

-RESEARCH ARTICLE-

REVISITING DOMESTIC SAVINGS AND ECONOMIC GROWTH: TIME SERIES EVIDENCE IN SOUTH AFRICA

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—Abstract—

Domestic savings and economic growth are two important macroeconomic variables, which play a significant role in the development of any economy. In economic literature, savings are perceived as a drive for economic growth. The low domestic savings and low economic growth in South Africa founded the purpose of the study. Annual data taken from the South African Reserve Bank (1994 to 2018) was employed. Methodologically, the Johansen multivariate approach and the vector error correction model were employed. The long-run findings suggest that domestic savings affect economic growth positively. This finding is in line with the Harrod-Domar, Keynes and Solow theories. In the short run, corporate saving is positive and significant in explaining the behaviour of growth in South Africa. Furthermore, the variance decomposition findings reveal that the variability of household savings has a greater influence in explaining the change in economic growth. South African policymakers should focus on policies that promote domestic savings, which will lead to the stimulation of economic growth. As such, policies that increase incentives on savings need to be implemented to encourage domestic savings within the country.

Keywords: Savings, growth, household, corporate, government

JEL classification: C31, D14, E21, H31, 040

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1. INTRODUCTION

Domestic savings and economic growth are two important macroeconomic variables that play a significant role in the development of any economy. In economic literature, savings are perceived as a drive for economic growth (Jagadeesh, 2015). The Keynesian macroeconomic model suggests that total economic growth is significantly affected by consumption and savings. According to Keynes, the part of income not consumed is saved and this leads to capital accumulation, which then contributes to economic growth in the economy.

Solow's (1956) growth theory states that for developing countries to converge with developed countries, there needs to be higher savings rates in developing countries to stimulate economic growth. In Southern Africa, the three major economies (Angola, Zambia and South Africa) contributed approximately 81.9 percent towards the region's GDP (African Development Bank, 2019). However, South Africa became one of the slowest growing economies in 2019 with an annual GDP growth rate of 0.2 percent (SARB, 2020). This has been the lowest recorded growth rate since the global financial crises in 2009, where economic growth averaged -1.5 percent.

According to the National Development Plan (2030), South Africa needs to achieve a growth rate averaging over 5 percent. It may, however, be a challenge for the South African economy to achieve this desired growth rate in the midst of low domestic savings. South Africa's savings levels compared to other Southern African countries such as Angola, Botswana and Zambia are low. In 2018, Angola recorded an average domestic savings rate of 33.2 percent, while Botswana recorded an estimated 30.3 percent and Zambia recorded a domestic savings rate of 44 percent (World Bank, 2020). South Africa's domestic savings for the same year averaged 18 percent (World Bank, 2020).

The low domestic savings and low economic growth have resulted in South Africa having to resort to foreign direct investment to fund investment spending and stimulate economic growth. In the 2018 state of the nation address, President Cyril Ramaphosa announced a five-year plan to attract foreign direct investment exceeding R100bn for the South African economy (State of the Nation Address, 2018). However, according to Syden (2012), if South Africa could have more savings rates it would not need to rely on having investments and borrowing of funds from other countries to meet its capital needs.

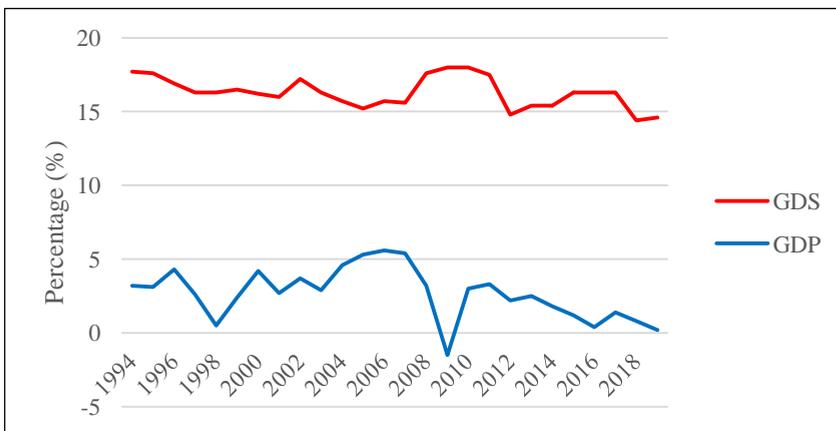
It is for this reason that this study seeks to revisit and contribute to the literature regarding domestic savings and economic growth in South Africa. Firstly, the

study contributes by employing the Johansen multivariate procedure to determine whether the variables move together over time. Secondly, the variance decomposition is estimated to determine how much variability of the dependent variable is explained by its own variance and variance of the independent variables in the economic system over time. The study is outlined as follows: part 2 provides an overview of domestic savings and economic growth in South Africa from 1994. Part 3 provides a brief literature review of selected African countries, and part 4 gives the model specification and data source. Part 5 details the methodology, and part 6 presents the results. Part 7 concludes the study.

2. OVERVIEW OF DOMESTIC SAVINGS AND ECONOMIC GROWTH

Annual domestic saving as a percentage of GDP have been averaging lower than 20 percent as indicated by Figure 1. In 1994, the percentage of domestic savings to GDP stood at 17.7 percent and it decreased to 16.3 percent in 1997, before slightly increasing to 16.5 percent in 1999 (SARB, 2020). A steady decline in the savings rate between 2000 and 2001 was realised. However, in 2005, the domestic savings rate fell reaching a low of 15.2 percent. The highest saving period was in 2008 and 2009 when saving reached a high of 18 percent. In the period thereafter, annual savings decreased to 14.8 percent in 2012. Although a slight recovery was realised from 2013 until 2017, domestic savings declined below 15 percent in 2019.

Figure 1: Domestic savings and economic growth in South Africa

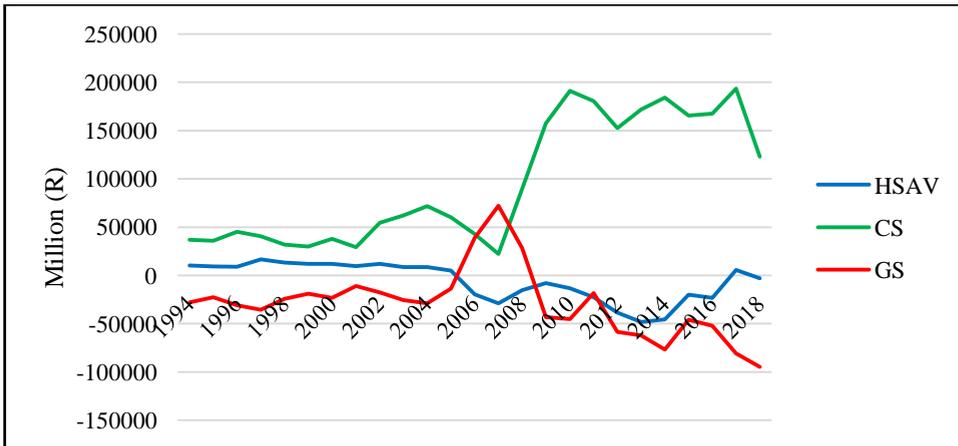


Source: Own computation using data from South African Reserve Bank (2020)

Domestic savings consist of household savings, corporate savings and government savings. An analysis of these three components can provide reasons why domestic

savings have been low in South Africa. According to IDC (2013), savings to disposable income of households in 1994 stood at 2.7 percent and a decline in the ratio continued in the years thereafter until savings reached a low of 0 percent in 2012. During the period between 2006 and 2018, households continued dissaving, and this resulted in the negative contribution to domestic savings, as indicated by Figure 2.

Figure 2: Household, corporate and government savings in South Africa



Source: Own computation using data from South African Reserve Bank (2020)

From 1994 to 2018, corporate savings have been contributing positively towards domestic savings. Investec (2016) corporates are the only significant contributor towards the savings pool. On the other hand, the decline in government saving since 1980 in South Africa is largely responsible for the low domestic savings (Aron & Muellbauer, 2000). Shown in Figure 2 is that government's contribution to the domestic savings pool has been negative, except for the period 2006 to 2008, where a positive contribution was made. According to IDC (2014), the limited contribution to domestic savings has resulted in government having to rely on foreign capital to finance investment. Equally so, government expenditure without savings can result in a crowding-out effect.

The low domestic savings may be responsible for the low economic growth in South Africa (Aron & Muellbauer, 2000). Since 1994, South Africa's annual economic growth rate has been averaging below 5 percent, except for 2005 to 2007, when economic growth averaged above 5 percent as shown by Figure 1. From the period 1994 to 1996, annual economic growth increased from 3.2 percent to 4.2 percent. However, the growth rate declined from 4.2 percent to 0.5

percent in 1998, because of the financial crisis of Asia. Despite the decline, economic growth managed to rise, reaching a high of 4.2 percent in 2000.

Although, there was a slight decline in economic growth between the period 2001 and 2003, where annual growth recorded 2.7 and 2.9 percent, the growth rate managed to reach a rate above 5 percent between 2005 and 2007. There was a sharp decline in annual growth between the period 2008 and 2009. The growth rate decreased from 3.19 percent to a further -1.53 percent due to the global economic crisis. A moderate recovery was realised in 2010, where the country recorded a growth rate of 3.28 percent. From there onwards, annual growth has been averaging below 3 percent.

3. LITERATURE REVIEW

The Harrod (1939) and Domar (1946) model suggests that an increase in savings will increase economic growth in any economy. This is because higher savings stimulate domestic investment. A summary of empirical literature from selected African countries is reviewed in Table 1.

Table 1: Domestic savings and economic growth in Africa

| Author | Country | Findings |
|---------------------------------|--|---|
| Odhiambo (2009) | South Africa | GDP → savings (long run) GDP ↔ DS (short run) |
| Oladipo (2010) | Nigeria | DS affects GDP positively (long run) Savings → GDP (short run) |
| Amusa (2014) | South Africa | GDP ↔ DS (long run) but corporate savings contributing more to GDP. |
| Jagadeesh (2015) | Botswana | GDP affects DS positively (long run) |
| Elias and Worku (2015) | East African countries (Ethiopia, Uganda and Kenya) | DS → GDP in Uganda and Ethiopia (long run). In Kenya ≠ relationship in the long run. GDP → DS (short run) |
| Bonga-Bonga and Guma (2016) | South Africa | DS affects GDP positively (long run) |
| Siaw, Enning and Pickson (2017) | Ghana | DS has a negative but significant relation with GDP (short run) |
| Bolarinwa and Obembe (2017) | Selected African countries (Nigeria, Ghana, Burkina Faso, Liberia, Niger and Sierra Leone) | GDP → DS in all the countries except for Liberia (long run). In the short run, GDS → GDP (Sierra Leone, Niger and Liberia). GDP → GDS (Ghana and Burkina Faso). GDP ≠ GDS (Nigeria) |

Note: Domestic savings (DS) and Economic growth (GDP)

4. MODEL SPECIFICATION AND DATA SOURCE

The model employed in this study is taken from Amusa (2014), where economic growth is regressed against domestic savings in South Africa as indicated by equations (1) and (2).

$$GDP_t = \sum GDS_t \quad (1)$$

The disaggregated gross domestic savings is presented by equation (2):

$$GDP_t = \beta_0 + \beta_1 HSAV_t + \beta_2 CS_t + \beta_3 GS_t + \mu_t \quad (2)$$

Table 2: Data description and source (1994-2018)

| Variable | Unit | Description |
|--------------------------|--------------|---|
| Economic growth (GDP) | Percent (%) | Gross domestic product at market prices |
| Household savings (HSAV) | Millions (R) | Savings by households |
| Corporate savings (CS) | Millions (R) | Corporate savings |
| Government savings (GS) | Millions (R) | Net savings by general government |

Source: South African Reserve Bank (2020)

To achieve the same unit of measure, the variables collected in millions (R) were transformed into percentages.

5. METHODOLOGY

The starting point is to examine the variables of interest for stationarity. The use of non-stationary variables can result in spurious regression (Granger & Newbold, 1974). In econometric literature, there is a wide variety of stationarity tests that can be employed to detect unit root. The augmented Dickey Fuller (1979) and the Phillips-Perron (1988) tests are adopted. The ADF test incorporates p lags of differenced dependent variables in a regression equation.

The Phillips-Perron (1988) test used the standard Dickey Fuller procedure and incorporated a non-parametrically modified test. An automatic correction allowed for autocorrelation among the residuals (Brooks, 2008). The ADF and PP test equations are given by equations (3) and (4).

$$\Delta X_t = \varphi_1 X_{t-1} + \sum_{i=1}^n p_i \Delta X_{t-1} + \mu_t \quad (3)$$

$$\Delta y_t = \delta + \beta k + \phi y_{t-1} + \mu_t \quad (4)$$

Where ΔX_t and Δy_t represent the year-on-year change of the series, β is the coefficient of k . The null hypothesis of both tests is that there is unit root among the variables.

Once stationarity is satisfied and the variables are integrated of the same order, the unrestricted VAR model is applied. When employing the unrestricted VAR, the rank (π) must be stationary so that the residuals are white noise. Eita and Mbazima (2008) state three possible cases that can determine the rank (π).

Case 1: Rank (π) = 0 – there is no evidence of co-integration.

Case 2: Rank (π) = full – variables are all stationary at levels.

Case 3: Rank (π) = reduced – variables are all stationary at first difference and co-integrating vectors can be determined using two maximum likelihood ratios.

Johansen (1988) developed two maximum likelihood estimations that allow one to test for more than one co-integrating vector. The trace test and maximum eigenvalue test are given by equations (5) and (6):

$$\partial_{trace} = -T \sum_{i=v+1}^p \ln(1 - \gamma_i) \quad (5)$$

$$\partial_{max} = -T \ln(1 - \gamma_{v_0+1}) \quad (6)$$

Where T represents the size of the sample and γ_i is the correlation. The null hypothesis states that $v \leq v_0$ while the alternative hypothesis states that $v_0 \leq v \leq p$ can be tested by the trace statistic. The trace test check whether the smallest $p - v_0$ is significantly different from zero (Verbeek, 2012). The alternative test, maximum eigenvalue, is based on the estimation ($v_0 + 1$)th largest eigenvalue.

When the condition of co-integration has been satisfied, the vector error correction model (VECM) can be estimated. The vector error correction model assists in showing the short-run flexible dynamics and the long-run component of the variables. Furthermore, any disequilibrium behaviour established in the previous year is corrected by the error correction (Asteriou & Hall, 2011). The VECM equation is given in equation (7) as:

$$\Delta Y_t = \sum_{l=1}^k \phi_l + \delta\beta(Y_{t-1} + Y_{\phi t-k}) + \mu_t \quad (7)$$

Here, $(Y_{t-l} + Y_{\phi t-k})$ represents the error correction. The matrices $\delta\beta$ represent the speed of adjustment and co-integration vectors.

6. ANALYSES OF RESULTS

The ADF and PP results presented in Table 3 show that the variables are stationary and are integrated of the same order I(1).

Table 3: Augmented Dickey Fuller and Phillips-Perron

| Variables | ADF | | PP | |
|-----------|---------------------------|---------------------------|---------------------------|---------------------------|
| | Intercept | Intercept with trend | Intercept | Intercept with trend |
| ΔGDP | -5.599531* (-2.638752) | -5.492696* (-3.248592) | -9.796600* (-2.638752) | -12.44513* (-3.248592) |
| ΔHSAV | -5.990122* (-2.638752) | -5.847896* (-3.248592) | -5.990122* (-2.638752) | -5.847896* (-3.248592) |
| ΔCS | -4.515526* (-2.638752) | -4.390375* (-3.248592) | -4.507690* (-2.638752) | -4.356752* (-3.248592) |
| ΔGS | -4.340621* (-2.638752) | -4.259847* (-3.248592) | -4.340621* (-2.638752) | -4.260601* (-3.248592) |

Values in () are test critical values at 10% (*) level of significance

Since stationarity among the variables has been established, the co-integration test can be performed using lag 1 as indicated by Table 4.

Table 4: Lag length

| Lag | AIC | SC | HQ |
|-----|-----------|-----------|-----------|
| 1 | 16.71461* | 17.69632* | 16.97506* |

(*) denotes the lag order selected by the criterion

The co-integration results in Table 5 show that there is one co-integrating vector for each test presented. The trace statistic is 47.85613 and the maximum eigenvalue is 27.58434, which are above the 0.05 percent level of significance. The study therefore fails to reject the null hypothesis of no co-integration among the variables since there is evidence of co-integration for both tests.

Table 5: Trace and maximum co-integration

| Hypothesised No. of CE(s) | Eigenvalue | Statistic | 0.05 Critical Value | Prob.** |
|---------------------------|------------|----------------------|---------------------|---------|
| None* | 0.932982 | 89.22908 (Trace) | 47.85613 | 0.0000 |
| None * | 0.932982 | 62.16441 (Max-Eigen) | 27.58434 | 0.0000 |

Since the variables are co-integrated, the vector error correction model is estimated to incorporate information about the equilibrium dynamics in the long- and short run. The long-run and short-run results are presented in Table 6.

Table 6: Vector error correction model

| Variable | Coefficient | Standard error | t-Statistics |
|--------------------------|-------------|----------------|--------------|
| GDP (-1) | 1.000000 | - | - |
| LogHSAV (-1) | 0.373571 | 0.03823 | -9.77208 |
| LogCS (-1) | 4.291242 | 0.50192 | -8.54973 |
| LogGS (-1) | 0.196086 | 0.04092 | -4.79228 |
| Error Correction: | | | |
| ECT | -0.629961 | 0.11254 | -5.59746 |
| D(logHSAV) | 0.178500 | 0.78441 | 0.22756 |
| D(logCS) | 0.167085 | 0.03142 | 5.31800 |
| D(logGS) | -1.081831 | 0.53807 | -2.01056 |

R-squared: 0.786633 Adjusted R-squared: 0.723877

$$GDP_t = 0.37HSAV_t + 4.29CS_t + 0.19GS_t + \mu_t \quad (8)$$

The results of the long-run estimation shown in Table 6 and equation 8 suggest that there is positive and significant relationship between economic growth and domestic savings. At a disaggregated level, the coefficient of household savings entails that a one-unit increase in household savings will increase economic growth by 37 percent, while corporate savings will stimulate economic growth by 4.29 percent. Lastly, a one-unit increase in government savings increases economic growth by 19 percent. These results are in line with the theory of Harrod-Domar, Keynes and Solow. When domestic savings increase, economic growth is stimulated in the long run.

The short-run results in Table 6 indicate that household savings and corporate savings have a positive relationship with economic growth, while government savings have a negative relationship with economic growth. The results further indicate that corporate savings are significant in explaining the behaviour of economic growth in the short run. A one-unit increase to household savings and corporate savings will increase economic growth by 17 and 16 percent, respectively, while government savings will decrease economic growth by 1.08 percent. The ECT coefficient is -0.62 with an absolute t-statistic of -5.59746 as shown in Table 6. The high speed of adjustment indicates that the economy quickly moves towards equilibrium.

Table 7: Variance decomposition

| GDP period | S.E. | GDP | LOGHSAV | LOGCS | LOGGS |
|------------|----------|----------|----------|----------|----------|
| 1 | 0.964902 | 100.0000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 1.239478 | 80.47919 | 9.916367 | 0.186442 | 9.418003 |
| 3 | 2.286504 | 28.35029 | 59.50305 | 5.026512 | 7.120153 |
| 4 | 2.917977 | 20.86263 | 69.94908 | 4.048123 | 5.140169 |
| 5 | 3.146726 | 23.41370 | 67.25308 | 4.834973 | 4.498254 |
| 6 | 3.314737 | 25.93339 | 64.69997 | 4.504847 | 4.861791 |
| 7 | 3.408700 | 28.71305 | 61.93500 | 4.587127 | 4.764818 |
| 8 | 3.600855 | 28.71707 | 62.48157 | 4.509541 | 4.291825 |
| 9 | 3.777614 | 28.80200 | 62.61369 | 4.612489 | 3.971821 |
| 10 | 3.981057 | 28.61022 | 63.11441 | 4.650491 | 3.624879 |

The variance decomposition of economic growth reported in Table 7 shows that the variability of economic growth is explained mainly by itself and variability of household savings both in the short- and long run. The significant proportion of variation is observed from the second to the tenth year. Household savings account for an estimate of approximately 60 to 70 percent shock of its own variation to economic growth, while corporate savings and government savings account for less than 10 percent. These results provide evidence that a disturbance to household savings affects economic growth as compared to corporate savings and government savings.

7. CONCLUSION

This study analysed the relationship between domestic savings and economic growth in South Africa (1994-2018), using the Johansen approach and the vector error correction model. The results found indicate that, in the long run, economic growth is positively and significantly affected by domestic savings. The short-run findings report a positive and significant relationship between corporate savings and economic growth. The variance decomposition results indicate that, in the short- and long run, the shock of household savings has a greater influence in explaining the behaviour of economic growth. This study therefore recommends that South African policymakers should focus on policies that promote domestic savings, which will lead to the stimulation of economic growth. At a disaggregated level, policies to boost household savings and government savings

should be implemented. Policies such as increasing incentives on savings are needed to boost the savings base and reduce reliance on foreign direct investment.

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