Comparative Analysis of the Determinants of Households' Consumption in WAEMU and CAEMU Zones: A Panel Data Study

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ARTICLE INFO	ABSTRACT
Publication Online: 25 July 2020 Corresponding Author: **Rémy Hounsou**	This study uses panel data covering the period 1990- 2017 to conduct a comparative analysis of the determinants of households' consumption in WAEMU and CAEMU zones. Although many factors affect consumption, the study concentrates on the relationship between consumption and real GDP, savings, investment, money, CPI and democratic index. The empirical results based on OLS and FMOLS methods indicate that these variables are for the most part non-stationary in level and there exists between them a long-term cointegration relation which makes the function of the households' consumption stable. The results from the FMOLS estimator are more robust than those obtained from the OLS estimator. Also, at the CAEMU zone level more variables explain the variation of the households' consumption than at the WAEMU level. Finally, the empirical results are in line with the macroeconomic theory because of the robustness of the model that attests to the usefulness and effectiveness of the econometric analysis of non-stationary panel data in the institutional framework of the Franc zone.

1. INTRODUCTION

Consumption is the sole end and purpose of all production (Smith, 1776). Consumption, which represents the largest part of GDP, can be divided into households' consumer goods and capital goods. Households' demand for consumer goods is the function of consumption while investment demand for capital goods is the function of marginal capital efficiency. The consumption decision by households is important for the economy both in the short term and in the long term. The consumption decision is crucial for short-term analyzes because of its role in aggregate demand which is the total amount of all goods demanded in the economy. It is also crucial for long-term analyzes for its role in economic growth, which is summed up by an increase in GDP or per capita income.

The economic theory of the consumption function has evolved through the history of economic thought. According to classical economists, consumption is a function of the interest rate. In particular, they believe that an increase in the interest rate encourages savings and depresses consumption. Keynes (1936) thinks that the interest rate does not have an important role, but rather the income, that is more precisely, the after-tax income or disposable income, which is the primary determinant of consumption. He argues that

consumption increases with an increase in disposable income, but in a proportion less than the increase in disposable income. If Keynes thinks that current consumption depends on current income, the neoclassic insist on the importance of anticipation in consumption decisions. The permanent income hypothesis developed by Friedman (1957) states that current consumption depends on current income and expected future income. Current household income can be separated into permanent and transitory components. Permanent consumption is determined by permanent income and transitory consumption can be interpreted as unanticipated consumption. Friedman (1957) assumes that there is no relationship between permanent income and transitory income, between permanent consumption and transitory consumption and between transitory consumption and transitory income. The life cycle hypothesis studied by Ando and Modigliani (1963) postulates that a person's consumption function depends on both his wealth and his income. Wealth consists of real assets (durable goods) and financial assets (capital goods). An increase in the wealth accumulated by households depresses savings and encourages consumption. The permanent income hypothesis by Friedman (1957) and the life cycle hypothesis by Ando and Modigliani (1963) can

be used to explain the relationships between short and long term consumption functions.

According to modern macroeconomic theory, consumption is also determined by other factors. Among these determinants we can cite taste (consumer attitudes, socioeconomic factors, age, educational level, occupations, the size and composition of the households, etc.), level of consumer debt, government debts that represent part of the nation's wealth. For this last determinant, if, for example, the government reduces taxes, consumption should be stimulated. However, Ricardian equivalence theory teaches us that the tax reduction financed by the public debt does not increase consumption. If households perceive that the debt generates an equal and offsetting increase in the tax burden, they will believe that they are no better off than before and no increase in consumption will occur.

Consumption and investment represent the two components of private spending. It is accepted in the macroeconomic literature that consumption and investment move together and that their determinants are practically the same. Thus, this study extends that of Hounsou (2019) on the determinants of private investment. In fact, Hounsou (2019) compares the determinants of private investment in the WAEMU and CAEMU zones. This study deals with the comparative analysis of the determinants of households' consumption in the Franc Zone composed of WAEMU and CAEMU. The countries of the Franc Zone are Benin, Burkina Faso, Ivory Coast, Guinea Bissau, Mali, Niger, Senegal and Togo for the WAEMU zone; Cameroon, Central African Republic, Congo, Gabon, Equatorial Guinea and Chad for the CAEMU zone. These countries all belong to the same monetary zone and cannot intrinsically use monetary policy to stabilize their economy in general. Fiscal policy therefore remains the only adjustment instrument available for the countries of the two WAEMU and CAEMU zones under a fixed exchange rate regime between the FCFA and the EURO. Thus, under this fixed parity regime, monetary policy is ineffective, taking into account any degree of capital mobility. On the other hand, fiscal policy is effective and this effectiveness increases with the degree of capital mobility. Hence, fiscal policy in these two zones is necessary to stabilize their economies. However, in practice, this fiscal policy is not conducted in the same manner. Thus, this lack of convergence in these economies explains the differences observed in these two zones through investment (Hounsou, 2017, 2019) and through the balance of payments (Hounsou, 2017). As investment and consumption move together, we can conjecture that households' consumption in the WAEMU and CAEMU zones, like private investment, may also present some differences. Hence, this study conducts a comparative analysis of the determinants of households' consumption at the Franc Zone level. We wonder if households' consumption decisions are the same at WAEMU and CAEMU level. More specifically, we ask ourselves if the income policy, the mode

of accumulation of wealth (human or non-human), the tax policy, the democratic mode, among others, have the same impact on the level of households' consumption. These concerns will be answered through the comparative analysis of the determinants of households' consumption in the two zones. Consumption in fact constitutes the largest component of the GDP and contributes, for example, to 75% of the GDP of the USA (Blanchard, 2006). Therefore, consumption represents the most important part of economic growth, starting from the well-being of the population. The study of consumption at the Franc Zone level makes it possible to understand the effectiveness of the fiscal policies conducted by the governments of the WAEMU and CAEMU countries in order to integrate them into a mixed policy. Another advantage of this study lies in the choice of explanatory variables. For example, the introduction of explanatory choice variables such as democracy index is an indicator of a policy of good governance which contributes largely to economic growth and therefore to the per capita income as a vector of consumer well-being (Kormendi and Meguire, 1985; Savvides, 1995 and Rivera- Baltiz, 2002).

In the rest of the study, we present a brief literature review in section 2. Section 3 examines the methodology adopted. Section 4 presents the empirical results and Section 5 concludes the work.

2. LITERATURE REVIEW

Conventional economists assume that consumption is a negative function of the interest rate and a positive function of savings. However, other economists are skeptical both theoretically and empirically and believe that an increase in the interest rate can reduce savings and increase consumption (Boskin, 1978; Howrey and Hymans, 1978). Boskin (1978) from a study on the USA finds a relatively strong relationship between consumption and the interest rate. In terms of the relationship between savings and the interest rate, the study shows that the elasticity of savings is approximately 0.4, which means that a 10 percent increase in the interest rate results in a 4 percent increase in savings. Howrey and Heymans (1978), in an empirical work on the USA, dispute these results and conclude that there is no relationship between savings and the interest rate.

The consumption function as a relationship between consumption and income is largely a contribution of Keynes (1936). He postulates that consumption depends mainly on income and that there is a positive relationship between the two. Consumption increases as income increases, but to a lesser extent. Explicitly, the marginal propensity to consume is greater than zero and less than unity. The first empirical studies show that there is a stable relationship between consumption and savings. Dornbusch and Fischer (1994) using annual data on consumption and personal disposable income for the USA over the period 1959-1991, show that the

marginal propensity to consume is approximately 0.92. In other words, 92 percent of consumption is explained by personal disposable income.

On the other hand, the permanent income hypothesis assumes that permanent income is linked to the behavior of current and past income, which implies that there is a difference between the short- term marginal propensity to consume and the long-term marginal propensity to consume. This is not the case for the Keynesian theory of the consumption function which is a function of the short term. Friedman (1957) views permanent income as an average weighting of current and past income with more weight for current income than for past income. In terms of estimation, he finds that the marginal propensity to consume for permanent income is equal to 0.88.

While the classics find that the interest rate determines the consumption function, Keynes the income, Friedman the permanent income and the transitory income, Ando and Modigliani (1963) assume that the well-being of an individual consumer is a function of current and future consumption. In other words, consumption depends on both wealth and income. As in the case of the permanent income theory, Ando and Modigliani (1963), for the USA, estimate the marginal propensities to consume from wealth and income which is in the order of 0.06 and 0.7, respectively. These results indicate that consumption is positively linked to wealth and income and that an increase in wealth by 10 percent for Americans, for example, will increase consumption by 0.6 percent and an increase in income by 1 percent will increase consumption by 0.7 percent.

Moreover, other economists base their studies on the monetary component (net financial assets) of wealth by dissociating it from the non-monetary component of wealth. This inclusion of liquid assets is justified by the fact that they serve as proxy variables for wealth, because data on real money supply are easier to obtain than data on wealth (Zellner et al., 1965).

Beyond the empirical evidence which defines the determinants of consumption as being the interest rate, income in the sense of Keynes, permanent or transitory income and wealth or money, consumption functions have evolved in the time by integrating the real life of consumers into an increasingly contemporary economy. For example, the imperfection of the financial market puts consumers in a position of uncertainty and leads them to adopt a less rational behavior in the face of the risk incurred, causing variation in the level of consumption unpredictable (Hall, 1978). Thus, recent work on modeling the households' consumption function introduces in their formulation various explanatory variables to take into account the complexity of consumer behavior. Alpen (2018) analyzes the relationship of economic growth with consumption, investment, unemployment rates, savings rates and portfolio investments in developing countries, notably Brazil, Russia, India, South Africa and Turkey on the period 2005-2016. The results from the Prais-

Winsten Panel Correlated Standard Errors and Feasible Generalized Least Squares estimate show that a 1 percent increase in consumer spending increases economic growth by 0.41 percent. Also, a 1 percent increase in the savings rate increases economic growth by 0.50 percent and a 1 percent increase in investment spending increases economic growth by 0.25 percent. Kim (2017) studies the effect of consumption on economic growth in Asia more specifically on 52 countries over the period 2012-2016 and relates to 18 explanatory variables (economic growth per capita, knowledge economy, globalization, global competitiveness, terms of trade, corruption, urbanization, type of political system, military expenditures, economic freedom, oil, foreign direct investment, gross savings, consumer spending, government spending, tax burden, domestic investment and unemployment). The results of the study based on a multivariate analysis show, among other things, the significant effect of consumption on economic growth.

3. METHODOLOGY
3.1 Empirical model
Through the conventional thoughts of macroeconomic theory, the consumption function depends on several variables. However, within the framework of our study which concerns the Franc Zone composed of developing countries for which the availability of data is a concern, only explanatory data of capital importance are chosen to reflect the realities which characterize these countries. Thus, the formulation of our consumption function depends on the traditional variables of income, savings, investment and money and on the choice variables expressed by the consumer price index and the democracy index. In other words, from an econometric point of view, our model specified in panel data and expressed in natural logarithm (ln) is as follows:

$$lnCON_{it} = \alpha + \eta_i + \theta_t + \beta_1 lnGDP_{it} + \beta_2 SAV_{it} + \beta_3 lnINV_{it} + \beta_4 MON_{it} + \beta_5 CPI_{it} + \beta_6 DEM_{it} + \varepsilon_{it}$$
$$(1)$$

where the variable CON is the households' consumption; GDP is the real gross domestic product; SAV represents savings; INV measures investment; MON indicates the demand for money by households; CPI is the consumer price index and DEM the democracy index which varies between -10 and +10. The higher the index (when positive), the more democratic institutions are of good quality. It is taken from the Policy 4 database of Freedom House. We consider a panel of observations relating to ($i = 14$) countries of the Franc Zone (including 8 for WAEMU and 6 for CAEMU) and t periods from 1990 to 2017. The coefficient η_i takes into account the heterogeneity of the member countries of the Franc Zone; θ_t is the shock common to all countries while ε_{it} is the global residual of the model.

The parameters β_1, β_2, β_3, β_4, β_5 and β_6 represent the coefficients to be estimated for each group of countries in the Franc Zone (WAEMU and CAEMU).

3.1.1 Specification of the dependent variable

Our consumption function, CON, is the households' demand for consumer goods which accounts for the largest share of GDP. Various approaches explain the theory of consumption including that of Hall (1978) for his theory of the random walk of consumption and that of Chao (2007) for his theory of the structure of the consumption function. For our study, the consumption function depends on the four traditional explanatory variables GDP, SAV, INV, MON and on the two choice variables CPI and DEM.

3.1.2 Specification of the independent variables

The model uses six explanatory variables, two of which are choice variables. (1) The variable GDP measures the wealth of everyone in the economy of a country deflated by inflation for a given period. The theory states that consumption is a positive function of disposable income (Keynes, 1936). This positive relationship between the consumption function and the real GDP can be expressed by a short-term consumption function of the Keynes type (1936) or a long- term consumption function of the Kuznets type (1946). From an empirical point of view, Dornbusch and Fisher (1994) find that 92 percent of consumption in the USA is explained by personal disposable income over the period 1959-1991; (2) the savings variable (SAV) is very important for the performance of an economy. According to the model of economic growth developed by Solow (1956), the savings rate is the primary determinant of a country's income level in the long term. According to Keynesian theory, households' disposable income is distributed between consumption and savings ($Y_d = C + S$). Thus, faced with the budgetary constraint, consumers will make a choice (tradeoff) between consumption and savings. In the presence of the interest rate, an increase in the interest rate, for example, will encourage savings and depress consumption according to classical theory; (3) the variable INV denotes the investment and is the most volatile component of the income. Investment and consumption according to macroeconomic theory usually move together. However, empirical evidence shows that investment is more volatile than consumption. Blanchard (2006) indicates that for the USA, and over the period 1960-2000, the relative movements of investment are between -16.2% and 12% while those in the consumption are between -4% and 3%. Also, for example, an increase in investment will cause an increase in production and therefore an increase in employment which means an increase in consumption (Ayivodji and al., 2019); (4) the money variable denoted MON measures the degree of the liquidity constraint in the economy and this constraint affects the consumption decision. The demand for money is assumed to depend on wealth, inclusive for initial financial assets. The traditional macroeconomic theory of money demand suggests that income, an indicator of economic activity and the interest rate, the opportunity cost of holding money, are the determinants of the demand for money. But for small economies such as the Franc Zone countries, such a specification may be limited and lead to erroneous conclusions dealing with domestic "patrimony" as the only substitute for money as an instrument reserve of value. This is the case of empirical studies which deal with the recent monetary policy experience of the countries of the Franc Zone. Rother (1998) shows that from 1973 to 1996 the demand for money in WAEMU countries was stable for M_1 but not stable for M_2; (5) the variable CPI is the consumer price index and it measures inflation related to the goods and services consumed by households. A high level of inflation translates into a decrease in consumption. However, in developing countries, the absence of developed financial markets and the tendency by the monetary authorities to manipulate the interest rate have led many studies to focus on the inflation rate, the opportunity cost of real cash balances (Sugimoto, 2001; Fry, 1988). Economic agents substitute real wealth (land, real estate) for real cash balances as wealth in the face of inflationary surges (Hounsou, 2017); (6) Regarding the variable DEM, which explains the democracy index, Kim (2017) finds that the types of political system affect the quality of life. Democratic political system with a 'free' market- economy (economic freedom) as well as with a higher degree of political freedom enhances the quality of life. Russet (2005) found that democracies, reflecting political freedom, are efficient in generating wealth and economic growth. Also, Kornendi and Meguire (1985), Savvides (1995) and Fosu (2008) show that strong democratic institutions are directly linked to a high quality of governance and that there is a close link between democracy and economic growth.

3.2 Estimation method

Following Hounsou (2019), this study uses the same estimation method to analyze the determinants of households' consumption through a comparative study between WAEMU and CAEMU. Hence, the use of panel data has become increasingly important in empirical studies (Baltagi, 2001; Wooldridge, 2002, and Mignon, 2004). For a group of units (countries, industries, households, etc.), panel data includes both snapshot and time series data. Therefore, panel data offers more varied information that is useful in strengthening the effectiveness of statistical tests such as unit root or cointegration tests. To test the stability of the consumption, an abundance of recent studies has relied on panel data and econometric techniques of non-stationary time series. In general, a time series is said to be non-stationary or has a unit root if the distribution of the series does not change over time. Consequently, a stationary time series leads one to believe that the future behaves like the past, at least in "probabilistic" term. Non- stationary time series produce estimators,

statistical tests, and erroneous predictions, as is the case with spurious regressions. Also, the cointegration concept stems from non- stationary time series. Hence, two series are said to be cointegrated if they are both non-stationary, but their linear combination is stationary. We briefly present these two types of tests as part of the panel data.

3.2.1 Unit Root Tests

The most commonly used unit root tests are based on the work of Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003). These two tests result from the unit root test of the Augmented Dickey-Fuller series (ADF) based on the following equation:

$$\Delta Z_{it} = \rho_i Z_{i,t-1} + \sum_{j=1}^{p} \theta_{ij} \Delta Z_{i,t-j} + \alpha_i + \varepsilon_{i,t} \qquad (2)$$

where, Z_{it} is the variable of choice, ε_{it} is the residue which is a white noise, with $i = 1, ..., N$, representing the individual elements of the panel, and $t = 1, ..., T$, the temporal dimension. The null hypothesis: H0: = 0, $\forall i$ indicates that Z_{it} is non-stationary and therefore cannot converge. On the other hand, the alternative hypothesis: H_1: <0 is that Z_{it} converges. Levin, Lin and Chu (2002) impose an identical convergence of the individual elements ($\rho_1 = \rho_2 = ... = \rho_i = \rho$), that is they converge at the same rate. On the other hand, Im, Pesaran and Shin (2003) relax the hypothesis of identical convergence, which makes it possible to envisage a heterogeneity of ρ, which can be adjusted at different levels.

3.2.2 Cointégration Tests

We use the Pedroni (1999, 2001) cointegration tests adapted to empirical panel data studies. First, Pedroni examines the characteristics of spurious regressions to suggest cointegration tests related to residual series. It proposes seven types of statistical tests divided into two categories. The first group consists of four tests based on the within (intra) dimension that analyze the intra-individual correlations of the residual series. These tests are the test-v panel, the test-ρ panel, the test-PP panel and the test-ADF. The first three tests are nonparametric and similar to the unit root test of the individual series of Phillips-Perron (1998). The last test is parametric and similar to the ADF test. The other group of tests consists of three tests based on the Between (inter) dimension to take into account inter- individual correlations of the residual series. These tests are the test-v panel, the test-ρ panel, the test-PP panel and the test-ADF. Like in the previous case, the first two tests are nonparametric whereas the last test is parametric and similar to the test of Im, Pesaran

and Chu (2003). The characteristics of these tests are as follows: the null hypothesis assumes that the residuals are non-stationary. That is to say that there is no cointegration relation between the variables used. The alternative hypothesis, on the other hand, suggests the stationarity of the residues and therefore the existence of the cointegrated relations between the variables.

3.2.3   Model estimation

To estimate the long-term equilibrium relationships of the households' consumption function (equation 1) in the Franc Zone (WAEMU and CAEMU), we use two econometric methods: the ordinary least squares method (OLS) and the fully modified ordinary least squares (FMOLS) method. In the presence of heterogeneous panels, the characteristics of these methods are as follows: the OLS method gives slope coefficients which are consistent but suffer from the problems of endogeneity of the regressors and problems of serial correlation of the residues. The alternative FMOLS method by Phillips and Hansen (1990) and Pedroni (1999) produces robust estimators regardless of the size of the sample used. Also, the FMOLS estimators are unbiased and converge asymptotically to the normal distribution, centered, and reduced. Furthermore, the method corrects the endogeneity problems of the regressors and the problems linked to autocorrelation and heteroskedasticity generally associated with panel data.

3.3 Characteristic data

The data of our study relate to the period 1990-2017. The beginning of the period (1990) indicates the beginning of the democratic experience for most of the Franc Zone countries (WAEMU and CAEMU). The end of the period (2017) is justified by the availability of recent data. The sources of our data come from the World Bank, the IMF and other specialized international institutions.

4.   EMPIRICAL RESULTS AND COMPARATIVE ANALYSIS

We use the unit root tests and cointegration tests to study the long- term relationship of the time series of panel data.

4.1 Results of unit root tests

Tables 1 and 2 contain the results of the panel unit root tests of Levin, Lin and Chu (2002) and Im, Pesaran, and Shin (2003) for WAEMU and CAEMU, respectively. The first column of the tables gives the results of the series in level and the second column illustrates the results when the series are differentiated.

Table 1: Unit Root Tests of Panel Series (WAEMU)

Series	Methods	Level	Difference
lnCON	Levin, Lin and Chu	0.1948	0.628**
	Im, Pesaran and Shin	0.73	-0.345**
lnGDP	Levin, Lin and Chu	0.475	-0.739**
	Im, Pesaran and Shin	0.835	-0.735**
lnSAV	Levin, Lin and Chu	-0.271**	
	Im, Pesaran and Shin	0.263**	
lnINV	Levin, Lin and Chu	0.562	-0.3457**
	Im, Pesaran and Shin	-0.8211	-0.842**
lnMON	Levin, Lin and Chu	0.723**	
	Im, Pesaran and Shin	0.432**	
CPI	Levin, Lin and Chu	0.6321**	
	Im, Pesaran and Shin	0.42**	
DEM	Levin, Lin and Chu	-0.392	-0.625**
	Im, Pesaran and Shin	0.734	0.4784**

The asterisk (**) indicates that the value is statistically significant at the 5% significance level.

Table 2: Unit Root Tests of Panel Series (CAEMU)

Series	Methods	Level	Difference
lnCON	Levin, Lin and Chu	0.8928	-0.528**
	Im, Pesaran and Shin	-0.272	0.772**
lnGDP	Levin, Lin and Chu	0.8215**	
	Im, Pesaran and Shin	0.845**	
lnSAV	Levin, Lin and Chu	0.5881	-0.7431**
	Im, Pesaran and Shin	0.64	-0.324**
lnINV	Levin, Lin and Chu	-0.8661**	
	Im, Pesaran and Shin	0.706**	
lnMON	Levin, Lin and Chu	0.643	0.275**
	Im, Pesaran and Shin	0.352	0.365**
CPI	Levin, Lin and Chu	0.1021	-0.861**
	Im, Pesaran and Shin	0.613	-0.493**
DEM	Levin, Lin and Chu	0.972	-0.465**
	Im, Pesaran and Shin	-0.214	-0.244**

The asterisk (**) indicates that the value is statistically significant at the 5% significance level.

The results of the unit tests are consistent with unit root tests in most macroeconomic series. Also, the results reveal characteristics that are specific to the countries of the WAEMU and CAEMU zones. In the WAEMU zone, we observe that the lnCON, lnGDP, lnINV and DEM series admit unit roots in level, but become stationary in first difference. In other words, these series are integrated of order I, I (1). The series lnSAV, lnMON and CPI have no unit root in level and so is I (0), that is, it is stationary in level. With respect to the CAEMU zone, the series lnCON, lnSAV, lnMON, CPI and DEM admit unitary roots in level, but become stationary in first difference. These series are thus integrated of order I, I (1). The series lnGDP and lnINV do not have a unit level root and therefore, I (0), meaning that they are stationary in level.

4.2 Results of cointegration tests
Tables 3 and 4 contain all the results of the cointegration tests of Pedroni (1999, 2001). Table 3 presents the results of the WAEMU households' consumption function equation, while

Table 4 presents the results related to the CAEMU zone for the households' consumption function.

Table 3: Panel Cointegration Test of Pedroni residues of Variables in WAEMU zone.

A- Panel Tests : Intra-individual (Intra)

Statistics v panel :	-0.230456
Statistics p PP of panel:	1.015672***
Statistics t PP panel :	-2.555983***
Statistics t panel ADF :	-4.046592

B- Panel Tests : Inter-Individual Dimension (Inter)

Statistics p Group PP :	2.333745***
Statistics t Group PP :	-1.564832**
Statistics t ADF Group :	-3.998457***

The asterisks (***) and (**) indicate that the values are respectively Statistically significant at the 1% and 5% level.

Table 4: Panel Cointegration Tests of Pedroni residues of Variables in the CAEMU zone.

A- Panel Tests: Intra-Individual (Intra)

Statistics v panel :	-0.312094
Statistics p PP of panel:	1.422263
Statistics t PP panel :	-3.180259***
Statistics t panel ADF :	-3.924591***

B-Panel Tests Inter-Individual Dimension (Inter)

Statistics p Group PP :	1.904873
Statistics t Group PP :	-3.476178***
Statistics t ADF Group :	-4.351762***

The asterisks (***) indicates that the values are respectively statistically significant at the 1% level.

In general, the results of the Tables 3 and 4 are coherent and lead to the conclusion that there is a cointegration relationship between the variables used. More specifically, concerning the WAEMU zone, five out of seven Pedroni tests (1999, 2001) are significant. This is also the case for the CAEMU zone where four out of seven tests are significant.

From the cointegration relationships of the households' consumption function, we can present the results resulting from the estimation of this function using the OLS and FMOLS estimators.

4.3 comparative analysis of empirical results

Table 5: Results of the model regression for WAEMU zone

Variables	OLS	FMOLS
lnGDP	0.2720677	1.000617***
	(0.91)	(10.84169)
lnSAV	-0.905737**	-0.062107
	(-2.21)	(-1.266998)
lnINV	0.2313711***	0.095756**
	(4.22)	(2.720817)

lnMON	-0.223806**	-0.041263
	(2.16)	(-0.558460)
CPI	-0.018429	-0.132274**
	(-0.50)	(-3.477233)
DEM	-0.076530**	0.064988**
	(-2.47)	(3.242378)
Time effects	*Yes*	*Yes*
Effects of heterogeneity	*Yes*	*Yes*
R^2-*adjusted*	*0.964*	*0.988*

The asterisks (***), and (**) indicate that the values are respectively statistically significant at the 1% and 5% level. Regressions have individual fixed effects that are not reported in the table.

Table 6: Results of the model regression for the CAEMU zone.

Variables	OLS	FMOLS
lnGDP	-0.6616984***	-0.516264***
	(-8.80)	(-13.61957)
lnSAV	0.343187***	0.320751***
	(4.16)	(4.451363)
lnINV	0.7056391***	0.753529***
	(4.18)	(5.199087)
lnMON	-0.0457814	0.150874
	(-0.29)	(1.387665)
CPI	0.0440656	-0.159002**
	(0.41)	(7.199455)
DEM	-1.31^{E}-08***	-1.64^{E}-08***
	(-3.50)	(5.532195)
Time effects	*Yes*	*Yes*
Effects of heterogeneity	*Yes*	*Yes*
R2-adjusted	*0.999*	*0.973*

The asterisks (***) and (**) indicate that the values are respectively statistically significant at the 1% and 5% level. Regressions have individual fixed effects that are not reported in the table Tables 5 and 6 summarize the results of the households' consumption function specifications for the WAEMU and CAEMU zones, respectively. We can observe that for the WAEMU zone, the signs of the estimated coefficients are for the most part consistent in a sense anticipated by the economic theory, especially the results from the FMOLS method. However, in the case of the

CAEMU zone, the results obtained from both methods are mixed. The significance of the coefficients by the student-t test is robust at the 1% and 5% thresholds. Similarly, the very high adjusted coefficient of determination exhibited by the model and the F-statistical tests indicate that the various specifications are very good for the two zones. In fact, the higher adjusted R^2 shows that the set of independent variables selected explain the most the households' consumption function in the WAEMU and CAEMU zones for the period of the study (Theil, 1957). However, the high values closed to the unit for the adjusted coefficients of determination for the model in the two zones are questionable at first glance given that the developing countries, mainly the Franc Zone countries, are not rich in data (Honohan, 1992) and also the model may be "capitalizing on chance" (Mayer, 1975; Bacon, 1977).

Thus, at the WAEMU zone level and for the OLS method, the variables that best explain the households' consumption function in the order of importance are: the investment, the savings, the money and the democratic index. Concerning the FMOLS method the order of importance is: the real GDP, the CPI, the investment and the democratic index. For the CAEMU zone and with respect to the OLS estimator, the variables that best explain the households' consumption function in order of importance are: the investment, the real GDP, the savings and the democratic index. About the FMOLS estimator, the order of importance is: the investment, the real GDP, the savings, the democratic index and the CPI. From these observations we notice that the FMOLS estimator at the level of the two zones presents more robust results than the OLS estimator. This remark is not surprising because by definition, the OLS method confers slope coefficients which are consistent but suffers from problems of endogeneity of the regressors and problems of serial correlation of the residues, while the FMOLS method corrects the problems of endogeneity of the regressors and the problems related to the autocorrelation and heteroskedasticity generally associated with the panel data.

These findings are similar to the results obtained when comparing the determinants of private investment in WAEMU and CAEMU zones (Hounsou, 2019). Also, these empirical results confirm the macroeconomic theory which stipulates that the consumption and the investment usually move together and that the investment is more volatile than the consumption (Blanchard, 2006).In fact, for example, we observe that for the CAEMU zone, the elasticities of the investment variable are important for both the OLS and the FMOLS method, meaning that a 10% increase in investment leads to more than 7% increase in consumption. With regard to the real GDP, in the case of the WAEMU zone, the coefficients are positively signed for the two estimators, whereas for the CAEMU zone this is not the case. For the WAEMU, the coefficient by the FMOLS is greater than 1, indicating a strong positive relationship between

consumption and revenue (Alper, 2018; Kim, 2017). However, the coefficient is not significant for the OLS estimator, suggesting that the FMOLS estimator is more robust than the OLS estimator. As for the savings, for the CAEMU zone, the coefficients are significant at the 1% threshold and are positively signed for both the OLS and the FMOLS estimators, whereas in the case of the WAEMU zone, the coefficients are negatively signed for the two estimators but significant for the OLS estimator at the 5% level. In other words, an increase in savings will encourage consumption in the CAEMU zone and discourage consumption in the WAEMU zone. The answer to these conflicting results would reside in the differences in the fiscal policies in these two zones even though the monetary policy based on agreements with France is quite different in practice: the Bank of Central African States (BEAC) monetary policy is oriented to the rediscount ceilings, while that of the Central Bank of West African States (BCEAO) is directed towards a global completion and sectorial financing orientation. As such, fiscal policy through budget constraint could lead to a tradeoff between consumption and saving and monetary policy expressed by an increase in the interest rate could encourage saving and discourage consumption. With respect to the variable DEM in the WAEMU zone, the sign for the coefficient is positive for the FMOLS estimator and negative for the OLS estimator, but the coefficients are significant at the 5% level. On the other hand, in the CAEMU zone, the coefficients are negatively signed for the two estimators and significant at the 1% level. The positive sign of the coefficient of the democratic index shows that this variable is a determinant of the social welfare and the positive correlation between the variables consumption and democracy means that overtime, households in the WAEMU countries can be more confident in the institutions and affect more of their revenue to consumption. However, the elasticities of the coefficients is too low, indicating that the regimes of the WAEMU and the CAEMU countries remain less democratic with a small advantage to the WAEMU zone. As for the variable CPI, we expect a negative relationship between the variable and consumption. The results show that only the WAEMU zone respects this relationship for both estimators, but with no significance for the OLS estimator. In the CAEMU zone, only the FMOLS estimator is negatively signed and significant. Moreover, we observe low semi-elasticities for the CPI variable. We should expect such results in the context of the Franc Zone where the discipline of monetary policy makes inflation a negligible concern (Hounsou, 2017). Finally, the variable MON is not significant in the CAEMU zone, but significant at the 5% level for the OLS estimator in the WAEMU zone. These results are not surprising. In fact, from a theoretical standpoint, monetary policy is in general ineffective in a fixed exchange rate regime. In the case of the Franc Zone, for a long time, the instruments of monetary policy were direct making the

performance of the interventions poor (Bourdin, 1980; Tchundjand, 1980; Koulibaly, 1992; Nguessan, 1996 and Parmentier and Tenconi, 1996).

5. DISCUSSION AND CONCLUSION

This study was intended to conduct a comparative analysis of the determinants of the households' consumption function in the WAEMU and CAEMU countries. The study uses panel data covering the period 1990- 2017. The function of consumption retained concerns opened countries with four traditional explanatory variables that are the real GDP, the savings, the investment and the money. The two variables of choice are the CPI and the democratic index. The main econometric results are presented as follows: At the CAEMU level, the variables lnGDP and lnINV are stationary in level, that is I(0), while the variables llnCON, lnSAV, lnMON, CPI and DEM are non- stationary in level meaning that those series are integrated of order I, I(1). For the WAEMU, the series lnSAV, lnMON and CPI are stationary in level and the series lnCON, lnGDP, lnINV and DEM are non- stationary in level. Based on the results of the cointegration, there is a cointegration relationship between the variables of the model. In general, the empirical results based on the FMOLS estimator are more consistent than those obtained by the OLS estimator. In the WAEMU zone, the signs of the estimated coefficients are mostly consistent with economic theory, but those signs are mixed for the CAEMU zone. The coefficients themselves are statistically significant at least at the conventional level of 5%, except for the explanatory variable lnMON which is not at all significant for the CAEMU zone. The adjusted coefficients of determination reinforce the significant effect of the independent variables on the dependent variable. In other words, the real GDP, the savings, the investment the CPI and the democratic index variables significantly impact the households' consumption in the Franc Zone over the period 1990- 2017. Based on the FMOLS, the variables that best explain the households' consumption function in order of importance in the CAEMU zone are the investment, the real GDP (in absolute terms), the savings, the democratic index and the CPI. In the WAEMU zone, the order of importance is the real GDP, the CPI, the investment and the democratic index. We can note that the FMOLS estimator results are better in the CAEMU zone than in the WAEMU zone. We can also remark that the investment, savings and the real GDP variables influence the most the consumption, which in line with the macroeconomic theory. In fact, from the theoretical standpoint, income is clearly the most important determinant of consumption. Savings and income are closely related to each other. Savings as a proxy (substitute) to wealth is an important determinant of consumption according to the life cycle hypothesis. Lastly, investment and consumption move usually move together even though investment is much more volatile than consumption (Keynes, 1936; Friedman, 1957; Ando and Modigliani, 1963; Blanchard, 2006).

This study presents many advantages: (1) unlike empirical studies based on time series, which are limited only to countries that are rich in data from the Franc Zone and which sometimes offer only ambiguous conclusions, the panel data approach here has advantages for our analysis. It treats the Franc Zone in its specificity where member countries are subject to common factors specific to the Zone. Moreover, it provides robust statistical tests that attest to the usefulness and effectiveness of the econometric analysis of panel data of non-stationary variables in the institutional framework of the Franc Zone; (2) like in the case of the comparative analysis of the determinants of private investment in WAEMU and CAEMU zones, the FMOLS estimator is more robust than the OLS estimator; (3) the number of variables that best explain the function of households' consumption in the CAEMU zone is greater than the one in the WAEMU zone; (4) the study shows that the empirical results are in accordance with the macroeconomic theory, mainly with regard to the traditional explanatory variables.

One shortcoming to the study concerns the stability of the estimates at the disaggregated level of the WAEMU and the CAEMU consumption sub- areas. Finally, like Kim (2017), many other explanatory variables could be added to the model to see their influences on the households' consumption function in the Franc Zone. Future research could be devoted to these areas.

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