

## **Determinants of Savings : An Empirical Evidence from African Countries, 1990-1999**

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**Abstract** :This study examined from an empirical point of view the response of domestic savings in a set of African countries to per capita income, commercial banks' interest rate, and the age dependency ratio. For this purpose ordinary least squares technique is applied to a cross-section data on domestic savings, income, commercial banks' interest rate, and age dependency ratio taken from African countries for the period (1990-1999). The results suggest that African savings are elastic to income only.

**Key Words** : Determinants, Savings, Empirical, AfricanCountries.

### **1. Introduction**

Conventional economic theory suggests that the mobilisation of domestic and foreign savings is important for accelerating economic growth. The problem of this study is to answer the question that, how to mobilize the African savings, and its importance appear from the importance of savings for investment and economic growth. Many economists regarded income, the rate of interest, and the age dependency ratio as important determinates of savings. Almost all economists, notably Burrows and Theodor (1974), Samuelson (1976), Leavačić (1976), Noel (1980), and Harvey (1977, 1985), seem to have believed that there exists a positive relationship between savings and income level. Some controversy, however, has surrounded the effect of the rate of interest on savings. While some economists suggest a positive relationship between savings and the deposit rate of interest, others reject this thesis at both the theoretical and empirical levels. Also it is believed that since older people as well as children are usually classified as non-productive members of the society, the increase in their numbers relative to the productive members of the society, a ratio which is referred to as the age dependency ratio, will more likely lead to a reduction in savings.

This paper is an attempt to examine from an empirical point of view the determinants of savings in Africa. For this purpose, Ordinary Least Squares regression technique is applied to a cross-section data taken for the period (1990-1999) to estimate a relationship between savings on the one hand and its hypothesized determinants, namely income, commercial banks deposit rate, and the age dependency ratio, on the other hand for a set of African countries. The results reveal that, over this period of time, African domestic savings are elastic only to income.

The rest of this paper is organized as follows. Section (2) reviews the literature, while section (3) outlines the empirical model, data and methodology. Section (4) reports the empirical results while section (5) provides some concluding remarks.

## **2. Literature review :**

The importance of savings for investment and economic growth has received a considerable attention in growth theory . According to Todaro (1977) one of the principal ‘tricks’ of development necessary for any take-off is the mobilisation of domestic and foreign savings in order to generate sufficient investment to accelerate economic growth. This thesis is captured by different growth models . Every economy must save a certain proportion of its national income if only to replace worn out or impaired capital goods.

Thus, according to the famous Harrod–Domar equation the rate of growth of GNP is determined jointly by the national saving ratio, and the national capital output ratio. More specifically, the growth rate of national income is positively related to the savings ratio and inversely related to the economy’s capital output ratio. The economic logic of this thesis is that in order to grow, economies must save and invest a certain proportion of their GNP. The more they can save, and therefore invest, the faster they can grow. The actual rate at which they can grow for any level of saving and investment depends on how productive that investment is. The ‘Tricks’ of economic growth and development, therefore, are simply a matter of increasing savings and investment. According to this theory the main obstacle to development was the relatively low level of new capital formation or investment in most poor countries. If a country wanted to grow and if it could not generate savings and investment, then it could seek to fill this ‘savings gap’ either through foreign aid or private foreign investment.

The neoclassical growth models such as that of Solow (1956) suggest that an increase in the savings rate generates higher growth only in the short-run, during the transition between steady-states. The long-run equilibrium rate of growth is exclusively a function of technical progress and growth of labor force, both assumed to be exogenous. An important implication of the neoclassical economic growth theory is that changes in savings rates affect the level of output and not the long-run growth rate. An increase in savings increases the ratio of capital stock to the given labour supply and initially raises the growth rate of output per-capita (Bijan, 1999).

“From macroeconomic theory perspective, if we assume a full employment economy, any amount of personal saving, *ceteris paribus* creates a gap in aggregate demand. This gap, unless met with an equal amount of real investment demand, will result in unemployment and could start a down ward chain reactions that lead to recessions. However, given the volatility of investment,

there is always a mismatch between aggregate savings and aggregate investment in the market economies of the real world. This is the fundamental source of disequilibrium and trade cycles in the capitalist economy, and also the target of most of the macroeconomic policies. Thus, in a full employment capitalist economy, personal saving, taken on its own, is always problematic as Keynes, J.M., has shown. Furthermore, there is no necessary theoretical relationship between real investment and personal domestic savings. What is needed is surplus income, but this surplus needn't be saved by individuals before it is used to finance real investment.” (Braima 1995).

According to Burrows and Theodor (1974), “Consumers can allocate their disposable income to expenditure on goods and services or to savings”. The simplest form of the hypothesis is that the level of consumption planned by consumers depends on the level of their disposable income. The level of consumption and saving planned by consumers must add up to the level of income. Consequently, if consumption varies with the level of income, so must saving. Accordingly, the savings function takes the form:

$$S = S(y), \quad 0 < S'(y) < 1$$

Samuelson (1976) argued that “An individual may wish to save for a great variety of reasons: to provide for his old age or for a future expenditure ... thrift may simply be a habit”. He also argued that “An important use of after-tax income is saving for the future rather than consuming now ... it is a matter of common observation that rich men save more than poor men, not only in absolute amounts but also in percentage amounts. The very poor are unable to save at all. Instead they ‘dissave’.... Thus, income is a prime determinant of saving”. A similar argument was advanced by Leavačić (1976), Noel (1980) and Harvey (1977, 1985).

In addition to income, savings are also positively related to the interest rate (Burrows and Theodor, 1974). Along the same lines, Todaro (1977) argued that “Monetary savings can simply be stored for future use, but in most cases their ‘real’ value will probably decline due to inflation. Alternatively, savings can be deposited in a bank to earn interest, so that their real value may increase to the extent that the interest rate paid by the bank exceeds the rate of inflation”. In contrast, Leavačić (1976) argued that the rate of interest is not an important determinant of savings.

According to Harvey (1977, 1985) the standard macroeconomics theory for industrial countries assumed that investment and demand for money vary inversely with interest rate. However, this theory is irrelevant for Africa, because there are insignificant bond markets, and the money supply is uncontrolled by the central bank.

Dornbusch and Fisher (1978) argue that “The life-cycle theory points to a number of unexpected factors affecting the savings rate of the economy; for instance, the age structure of the population is, in principle, an important determinant of consumption and saving behavior”. They argue that people will save while working, and then dissave to finance spending in their retirement. If population and (GNP) were constant through time, each individual would go through the life cycle of saving and dissaving. At any time, in equilibrium, savings of working people would be exactly matched by the dissaving of retired people. However if population is growing there would be more young people than old. In that case, there would result more saving in total than dissaving and there would be net savings in the economy.

Todaro (1977) argued that “A Major implication of the high LDCs birth rates is that the proportion of children under the age of 15 is almost half of the total population while in the developed countries the ratio is approximately quarter of the total population. On the other hand the proportion of the older people over the age of 65 is much greater in the developed nations. Older people as well as children are often referred to as economic dependency burden in the sense that they are non-productive members of the society”.

“Almost all economists seem to have believed that the rate of population growth reduced the rate of income growth per head, and that it was a threat to there being any growth at all, at least in the most densely populated countries. That it was supposed to be such a threat is a little surprising in view of the fact that it was wrongly thought that the average rate of growth in the densely populated countries was quite low... population growth would reduce the growth rate of income itself, for two reasons. First, the faster the population grows the higher is the dependency ratio, which, it was argued, would reduce savings. Second, growing numbers imply a diversion of investment to education, housing, and urban construction, and these forms of investment are supposedly less productive”. (Little 1982).

At the empirical level, Surjeit (1977) examined the effect of income sources and investment opportunities on the saving behavior of farm households in India by relating savings to the agricultural and non-agricultural components of income. He observed that the “marginal propensity to save out of non-agricultural incomes was higher than that of saving out of agricultural income. This is due to the fact that farm household income in India is a larger transitory component of income. On the relationship between saving and investment opportunities the empirical results indicated that *ceteris paribus*, investment opportunities increase savings, for the subsistence group of households, while they have a negative effect on savings of the non-subsistence group”.

Using an aggregate saving equation of the Keynesian type as used by Fry (1978), Giovannini (1983) estimated the interest elasticity of saving using cross-section data for Burma, India, Korea,

Malaysia, Philippines, Singapore, and Taiwan, over different periods of time. His results suggest that “there exists evidence against the hypothesis that savings respond positively to the rate of interest in LDCs”.

Mejía and Ortega (1998) examined the determinants of private savings in Colombia with a view to explain the decline of the private saving rate in the 1990s, the consumption boom, corporate behavior, and tax increase. Their results revealed “that the recent decline of private saving was not associated with the significant increases in the share of private consumption in GNP. The empirical evidence indicated that permanent income is the only variable capturing the "euphoria" factor attributed to the structural reforms undertaken during the 1990s and that total private saving is not determined by corporate behavior. Furthermore, tax increase can not entirely explain the recent collapse of the private saving rate”.

Brooks (2003) used a multi regional over-lapping generation model with perfect capital mobility to simulate the general equilibrium effects of projected population trends on international capital flows. He found that the “retirement saving by aging baby boomers will raise the supply of capital substantially above investment in both European union and North America... Africa will remain dependent on foreign capital for the foreseeable future because of continued high population growth”.

Using Granger-Causality test, Emmanuel and Ahmad (2001) examined the causality between economic growth and the growth rate of domestic savings for Congo, Côte d'Ivoire, Ghana, Nigeria, Kenya, South Africa, and Zambia. The empirical results indicate that for Ghana, Kenya, Nigeria and Zambia, economic growth Granger causes growth of domestic saving. This result is consistent with the results found by Abdalla (2002) for the case of Sudan (1971-1994), Kher Allah (2002) for the case of Tanzania (1973-1994) and Awad Allah (2002) for the case of Kenya (1972-1995). For the case of Congo, the result indicated that growth of domestic savings Granger causes economic growth. For the case of South Africa and Côte d'Ivoire, the results revealed the existence of two way causality. This is consistent with the results reported by Omer (2002) for the case of Nigeria (1973-1994), and Abu Baker (2002) for the case of South Africa (1973-1995).

As noted earlier, the purpose of this paper is to examine from an empirical point of view the determinants of savings for a set of African countries (as listed in Table A.1 of the appendices). For this purpose, the next section outlines the empirical model and the methodology adopted in the analysis.

### **3. The Empirical Model and Methodology :**

Based on the literature reviewed in the previous section, it may be argued that saving is a function of income, commercial banks deposit rate, and the age dependency ratio. Thus the savings function may be written in the general form given by:

$$S = S(y, r, D) \quad S_1, S_2 > 0, S_3 < 0 \quad (1)$$

Where :

S : gross domestic savings.

y : real per capita gross domestic product.

r : commercial banks' deposit rate.

D : age dependency ratio.

Based on economic theory, this model suggests that gross domestic savings is positively related to income (real per capita GDP) and commercial banks' deposit rate, and negatively related to the age dependency ratio.

Having specified the theoretical relationship between saving and its determinants, we now outline the methodology adopted in examining this relationship from an empirical point of view. Data for the purpose of the analysis are compiled for 35 African Countries from World Bank Africa's Development Indicators (2001), and are reported in Table A.1 of the Appendices. Note that some countries have been excluded due to lack of data. The data on gross domestic savings ( $S_t$ ) and real gross domestic product ( $Y_t$ ) covered the period (1990-1999). Data on Commercial banks deposit rate ( $r_t$ ) covered the period (1990-1998), while data on age dependency ratio is obtained for the year 1998. According to World Bank (2001) data on gross domestic savings ( $S_t$ ) were calculated by deducting total consumption from gross domestic product in current prices. The data on real gross domestic product ( $Y$ ) were calculated without making deductions for depreciation of 'manmade' assets or the depletion and degradation of natural resources, and regardless of the allocation to domestic and foreign claims. Data on commercial banks' deposit rate ( $r$ ) were calculated as the rate paid to depositors on time savings and demand deposits by deposit money banks and similar financial institutions. Finally, data on age dependency ratio ( $D_t$ ) is calculated as the ratio of dependents (population under age 15 and above age 65) to working age population (those aged 15 to 64).

For our purposes, annual averages for 10 years are calculated from the cross-section data on both ( $S$ ) and ( $y$ ), and for 9 years for the deposit rate ( $r$ ). Ordinary least squares (OLS) method is

adopted to the data in Table A.1 of the Appendices to estimate the model in equation (1). In the next section we report the empirical results.

#### **4. The Empirical Results :**

**In this section we report the empirical results. To measure the degree and direction of the linear association between domestic savings and its determinants, Pearson's correlation coefficients were calculated as reported in table (1), where figures inside the brackets are the t-ratios of the estimated coefficients.**

These correlation results reveal that African domestic savings are positively correlated with income and negatively with commercial banks deposit rate and the age dependency ratio. However, while the correlation coefficient with respect to income is significant at 1% level , the other coefficients are not statistically significant.

Applying OLS technique to a log-linear form of equation (1) we obtained the results reported in table (2), where figures inside the brackets are the t-ratios of the estimated elasticities .

It is clear from these results that all equations are significant at the 0.01 level as indicated by the value of their F-ratios. The results also suggest that on average over 40% of the variations in savings are explained by the explanatory variables. Moreover, in line with the correlation results, the elasticity of savings with respect to real per capita income turned out to be the only significant parameter. Furthermore, in all equations the constant term and the coefficient of real per capita income turned out to have the signs as postulated by economic theory. Equation (4) is the most significant equation as indicated by the value of F-ratio. The remained un explained variations in African savings may be attributed to the heavy tax burden, or to the African population behavior , and the age distribution .

All in all , these results strongly support the theoretical argument which identified income as an important determinant of savings (Burrows and Theodor 1974, Samuelson 1976, Leavačić 1976, Noel 1980, and Harvey 1977, 1985), while they reject the existence of a relationship between savings, interest rate (Leavačić 1976 and Giovannini, 1983), and dependency ratio in LDCs.

#### **5. Conclusion**

This study examined the response of domestic savings in a set of African countries to its most important determinants, namely income, commercial banks' interest rate, and the age dependency ratio. For this purpose Ordinary Least Squares regression technique is applied to cross-section data

taken for a set of African countries over the period (1990-1999). The empirical results suggest that African domestic savings are elastic only to income. Based on this, it may be argued that the mobilisation of domestic savings for the acceleration of economic growth and development, African countries should focus more on policies that increase incomes and reduce unnecessary spending.

Table (1) : Pearson’s Correlation Coefficients of Dependent Variable with Explanatory Variables

Explanatory Variables	Correlation Coefficient	$t_{\alpha/2, n-2}$	
		0.01	0.050
y	0.607 (5.52)	2.75	2.042
r	-0.039 (-.224)	2.75	2.042
D	-0.318 (-1.659)	2.75	2.042

Source: own calculations based on data of table (A.1) of the appendices .

Table( 2) : Regression Results

Equ. No.	Const.	Estimated Elasticities			R <sup>2</sup>	R <sup>-2</sup>	F	F(v <sub>1</sub> , v <sub>2</sub> )	
		ln y	ln r	ln D				0.01	0.05
1.	-1.9 (-1.852)	0.62 (3.683)	-0.06 (-.368)	-0.04 (-.251)	0.42	0.36	7.33	4.5	2.92
2.	-2.005 (-2.259)	0.64 (4.743)	-.052 (-.385)	-	0.41	0.38	11.3	5.39	2.92
3.	-1.9 (-1.872)	0.62 (3.733)	-	-0.04 (-.244)	0.41	0.38	11.2	5.39	2.92
4.	-1.995 (-2.28)	0.64 (4.8)	-	-	0.41	0.39	23.04	7.56	5.39

Source : Own calculations .

### Appendices

Table (A.1)

Annual Average, Gross domestic Savings, Real Gross Domestic Product,

Commercial Banks interest Rate, and Age Dependency Ratio for Africa

		(1)	(2)	(3)	(4)
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No	Country	Annual average gross domestic savings (1990-1999)	Annual average per Capita real GDP (1990-1999) Million US\$, const. 1995 prices	Annual average commercial bank interest rate (%) 1990-1998	Age dependency ratio 1998
1	Angola	24.86	536.50	3.77	1.00
2	Benin	7.39	370.53	.280	.800
3	Botswana	33.68	2015.64	1.14	.800
4	Burkina faso	8.53	243.85	.280	.900
5	Cameroon	18.94	652.02	.750	.800
6	Cape Verde	2.51	1263.85	.490	.900
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7	Central African Republic	3.15	336.18	.750	.900
8	Congo. Republic of	37.20	976.17	.750	.900
9	Cote d'Ivoire	17.47	770.10	.280	.800
10	Eguatorial Guinea	17.79	590.38	.750	.900
11	Ethiopia	4.89	102.45	.880	.800
12	Gabon	41.72	4502.67	.750	.800
13	Gambia. The	4.89	356.74	1.40	.900
14	Chana	8.06	379.24	2.65	.900
15	Guinea	14.12	567.93	1.55	.900
16	Guinea-Bissau	1.20	220.95	3.31	.900
17	Kenya	13.42	339.32	.890	.800
18	Madagascar	4.00	244.98	1.91	.900
19	Malawi	2.98	148.00	2.29	1.00
20	Mali	7.74	257.48	0.28	1.00
21	Mauritania	7.73	457.57	.170	.900
22	Mauritius	24.01	3492.74	1.19	.500
23	Namibia	9.36	2054.80	1.12	.800
24	Niger	2.76	256.51	0.28	1.00
25	Nigeria	24.27	237.03	1.51	.900
26	Senegal	10.10	553.89	.280	.900
27	Sierra Leone	1.17	240.37	2.57	.900
28	South Africa	17.62	3910.03	1.60	.600
29	Swaziland	21.66	1415.73	1.11	.800
30	Tanzania	1.79	182.38	0.60	.900
31	Togo	7.30	327.92	.280	1.00
32	Uganda	3.76	296.02	1.96	1.00
33	Zambia	6.05	419.53	3.18	.330
34	Zimbabwe	23.50	742.82	2.55	.800
35	Egypt, Arab Republic	13.37	1038.91	1.25	0.70

**Sources :** Columns (1), (2), (3) : Own calculations based on data from World Bank, Africa's Development Indicators (2001) ; Column (4) : World Bank, Africa's Development Indicators (2001).

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