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INVESTIGATING THE RELATIONSHIP BETWEEN DOMESTIC SAVINGS AND ECONOMIC GROWTH IN ZIMBABWE (1980-2015)

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ABSTRACT

The research sought to establish the relationship between domestic savings and economic growth in Zimbabwe using secondary time series data from 1980 to 2015. The study employed the Engle-Granger residual based cointegration. The regression analyses were performed using Eviews 8.1 statistical package. It is suggested from theories of savings and economic growth that savings leads to increased investment and thereby increases economic growth. However, the issue of long run equilibrium between savings and economic growth is debatable both theoretically and empirically. Empirical literatures reviewed are of mixed opinions and do not provide conclusive empirical evidences. From the findings of this research, it has been concluded that gross domestic savings movements do not significantly impact on the changes in economic growth in Zimbabwe. According to this research there is evidence to accept the null hypothesis that there is no long run relationship between domestic savings and economic growth.

Key words: *Economic growth, domestic savings, cointergration, Zimbabwe*

INTRODUCTION

From the perspective of economists, economic growth has been considered as the prime motive of all developmental agendas and policies of all countries. The importance of savings is observed primarily in the provision of national capacity for production brought through investment (Rasmidatta, 2011). Generally, it is accepted that if aggregate domestic savings

are increased that will definitely translate to higher levels of economic growth in the short run. This is based on the notion that higher savings rates are a result of less consumption which then leads to higher levels of capital investment and therefore a higher rate of economic growth (Bacha, 1990; DeGregorio, 1992; Jappelli and Pagano, 1994). However, it has also been concluded from other studies that economic growth contributes to savings (Sinha and Sinha, 1998; Salz, 1999; Anoruo and Ahmad, 2001).

BACKGROUND

For the past two decades, Zimbabwe has been experiencing a lot of fluctuations in most of its macroeconomic indicators with a negative trend. According to the World Bank Development indicators (2015), the value for Gross domestic savings in Zimbabwe was US-1,9 billion as of 2013. During the period 1980-2014, gross domestic savings in Zimbabwe reached the highest value USD1,7 billion in 1988 and a minimum value of USD-1,9 billion in 2013. Gross domestic savings are defined as gross disposable income with final consumption expenditure being subtracted after taking account of pension funds adjustment for (SNA, 1993). Gross domestic savings, as a percentage of Gross Domestic Product in Zimbabwe was -14.44 as of 2013. Its highest value over the past 34 years was 22.08 in 1988, while its lowest recorded value between 1980 and 2015 was -21.46 in 2008 (World Bank, 2015).

Economic growth, on the other hand has been fairly growing since 1980 but started to decelerate since 1997 with a fall of real GDP reaching 5.5% by 2000 and 7.5% in 2001. This was mainly due to poor productivity and performance in the agricultural sector which is regarded as the backbone of the Zimbabwean economy (Saungweme, 2013). The growth rates per annum measured in real terms ranged between 3-4%, with a highest recorded rate of 7.6% in 1988. After 1990, the economy grew at an average rate of 3.2% per annum. During this period, the country adopted a series of economic reforms which were market oriented amongst them was the Economic Structural Adjustment Programme (ESAP) of 1991. However, according to Saungweme (2013), the country started to experience effects of economic slowdown by early 1998 and a recession was subsequently entered into in 2000. However, following a decade of contraction from 1998-2008, Zimbabwe's economy recorded annual real growth rate of roughly 10% between 2010 and 2011 before slowing in 2012-2013 due to poor harvests and low diamond revenues (World Bank, 2014).

MATERIALS AND METHODS

Data type and sources: This study used time series data that span for a period of 36 years (1980-2015). It was also based on the secondary data which was drawn from the World Bank World Development Indicators, Zimbabwe National Statistics Agency, Ministry of Finance and Economic Development and the Reserve Bank of Zimbabwe. The study was carried out using a bivariate analysis and the variables used are gross domestic savings and gross domestic product.

Variables used in the study: Gross Domestic Product (GDP) is regarded as an appropriate proxy to measure economic growth. Real GDP, the measure of real rate of return of economic activities according to Nwanne (2014), has been preferred for its ability to capture changes in output adjusted for inflation, a key factor in both economic growth and development. Economic growth, which according to Romer (1987) refers to a sustained expansion of potential output as measured by the increase or decrease in Real Gross Domestic Product over certain period of time.

Gross Domestic Savings (GDS), play a pivotal role in the growth and stability of any economy (Mohan, 2006). Keynesian economics define savings as the amount left over after consumption expenditures are subtracted from the total disposable income that has been earned in a given time period. Mohan (2006), defined savings as a fraction of disposable income that has not been used on consumption of final goods and services but invested or accumulated directly in capital equipment or in paying off a home mortgage, or indirectly through purchase of securities on financial markets**.** Growth of an economy requires injection of investments and this is achievable through domestic and/or foreign savings.

Literature reviewed will lead one to infer that there is existence of a long run relationship between these two variables and a unidirectional causality relationship.

Test for long run relationship

The Engle-Granger (1987) cointegration test was used for analysing the long run equilibrium/relationship between gross domestic savings and economic growth in Zimbabwe for the period 1980-2015. According to Gujarati and Porter (2008), two variables are said to

be cointegrated if they are first order integrated (I(1)) and their regression on each other is meaningful. In order to proceed with the process, the following cointegrating equation(s) are firstly esimated:

$$\mathbf{LGDP_t = \alpha + \beta\ LGDS_t + \varepsilon_t} \quad \mathbf{(1)}$$

$$\mathbf{LGDS_t = \alpha + \beta\ LGDP_t + \mu_t} \quad \mathbf{(2)}$$

Where;

LGDPt - economic growth rate at time t

LGDSt - gross domestic savings at time t,

ε_t and μ_t - residuals or random error terms.

Random error terms ε_t and μ_t cater for deviation of the $LGDP_t$ and $LGDS_t$ from the equilibrium at time t. if the residuals or the random error terms are stationary at level, then a conclusion of cointegration between the series can be reached.

RESULTS

Unit root test: Since the data was drawn from secondary sources, there is a possibility of the existence of unit root in the series which could cause decisions to be made based on spurious results. In order to get rid of this, the Augmented Dickey Fuller (ADF) unit root tests were used and results are presented in the table below.

Table 1: Stationarity/Unit Root Test Results

Variable(s)	***Stationarity Process***	***ADF Test Statistic***	***Critical Levels (%)***			***Decision***
			1%	***5%***	***10%***	
LGDP	*Trend and Intercept*	*-1.652199*	*-4.252879*	*-3.548490*	*-3.207094*	*Non-stationary*
DLGDP	*Trend and Intercept*	*-3.628178*	*-4.252879*	*-3.548490***	*-3.207094*	*Stationary [I(1)]*
LGDS	*Trend and Intercept*	*-2.489569*	*-4.243644*	*-3.544284*	*-3.204699*	*Non-stationary*
DLGDS	*Trend and Intercept*	*-4.658935*	*-4.284580**	*-3.562882*	*-3.215267*	*Stationary [I(1)]*

Source: *Authors computation using Eviews 8.1*

Key: ** statistically significant at 1%*

*** statistically significant at 5%*

LGDP and LGDSindicate log transformations of GDP and GDS.

The results of the Augmented Dickey Fuller unit root tests show that gross domestic product and gross domestic savings were non-stationary in levels as shown in Table 1 above. These variables however, became stationary after the first difference. This means they are integrated of order one, that is they are I(1), which is a necessary condition for the cointegration technique. Stationarity is observed when the absolute value of the ADF test statistic is greater than the absolute value of one of the critical values say at 5% level of significance. For instance, DLGDP has an ADF of 3.628178 which is greater than 3.548490, hence it is stationary at 5%.

Multicollinearity test results: This test was carried out based on high pair-wise correlations between the variables in question. The decision rule states that if the pairwise or zero-order correlation coefficient between the variables is high, for instance more than 80% (0.8), then multicollinearity is said to be a serious problem (Gujarati, 2004). However, the pair-wise correlation value of 0.181525 is quite low, suggesting that the evidence of multicollinearity in the data is very low. The table below shows the intercorrelatios between LGDS and LGDP.

Table 2: Correlation matrix

	LGDP	*LGDS*
LGDP	*1.000000*	*0.181525*
LGDS	*0.181525*	*1.000000*

***Source:** Author computation using Eviews 8.1*

Causality test results: the test was carried out to determine the extent to which one variable can be used to forecast the other variable. The concept looks how the past data values of one variable can better explain the present values of the other variable. In this study, pairwise Granger Causality Tests were carried out using E-Views 8.1 and results are shown in Table 3.

Table 3: Pairwise Granger Causality Tests

Sample: 1980 2015

Lags: 2

Null Hypothesis:	*Obs*	*F-Statistic*	*Prob.*
LGDS does not Granger Cause LGDP	*34*	*0.24832*	*0.7818*
LGDP does not Granger Cause LGDS		*0.45384*	*0.6396*

Source: *Authors computation using Eviews 8.1*

Basing the decision on the probability outcomes of the Granger Causality test of 0.7818 and 0.6396, we accept the null hypothesis that gross domestic savings does not granger cause gross domestic product and conclude that gross domestic savings does granger cause gross domestic product. Neither does gross domestic product Granger cause domestic savings. This implies that an increase in one of the variables does not cause a change in another variable. From the results there is sufficient evidence to conclude that there is no causality relationship between gross domestic savings and economic growth in Zimbabwe. The results are not consistent with theory where we expect unidirectional causality relationship between savings and economic growth.

Test for long run relationship: In this analysis, the hypothesis of existence of any long-run equilibrium relationship between domestic savings and gross domestic product function was tested by using the Engle-Granger cointegration methodology based on the residuals stationarity.

The hypothesis is stated as; H_0: No cointegration

Variables are said to be cointegrating if they have a long run equilibrium or relationship between them (Gujarati and Porter, 2008). Using the data on savings and economic growth, LGDS was first regressed on LGDP and the following regression was obtained;

Table 4: Estimated cointegrating equation

Dependent Variable: LGDP

Method: Fully Modified Least Squares (FMOLS)

Included observations: 35 after adjustments

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
LGDS	*0.445468*	*0.560373*	*0.794950*	*0.4323*
C	*5.579016*	*5.612064*	*0.994111*	*0.3274*

Source: *Author computation using Eviews 8.1*

Econometrics decisions are usually made basing on the 5% level of significance due to the uncertainty in the quality of data. From the regression analysis above, there is some existence of a proportionate linear relationship between gross domestic savings (LGDS) and gross domestic product (LGDP) in Zimbabwe. The sign of the coefficient shows a positive relationship between the variables therefore confirming a priori expectations which are inclined well to theory. However, the statistical evidence emanating from the p-value shows that the endogenous variable does not explain any variation in the dependent variable.

Since the regression equation above was estimated using the variables LGDP and LGDS which are integrated of first order, that is I(1), an Engle-Granger cointegration test was carried out in order to observe if a long run equilibrium exist between the variables.

Engle-Granger cointegration test results and interpretation

The Engle-Granger cointegration test results are categorised into three different classes/sections. The first section shows the test specification and settings, together with the test values and corresponding p-values as shown below;

Table 5: Engle-Granger cointegration test; specification and settings

Cointegration Test - Engle-Granger

Specification: LGDP LGDS C

Cointegrating equation deterministics: C

Null hypothesis: Series are not cointegrated

Automatic lag specification (lag=1 based on Schwarz Info Criterion, maxlag=8)

	Value	*Prob.**
Engle-Granger tau-statistic	*-1.772247*	*0.6468*
Engle-Granger z-statistic	*-6.927781*	*0.5405*

**MacKinnon (1996) p-values*
Source: *Author computation using Eviews 8.1*

From the results above, the t-statistic (tau-statistic) and the z-statistic (normalized autocorrelation coefficient) both provides evidence to accept the null hypothesis of no cointegration at 5% level. The evidence clearly suggests that LGDP and LGDS are cointegrated.

The middle part of the results section shows intermediate results used in constructing the test statistic that may be of great interest.

Table 6: Engle-Granger cointegration test; immediate results

Intermediate Results:

Rho - 1	*-0.105524*
Rho S.E.	*0.059542*
Residual variance	*0.000929*
Long-run residual variance	*0.003465*
Number of lags	*1*
Number of observations	*34*
*Number of stochastic trends***	*2*

***Number of stochastic trends in asymptotic distribution.*
Source: *Authors computation using Eviews 8.1*

Initially, the Rho S.E and the residuals variance in the intermediate section are the degrees of freedom, (d.o.f) and the squared standard error of regression. The Long-run residual variance (LRRV) is the estimated long run variance of the residuals based on the estimated econometric model. The values of the residual variances and the long run variances are used to calculate the denominator of the normalized autocorrelation coefficient (z-statistic). Finally, the number of stochastic trends entry shows the values used to obtain the p-values.

Table 7 depicts the results for the actual ADF test equation. It is also known as the residual based cointegration test. The Engle-Granger residual-based tests for cointegration is simply stationarity/unit root test done on the residuals obtained from Static Ordinary Least Squares (SOLS) estimation of the cointegrating equation. Under the assumption that the series are not cointegrated, all linear combinations of, including the residuals from SOLS, are unit root non-stationary.

Table 7: Engle-Granger cointegration test; ADF test

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Sample (adjusted): 1982 2015
Included observations: 34 after adjustments

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
RESID(-1)	*-0.105524*	*0.059542*	*-1.772247*	*0.0859*
D(RESID(-1))	*0.482113*	*0.151059*	*3.191549*	*0.0032*

R-squared	*0.242077*	*Mean dependent var*	*0.007886*
Adjusted R-squared	*0.218392*	*S.D. dependent var*	*0.034482*
S.E. of regression	*0.030485*	*Akaike info criterion*	*-4.086134*
Sum squared resid	*0.029739*	*Schwarz criterion*	*-3.996348*
Log likelihood	*71.46428*	*Hannan-Quinn criter.*	*-4.055514*
Durbin-Watson stat	*2.122274*		

Source: *Authors computation using Eviews 8.1*

A p-value of 0.0859 (above 5%) shows that the residuals are non-stationary at level therefore leading to the conclusion that the non-stationarity of LGDP and LGDS extends to residuals which is enough evidence to accept H_0 that there is no cointegration between the variable though the residuals become stationary at first difference as shown by a p-value of 0.0032. Since, a test of the null hypothesis of no cointegration against the alternative of cointegration corresponds to a unit root test of the null of non-stationarity against the alternative of stationarity, there is sufficient evidence to conclude that there is no cointegration/long run equilibrium/relationship between domestic savings and economic growth in Zimbabwe.

CONCLUSION

Theories of savings and investment suggests that savings causes investment and thereby increases economic growth. However, the issue of long run relationship between savings and economic growth is debatable both theoretically and empirically. Empirical literatures reviewed are mixed and do not provide conclusive empirical evidences. Based on the findings of this study, the researchers came to the conclusion that changing gross domestic savings movements have no significant effect on the change in economic growth in Zimbabwe. According to this research there is evidence to accept the null hypothesis that there is no relationship between domestic savings and economic growth in Zimbabwe.

Following the analysis of this study, it is recommended that the government should set a sound and fertile macroeconomic environment in order to foster the growth of other sectors that will help to increase the level of economic growth in Zimbabwe such as external trade and also put in place policies to attract foreign direct investment. The study found a no relationship between domestic savings and economic growth. Government and policy makers should therefore work around other forms of savings such as foreign savings. However, care should also be taken when dealing with these savings and try to distinguish between private and public savings.

In addition to that, it is also recommended that a close eye is put on the way in which savings are managed in Zimbabwe so that the reason behind their inconsistent with theory is unpacked. Maybe higher savings contribute to economic growth of which it was noted that the period 2004-2015 was associated with negative savings.The government also needs to continually invest in research and development in the different sectors of the economy in

order to evaluate the significance and contribution of each sector to aggregate economic growth.

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