent variable), STOKV, GDPG and M3 using the ARDL co-integration procedure are presented in Table 1. The model was implemented with automatic lag selection using E-views version 11. The ARDL (1,0,0,4) model was selected based on the least AIC. In the long-run, STOKV and GDGP were found to have a positive and statistically significant relationship with BSE. M3 was observed to have a positive relationship with BSE; however, its influence was statistically insignificant ($p>.05$). When using STOKV as the dependent variable, BSE and GDPG were found to have a positive relationship with BSE, albeit insignificant. Only M3 had a negative relationship with BSE; however, the relationship was insignificant. In the third model, GDPG was used as the dependent variable. BSE exhibited a positive and statistically significant relationship with GDPG at a 95% confidence level. On the other hand, the relationship between M3 and GDPG was negative and statistically significant. In the final model, M3 was the dependent variable, while STOKV, GDPG, and BSE were the explanatory variables. The coefficients for STOKV and GDPG were positive and statistically insignificant. BSE depicted a negative and statistically insignificant relationship with M3.

Table 1: Long-term estimates

Long-run Result Constant and No Trend – BSE				
Variable	Coefficient	St.Error	t.Statistic	Prob
STOKV	2.258246***	0.178830	12.62788	0.0000
M3	0.064230	0.089269	0.719513	0.4772
GDPG	78.35344***	22.66281	3.457357	0.0016
Long-run Result Unrestricted Constant and Unrestricted Trend – STOKV				
BSE	0.025422	0.019682	1.291617	0.2071
GDPG	1.084721	1.133032	0.957361	0.3466
M3	-0.000583	0.008610	-0.067659	0.9465
Long-run Result Restricted Constant and No Trend – GDPG				
BSE	0.021599**	0.008837	2.444295	0.0213
STOKV	-0.042145***	0.013090	-3.219648	0.0033
M3	0.0036338	0.002722	1.336279	0.1926
Long-run Result- No Constant No Trend – M3				
STOKV	0.145327	1.557366	0.093316	0.9262
GDPG	-20.54444	13.07846	-1.570862	0.1255
BSE	0.607702	0.590862	1.028501	0.3110

Source: Authors' Analysis, data from SARB and Old Mutual SA, 2022

3.2 The error correction model

To tie the short-run behaviour of banking sector to its long-run value, the error correction term (ECT) was used for this purpose (Gujarati & Porter, 2009; Puatwoe & Piabuo, 2017). The analysis in Table 2 shows that ECT is negative and significant for BSE (-0.630729; p<0,05), STOKV (-0.119320; p<0,05), GDPG (-0.333220; p<0,05) and M3 (-0.647007; p<0,05). This shows the speed of automatic adjustment in the system between the short- and long-run equilibrium of approximately 63% for BSE, 12% for STOKV, 33% for GDPG, and 64% for M3 in the following year. All the short-run variables are statistically significant at the 5% significance level. It can be concluded that the variables used in this model have a short-run influence on BSD.

Table 2: Short-run estimates

Dependent Variable	ECM(-1) Coefficient	T-Statistic	Prob
D(BSE)	-0.630729	-2.666167	0.0046
D(STOKV)	-0.119320	2.372494	0.0017
D(GDPG)	-0.333220	-2.693593	0.0000
D(M3)	-0.647007	-3.133825	0.0000

Source: Authors' Analysis, data from SARB and Old Mutual SA, 2022

3.3 Diagnostic tests

The result of the diagnostic tests is presented in Table 3 ensure that the empirical model is correctly specified, the Breusch-Pagan-Godfrey Serial Correlation LM Test, Heteroskedasticity Test: Breusch-Pagan-Godfrey, and JB test were conducted. The results show that the estimated ARDL model is reliable. All the hypotheses of no serial correlation, no heteroskedasticity and normally distributed residuals cannot be rejected. Thus, it can be concluded that the residuals are homoscedastic, not correlated and normally distributed.

Table 3: Diagnostic statistics

Long-run Obs* R-square/F-statistic			
Variable	Breusch-Godfrey Serial Correlation LM Test	Heteroskedasticity Test Breusch-Pagan--Godfrey	Jarque-Bera test of Normality
BSE	1.179580 (prob. 0.32)	2.011007 (prob. 0.08)	0.689704 (prob. 0.71)
STOKV	0.699537 (prob. 0.51)	1.897127 (prob. 0.07)	4.219974 (prob. 0.12)
GDPG	0.121357 (prob. 0.87)	2.005597 (prob. 0.07)	26.11414 (prob. 0.00)
M3	0.337721 (prob. 0.72)	0.414504 (prob. 0.86)	10.78707 (prob. 0.58)
Short-run Obs* R-square/F-statistic			
BSE	0.779363 (prob. 0.47)	0.189223 (prob. 0.96)	4.050110 (prob.0.13)
STOKV	2.263566 (prob. 0.12)	1.684258 (prob. 0.17)	9.828466 (prob. 0.01)
GDPG	2.063025 (prob. 0.14)	2.279755 (prob. 0.07)	26.80355 (prob. 0.00)
M3	2.573734 (prob. 0.09)	0.997862 (prob. 0.43)	0.209767 (prob. 0.90)

Source: Authors' Analysis, data from SARB and Old Mutual SA, 2022

3.4 Stability Tests

The study explores the stability of the regression coefficients of the model using the cumulative sum of recursive residuals (CUSUM), and the cumulative sum of the squares of recursive residuals (CUSUMSQ) tests. The estimated findings are presented in Figures 2 and 3 respectively show that, the blue lines for both CUSUM and CUSUMSQ lie within the critical bounds and are significant at 5%. The figures suggest that the null hypothesis of stable coefficients of the model cannot be rejected at the 5% level of significance for both CUSUM and CUSUMSQ tests as the sum stays within the 95% confidence band. The CUSUM tests indicates coefficients in the equation are stable within the 5% critical lines while CUSUMSQ shows that the residual variance is stable within the 5% level of significance.

CUSUM and CUSUM square

Figure 2: Results of CUSUM and CUSUM SQUARE test using ARDL

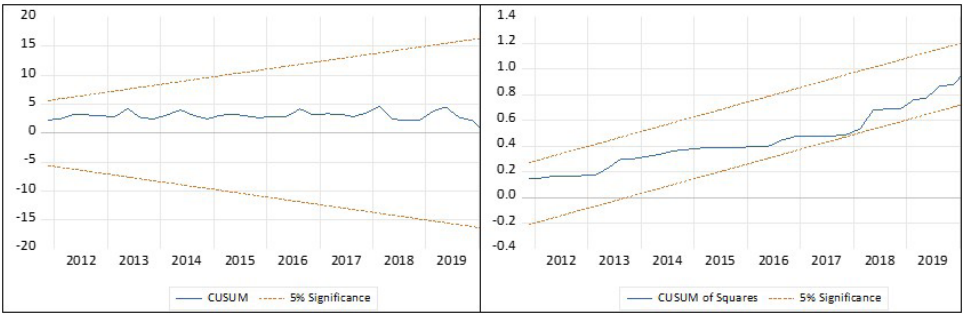
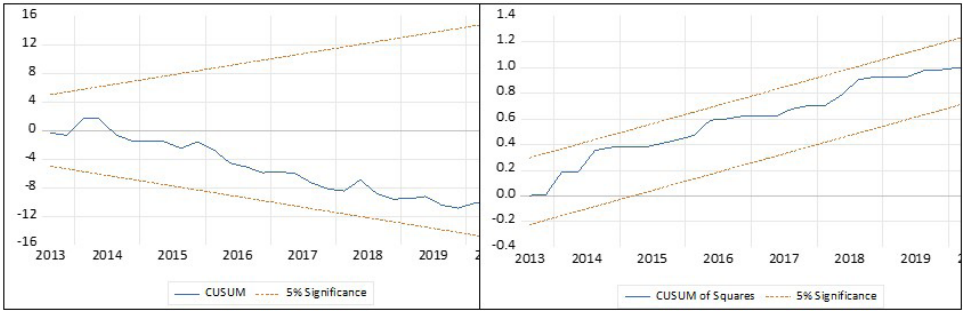


Figure 3: Results of CUSUM and CUSUM SQUARE test using ECM



4 Conclusion

The study examined stokvel and banking sector efficiency using ARDL bound test approach to cointegration using quarterly time series secondary data ranging from 2009Q4 to 2020Q2. The F-statistic value for the ARDL, bounds test result shows evidence of cointegration among dependent variables because the computed asymmetric ARDL F-statistic values exceed the tabulated value of the upper bound at the 5% level of significance. The error correction model [ECT(-1)] also confirmed the prevalence of a causal relationship between STOKV and BSE. The study further tested the model using standard diagnostics tests confirmed that ARDL results are significant and serially correlated. Further, Stability tests were carried out using the CUSUM and CUSUMQ measures of model stability. The results showed that the models were highly stable over the sample period. Thus, it can be said that including stokvels in the banking system does not help with the development of the banking sector.

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