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Demographic Determinants of Savings in ECOWAS

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Authors' contributions

This work was carried out in collaboration between both authors. Author DBO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DBO and KFA managed the analyses of the study. Author KFA managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Countries in ECOWAS had recorded low savings rate in the last three decades. Savings rate as a percentage of GDP in Mali and Sierra Leone were negative in the period considered in this study. Previous studies mainly focused on the determinants of savings in ECOWAS with little attention on the role of demographic structure. This paper examined the determinants of savings in ECOWAS and the importance of demographic structure in savings rate. Data on gross savings rate, per capita income, interest rate, inflation, financial aids, remittances and population age structure were collected for six ECOWAS countries namely, Cote d' Ivoire, Ghana, Mali, Niger, Nigeria and Sierra Leone. The data spans from 1981 to 2014. The fixed effect least square dummy variable was used to analyze the data. Per capita income and real interest rate were found to have statistically significant effect on savings rate. Young age dependency rate and working population rate showed negative effect on savings rate. Although the result of the working population age group is contrary to theory they provided important policy lessons. Economic policies should be directed towards increasing income of the working population age group to increase the saving rate in the region.

Keywords: Demographic factors; savings; per capita income; least square dummy variable.

JEL classification: D91, E21, E29, J10.

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1. INTRODUCTION

Savings¹ rate have been generally low across Africa region in the past decades. Regional differences abound in savings rate. For instance, [1] noted that over the past three decades, savings in East Asia have doubled while that of sub-Saharan Africa and the Caribbean had stagnated. The low rate of savings in sub-Saharan Africa, ECOWAS² inclusive, has reduced the level of capital accumulation for investment. This is one of the main factors that have caused slow growth in the region.

Available statistics indicated that gross domestic savings in 2005 was 17.6% of GDP for sub-Saharan Africa, 24% in Latin America, 26% in South Asia while it represented 42.9% in East Asia and Pacific countries [2]. A study conducted by [3] indicated that in less than a generation, savings and investment across the globe will be dominated by the developing countries of the world with clear and distinct domination by Asia and the Middle East. This report also projected steady growth investment for sub-Saharan Africa, envisaged from the growth from her robust labour force.

Although some studies had examined the determinants of savings in ECOWAS, little attention has been given to the effect of demographic structure on national savings. The demographic structure of the population could have a strong implication on the national savings rate. Countries with greater proportion of population between the ages of 15 and 64 (working population) are expected to have higher savings than those with of their populace in the dependency range. Also, higher income countries rate of savings tends to be higher compare to the middle income and low income countries.

Economic progress is a reflective of a nation's saving rate. Thus, achieving sustainable development in ECOWAS depends on the level of investment which in turn, is affected by the region's savings rate. A clear understanding of the main factors that determine savings in ECOWAS and the role of demographic structures on savings rate is important for designing effective

policies that can accelerate savings rate in the region.

The effect of savings in stimulating investment and the promotion of economic growth and development through capital formation and capital accumulation have been recognized over decades [4,5,6]. At the macroeconomic level, savings is an inducement for growth for the attainment of macroeconomic stability at both developing and developed countries. However, at the micro level, it is a crucial factor in breaking down the vicious cycle of poverty which is a major issue in ECOWAS region.

Despite importance of savings in promoting growth, countries in ECOWAS have not achieved an accelerated savings rate. Domestic savings and investment rates in the region in the 1990s dropped below the rates recorded in the 1980s, while in the 2000s, the record were lower than in the 1990s, [7]. The rationale behind this low rate of savings were found by [8] to be due to; low income per capita, high young-age dependency ratio, and high dependence on foreign aid. [9] also identified the role played by corruption in the ECOWAS region which has led to the slow pace of savings in the region.

Unrealistic government budget and Inflation which distort stability has also contributed to this slow pace. The gap between savings and investment has widened, making the sub-region even more dependent on external financing for its development. It is in this light, that this paper seeks to determine the trends in savings and investigate the effect of demographic structure on savings in ECOWAS region with focus on achieving economic prospect for ECOWAS using selected countries from the region. Six ECOWAS countries were selected, namely, Nigeria, Ghana Niger, Sierra Leone, Cote d Ivoire and Mali; based on data availability. The coverage of the study is from 1981 to 2014.

The rest of this paper is organized as follows. Section two discusses the trend and development in savings in ECOWAS. Literature review is documented in section three. Further, section four presents the theoretical framework and methodology for the study. In section five, the data collected for the study are analysed and discussed. This follows by conclusion and policy implication of findings in section six.

¹ Savings generally reflects the residual income used for the acquisition of financial and non financial assets.

² Economic Community of West African States.

2. OVERVIEW OF NATIONAL SAVINGS AND DEMOGRAPHIC STRUCTURE IN ECOWAS

2.1 Trends in savings Rate in ECOWAS

Table 1 presents gross national savings as percentage of GDP in ECOWAS. West Africa countries had experienced persistent fluctuation in their savings rate since 1980s. Also, considerable variations abound in savings rate of ECOWAS countries during the period under study. On average, between 1981 and 1985, percentage of gross savings to GDP was -3.02% in Mali. This negative savings rate is a reflection of low income in the country. However, in the reference period, Nigeria's savings rate was high (20.84%) relatively to other ECOWAS countries. One of the plausible reasons for the high savings rate in Nigeria was due to the crude oil boom that occurred in the late 1970s to early 1980s.

Following the Structural Adjustment Programme (SAP) adopted by ECOWAS countries in 1985, savings rate increased in Ghana, Mali, Niger and Sierra Leone. Nevertheless, Cote d'Ivoire gross national savings as a share of GDP decline to 1.15% between 1986 and 1990 (see Table 1). Between 1991 and 1995, Ghana and Mali witnessed remarkable increase in savings rate. In the reference period, averaged savings rate as a share of GDP in the countries were 13.67% and 11.53%, respectively. Average gross savings rate as a share of GDP in Sierra Leone was at its lowest between 1996 and 2000. Ghana's gross savings as a percentage of GDP increased to 14.23%. Also, between 2001 and 2005, Ghana's gross savings as a percentage of GDP was high compare to other countries in the ECOWAS region. During the period, gross savings as a percentage of GDP lagged considerably behind

in Sierra Leone and Cote d'Ivoire. Subsequently, remarkable improvements in the savings rate were recorded in Mali, Nigeria and Sierra Leone between 2006 and 2010 (see Table 1). Mali and Nigeria continued to maintain a relatively high savings rate up till 2014.

2.2 Trends in Demographic Structure of ECOWAS Countries

Table 2 shows the demographic structure of ECOWAS countries using the population age structure. Accordingly, the population age structure that falls between 0 and 14 as well as 65 above depend on the working population (15-64) category. The demographic structure of the region tends to follow a similar trend across member countries. In 1985, Sierra Leone has the highest share of population that falls between 15 and 64.

The dependency ratio of all countries in the region was high. For instance, in Cote d'Ivoire population between the ages of 0 and 14 ranges from 42.7% to 45.2%. Niger and Nigeria recorded 47.7% and 44.9%, respectively. A close observation of Table 2 indicates that on average, population within the ages of 15 and 64 (working population) for all countries in the region is marginally higher than the population in the dependency categories.. Although, these figures showcase availability of labour force in the region, the lack of innovation and presence of high unemployment have detrimental effects on their productivity.

In most of the sampled countries, the proportions of population above 65 are low. These can be attributed to low life expectancy rate associated with poor sanitation, poor health facilities and care for the aged. All these had resulted to low life expectancy in the region.

Table 1. Gross savings rate (% of GDP) in Selected ECOWAS countries

S/N	ECOWAS countries	Gross savings rate. % of GDP						
		1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010	2011-2014
1	Cote d' Ivoire	9.74	1.15	3.86	10.71	5.96	13.99	15.06
2	Ghana	6.06	9.28	13.67	14.23	20.62	13.55	17.40
3	Mali	-3.02	9.66	11.53	12.80	15.29	20.44	25.37
4	Niger	7.29	7.37	3.92	4.20	8.03	15.64	19.63
5	Nigeria	20.87	19.63	15.98	12.96	10.58	24.19	25.27
6	Sierra Leone	6.41	9.21	1.14	-1.55	2.40	10.57	11.63

Source: Authors compilation from World Bank's World Development Indicator

Table 2. Population age structure of selected ECOWAS countries

S/N	Countries		1985	1990	1995	2000	2005	2010	2014
1	Cote d'Ivoire	Age 65+	2.5	2.7	2.8	2.8	2.8	2.9	3
		Age 15-64	52.1	52.5	53.5	53.7	53.1	53.3	54.2
		Age 0-14	45.2	44.7	43.7	43.4	44.1	43.6	42.7
2	Ghana	Age 65+	2.6	2.7	2.9	3	3.3	3.5	3.4
		Age 15-64	52.4	53.4	54.3	55.5	56.4	57.3	57.6
		Age 0-14	44.8	43.8	42.7	41.4	40.2	39.1	38.9
3	Mali	Age 65+	3.5	3.8	3.6	3.2	2.9	2.7	2.5
		Age 15-64	51.2	49.5	49.8	50.2	50.4	50.1	49.9
		Age 0-14	45.1	46.6	46.5	46.5	46.6	47	47.5
4	Niger	Age 65+	2.1	2.3	2.4	2.4	2.4	2.5	2.5
		Age 15-64	50.1	49.9	50.1	49.5	48.4	47.5	47
		Age 0-14	47.7	47.6	47.4	47.9	49	49.9	50.4
5	Nigeria	Age 65+	2.8	2.8	2.8	2.8	2.7	2.7	2.7
		Age 15-64	52.2	52.2	53	53.6	53.6	53.3	53.1
		Age 0-14	44.9	44.8	44.1	43.5	43.5	43.9	44
6	Sierra Leone	Age 65+	3.2	3	2.7	2.4	2.5	2.5	2.6
		Age 15-64	53.4	52.6	52.8	53.2	53.6	53.9	54.6
		Age 0-14	43.3	44.2	44.4	44.2	43.8	43.4	42.6

Source: Authors compilation from World Bank's World Development Indicator

3. REVIEW OF RELATED LITERATURE

3.1 Theoretical Literature

There are several theories in economic literature on the relationship between savings and economic performance both at micro and macro levels. Most of the theories on this theme were on determinants of savings and the relationships between savings and aggregate output. Notably, theories of consumption form a starting point in the analysis of the relationship between savings and its determinants.

Differences in savings among people can be explained in the life cycle model of savings. According to the life cycle model of savings, people save when they are young to finance their consumption in retirement. This implies that private savings increase with a higher percentage of working population and falls with a higher percentage of the young and aging population. The basic life-cycle model of savings was modified by [10] to include longevity. The theoretical model assumes that agents maximize their utility over their lifetimes, choosing how much to work and how much to consume and how changing in life expectancy influence their decisions. A major shortcoming of the model is that it assumes that longevity is fixed exogenously, ignoring the fact that it depends on consumption and access to healthcare.

In an enquiry on the dynamics of savings, [11] modified the life cycle-overlapping generation model of agents who live for two-periods, working during the first and retirement in the second. The model is based on the assumption of constant returns to scale, Cobb-Douglas utility function, population growth and no bequest. The general argument is that savings depend on income and changes in income over time. Similarly, [12] developed an overlapping generation model based on the neoclassical assumptions. It shows how demographic structure changes induced by an exogenous shift in birth rate affect the level of capital accumulation. This model emphasized the effect on age dependant in capital accumulation.

The paper by [13] modelled demographic structure and Total Factor Productivity (TFP) in a discrete time household utility function. The production function of the firm follows the Cobb-Douglas process. Each factor earns its real rate of return. The households have an endogenous supply decision. These assumptions allow household to smooth his/her consumption and hence affect the households' savings decision. This model is an improvement of the traditional over-lapping generation model. [14] extended the conventional life-cycle theory to four periods lived agents, a representative firm producing single good and government. The model shows that savings rate of the young and middle-aged agents are decreasing in fertility and increasing in survival rates.

3.2 Empirical Literature

The empirical studies on the determinants of savings have shown mixed evidence. The study conducted by [8] focused on the sub-Saharan Africa region using data spanning from 1970-1995 to analyze the factors that determines private saving. Their study found out that savings in the region was low in comparison with other regions of the world (especially the high performing Asian economies). With the use of granger causality test, the study found out that savings granger cause investment. The study therefore concludes that the low investment in the region is a causal factor of low savings which emanates from the regions low per capita income, high dependence on aid and the presence of high young –age dependency ratio. The general focus of [15] is on the determinants of aggregate private saving in European countries. Economic and demographic developments were considered in the analysis. A long-run relationship exists among private saving, dependency ratio, liquidity, real disposable income growth, real interest rate and inflation. The result established the existence of long-run saving function in Europe.

In the quest to investigate factors generating the savings rate in Japan, [16] used a calibrated general equilibrium model. It was revealed that the growth rate of Total Factor Productivity (TFP) played an important role in generating some fluctuations in Japanese savings rate in the period of interest. Further, during 1990-2000, a declining population growth rate resulted to lower savings. The effect of age structure of the population was not examined in the study. The study conducted by [17] explored a dynamic panel analysis to investigate the determinants of the household saving rate in China. It was found that household saving has increased during the period under study. Some major determinants of the variation in household savings were identified, namely, income growth rate, real interest rate and inflation rate. Dependency ratio was found to have a negative impact on saving rate.

The determinants of gross domestic saving in ECOWAS were examined by [18] using savings model derived from the standard life-cycle theory. The study used panel data for aggregate ECOWAS covering the period 1980- 2006. Mixed results were observed from the fixed and random effects models. The result signifies that among ECOWAS countries, a positive but insignificant

effect of GDP growth rate on gross domestic savings while GDP per capita showcase a significant negative impact on gross domestic savings. The study reported significant negative impact of inflation, high budget deficit and terms of trade on gross saving in ECOWAS.

The study conducted by [19] on Middle East and North Africa (MENA) countries revealed a significant positive relationship between national savings ratio and the percentage of working population groups. Similarly, [20] found that age structure is a prime determinant of national savings in Pacific Island countries. The results showed a statistically significant and positive relationship between national savings ratio of GDP and the percentage of working population groups. Also, a statistically significant and negative relationship between national savings and percentage of retired population was obtained. Using Thailand's data, [21] revealed that an increase in economic growth, inflation and terms of trade has positive and significant impact on household and private saving rates. However, availability of bank credit reduced household and private saving rate.

Using data spanning from 1996-2012 and OLS and TSLS-instrumental variable techniques, [9] identified the role of corruption on low savings rate in ECOWAS region. The results revealed that lower corruption is in relation with higher savings while high income level reduces the effect of corruption on savings. The study concludes that to raise savings, government in ECOWAS should operate policies that will reduce corruption and also increase incomes for combating the negative effect of corruption on savings.

The findings of [22] showed that demographic factors, namely, fertility rate and longevity explained about 68% of cross-country dispersion in savings rate. Fertility rate was found to have greater impact on cross-country savings rate than longevity. The paper provided an insightful explanation of the large gap in savings rate between high and low income countries.

Further, [23] employed co-integration and error correction mechanisms to establish the determinants of savings in Namibia using data from 1991 to 2012. The study found long run relationship between savings and variables such as inflation, income, population growth. Population growth was found to have a negative relationship with savings while income and

inflation exhibit positive relationships with savings. The result analysis also revealed that financial deepening and deposit rate have no significant effects on savings rate.

The study conducted by [24] established that age dependency exert a negative effect on domestic savings on 16 African countries using bound test analysis of cointegration of persaran et al and the modified granger causality test. The study found that there is evidence of cointegration for eleven countries while the result of causality test revealed that low savings was caused by dependency ratio in nine countries while two countries showcase a positive relationship between dependency ratio and savings.

4. THEORETICAL FRAMEWORK AND METHODOLOGY

4.1 Theoretical Framework

The key idea of Life Cycle hypothesis developed by [25] and [26] is that individual's consumption in a given period of time depends not only on the current income but income over his or her life time. The difference between current and permanent income is transitory income. Further analysis in economic literature shows that time path of income is important for savings.

The [25] model shows that individual maximizes his utility subject to the resources available. These resources are the sum of current and discounted future earnings over his life time. Suppose that the total consumption of an individual of age A is a function of total resources available to such individual over his entire life time. This can be given as:

$$C_t = \lambda^A W^A \quad (1)$$

In the equation (1) λ^A is a proportional factor that depends on the rate of return on assets, demographic factors (Age) and type of utility function. The wealth of an individual at age A, that is W is the sum of the initial capital³ K_0 and the present value of individual earnings over his entire life time.

$$W_t = K_0 + y_t + \sum_{v=A+1}^N \frac{y^\alpha}{(1+r_t)^{v-A}} \quad (2)$$

³ This is the bequest bestowed on individual household

The current income is denoted by y_t . Income earned by the individual up till the end of his life time is represented by y^α . N is the period an individual earns income and r_t is the rate of return on assets. Accordingly, the average annual expected income y_t^A of an individual can be expressed as follows:

$$y_t^A = \frac{1}{N-A} \sum_{v=A+1}^N \frac{y^\alpha}{(1+r_t)^{v-A}} \quad (3)$$

Assuming the value of λ is identical for all age groups; hence consumption for the age groups can be rewritten as follows:

$$C_t^A = \lambda^A y_t^A + \lambda^A (N-A) y_t^A + \lambda K_0 \quad (4)$$

Savings for the age groups can be expressed as follows:

$$S_t^A = y_t^A - C_t^A \quad (5)$$

$$S_t^A = \left[\frac{1}{N-A} \sum_{v=A+1}^N \frac{y^\alpha}{(1+r_t)^{v-A}} \right] - [\lambda^A y_t^A + \lambda^A (N-A) y_t^A + \lambda K_0] \quad (6)$$

The expression in equation (6) shows that savings is the difference between the income an individual is expected to earn over his life time and aggregate consumption.

4.2 Methodology

First is to conduct unit root test for all the variables to be used in the analysis. This study adopts the IM Pesaran and Shin panel unit root test procedure. The fixed effect Least Square Dummy Variable (LSDV) technique is adopted to estimate the effect of demographic factors and other determinants of savings rate, such as, per capita income, interest rate, inflation, financial aids, and remittances on national savings of ECOWAS countries. The dummy variable coefficients are the country specific intercepts are included in the model specification. We adopt the LSDV because it captures the differences across countries. In this study we are interested in measuring the significance of the differences across countries of interest. Additionally, the LSDV allows controlling for the unobserved

heterogeneity across countries by adding dummy for each country.

The empirical model deals with the effect of demographic structure and other determinants of savings on national savings. Drawing from the theoretical framework and some of the empirical studies, the determinants of savings considered in this study include income per capita, interest rate, inflation, foreign aids and remittances. In our quest to determine the relevance of demographic structure, age structure are categorized into three, namely, 0-14, 15-64 and 65+. The model specification can be expressed as:

$$NS_{it} = f(pci_{it}, int_{it}, inf_{it}, oda_{it}, rem_{it}, A_{it}^{0-14}, A_{it}^{15-64}, A_{it}^{65+}) \quad (7)$$

The Least Square Dummy Variable model to be analysed is specified as follows:

$$\begin{aligned} \ln NS_{it} = & \beta_{11}D_{1i} + \beta_{12}D_{2i} + \beta_{13}D_{3i} + \beta_{14}D_{4i} \\ & + \beta_{15}D_{5i} + \beta_{16}D_{6i} + \beta_{17}D_{7i} + \beta_{18}D_{8i} + \beta_1 \ln pci_{it} \\ & + \beta_2 int_{it} + \beta_3 inf_{it} + \beta_4 \ln oda_{it} + \beta_5 \ln rem_{it} \\ & + \beta_6 A_{it}^{0-14} + \beta_7 A_{it}^{15-64} + \beta_8 A_{it}^{65+} + U_{it} \end{aligned} \quad (8)$$

Where;

$D_{1i} - D_{8i}$ = Dummy variables

$\beta_{11} - \beta_{18}$ = Country intercepts

$\ln NS_{it}$ = Log of national savings as a percentage of GDP

$\ln pci_{it}$ = Log of Per capita income

INT_{it} = Interest rate

INF_{it} = Inflationary rate

$\ln oda_{it}$ = Log of foreign aids

$\ln rem_{it}$ = Log of remittances

A_{it}^{0-14} = Percentage of population between the ages of 0 and 14 (young age dependency rate)

A_{it}^{15-64} = Percentage of population between the ages of 15 and 64 (working population)

A_{it}^{65+} = Percentage of population over 65 years of age (old age dependency rate)

4.3 Data Sources and Measurement

Data for this study were gathered from various institutions' publications. In particular, data of national savings, real GDP per capita, foreign aids (official development assistance), remittances and demographic structure were collected from World Bank's World Development Indicator. Data on interest rate and inflationary rate were obtained from International Monetary Fund's International Financial Statistics. Here, the deposit rate was used to capture interest rate and end of the period headline inflation for each country were collected for countries' inflationary rate. The data are from 1981 to 2014.

5. EMPIRICAL RESULTS AND DISCUSSION

The results of the I M Pesaran and Shin panel unit root test are presented in Table 3. Stationarity test were conducted on all variables used in the study. It can be inferred here that the null hypothesis of all panels contain unit root cannot be rejected for most of the variables. Essentially, national savings rate and inflation rate are stationary at level. Other variables, namely, per capita income, interest rate, financial aids, remittances, percentage of population between the ages of 0 and 14, Percentage of population between the ages of 15 and 64 as well as percentage of population over 65 years of age are stationary at first difference.

Table 4 shows the result of Hausman Test that was conducted to determine whether fixed or random effect is preferable in the analysis. The null hypothesis is that the preferred model is random effect and the alternative is that fixed effect is preferable. The significance of the p-value in Table 4 shows that fixed effect model is preferred.

Table 5 shows the result of the Least Square Dummy Variable (LSDV) model. The coefficient of per capita income and real interest rate are statistically significant at 1% and 5% levels, respectively. This implies that a 10% increase in per capita income leads to 5.8% increase in

savings. Here, it is evident that per capita income is a major determinant of national savings rate in ECOWAS region. Similarly, a 10% increase in real interest rate would result to 0.2% increase in national savings rate. The coefficient of financial aid and remittances are only significant at 10% level. These show that the effect of financial aid and remittances on savings rate in ECOWAS is negligible. The results of the LSDV show that inflation is not statistically significant at the conventional levels. The statistical insignificant value of the coefficient of inflation could be as a result of price-wage adjustment mechanism which is slow in the ECOWAS region.

Of interest in this paper are the effects of demographic structure on national savings rate. Consequently, demographic structure variables, notably, the percentages of population between ages 0-14 (young age dependency rate) and percentages of population between ages 15-64 (working population) are statistically significant at 5% levels. Although the sign of the coefficient of the percentage of population between the ages of the young age dependency rate conforms to theory, the coefficient of the working population deviates from the *a priori* expectation. Further, the coefficient of the old age dependency rate is not statistically significant in the estimation. This is due to the fact that the old age group (65+) has no significant contribution to the nation savings in ECOWAS.

The coefficient of population of young age dependency rate is negative because this population group depends on the working population; hence, they are expected to reduce

the amount of the gross savings. It implies that a percentage increase in the population of the young age dependency rate will lead to 0.3% decrease in national savings. Contrary to expectation, the coefficient of the working population has negative effect on national savings. Some plausible explanation can be provided for these findings. First, unemployment rate has been very high in the past two decades across the sampled countries; this has led to low savings rate of the population. Second, real income has fallen across ECOWAS countries due to high rate of inflation with low real wage rate. All these could result to the negative effect of the working population on national savings.

Further, differences across countries were tested in the LSDV model in Table 5. The statistically significant of the dummies show that country specific characteristics have influence on national savings. The R² value shows that 53% of the variation in national savings is accounted for by its determinants and demographic structure in ECOWAS. Overall, the F-statistics confirms the appropriateness of the model.

The cross-sectional dependence of the residuals was tested using the Breusch-Pagan (B-P) LM test of independence (see Table 6). [27] argued that although contemporaneous correlation may not be a problem in micro panels, it could result to problems in macro panel. The null hypothesis B-P LM test is that the residuals across entities are not correlated. The statistically insignificant of the Chi-square obtained shows that there is no cross-sectional dependence.

Table 3. I M Pesaran and shin panel unit root test

S/N	Variables	Statistics at level	P-Values	Statistics at 1 st difference	P-Value	Order of integration
1	NS	-2.6938	0.0035	-8.9704	0.0000	I(0)
2	pci	6.2702	1.0000	-6.7692	0.0000	I(1)
3	inf	-5.4999	0.0000	-9.0866	0.0000	I(0)
4	int	-0.2704	0.3934	-6.9626	0.0000	I(1)
5	oda	-1.2201	0.7597	-4.2321	0.0000	I(1)
6	rem	0.2365	1.0000	-3.8775	0.0000	I(1)
5	A ⁰⁻¹⁴	1.9454	0.9741	-1.7024	0.0443	I(1)
6	A ¹⁵⁻⁶⁴	4.6835	1.0000	-2.7310	0.0032	I(1)
7	A ⁶⁵⁺	1.0057	0.8427	-2.3162	0.0103	I(1)

Table 4. Hausman test

	Fixed	Random	Difference	S.E
lnpci	.5801265	.7478869	-.1677603	-
int	.0187229	.0250574	-.0063345	-
inf	-.0005232	.0013851	-.0019083	-
lnoda	.147378	.0454976	.1018803	.0393141
lnrem	-.0685326	.0722134	-.140746	.0282472
A ⁰⁻¹⁴	-.3380466	.1600942	-.4981407	.1361402
A ¹⁵⁻⁶⁴	-.3944486	.0074325	-.4018811	.1654149
A ⁶⁵⁺	.2140225	1.051177	-.8371545	.128328

Test: Ho: difference in coefficients not systematic; $\chi^2(8) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 77.31$;
 Prob> $\chi^2 = 0.0000$; (V_b-V_B is not positive definite)

Table 5. Fixed effect estimate (Least square dummy variable)

Inns	Coef.	Std. Err.	t	P> t
lnpci	.5801265	.1496423	3.88	0.000
int	.0187229	.0087463	2.14	0.034
inf	-.0005232	.0022005	-0.24	0.812
lnoda	.147378	.0791039	1.86	0.065
lnrem	-.0685326	.0399896	-1.71	0.089
A ⁰⁻¹⁴	-.3380466	.1430529	-2.36	0.020
A ¹⁵⁻⁶⁴	-.3944486	.1654539	-2.38	0.019
A ⁶⁵⁺	.2140225	.2321343	0.92	0.358
_lcountry_2	-.798012	.2481591	-3.22	0.002
_lcountry_3	-.4335718	.2693163	-1.61	0.110
_lcountry_4	-1.383641	.2652775	-5.22	0.000
_lcountry_5	-20.74807	8.270793	-2.51	0.013
_lcountry_6	-18.80848	7.872514	-2.39	0.018
_cons	32.78026	14.99498	2.19	0.031

Number of Obs = 148; $F(13, 134) = 11.88$; $Pro > F = 0.0000$; $R\text{-squared} = 0.5355$; $Adj R\text{-squared} = 0.4904$
 Root MSE = 0.52076

Table 6. Correlation matrix of residuals

	_e1	_e2	_e3	_e4	_e5	_e6
_e1	1.0000					
_e2	-0.4902	1.0000				
_e3	-0.0853	0.0287	1.0000			
_e4	-0.2340	0.3534	-0.0291	1.0000		
_e5	-0.1667	0.0954	0.0059	-0.0054	1.0000	
_e6	-0.1709	0.1539	0.0428	-0.3628	0.2839	1.0000

Breusch-Pagan LM test of independence: $\chi^2(15) = 16.122$, $Pr = 0.3740$

6. CONCLUSION

A key argument in the economic literature on savings is the importance of demographic structure on savings rate. This study examined some important determinants of gross savings and investigates whether demographic structure has any role to play in ECOWAS. The Least

Square Dummy Variable (fixed effect) model was used to analyze the determinants of national savings.

Per capita income and real interest rate have statistically significant effect on savings rate in ECOWAS. However, foreign aids and remittances are only significant at 10% level. The

young age dependency ratio and the working population ratio negatively affected savings rate. Although, the negative effect of young age dependency rate is expected, the negative effect of working population on national saving could be as a result of the high rate of unemployment in the region and low real wage.

Government policies should be directed towards improving per capita income and low inflation rate in ECOWAS countries. Additionally, increasing market interest rate could result to substantial increase in the national savings rate. Government effort towards reducing unemployment and increasing wage-rate in the ECOWAS could lead to a positive effect of the working population contribution to national savings.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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