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AN AUTOREGRESSIVE ANALYSIS OF THE DETERMINANTS OF PRIVATE SAVINGS IN NIGERIA

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ABSTRACT

Purpose. *Despite the increasing trend of private savings in Nigeria, the country is still characterised by low investment and output growth, thus, suggesting that the average saving rate is still far from being impressive. This study investigates the determinants of private savings in Nigeria.*

Methodology. *Autoregressive Distributed Lag (ARDL) Model using annual time series data from 1981 to 2016 within the theoretical framework derived from the life-cycle hypothesis is employed in this study. The key variables under investigation are private savings, income, dependency ratio, real interest rate, social security payment, financial development and macroeconomic stability. The data used for analysis are sourced from Central Bank of Nigeria Statistical Bulletin (2016) and World Development Indicator (2016).*

Findings. *The results show that lifetime income and social security payment have significant positive relationship with private saving in the long-run, while adult dependency has significant negative relationship. In the short-run, adult dependency and social security payment have significant positive relationship with private savings. In addition, the result shows that 62% of deviation from the long-run equilibrium level of private savings is annually corrected for by the model estimated.*

Originality. *This research investigates both the long-run and short-run effects of the various determinants of private savings in Nigeria. Thus, the study can serve as eye opener to the important variables that can improve the level of private savings in Nigeria.*

1. INTRODUCTION

Savings remain one of the most important economic activity for mobilising funds for investment purposes; therefore, it is recognised as a catalyst of economic growth. An adequate supply of domestic savings remains a core national policy objective, mainly due to its direct impact on growth process as well as its role as domestic investment stimulants. Ogbokor and Samahiya (2014) emphasised that higher savings rate is crucial for long term investment process, which in turn facilitates an increase in employment rate and economic growth. Given the increasing integration of international financing for instance, it is high domestic savings that can ensure macroeconomic stability internally. The position of the literature (for example Ogbokor and Samahiya, 2014) on the positive influence of savings on investment and subsequently growth and development lend credence to the importance of savings.

However, the dismal domestic savings behaviour in most African countries, including Nigeria, relative to other regions of the world have been of concern to economists in the recent time. For instance, despite the increasing trend of private savings in Nigeria, the country is still characterised by low investment and output growth, thus, suggesting that the average saving rate ratio is still far from being impressive. Iyoha (1998) affirmed this poor state of saving-investment and output relationship in Nigeria and attributed the mid-1980s negative output growth rate to a host of factors among which are decline in investment and savings. In a similar development, Nnanna (2003) also posited that the underdeveloped state of the Nigerian economy is due to her poor savings and investment culture. Basically, there is lack of incentives for a good domestic savings culture in Nigeria mainly due to poor understanding of savings determinants.

While acknowledging the vast contributions of scholars in the literature on various aspects of saving behaviour, it is also important to emphasise that crucial questions still remain unanswered with regard to factors that can enhance the performance of national savings. Germane in this study are issues that focus on: (i) effectiveness of higher income rate as stimulus for raising private saving rate in Nigeria; (ii) effectiveness of financial development for enhancing savings behaviour in Nigeria; and (iii) whether there are roles for monetary policy in increasing private savings in Nigeria?

Various determinants of savings have been identified in the literature such as income, financial development, inflation, and interest rate, among others. Studies have investigated the long-run and the short-run effects of the various determinants, and several standings have been promoted depending on the methodology of the study. Thus, to extend the literature and study the differential impact of the long-run and short-run analyses, this study employs an autoregressive distributed lag (ARDL) technique to analyse the determinants of private savings in Nigeria, given the fact that much of the extant studies focus more on investigating total national savings.

The rest of this paper is sectionalized as follows. Section 2 presents the literature review. Section 3 presents stylized facts on national savings in Nigeria. Section 4 covers the methodology for the study. Section 5 presents empirical analysis. Finally, section 6 covers conclusion.

2. LITERATURE REVIEW

Theoretically, many arguments have been established to explain the motivation for savings. For instance, Keynesian Theory propounded by Keynes (1936) identified absolute disposable income as an important determinant of saving. He defined savings as the amount left over when the cost of consumer expenditure is subtracted from the disposable income that he or she earns in a given period of time. On the other hand, Permanent Income Hypothesis (PIH) advocated by Friedman (1957) differentiates between permanent and transitory income. He opined that savings is influenced by both permanent and transitory income as well as present level of wealth, both human and nonhuman. Also, Ando and Modigliani (1963) propounded the Life Cycle Hypothesis (LCH) and advanced the view that the motivation for savings is the enablement of lifetime consumption. An individual's savings will peak in his or her prime earning years and fall as the savings are drawn down to finance consumption during retirement years. Theoretically, the marginal utility of consumption at a time of lower income is greater than that at a time of higher income (Gersovitz, 1995).

Empirically, there are ample number of studies on determinants of savings. Example of such studies include the work of Modigliani and Brumberg (1954), Ando and Modigliani (1963), Modigliani (1986), Loayza et al. (2000), Athukorala and Tsai (2003), Ozcan, Gunay and Ertact (2003), Kudaisi (2013), Ogbokor and Samahiya (2014), Ndirangu & Muturi (2015), Aissata, Yushi and Borojo (2016), and Abdelmawla and Omran (2016), among others. Results obtained from these studies have been mixed and many authors like Modigliani and Brumberg (1954), Ando and Modigliani (1963) and Modigliani (1986) indicated that savings is positively determined by growth rate of income. Results of these studies are consistent with findings of some household savings studies such as Ogbokor and Samahiya (2014), Aissata, Yushi and Borojo (2016), and Abdelmawla and Omran (2016). However, study by Loayza et al. (2000) obtained negative relationship between saving and growth rate of income for developing countries.

Another relevant determinant of private savings investigated in the literature is financial depth mostly captured by the ratio of money supply (broad money, M_2) to GDP (Ozcan, et al., 2003). Financial depth or financial market development shows the range and availability of financial assets, accessibility to banking facilities, and extent of credit opportunity. Increase in financial depth can have positive effect on domestic saving (Touny, 2008). However, in Ogbokor and Samahiya (2014) and Aissata, Yushi and Borojo (2016), financial deepening have no significant effect on savings in Namibia and Guinea, respectively.

In most studies, inflation is incorporated to capture the impact of macroeconomic uncertainty on saving behaviours. Ndirangu & Muturi (2015) and Kudaisi (2013) found that inflation has robust positive effect on gross domestic saving in Kenya and West African countries. These literatures reason out that inflation has positive effect on saving because higher uncertainty would rise saving since risk averse consumers set resources aside as a precaution against possible adverse changes in income and other factors (Modigliani and Cao, 2004). Another effect of inflation is that since it increases nominal interest rate, it will in turn lead to higher household income and saving. This finding is consistent with studies such as Ogbokor and Samahiya (2014) and Aissata, Yushi and Borojo (2016). However, if interest rate is not adjustable to inflation rate changes, a rise in inflation rate will reduce real interest rate and this will be a disincentive to save in financial assets (Loayza et al., 2000).

Other variables that have been investigated as determinants of savings in the literature include deposit interest rate and past income. The behaviour of these variables in the literature were also characterized with mixed results.

Considering the articles reviewed, it is clear that consensus has not been reached as findings are still debatable. The behaviour of the various determinants of savings varies across studies. While some showed clear direction of impact, some were ambiguous.

3. STYLIZED FACTS ON NATIONAL SAVINGS IN NIGERIA

Nigeria economy has witnessed a steady growth in the last few decades. For example, the GDP growth rate averaged 6.80 percent between 2005 and 2013. The growth rate increased from 4.2% in 2012 to 5.5% in 2013. However, the productive base of the Nigerian economy remains weak, narrow and externally-oriented with primary production activities of mining and quarrying (including crude oil and gas) accounting for about 13.82% of total revenue and over 80% of government revenues (Ajakaiye and Babatunde, 2015).

However, despite the fact that Nigerian economy is growing, the proportion of the population living below the poverty line increased significantly from 1980 to 2004. The upshot of the foregoing is that while the country has recorded a steady rate of growth, it has not been inclusive. One of the reasons why the current growth pattern has not been inclusive is the limited sphere of influence that monetary policy has on the Nigerian economy due to its weak productive structure. For example, the agricultural sector is largely insulated from the effects of monetary policy because it is largely peasantry in nature except for a few modern farms. In addition, the services sector with the dominant share of the GDP is largely informal in nature and isolated from the economy except for few sub-sectors such as telecommunication, financial, and the recent modern chain stores. However, the manufacturing sector which the monetary policy is expected to influence directly is small given its share

in GDP. Thus, the success of monetary policy depends on the productive structure of the economy. The challenge therefore is how to make monetary policy more effective especially with regards to savings mobilization for productive economic activities. But the trend of Determinants and performance of savings mobilisation for productive investment is far from being impressive. Although the interest rate movement have been highly volatile (Table 1.), yet private savings on the other hand have been less volatile. The extremely low and negative real interest rate as recorded during the period of study has the likelihood of being responsible for the low private savings recorded. Private savings only begins to witness upward trend in the 1990s. Therefore, private savings in the last one and half decade (1990-2006) trends upward but still shows dismal performance towards the end of the period under study.

Table 1.: Five Year Average of Growth of Selected Macroeconomic Variables

YEAR	Financial Development	Adult Dependency	RGDP	Social Security Payment	Private Saving Rate	Real Interest Rate	Inflation
1981-1985	10.886	5.386	1.657	4.421	14.474	-7.776	15.396
1986-1990	11.263	5.516	5.317	36.179	19.350	-11.924	25.870
1991-1995	12.209	5.473	1.068	38.935	31.173	-32.361	48.926
1996-2000	10.885	5.321	3.095	28.964	29.237	-1.302	12.269
2001-2005	13.546	5.169	9.645	21.946	29.105	-1.654	15.729
2006-2010	18.140	5.145	7.827	18.616	36.616	0.272	10.092
2011-2015	19.513	5.167	4.802	3.977	14.928	-1.544	9.722
2016	21.291	5.183	-1.583	3.445	7.524	0.903	9.059

Source: Author's computation from Statistics Obtained from the Central Bank of Nigeria Statistical Bulletin (2016).

A comparative analysis of private savings vis-a-vis financial development, real interest rate, *RGDP* and social security payments indicates that the private saving (*PSR*) mirrored the trends in social security payment (*SSP*) during the period. Available data shows that *PSR* rises as *SSP* was increasing reaching an all-time high of 54.3% in 1993 when *SSP* was 106.1%. The periods of negative growth in *RGDP* but increase in *SSP* might not be unconnected with periods of huge borrowings and fiscal deficit financing by the government. Growth in financial development does not move in the same direction with *SSP* growth rate. Moreover, *RGDP* moves in the same direction with *PSR* and *SSP* in the period under study.

4. METHODOLOGY

4.1. Model Specification

The review of theoretical framework provides guidance to determine the set of relevant variables to be included in an empirical investigation of saving behaviour in Nigeria. Thus, the empirical model was adopted from a study by Huang (2006). The adopted model is however, modified in the context of this study to account for financial development and it is specified as follows:

$$PSR = F(INCOM, ADEP, INTR, SSP, FD, MAC) \quad (1)$$

Where PSR is growth of private saving, $INCOM$ is income, $ADEP$ is dependency ratio, $INTR$ is real interest rate, SSP is social security payment, FD represents financial development, while MAC denotes macroeconomic stability proxy by inflation rate. However, the model specified in equation (1) above is in its implicit form, to derive the explicit form that is amendable to regression analysis; the model is further re-specified in explicit form as follows:

$$PSR_t = \beta_0 + \beta_1 INCOM + \beta_2 ADEP + \beta_3 INTR + \beta_4 SSP + \beta_5 FD + \beta_6 MAC + \varepsilon_t \quad (2)$$

Equation (2) is further transformed into an autoregressive distributed lag model as follows;

$$\begin{aligned} \Delta PSR_t = & \alpha_0 + \theta_1 PSR_{t-1} + \theta_2 INCOM_{t-1} + \theta_3 ADEP_{t-1} + \theta_4 INTR_t + \theta_5 SSP_t + \theta_6 FD_t \\ & + \theta_7 MAC_t + \sum_{i=0}^m \beta_i \Delta PSR_{t-i} + \sum_{i=0}^m \beta_i \Delta INCOM_{t-i} + \sum_{i=0}^m \beta_i \Delta ADEP_{t-i} \\ & + \sum_{i=0}^m \beta_i \Delta INTR_{t-i} + \sum_{i=0}^m \beta_i \Delta SSP_{t-i} + \sum_{i=0}^m \beta_i \Delta FD_{t-i} + \sum_{i=0}^m \beta_i \Delta MAC_{t-i} + \varepsilon_t \quad (3) \end{aligned}$$

Theoretically, we expect private saving in a particular period to respond positively to income, but the response of private saving to factors such as $ADEP$ and $INTR$ is however ambiguous and therefore could be positive or negative. An effective financial development should enhance private saving culture hence; we predict positive response of private saving to financial development (FD). Increase in social security payment (SSP) is expected to increase private saving, but the response should be otherwise for rising inflation rate (MAC).

4.2. Data Sources and Variable Measurement

The study opted for the ARDL estimation technique because of its advantage over Ordinary Least Square method (OLS) to choose appropriate number of lags for each of the independent variable and the most parsimonious model automatically. We

employed annual data series from 1981 to 2016 sourced from the Central Bank of Nigeria Statistical Bulletin (2016) and World Development Indicator (WDI, 2016). The private saving in equation (2) is measured as growth of private savings; the income is proxy by GDP growth rate; social security payment is proxy by growth of government expenditure; financial development is measure as ratio of broad money supply (M2) to GDP; while the macroeconomic stability is proxy via inflation rate.

5. EMPIRICAL ANALYSIS

The analysis in this section proceeded in three stages following empirical econometric literature. The analysis is carried out using pre-analysis, modelling and post estimation techniques with the theoretical ARDL model proposed by Pasaran et.al (2001).

5.1. Preliminary Analysis: Descriptive Statistics and Correlation Analysis

The results of the Descriptive Statistics indicate that the average increase in *PSR* over the period is 5.66% which closely mirrors *SSP* with an average increase of 5.88% over the period. Although *INCOM* recorded an average increase of 10.2%, the savings culture is still a poor reflection of this performance. *MAC* recorded an average increase of 19.42% which is a reflection of an unstable macroeconomic climate. The correlation analysis also shows that there is positive relationship among the variables, except *ADEP* and *MAC* that have negative relationships with all the other variables.

Table 2.: Descriptive Statistics of Variables Used in the Regression Analysis

	ADEP	FD	INTR	PSR	LNCOM	SSP	MAC
Mean	5.307	13.986	-7.793	5.659	10.220	5.881	19.419
Median	5.286	12.479	-0.314	5.463	10.016	6.371	11.897
Maximum	5.535	21.291	12.419	9.419	11.142	8.554	72.836
Minimum	5.087	9.152	-59.305	1.881	9.531	2.266	5.382
Std. Dev.	0.150	3.862	16.392	2.494	0.535	2.212	17.767
Skewness	0.185	0.781	-1.598	0.081	0.443	-0.359	1.669
Kurtosis	1.463	2.100	4.736	1.663	1.775	1.689	4.522
Jarque-Bera	3.750	4.879	19.844	2.719	3.431	3.353	20.190
Probability	0.153	0.087	0.000	0.257	0.180	0.187	0.000
Observations	36	36	36	36	36	36	36
Correlation Analysis Table							
	ADEP	FD	INTR	PSR	LNCOM	SSP	MAC
ADEP	1.000						
FD	-0.650	1.000					
INTR	-0.443	0.285	1.000				
PSR	-0.838	0.850	0.313	1.000			

	ADEP	FD	INTR	PSR	LNCOM	SSP	MAC
LNCOM	-0.826	0.881	0.331	0.981	1.000		
SSP	-0.834	0.752	0.294	0.978	0.932	1.000	
MAC	0.494	-0.311	-0.976	-0.328	-0.359	-0.289	1.000

Source: Authors' estimation using data extracted from Central Bank of Nigeria Statistical Bulletin, 2016.

The results in respect of the unit root tests are presented in Table 3. In general terms, it indicates that only *ADEP* and *INTR* were stationary at levels while *FD*, *PSR*, *SSR*, *INCOM* and *MAC* were non-stationary at levels. However, they were all found to be stationary after first differencing.

Table 3.: Unit Root Test Results

Unit Root Test Results					
Variable	Level		First Difference		Stationarity Order
	ADF	PP	ADF	PP	
ADEP	-5.10***	-0.72	-3.55***	-3.53***	I(0)
FD	-0.59	-0.68	-5.17***	-5.21***	I(1)
INTR	-3.16**	-3.05**	-5.76***	-10.99***	I(0)
PSR	-0.20	-0.21	-4.44***	-4.46***	I(1)
INCOM	0.10	1.21	-3.23**	-3.04**	I(1)
SSP	-1.53	-1.21	-1.40	-6.94***	I(1)
MAC	-2.77*	-2.68*	-5.44***	-8.83***	I(1)

Source: Authors' estimation from E-views 9; Note: *, ** and *** indicate rejection of the null hypothesis of non-stationarity (there is unit root) at 10%, 5%, and 1% significance level respectively.

5.2. Results on the Determinants of Private Savings in Nigeria

Given the mixture of stationarity arising from the unit root results presented in Table 3., this study proceeded to estimate the Bound test Co-integration (proposed by Pesaran, Shin, and Smith, 2001) to confirm the existence of long-run relationship among our series. The results of the ARDL-bounds test is presented in Table 4. The model F-statistics is greater than the upper bound and lower-bound critical value at all level of significance. Hence the null hypothesis of no co-integration is rejected and long-run co-integration relationship established among the variables in this model. This prompted us to estimate both long and short-run relationship for the model specified in equation (2).

Table 4.: Bound Test Co-integration Result

	Bound Level of Significance		
	10%	5%	2.5%
F-Statistics = 5.782 (6)			
I(0)	2.12	2.45	2.75
I(1)	3.23	3.61	3.99

Source: Authors' estimation.

The short-run and long-run ARDL results on the determinants of private savings in Nigeria is presented in Table 5. In the long-run, *ADEP* has a significant negative influence on *PSR*. Thus, 1.0% increase *ADEP* causes about 2.6% decrease in *PSR*, and vice versa. The results further showed that *FD* and *INTR* has insignificant positive relationship with *PSR* in the long-run. Meaning that as *FD* and *INTR* increase in Nigeria, *PSR* also increase. This implies that in the long run, as financial institutions activities and dealings improve, in terms of electronic transaction, financial inclusiveness and Bank-Customer relationship through convenience, relevance and responsiveness, the economy at the aggregate will record more private savings. Similarly, *INTR* is observed to be positively related with private savings in Nigeria. The intuition derived from this result is that a rise in *INTR* within the country will attract foreign investor (in form of foreign direct investment and foreign portfolio investment) and thus, generate more employment and income and will further increase private savings. However, the result shows that the effect of *FD* and *INTR* is not significant (not different from zero). *INCOM* and *SSP* have significant positive relationship with *PSR*. A 1.0%, increase in *INCOM* and *SSP* go with an associated improvement of about 2.19% and 0.5% in *PSR*, respectively. Further, results show there is insignificant positive long run relationship between *MAC* and *PSR* in Nigeria.

In the short-run, result reveal that the effect of *ADEP* and its lagged values on *PSR* is positive, though only lagged *ADEP* is significant at 5% level of significant in the short-run. This implies that a 1% increase in past value of *ADEP* will lead to improvement of about 1.79% in *PSR*, also, an improvement of about 0.01% by approximation of current *ADEP* will be required to increase *PSR*. Overall, short run results indicate a positive relationship between *FD*, *INTR*, current *INCOM*, *MAC* and *SSP* on *PSR* in Nigeria. Thus, 1.0% increase in *FD*, *INTR*, current *INCOM*, *MAC* and *SSP* results in an increase in *PSR* by 0.01%, 0.01%, 0.33%, 0.01% and 0.32% respectively.

The coefficient of the error correction term (ECT) represented by $CointEq(-1)$ is significant at 1% thus, suggesting that 62% of deviation from the long-run equilibrium level of *PSR* is corrected for annually.

Table 5.: ARDL Analysis of the Determinants of Private Savings in Nigeria

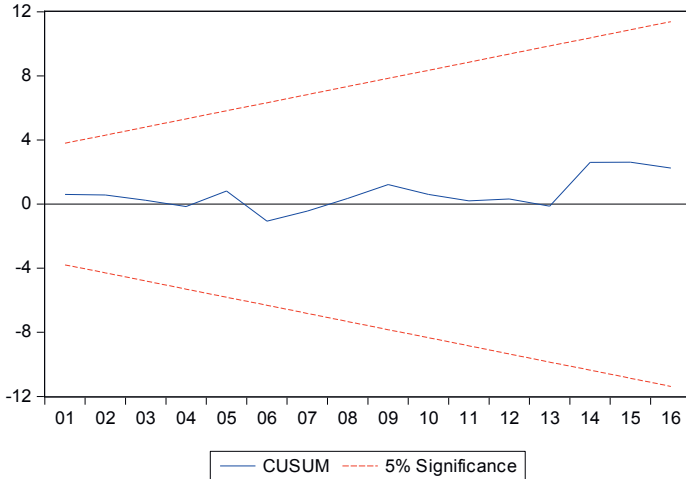
Short-Run Results			
Variable	Coefficient	Std. Error	Prob.
D(ADEP)	0.001	0.708	0.999
D(ADEP(-1))	1.793**	0.724	0.025
D(FD)	0.011	0.015	0.484
D(INTR)	0.011	0.008	0.187
D(LNCOM)	0.325	0.681	0.640
D(LNCOM(-1))	-0.447	0.834	0.599
D(LNCOM(-2))	-1.263*	0.616	0.057
D(MAC)	0.012	0.007	0.132
D(SSP)	0.320***	0.098	0.005
D(SSP(-1))	0.209*	0.106	0.067
D(SSP(-2))	0.248**	0.115	0.046
CointEq(-1)	-0.621***	0.155	0.001
Long-Run Results			
Variable	Coefficient	Std. Error	Prob.
ADEP	-2.595**	0.973	0.017
FD	0.017	0.021	0.439
INTR	0.017	0.015	0.273
LNCOM	2.188***	0.333	0.000
MAC	0.016	0.014	0.268
SSP	0.497***	0.079	0.000
C	-6.000	4.768	0.226
R-squared	0.999		
F-statistic	1796.639		
Durbin-Watson stat	2.404		
ARDL Diagnostic Tests			
Serial Correlation LM Test	1.131		0.304
Jarque-Bera	2.772		0.250
ARCHTest	1.756		0.195
Breusch-Pagan-GodfreyTest	0.549		0.879
Ramsey RESET Test	0.048		0.829

Source: Author's Estimates from E-views 9. Note: ***, ** and * represent 1%, 5% and 10% level of significance respectively.

The non-significance of the diagnostic tests confirm that the estimated model satisfied all the required properties of a good model. The residual series are normally distributed as suggested by the Jarque-Bera statistics; the model has no serial correlation as indicated by the Breusch-Godfrey LM test; and the residuals are homoscedastic as suggested by the ARCH test. Moreover, the Ramsey RESET test shows that the model is well specified with the correct linear functional form. In addition,

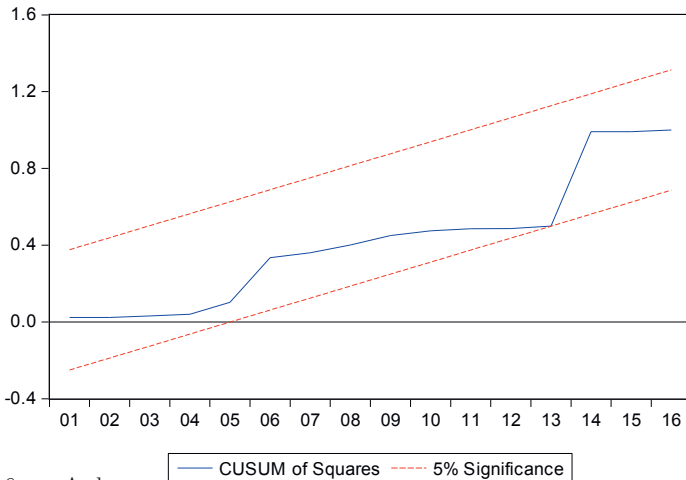
Figure 2. and 3. confirm the stability of the model estimated in equation 2 and presented in Table 5. The figures shows that our model is stable and correctly specified and estimated. Thus, the results are reliable.

Figure 2.: CUSUM Stability Test



Source: Authors.

Figure 3.: CUSUM of Square Stability Test



Source: Authors.

6. CONCLUSION

This study seeks to underscore the determinants of private savings in Nigeria during 1981-2016. The estimated autoregressive distributed lag (ARDL) model was derived from the life-cycle hypothesis. Both long-run and short-run effects of lifetime income (*INCOM*), dependency ratio (*ADEP*), real interest rate (*INTR*), Social Security Payment (*SSP*), financial development (*FD*) and macroeconomic stability (*MAC*) on private savings (*PSR*) were analysed.

Long-run results show that *ADEP* has a negative and significant influence on *PSR*, while *FD* is positive. Also, *INTR* is positive but insignificant at 10%, suggesting that a rise in *INTR* within the country will lead to a further increase in private savings, as more fund will be available through investment from foreign investor who are pursuing higher interest rate for investment. In addition, the coefficient of *INCOM*, *MAC* and *SSP* have positive impact on *PSR* in Nigeria.

In the short-run, result reveal that the effect of *ADEP* and its lagged values on *PSR* is positive, though only lagged value of *ADEP* is significant at 5% level of significant in the short-run. This implies that a 1% increase in past value of *ADEP* will lead to improvement of about 1.79% in *PSR*, also, an improvement of about 0.01% by approximation in current *ADEP* will be required to increase *PSR*. Overall, short run results indicate that *FD*, *INTR*, current *INCOM*, *MAC* and *SSP* have positive relationship with *PSR* in Nigeria. Thus, 1.0% rise in *FD*, *INTR*, current *INCOM*, *MAC* and *SSP* results in an increase in *PSR* by 0.01%, 0.01%, 0.33%, 0.01% and 0.32%, respectively under the period covered. The coefficient of the error correction term (ECT) that is represented by $CointEq(-1)$ is significant at 1% thus, suggesting that 62% of deviation from the long-run equilibrium level of *PSR* is corrected for, annually.

Based on the above findings, the following recommendations are made for policy. Given that interest rate and *FD* foster increased private savings, there is need to raise demand for credit or loans for domestic investor by reducing collateral demand by financial institutions so as to further increase the amount of private savings. Therefore government and his agencies should promote policy to address uncertainty in macroeconomic environment and financial reforms to reduce financial exclusion in rural areas so as to increase private savings.

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