



## Investigating the effects of interest rates, income levels and inflation rate on household savings in Cameroon

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### Abstract

*This paper has as objective to examine the determinants of household savings in Cameroon using time series data from 1979 to 2018, collected mainly from the World Bank database. The data were analysed using multivariate regression analysis and the ordinary least square technique was used to estimate the parameters of the model, as well as the Engle and Granger causality test. The model residual was diagnosed for heteroscedasticity, autocorrelation and the normality. The result of household saving model was globally significant at five percent and the model very adequate with all the independent variables accounting for 79 percent of the changes in household savings. For the three hypotheses, the relationship between interest rate and household savings is positive and significant at five percent. The relation between GDP growth was also positive and equally significant at five percent. The results report a negative relationship between savings and the rate of inflation which was not significant indicating, that the three hypotheses which were set initially to guide this study are attained except for inflation rate that the relation was negative as expected but not very significant. Based on the major findings of this study, it is recommended that policy makers could encourage household saving in Cameroon by increasing the interest so as to make savings more attractive. Equally by stimulating the level of economic activities with the aim of creating more income generating activities and, finally, by suppressing inflation in the economy even though with cautions.*

### 1- INTRODUCTION

The role of savings and investment in achieving and maintaining high economic growth is extensively laid out in theories of economic growth. Harrod-Domar growth theory highlighted how economic growth depends on the rate of saving or investment and the incremental capital-output ratio in the economy. The neoclassical growth theory as noted by Solow (1956) assigned a critical role to saving rate for facilitating a higher growth in per capita capital and per capita income in the transition to the steady state and also implied that a high saving rate facilitates achieving a higher level of steady state per capita capital and income. Subsequently, fully endogenous growth models suggest that increases in saving rate and in the size of population increase the longterm growth rate. Consistent with theoretical predictions,

Determinants of savings are root from the life cycle model of consumption developed by Modigliani and Brumberg (1954), Ando and Modigliani (1963) and Modigliani and Brumberg, (1990) which assert that individuals work and save in the first period of their lives, then retire and dissave during the second period (Athukorala and Sen, 2004; Husain, 1995). From these models, a number of factors that have been identified in literature to affect savings including dependency ratio, real interest rate, inflation, financial deepening and terms of trade, fiscal stance, income and political stability.

Saving rates display considerable variation across countries of Africa and over time. A comparison of West Africa rate of savings, with that of other regions of Africa, shows that the region has performed poorly throughout, the period of study. In the period 1980-1985, the North Africa had the highest savings rate of 22.1%, Middle Africa follows at a distant rate, with 9.9 per cent. West Africa savings rate stayed at a very disturbing low rate of 6.1 per cent. Although, the savings rate in West African increased from 6.6 percent in 1980-85 to 7.8 per cent in the period 1985-1990, the region continued to trail behind all other regions except South Africa. The period of 1990-1995 and 1995-2000, still left West Africa trailing behind North and Middle Africa sub-regions. Even, in the recent period of 2000-2006 when most countries witnessed some growth the rate of savings in West Africa was still below 10 per cent (WDI, 2010).

In the aftermath of independence, Cameroon opted for a development strategy based on five-year plans with main objective to revive a general investment and economic growth. All these depends largely on the levels of savings in the

economy. Indeed, until the second half of the 1980s, Cameroon's economic growth remained positive and relatively stable in term of economic growth, with acceptable rates of investment and saving. Despite the move towards an integrated global economy, Cameroon remained marginalized because of the weaknesses of its savings and investments which are major determinants of economic growth. Thus, there is a link between savings, investment and economic growth in Cameroon. Savings are an indispensable resource for economic growth and also financial institution including microfinance institution (MFIs). They must mobilize sufficient savings to meet their commitment and become independent from grant providers. They must therefore convince customers, which includes the public in general and micro and small size enterprises, to entrust their savings. This requires an understanding of customers' characteristics, as well as their needs and expectations.

Cameroon in 2020 had a low saving rate of 13.4% representing barely 15% of GDP in Cameroon. Given that saving is what has to be mobilized for investment with its numerous benefits on an economy, the low rate of saving pushes the country into severe external debts with its disastrous effects in the economy. With this in mind, much attention has to be paid on research on the field of saving but no recent thorough research has been conducted in Cameroon on this field. This is what prompted the researcher to explore this gap in literature by posing the following question: what are the major determinants of saving in Cameroon? This paper therefore intends to empirically examine the determinants of household savings in Cameroon. Specifically,

- To investigate the effect of interest rates on household savings in Cameroon.
- To assess the effect of income on household savings.
- To evaluate the effect of inflation on household savings.

Having introduced the paper in the first section, the rest of the sections are structured as follows: section two discusses the literature review and theoretical framework. Section three describes data and econometric techniques used in investigating the short and long-run relationships between the variables. The empirical results are presented in section four while section five focuses on the conclusion and policy implications emanating from the study.

## 2- REVIEW OF RELATED LITERATURE

### 2.1- THEORETICAL REVIEW

Economists have developed three major theories of consumption and saving behavior which include the life-cycle hypothesis (Modigliani and Brumberg, 1954; Modigliani and Ando, 1957; Ando and Modigliani, 1963); the permanent income hypothesis (Friedman, 1957); and the relative income hypothesis (Dusenberry, 1949). All three theories have their conceptual roots in the microeconomic theory of consumer choice. However, the life-cycle and permanent income hypotheses are the most similar; both theories assume that individuals attempt to maximize their utility or personal well-being by balancing a lifetime stream of earnings with a lifetime pattern of consumption. The relative income hypothesis is quite different. Dusenberry theorized that individuals are less concerned with their absolute level of consumption than with their relative level—the idea of "keeping up with the Joneses."

#### Life Cycle Theories of Savings and Consumption

The life-cycle hypothesis has been utilized extensively to examine savings and retirement behavior of older persons. This hypothesis begins with the observation that consumption needs and income are often unequal at various points in the life cycle. Younger people tend to have consumption needs that exceed their income. Their needs tend to be mainly for housing and education, and therefore they have little savings. In middle age, earnings generally rise, enabling debts accumulated earlier in life to be paid off and savings to be accumulated. Finally, in retirement, incomes decline and individuals consume out of previously accumulated savings.

The pension wealth that retired persons hold is not liquid and they are not able to draw down their pension wealth any faster than the annuity payments that they receive. A number of studies, have found evidence of a hump-shaped pattern of savings that is consistent with the life-cycle hypothesis. It is important to note that most studies have tended to underestimate the degree of dissaving among older persons, because these studies have not generally accounted for the decumulation of pension wealth associated with Social Security and private pension payments.

#### Permanent-Income Hypothesis

Friedman considered infinite-lived households and distinguished between a "normal" level of income that they expect over their lives, which he called permanent income, and (positive or negative) deviations from that level, which is termed transitory income. According to Friedman permanent consumption is the part of consumption that is planned and steady, meanwhile transitory consumption is unexpected or irregular spending such as unexpected medical bills or temporary college tuition expenses. He argues that permanent consumption will be proportional to permanent income. Households will plan to spend in an average period a fraction (equal to one or slightly less) of their average lifetime income.

Friedman presumed that both permanent and transitory consumption are independent of transitory income and that transitory consumption in any period is independent of permanent income. Thus, consumption consists of a planned part that depends on permanent income and an unplanned part that is totally independent of income. The focus of the

permanent-income model, then, is the estimation of the relationship between consumption and a measure of permanent income.

In terms of the modern consumption model, permanent income can be thought of as the size of a constant annual flow of income that would have the same present value as the (possibly uneven) flow of income that is actually expected. If we know the future income path, we can calculate permanent income from the budget constraint as

$$\sum_{t=0}^{\infty} \frac{Y^p}{(1+r)^t} = A_0 + \sum_{t=0}^{\infty} \frac{Y_t}{(1+r)^t},$$

where  $Y^p$  is permanent income. It can be shown that  $Y^p = r\Omega$ , where  $\Omega$  is the wealth measure from equation (2). This shows the close relationship between the life-cycle model, in which consumption is assumed to depend on wealth, and the permanent-income model, where consumption depends on permanent income. Early empirical estimation of the permanent-income model relied on the rather shaky assumption that future income could be predicted as a stable linear function of current and past incomes. Under this *adaptive-expectations model*, permanent income could be expressed as a linear function of current and past incomes. However, this model of expectations was often very inaccurate because it failed to distinguish between changes in income that people knew were permanent and those they knew were temporary.

### Relative-Income Hypothesis

The relative-income hypothesis, was put forth as one of the earliest attempts to reconcile these conflicting pieces of evidence about the consumption-income relationship was described by James Duesenberry (1949). The relative-income model was formulated in two variants: a cross-section version and a time-series version. These variants correspond to the cross-section and time-series aspects of the Kuznets paradox. In both variants, consumption depends on current income *relative* to some income standard that the household sets based on its own past income or on the income of other households around it. In the cross-section version, Duesenberry appealed to the idea of “keeping up with the Joneses.” He argued that a household’s consumption would depend not just on its own current level of income, but on its income relative to those in the subgroup of the population with which it identifies itself. The household will attempt to align its consumption expenditures with those of other members of its group. Thus, households with lower income within the group will consume a larger share of their income to “keep up,” while households with high incomes relative to the group will save more and consume less. This hypothesis gained support from the observation that families with the same income seemed to consume systematically different amounts depending on the group to which they belonged. For example, survey evidence indicated that a black family with a given income would usually consume less than a white family with the same income. The relative-income hypothesis attributes this to the difference in their *relative* income within their respective groups. Because average incomes among whites were higher, the white family was presumed to consume more relative to its income in order to try to attain parity with other white families, while the black family feels less of this pressure among the group of black families.

### Keynesian theory Of Savings and Consumption

Keynes treated consumption on a very “common sense” level. The fundamental psychological law states that men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in their income (Keynes, 1936). Keynes’s basic model of consumption was that current consumption expenditures are determined mainly by current disposable income. The Keynesian consumption function is usually written in linear form:  $C_t = a + bY_t$ . The coefficient  $b$ , which Keynes called the “marginal propensity to consume” or MPC and which we would define concisely as  $\partial C/\partial Y$ , was to vie for the title of “most estimated coefficient” for several decades. Initial linear econometric consumption functions estimated by ordinary least squares produced results that conformed to Keynes’s theory: consumption seemed to be closely related to current disposable income and the MPC seemed to be positive and less than one. However, Haavelmo used the consumption example prominently in pointing out the bias that is present in OLS estimation when the variable on the righthand side of the equation (income, in this case) is correlated with the error term. When the “Haavelmo problem” was accounted for, the corrected estimates of the MPC turned out to be considerably lower than OLS estimates. And once MPC ( $b$ ) is lower, marginal propensity to save, MPS ( $1-b$ ) is higher as the corresponding saving function derived from  $C_t = a + bY_t$  is  $S_t = -a + (1-b)Y_t$ .

### The Kuznets Theory

The theory was put forth by Simon Kuznets who refined national account measures of income and consumption and pointed out a paradox that could not be explained by the simple linear consumption function. The theory is therefore termed the *Kuznets paradox* and it was that the percentage of disposable income that is consumed is remarkably constant in the long run, which suggests a proportional consumption function, implying that the intercept term  $a$  is equal to zero. However, estimates across individual households or using short-run aggregate time-series fluctuations in income and consumption consistently produce estimates implying that  $a > 0$ , which means that the share of income consumed declines as income rises. Explaining the Kuznets paradox became a primary goal of consumption theorists in the 1950s.

## 2.2- EMPIRICAL REVIEW

Husain (1995) using the multiple regression method found that demographics did not influence the long-run saving rate in Pakistan for the period 1975 -1993. The author attributes this to the limited variability and change in the working age population ratio together with limited savings in the sampled period. However, Ahmad et al. (2006) found that both the young and old dependency ratios have a significant and negative effect on the household savings in Pakistan in the short run and long run periods. The authors employed the Johansen-Juselius multiple regression technique and error correction model using time-series data over the period 1972-2003.

Athukorala and Sen (2004) in their study of the determinants of private savings in India using data for the period of the study from 1954 – 1998 and employing error correction model estimation technique, the authors found a positive effect of inflation on savings confirming the argument that individuals save more in the face of increased uncertainty in the economic environment and that inflation led to a reduction in savings. Ahmad et al. (2006) found the impact of the real interest rate to be significantly positive on household saving in Pakistan but Nwachukwu and Egwaikhide (2007) found a negative relationship between the interest rate and savings in Nigeria. Also, Agrawal et al (2007) found mixed results in their study. They found that the real interest rate has a negative and significant coefficient for India and Pakistan; insignificant coefficient for Sri Lanka and positive and significant coefficients for Bangladesh and Nepal. Chaudhry et al (2010) found positive and significant impact of interest rate on savings in Pakistan.

Nwachukwu and Egwaikhide (2007) employed the error correction model to estimate the determinants of savings in Nigeria for the period 1970-2005. The authors used annual data and found that the inflation rate has a strong positive effect on the private saving rate. They equally report a positive effect of the real interest rate on the savings rate. Agrawal et al. (2007) conducted an empirical study in five South Asian countries by employing an error correction model and Dynamic OLS for the 1960-2005 period. The results of their findings revealed that income taken as real per capita income has a positive impact on savings for all the five countries including India, Pakistan, Sri Lanka, Nepal and Bangladesh. The results of granger causality test conducted in the same study reports a uni-directional causality from income to saving.

Nwachukwu and Odigie (2009), employed an Error Correction Model to examine the effects of financial development on savings mobilization in Nigeria. The results reveal that there is no long-run equilibrium relationship between financial depth and domestic resource mobilization. They however noticed that the level of income is very crucial factor in determining savings. Chaudhry, Faridi, Abbas, and Bashir (2010) investigated the determinants of national savings of Pakistan in the long run as well as in the short run using time series annual data from 1972 to 2008. Utilizing Johansen multiple regression and the Vector Error Correction Model, it was observed that inflation has a positive and significant impact on national savings in Pakistan in the long run.

Kibet et al (2009) have also examined the determinants of household savings in rural areas in Kenya. The authors ran an Ordinary Least Square (OLS) estimation and found that an increase in the dependency ratio has a negative effect on the level of saving by the individual household. When the data was disaggregated into smallholder farmers, entrepreneurs and teachers the result did not change. In Ghana, Issahaku (2011) did a study on the determinants of savings and investment in deprived districts and found a negative and significant impact of dependency ratio on savings. The estimation was that a unit increase in the dependency ratio would reduce saving by GH¢ 0.508. Another factor, which influences savings, is inflation; although one cannot a priori determine the effect of inflation on savings. This is because in an era where inflation creates uncertainty about future asset values and future real incomes, savings would be encouraged (Ahmad et al., 2006). Also, inflation can lower savings when income is negatively affected. Another reason why inflation's impact on savings cannot be determined a priori is its reduction effect on real interest rate (Agrawal et al 2007). Some empirical studies confirm the argument that the effect of inflation cannot be determined a priori.

Taking a case of Cameroon with low saving rate of just 13.4% as of 2020 despite the important of saving as a financial resource to be mobilized for investment. Yet less attention has been paid on the determinants of savings in in Cameroon. This study takes as a challenge to fill the gap in literature.

## 3- METHODOLOGY

### Data Collection Procedure

The study will make use of time series data spanning from 1985 to 2020. The data shall be collected mainly from world development indicator- WDI (2020), and National Institute of Statistics (NIS, 2021) in Yaounde

### Model of the household savings

The analytical framework for assessing the role of various determinants of domestic saving in Cameroon is mainly based on life cycle hypothesis of saving (LCH) propounded by Modigliani and Brumberg (2005) and Modigliani and Ando (1963) In the present study, the econometric model used for our empirical analysis is derived from LCH, which is also augmented by certain improvements and extensions taking into account recent developments in consumption theory and structural aspects prevailing in a developing country like India. The LCH assumes that a representative individual maximizes her utility from life-time consumption, and savings are residuals reflecting differences between individual income and consumption. Following Modigliani (1992), we may conceive an individual beginning with negative savings at a young age, accumulating savings during working age, and finally returning to dissaving as she retires. The LCH also implies that consumption smoothing leads to a humped-shape age path of wealth holding. The saving function derived from the life-cycle model of Modigliani and Brumberg (1963) permitted us to identify a good number of factors

influencing savings of an individual such as; current income of the individual, current individual consumption, lifespan of economic significance, age of the individual, remaining lifespan at age, is earning span of the individual, expected income of the individual, and, initial assets possessed by an individual.

According to the theory, current savings of an individual are a linear and homogeneous function of current income, expected average income, and initial assets, with coefficients depending on the demographic profile of the individual. In the empirical literature on the analysis of determinants of saving, this analytical concept permits us to extend from individual perspective to the saving function for entire economy by aggregating the saving behavior of each of the individuals in the economy.

To empirically model the determinants of household savings in Cameroon, the following functional model is used

$$SAV_t = F(IR_t, GDP_t, INFL_t, Z_t) \quad (1)$$

Where:

$SAV_t$  is Savings taken as the saving ratio to GDP (Saving ratio)

$IR_t$  is interest rate

$GDP_t$  is income level

$INFL_t$  is the rate of Inflation

$Z_t$  is the set of controlled variables

### Specification of the Model of the performance of commercial bank

Multiple regression analysis model used in modeling the major determinants of Savings is as specified below:

$$SAV_t = a_0 + a_1 IR_t + a_2 GDP_t + a_4 INFL_t + a_5 CFD_t + a_6 DEM_t + a_7 WH_t + e_t \quad (2)$$

Where;

$SAV_t$  is Savings taken as the saving ratio to GDP (Saving ratio)

$IR_t$  is the real Interest rates

$GR_t$  is the Income levels proxy in terms of annual growth rate of real GDP

$INFL_t$  is the rate of Inflation captured in terms of consumer price index (base year 2010).

$CFD_t$  is Confidence with the financial sector taken as volume of liquid asset ratio of commercial banks

$DEM_t$  is Demographics factor or Age distribution measured in terms of the proportion of adult to total population

$WH_t$  is the Stock of Wealth captured using broad money supply to GDP ratio

$e_t$  is the error term

### Description of variables

#### Dependent variable

##### Savings ( $SAV_t$ )

Household saving is defined as income that is not consumed. Savings can be kept in cash form, saved in a bank account or saved in long-term assets, such as government bonds. There are two ways of measuring saving levels: Total (gross) saving levels, and Saving ratio which is the percentage of income that is saved.

#### Independent variable

##### Interest rates ( $IR_t$ )

Higher interest rates mean that households will gain a higher rate of return on depositing savings in a bank. Evidence shows that higher interest rates encourage saving. Also, there is an income and substitution effect. Higher interest rates make saving more attractive than consumption, but on the other hand, there is an income effect – if interest rates rise, then a saver can get their target interest payments with a lower level of savings. Also, another issue is the inflation rate. If interest rates are 15%, but inflation is 16%, then saving money in a bank gives a negative interest rate and there is less incentive to save. If interest rates are 3%, but inflation 0%, then there is a positive real interest rate of 3%. Real interest rate is therefore expected to have a positive relationship with household savings in Cameroon.

##### Income levels ( $GR_t$ )

Rising income levels will lead to a rise in total saving levels. As households gain more disposable income and have the ability to save more. However, periods of economic growth can also create optimism and confidence amongst consumers and encourage a relatively higher percentage of consumption. When households expect rising incomes, then they are more likely to borrow to finance luxury goods and cut back on spending. Income levels is measured in this study in terms of annual growth rate of real gross domestic product (Economic growth-  $GR_t$ ) and the variable is expected to have a positive nexus with household savings using Cameroon time series data as in Waithima (2008).

##### Rate of Inflation ( $INFL_t$ )

Inflation can have an effect on saving. If there is high inflation and if inflation is higher than interest rates, then this will discourage saving. Households may look to either spend money before it falls in value or buy assets which hold their value during inflation. However, in the 1990s, inflation increased, yet the Cameroon saving ratio rose. This is partly a

reflection that towards the end of the 1990s, interest rates were increased to maintain a positive real interest rate. Also high inflation can create uncertainty and confusion and discourage consumers from taking risks such as taking out a loan. Inflation can be the uncertainty which encourages greater saving so long as there are worthwhile places to save the money. Rate of inflation is captured in this study in terms of consumer price index with 2010 taken as the base year and the variable is expected to have a negative effect on household savings and greater proportion of household income is likely to be absorbed by inflation.

### Controlled variables

#### Stock of Wealth ( $WH_t$ )

In a period of rising asset prices, households may feel less necessity to save. For example, a rise in house prices leads to an increase in wealth, that homeowners can access through mortgage equity withdrawal. In the 1980s and early 2000s, there was a significant rise in house prices which increased the wealth of homeowners – this gives households more confidence to reduce saving levels. Stock of wealth is measured in this study in terms of broad money supply to GDP ratio and is expected to have a negative effect on the level of household savings. is captured in this study in terms of consumer price index with 2010 taken as the base year

#### Confidence with the financial system ( $CFD_t$ )

Confidence and expectations of the future have a large bearing on saving. If households are optimistic about the future, they are more willing to borrow and run down savings. But, if confidence is low, then it is an incentive to save for unexpected problems. Factors that will influence economic confidence are closely related to the current economic climate, like the rate of economic growth, unemployment levels, house prices. Experience has shown that, as people become more knowledgeable about the banking services, they develop confidence in banks. The result of which is an increase savings. Bank liquidity is used measure public confidence in the bank. Customer's confidence in banks is proxied by the volume of liquid asset ratio of commercial banks and expected to vary directly with the household savings.

#### Demographics factor or Age distribution ( $DEM_t$ )

Life cycle theories of consumption argue that individuals try to smooth consumption over a lifetime. During a person's student years, they will typically borrow (student loans), then in their 40s and 50s, with high income, they will save. Then during retirement, they will run down their savings. An ageing population can lead to a fall in the saving ratio. However, there is no guarantee that retired people will run down savings. They may wish to pass savings on to their children or feel they will live a very long time. Demographic factor is measured in terms of the proportion of adult to total population and the variable is expected to have a positive effect on household savings since at old age, dissaving is more common while saving is done at the adult age.

### Estimation procedure

Multivariate regression analysis is employed for testing of hypothesis about the relation between a dependent variable, household savings and two or more independent variables. Multiple regression analysis is a powerful technique used for predicting the unknown value of dependent variable from the known value of several predictors, or independent variables. Multiple regression analysis is used when one is interested in predicting a continuous dependent variable from a number of independent variables.

Estimation of the Parameters of multiple regression is done using Ordinary least square in this study as the method is considered as the most popular among all unbiased linear estimators. OLS is a BLUE, that is, best (efficient with small variance and smaller confidence interval) linear unbiased (as  $E(\beta)=\beta$ ) estimator, consistent and asymptotically unbiased in estimating the parameters of the regression.

Estimating the parameters of Multiple regression using Ordinary least square technique assumes that the relationship between the dependent variable and independents variables is linear. Another important assumption is non-existence of multicollinearity- the independent variables are not related among themselves. At a very basic level, this can be tested by computing the correlation coefficient matrix between each pair of independent variables. Equally, the procedure presupposed that the errors term,  $\varepsilon_i$ , are independent or uncorrelated, again that the errors term at each value of the predictor, are normally distributed, and finally that the error terms at each value of the predictor have equal variances. In other words, the method of OLS are based on the assumption of linearity, homoscedasticity, normality, absent of multicollinearity and autocorrelations.

The estimates of the  $\beta$  coefficients are the values that minimize the sum of squared errors for the sample. OLS method of estimating the Parameters  $\beta_0$  and  $\beta_1$  consists of minimizing  $\sum \hat{\varepsilon}_i^2$  and then taking partial derivative with respect to the various parameters of the model ( $\beta_s$ ) and equating to zero in order to derive the various normal equations. From then, the variance and standard error of parameters are calculated used in obtaining the respective t-value. The t- values are used in testing the significants of varions independent variables in the regression model.

To measures of model adequacy or test of goodness of fit, coefficient of determination ( $R^2$ ) is used. Coefficient of determination ( $R^2$  adjusted =  $(1 - R^2) \frac{n-1}{n-k}$ ) examines the proportion of total variation in dependent variable explained by independent variables. that is, the amount of variability in the data accounted for by the regression model. ANOVA (Analyse of Variance) is used for Fischer (F) test, and the test is used to investigate the overall significance of the model. The regression is globally significant when  $F_{cal} > F_{crit}$  as alternative hypothesis would be accepted. In this case, p-value is less than 0.05.

### Post estimation testing procedure

To ascertain that the regressions are in the correct functional form, a good number of post estimation tests are applied. in this study, three main tests shall be applied, based on the nature of the data collected and equally on the choice of the empirical analysis used in this research. That is, the Breusch-Godfrey Serial Correlation LM Test for serial correlation of successive error terms, the ARCH (Auto-regressive Conditional Heteroscedasticity) test for heteroscedasticity and the Jarque-Bera test for normality of errors. The tests are briefly explained as follows:

## 4- PRESENTATION AND DISCUSSION OF THE RESULTS

### 4.1- PRESENTATION OF THE RESULTS

#### Descriptive Analysis

Before getting into the data analysis of the study, a prior statistical analysis relative to the sample of study needs be effectuated. Table 4.1 bellow, shows the descriptive statistics relative to the variables used for the sample used.

**Table 1: Summary of Descriptive Statistics of Variables**

	N	Minimum	Maximum	Mean	Std. Deviation
Real interest rate	40	2.450	8.450	5.326	1.903
GDP growth rate	40	-7.932	17.083	3.244	4.653
Gross saving ratio	40	5.227	24.784	17.567	3.730
Adult to pop ratio	40	50.075	54.640	51.898	1.462
Broad money to GDP	40	11.051	23.666	18.037	3.718
inflation rate	40	19.671	115.808	71.057	29.884
Bank liqto assets ratio	40	14.992	45.454	28.702	7.783
Valid N (listwise)	40				

*Source: Author computation using data from WDI (2020)*

From the above, the scale of the Gross domestic savings (GDS) was very large compared to the other variables hence there was the need of logging the variable so as to reduce the scale. Therefore, the variable save was logged before running regression of our study so as to reduce the scale effect of the variable.

#### Trend Analysis

The evolution of the seven variables used in this research report from 1979 to 2020 as per World Development indicator data base are summarized as follows:

#### Evolution of Gross saving to GDP ratio in Cameroon (1979 – 2018)

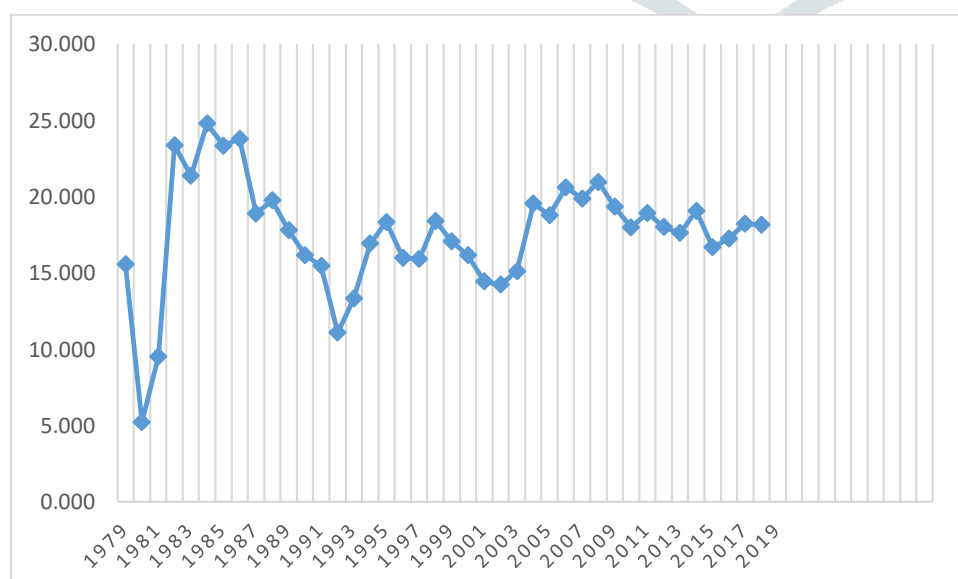


Figure 1: Trend analysis for saving as a percentage GDP

Source: Author computation

Figure 1. indicates that gross saving as a percentage of GDP rises sharply from 1980 to 1985 from where it falls up to 1993. By 1995, the saving to GDP ratio regain an upward trend. The frequent fluctuations witnessed in the last decade is accounted for by changes in economic activities, interest and other macroeconomic variables which are going to be discover in the due course of this study.

**Evolution of GDP growth rate in Cameroon (1979 – 2018)**

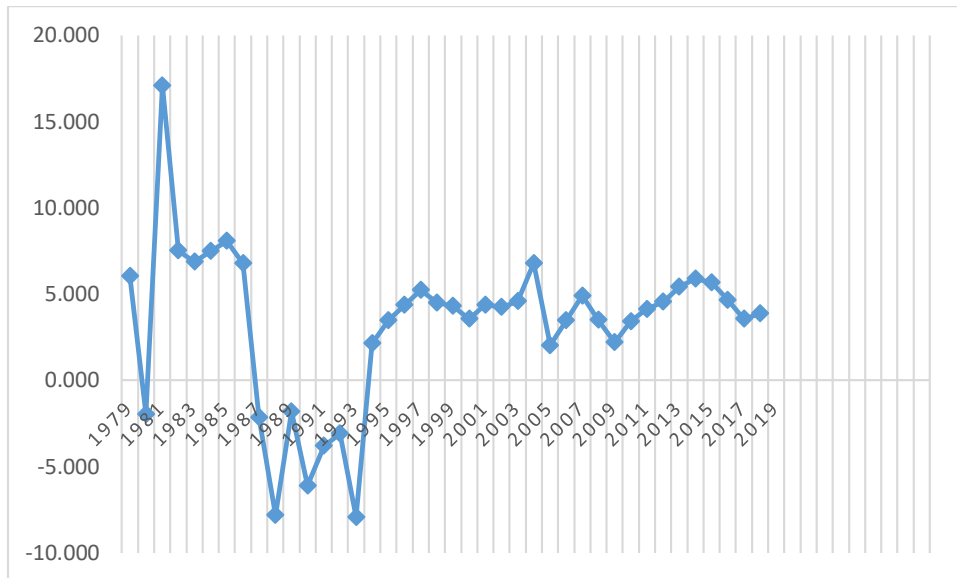


Figure 2: Trend analysis for annual growth rate of real GDP

Source: Author computation

The trend of annual percentage growth in GDP of Cameroon is presented on Figure 2 shows that the variable witnessed a constant growth rate from 1979 to around 1983, after which there was a drastic fall from 1983 to 1994. This could be due to the various economic and institutional changes which took place during these periods such as the oil price crisis and the adjustments to the newly introduce structural adjustment program (SAP) by the IMF. By 1995, the GDP regain an upward trend. The uprising of the GDP after 1994 could be attributed to the devaluation of 1994, which however encouraged international trade and economic activities that improved the Cameroon’s economy and thus helped to restore its growth rate. frequent fluctuations can be to the fluctuations in the prices of agricultural products in the world market, and advent of political crisis in different part of the country coupled with institutional problems.

**Evolution of inflation rate in Cameroon (1979 – 2018)**

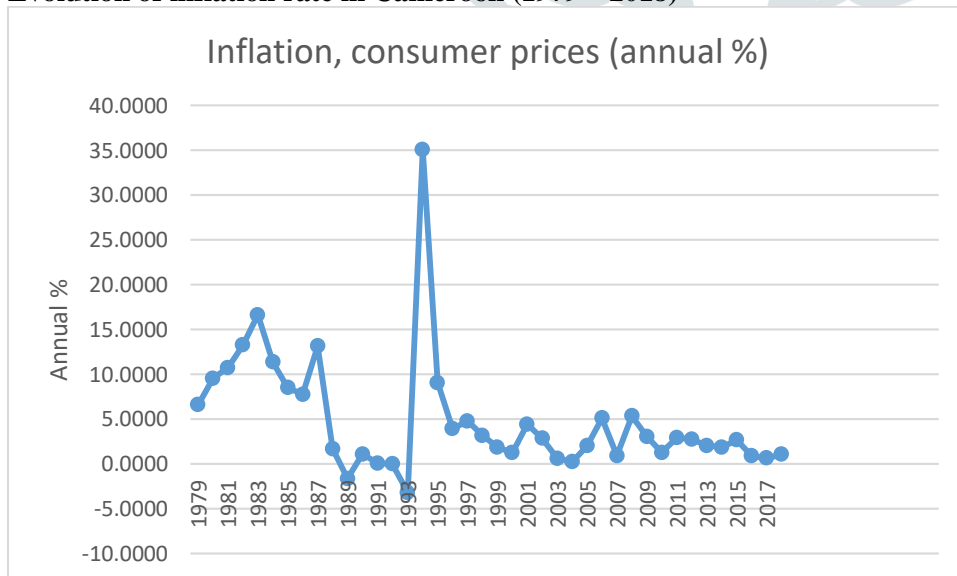


Figure 3: Trend analysis for inflation rate (consumer prices- annual %)

Source: Author computation

Figure 3 provide the graphical evolution of inflation in Cameroon from 1979 to 2018. The inflation rate is captured in this study by the annual growth rate of Consumer Price Index (CPI). The inflationary trend indicates a slide increase inflation



rate from 1979 to 1983 and a slow constant decrease in inflation rate from 1983 to 1987. Shortly after that, the inflation rate fell from 1987 to 1993. It then increased sharply to 1995, fell faster in 1996 and from then it experienced a slide increase in 2009 which coincide with to the peak of the global financial crisis. From there it dropped slightly to 2010 and became constant from 2011 to 2013 and a slide fall to 2015 where it became almost constant from 2015 till 2018. This dynamic nature of the inflationary trend in Cameroon can be justified by the various economic happenings in Cameroon over the period of study. The economic boom of 1980s, the economic crisis of 1990s justified the level of Cameroon at each level.

**Evolution of real interest rate in Cameroon (1979 – 2018)**

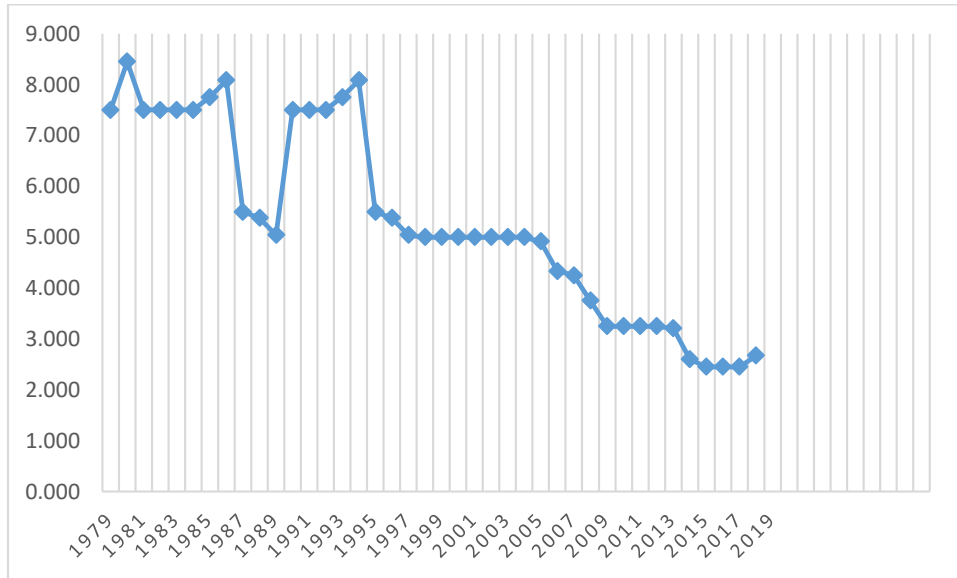


Figure 4: Trend analysis for Real Interest Rate

Source: Author computation

Figure: 4 shows the evolution of real interest rate in Cameroon from 1979 to 2018. The graph shows a stochastic fluctuation in the interest rate to reflect the different economic situations the country went through. From 1980 to 1984 the interest rate increased. It dropped continuously to 1986 and again increased to 1987. After 1987 it reduced drastically to 1989 and fluctuated till 1993. This period coincides with the economic crisis from 1986 to 1993. From 1993 to 1994, the interest rate increased drastically probably to offset the high level of inflation the country was experiencing at that time. Again from 1994 to 1996 it dropped drastically and fluctuated till 2018

**Correlation Analysis**

To have a previewed knowledge of the relationship between the variables, we constructed the correlation metric to show a preview of the trend of the relationship between the variables used. The results of the correlation metric are therefore presented on

Table 2 below.

Table 2 **Correlation Matrix**

	Real interest rate	GDP growth rate	Gross saving ratio	Adult to pop ratio	Broad money to GDP	inflation rate	Bank liq to assets ratio
Real interest rate	1.000						
GDP growth rate	.132	1.000					
Gross saving ratio	-.169	.220	1.000				
Adult to pop ratio	-.631	.345	.081	1.000			
Broad money to GDP	.179	.123	.125	.111	1.000		
inflation rate	-.513	.118	.141	.634	-.279	1.000	
Bank liq to assets ratio	-.104	-.068	.459	-.037	.019	.043	1.000

The correlation results presented in Table above, show that there exist both positive and negative relationships between the variables included in the study. This table shows both the relationship between the independent and the dependent variables and between the independent and independent variables. The correlation results could also be used as a prelude to investigate the presence of multicollinearity within the independent variables if the correlation coefficient is as large as 0.7 or more. it implies that there exists a weak correlation between the pair of variables and if the correlation coefficient is more than 0.7, it implies that there exists a strong correlation between the pair of variables.

## REGRESSION ANALYSIS

The strength of multiple regression model of household savings in Cameroon was tested using Analysis of Variance (ANOVA) which summarizes the relationship between regression mean square and error mean square given F-statistical value of 3.265 with the p-value of 0.012 indicating the that the model is reported to very significant at 95% confidence level and 5% significant level. This implies that the model is significant in explaining the relationship between the correlates of household savings. Therefore, the model is globally significant. permit us to proceed with presentation of the regression results.

Table 3 **Regression coefficients**

Model	Coefficients	Std. Error	t	Sig.
(Constant)	100.008	48.263	1.494	0.145
Real interest rate	0.092	0.061	2.072	0.046
GDP growth rate	0.294	0.127	2.308	0.027
inflation rate	-0.190	0.803	-0.836	0.415
Adult to pop ratio	1.953	0.981	1.990	0.055
Broad money to GDP	0.380	0.196	1.943	0.061
Bank liqto assets ratio	0.195	0.069	2.819	0.008
<b>F-statistics (6,33)</b>	<b>3.265</b>			<b>0.012<sup>b</sup></b>
<b>Adjusted R Square</b>	<b>0.791</b>			
<b>Std. Error of the Estimate</b>	<b>1.2122888</b>			

The general result of household saving model indicates that all the exogenous variables included in the model capable of explaining over 79 percent of the variations in household saving as shown by the adequacy test measured using R square ajusted in the above table. The results indicate that the model is satisfactorily adequate.

The coefficients of all the independent variables displayed the expected signs in the regression. The relationship between interest rate and household savings is positive and significant at five percent. The relation between GDP growth and household saving was also positive and equally significant at five percent. The results report a negative relationship between savings and the rate of inflation which was not significant. broad money supply was found to be positively and significantly related with household savings. Age composition taken as percentage of adult to total population has a positive but not very significant relationship with household savings in the study. Further analysis was done using causality testing procedure.

## CAUSALITY ANALYSIS

Causality analysis was done by making use of the Engle and Granger causality test. The results of test consists of rejecting the null ( Ho) hypothesis of no causality when the probability of the F-Statistics is less than 10 percent. The results of this test is presented in Table (6)

Table 6 **Results of short run causality test**

Null Hypothesis:	Obs	F-Statistic	Probability	Decision
LogSAV does not Granger Cause LogGR	40	0.3180	0.0218	Reject Ho
LogGR does not Granger Cause LogSAV		1.1340	0.01174	Reject Ho
LogSAV does not Granger Cause IR	40	0.4196	0.3122	Accept Ho
IR does not Granger Cause LogSAV		9.4014	0.0211	Reject Ho
LogSAV does not Granger Cause LogINFL	40	3.5143	0.0319	Reject Ho
LogINFL does not Granger Cause LogSAV		0.1812	0.1104	Accept Ho

*Source: Authors calculations*

The results of short run causality in Table (6) report the existence of bidirectional causality between Household savings and level of economic growth as the null hypothesis of no causality is rejected in both directions. One-way causality is noticed to run from interest rate to Household savings but not the other way round as null hypothesis of no causality is

accepted. Another unilateral causality witnessed flow from Household savings to inflation rate as the null hypothesis of no causality is rejected with probability of 0.00281 which is less than the significance levels of 0.05.

### Post Test Estimations

Three major diagnostic Test were conducted of the residual of the regression model to ascertain that the model is in the correct functional form. This include the test for normality, heteroscedasticity and that for autocorrelation of the residual term.

**Table 7: post estimation diagnosis test on the residual**

Residual Diagnoses tests	Statistics	Probability
Jacque- Bera for Residual Normality	4.32004	0.12034
Breusch-Pagan-Godfrey Heteroscedasticity	0.80172	0.3799
Breusch-Godfrey Serial Correlation LM Test	2.433719	0.1496

Source: by author using Eviews 9

Normality test is used to determine whether a data is well-modeled by a normal distribution or not was tested using Jarque-Bera statistics to check if the estimated error terms follow a normal distribution. As a rule of thumb, since it is insignificant, the regression analysis is normally distributed.

The second post estimation test worth investigating was test for heteroscedasticity. If there heteroscedasticity, it means that inferences from the standard errors are likely to be misleading. The result is robust only when the error term exhibit the features of Homoscedastic indicating that the variances of the error term are constant over the observations. The study used the Breusch-Panga test to determine presence of heteroscedasticity and because the p-value is high, the test is statistically insignificant at 5% indicating the absent of heteroscedasticity problem

The third test conducted in this regards was that of Serial correlation used to verify whether the values of the error term are the correlated over the period of study. If this happens, it means that the variance of the error terms is correlated and as such the inferences from the standard errors are likely to be misleading. Here the null hypothesis is not rejected meaning that there is the absence of serial correlation and the probability value of F- test shows that it is statistically insignificant at 5% level of significant meaning that the values of the error terms are not correlated over the period of the study.

## 4.2 DISCUSSION OF THE FINDINGS

The results of the study have permitted us to test the three hypotheses derived in chapter one to guide this research work. Firstly, results from the data analysis reveal that there is positive and significant relationship between interest rate and household savings in Cameroon. This is in like with the results of Issahaku, (2011) who equally found that household are motivated to save more when real interest is higher than otherwise. The study found that interest rate shocks had a significant positive impact on gross savings with the economic theory. The life cycle hypothesis of saving (LCH) propounded by Modigliani and Brumberg (2005) and Modigliani and Ando (1963) equally supported this view.

With reference on the second hypothesis on the relation between GDP growth and household saving, the results of this research equally found that there exist a positive and significant relationship between the two variables and this result was inline with the one of Waithima, (2008). This is because rising income levels would enable households gain more disposable income and have the ability to save more. From the result of regression analysis and Engle/ Granger causality, the relationship between savings and the rate of inflation was negative as hypothesized but not very significant. The results of the finding reveal that households tend to spend greater proportion of their income or money before it value falls or they acquire assets which hold their value during inflation. All this because high inflation always creates uncertainty and confusion and discourage consumers from taking risks such as taking out a loan.

Other important determinants of saving according to the time series data for Cameroon are broad money supply as well as the liquidity to asset ratio of banking used in this study to capture confidence in the bank. Specifically, the results reveal that there is a positive and significant effect of broad money used in this study to capture the stock of wealth on household savings. Also, liquid asset ratio indicates that there is significant positive effect of household savings.

Age structure of the population described as demographics factor which we use the proportion of adult to total population also indicate a positive but not very significant relationship with household savings in Cameroon. This is logical as it is generally noted that at old age, dissaving is more common while saving is done at the adult age.

Finally, the results are globally significant with a significant fisher value. Meaning that these results are consistent and confirm by the post- test estimations, which confirm that, the model does not suffer from any econometrics problems. Hence, the results can be use for policy recommendation

## 5.1- CONCLUSION

The main purpose of economic policy is to step up the level of savings which can then be mobilised for economic growth to be realised. This study had as objective to model the determinants of household savings in Cameroon. The study uses mainly time series data 1979 to 2018 from the World Bank database and applied multiple regression model together with Engle and Granger causality analysis to find out that: Household saving regression model is highly significant and adequate. Equally that, The relationship between interest rate and household savings is positive and significant at five percent. The relation between GDP growth was also positive and equally significant at five percent. The results report a negative relationship between savings and the rate of inflation which was not significant. Indicating that

the three hypotheses which were set initially to guide this study are attained except for inflation rate that the relation was negative as expected but not very significant.

## 5.2- RECOMMENDATIONS

Based on the major findings highlighted above, the following recommendations are suggested;

- Policy makers in Cameroon could encourage household saving by increasing the interest so as to make savings more attractive.
- Equally by stimulating the level of economic activities with the aim of creating more income generating activities and,
- Finally, by combating inflation in the economy using appropriate deflationary policy even though with cautions of its attendant ills.

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