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Abstract

This paper investigates the effect of interest rates on private consumption in the West African Economic and Monetary Union (WAEMU). After checking for unit root and co-integration, Error Correction Model is specified and three estimators are performed: Mean Group, Pooled Mean Group and Dynamic Fixed-Effects. Hausman tests indicate that the Dynamic Fixed-Effects estimator is more efficient and consistent than others. Results suggest that, there is no statistical evidence, both in short-run and long-run, impact of real and nominal saving interest rates on private consumption in the WAEMU region, from 2006 to 2014. These finds imply that, neither substitution effect, nor income effect, operate in this zone. However, the paper finds that, the growth of private consumption is strongly depends positively, in the long-run, on the gross national disposable income and the credit to private sector ratio. The long-run income elasticity and semi-elasticity of liquidity constraints are statistically significant and average to 0.92 and 0.0085, respectively. These finds imply that, there is a need for more proper financial market development and financial education policies implementation to have negative and significant impact of interest rates on private consumption in the WAEMU zone.

Keywords: Private Consumption, Interest Rates, WAEMU, Pooled Mean Group, Mean Group, Dynamic Fixed-Effects Estimator

JEL Code: C33, E21, F15

1. - Introduction

The relation between real interest rates and private consumption has been widely debated in the economic literature. In general, standards models of private consumption indicate that households will tend to smooth consumption over time according to the evolution of real interest rates. A higher interest rates make current consumption more costly than future consumption (*substitution effect*) and causes private consumption to decrease. But, higher real interest rates also make it possible to enjoy more future consumption without decreasing current consumption (*income effect*). The final effect is ambiguous and depends on the relative magnitudes of the substitution effect and the income effect.

McKinnon (1973) and Shaw (1973) have developed theoretical framework in favor of financial liberalization as a way to promote saving and hence growth. This framework is based on assumption that the negative substitution effect dominates the positive income effect in developing countries.

Since the theory provides an ambiguous answer, it is necessary to empirically determine which effect dominates in order to know whether interest rates will always have a negative effect on private consumption. Thus, empirical literature on the effect of interest rates on private consumption in developing countries has produced very little consensus, and predictions are ambiguous as those made by the theory (Khatkhate, 1988; Arrieta, 1988). In addition, the results often seem to depend on the particular data sets, sample choices, and specifications.

Giovannini (1985), Bordes and al. (1995), and Loayza et al. (2000) point the negative effect of real interest rates on private consumption in developing countries. Modigliani and Caa (2004), and Blanchard and Giavazzi (2006) reach the same results in the context of China.

On the other hand, Reinhart and Ostry (1995) find that consumption is not very responsive to fluctuations in real interest rates. Gleizer (2013) assesses that, policies to strengthen national and private savings, by increasing the real interest rates, was not any occur in Brazil, because there was not any significant relation between these variables from 1960 to 1985.

Wilcox (1990) argues that interest rates have powerful effects on consumption, but they operate through nominal, not real interest rates.

In recent years, private consumption increased in the West African Economic and Monetary Union (WAEMU) in the context of real interest rates progressing. While private consumption average 4.0 percents over 1997-2005, it rose to an average of 5.6 percents over 2006-15. At the same time, 2006-15, real interest rates, both creditor and debtor, progressed from 2.44 percents and 5.52 percents in 2005 to 4.15 percents and 6.0 percents in 2015, respectively.

These stylized facts raise questions about the empirical relationship between interest rates and private consumption in the WAEMU zone: Does income effect more dominant substitution effect in this zone? Or it is nominal, not real interest rates that most influence consumer spending and saving in this region?

This paper is the first focusing on the analysis of interest rates effect on private consumption in the WAEMU region. It's also the first proxying the disposable income with the gross national disposable income among the empirical private consumption function works on developing countries. This study should be useful, not only for researchers, due to his empirical approach in the WAEMU context, but also for policymakers in providing knowledge about designing policies for saving or consumption promotion.

The rest of the paper is organized as follows. Next section offers an overview of the empirical framework. Section three presents results, discussion, and an analysis of the robustness. Concluding remarks and policy implications are provided in the final section.

2. - Methodology and Data

2.1. - Model Specification

To facilitate comparison to recognize econometric specifications, we adopt a fairly standard empirical model of private consumption. A standard representation of that private consumption function is:

$$C_{i,t} = \theta_{0t} + \alpha_i IR_{i,t} + \beta_i X_{i,t} + \mu_i + \varepsilon_{i,t} \qquad (1)$$

Where $C_{i,t}$ represents the real private consumption per capita of country i in time t, IR is the real saving interest rates (computed by subtracting inflation rate from nominal saving interest rate). X is a set of control variables, informed by both theory and empirical evidence, such as real Gross National Disposable Income per capita (GNDI), as a proxy of disposable income; and Financial Development (FD), measured by domestic credit to private sector as share of Gross Domestic Product (GDP), proxy for liquidity constraints.

2.2. - Data Description and Pre Diagnostic Tests

The data set of real private consumption, real interest rates, and control variables consist of annual observations, from 2006 to 2014, and cover seven member countries of the WAEMU region: Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal, and Togo. Guinea-Bissau is excluded, due to data unavailability. Real private consumption, real interest rates, real gross national disposable income, and credit to private sector as share of GDP have been gained from the Central Bank of West African States database, while population were obtained from the data set of "Perspective Monde website" (See Appendix A for details of the construction, definition and sources of each variable).

As a common wisdom in panel data analysis, econometric methodology involves a battery of pre and post diagnostic tests, checking for unit root and co-integration. The results of panel unit root tests of Levin, Lin and Chu (2002); Im, Pesaran and Shin (2003); and Maddala and Wu (1999), and Choi (2001), indicate that, private consumption and interest rates are stationary in level, while gross national disposable income, and credit to private sector ratio are stationary in first difference (See Appendix B). In addition, Westerlund (2007) tests largely conclude that the null hypotheses of no co-integration are rejected for gross national disposable income (See Appendix C).

2.3. - Estimation Techniques

This feature of data implies an Error Correction Model Specification in which the short-run dynamics of the variables in the system are influenced by the deviation from equilibrium. Thus, the equation (1) is become as follows.

$$\Delta C_{i,t} = a_{0,i}\left(C_{i,t-1} - \theta_{0t} - \mu_i - \alpha_i IR_{i,t} - \beta_i X_{i,t}\right) + \gamma_i \Delta IR_{i,t} + \delta_i \Delta X_{i,t} + \varepsilon_{i,t} \qquad (2)$$

The parameter $a_{0,i}$ is the error-correcting speed of adjustment term. If $a_{0,1} = 0$, then there would be no evidence for the long-run relationship. This parameter is expected to be significantly negative under the prior assumption that the variables show a return to a long-run equilibrium.

Most aggregate consumption theories indicate that the long-run income elasticity should be equal to one, and the liquidity constraints effect is generally positive.

The recent literature on dynamic heterogeneous panel estimation, in which both N and T are large, with a co-integration mixed of I (0) and I (1) variables, suggests several approaches to estimate equation (2) (See Blackburne and Frank (2007) for more details).

On one extreme, a Dynamic Fixed-Effects (DFE) estimation approach could be used in which the time-series data for each country are pooled and only the intercepts are allowed to differ across countries. If the slope coefficients are in fact not identical, however, the DFE approach produces inconsistent and potentially misleading results. On the other extreme, the model could be fitted separately for each country, and a simple arithmetic average of the coefficients could be calculated. This is the Mean Group (MG), estimator proposed by Pesaran and Smith (1995). With this estimator, the intercepts, slope coefficients, and error variances are all allowed to differ across country.

More recently, Pesaran, Shin, and Smith (1997, 1999) have proposed a Pooled Mean Group (PMG) estimator that combines both pooling and averaging. This intermediate estimator allows the intercept, short-run coefficients, and error variances to differ across the countries (as would the MG estimator) but constrains the long-run coefficients to be equal across countries (as would the DFE estimator). Hausman specification test is performed to obtain the estimator that is efficient and consistent according to the data feature.

3. - Results, Analysis and Discussion

Results indicate that the Pooled Mean Group estimator, the efficient estimator under the null hypothesis, is preferred to Mean Group estimator. The calculated Hausman statistic is 0.94 and is distributed Chi2. But, it also confirms that, the Dynamic Fixed-Effects estimator is more efficient and consistent than the Pooled Mean Group estimator, according to Hausman test, checking for endogeneity between the error term and the lagged dependent variable. The calculated Hausman statistic is 18,213.86 with a corresponding p-value of zero. In addition, residuals of the models are checked and the skewness and kurtosis suggest normally distributed residuals.

The Dynamic Fixed-Effects results suggest that, there is no statistical evidence, both in short-run and long-run, impact of real and nominal saving interest rates on private consumption in the WAEMU region. This implies that neither substitution effect, nor income effect, operate in this zone, from 2006 to 2014, and reflect that, raising real interest rates is necessary, but not sufficient to increase private saving, and thus provide the resources for growth in the WAEMU countries. This implies also that, financial liberalization may not be sufficient to catalyze higher saving rates. Other reforms should be initiated. These results could be explained by the fact that, the private sector in these countries lives at subsistence level, the financial market is less developed and the lack in financial education of the population.

The results indicate moreover that, the growth of private consumption is found to strongly depend positively, in the long-run, on the gross national disposable income and the credit to private sector ratio. The long-run income elasticity and semi-elasticity of liquidity constraints are statistically significant and average to 0.92 and 0.0085, respectively. These finds imply that a 10 percentage points increase in gross national disposable income may rise in overall 9.2 percentage of private consumption. Furthermore, when the liquidity constraints is loss of 10 percentage points, private consumption will increase approximately 0.085 percent.

The error correction term, the adjustment coefficient, has a negative and statistically significant value (-0.86). This infers that the model is dynamically stable, and private consumption in the WAEMU region takes less than nine months to adjust back to equilibrium after a shock to any of its determinants.

Table 1: Long-Run and Short-Run Dynamic Fixed-Effects Estimation in The WAEMU

VARIABLES	MODEL 1	MODEL 2	MODEL 3
D.GNDI	0.485	0.474	0.437
	(0.602)	(0.578)	(0.628)
D.FD	-0.00522	-0.00630	-0.00789
	(0.00796)	(0.00868)	(0.00872)
D.RSIR		0.00407	
		(0.00380)	
D.NSIR			0.0421
			(0.0303)
EC	-0.860***	-0.853***	-0.858***
	(0.161)	(0.150)	(0.161)
GNDI	0.885***	0.930***	0.955***
	(0.211)	(0.241)	(0.235)
FD	0.00772***	0.00896***	0.00887***
	(0.00275)	(0.00329)	(0.00286)
RSIR		-0.00540	
		(0.00429)	
NSIR			-0.0285
			(0.0211)
Constant	-2.640	-2.324	-2.048
	(1.714)	(1.876)	(1.832)

Source: Author

Note: Robust standard errors (in parenthesis) and cluster the standard errors at country level *** p<0.01, ** p<0.05, * p<0.1

4. - Conclusion and Policy Implications

Liberalization policies to promote saving and economic growth in developing countries are based on assumption that, the negative substitution effect of saving interest rates rising dominates the positive income effect in these countries.

This paper investigates the relation between interest rates and the private consumption in the WAEMU zone, and indicates that there is no statistical evidence, both in short-run and long-run impact, of real and nominal saving interest rates on private consumption in this region from 2006 to 2014. However, the paper finds that, the growth of private consumption is strongly depends positively, in the long-run, on the gross national disposable income and the credit to private sector ratio.

These finds imply that, there is a need for more proper financial market development and financial education policies implementation to have negative and significant impact of saving interest rates on private consumption in the WAEMU zone.

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Appendix

Appendix A: Definitions and Sources of Variables

Variables	Definitions	Sources
Real Private Consumption per capita	C = Ln (Final Private Consumption at Constant Price (Base = 2008) / Population)	BCEAO Data Base, Eden
Gross National Disposable Income per capita	GNDI = Ln ((Gross Domestic Product + Primary Income Balance + Secondary Income Balance) / Deflator / Population)	BCEAO Data Base, Eden, and Balance of Payment Reports
Financial Development	FD = Credit to Private Sector / GDP	
Nominal Saving Interest Rate	NSIR = Annual Average Saving Interest Rate	BCEAO Data Base Eden
Real Saving Interest Rate	RSIR = (Annual Average Saving Interest Rate – Inflation Interest Rate)	
Population		Perspective Monde, Canada

Source: Author

Appendix B: Summary Results of Panel Unit Root Tests

	Levin, Lin and Chu	Im, Pesaran and Shin	Maddala and Wu
C, level with trend	-16.79***	-1.56**	21.37***
GNDI, first difference	-7.32***	-1.74***	16.77***
FD, first difference with trend	-7.26***	-2.93***	10.01***
NSIR, level with trend	-7.43***	-2.09**	4.32***
RSIR, level	-4.34***	-2.52***	2.44***

Source: Author

Notes: ***, **, and * indicate that the statistic is statistically significant at the 1%, 5%, and 10% levels, respectively. The null hypothesis of stationarity tests are = Non stationarity.

Appendix C: Westerlund Error Correction based Panel Cointegration Tests

Variables	Private Consumption, C			
	Gt	Ga	Pt	Pa
GNDI	-4.18***	-3.52	-4.77***	-3.64***
FD	-0.91	-0.13	0.38	0.03
RSIR	-0.74	-0.02	-0.99	-0.01
NSIR	0.11	0.07	-0.11	-0.01

Source: Author

Notes: ***, **, and * indicate that the statistic is statistically significant at the 1%, 5%, and 10% levels, respectively. The null hypothesis of Westerlund test is = Non-cointegration.

Appendix D: Hausman's modele Specification Tests, Optimal Estimator

	MG vs PMG	DFE vs PMG
Chi2 Statistic	0.94	18213.86***
P-value	0.81	0.00

Source: Author

Notes: ***, **, and * indicate that the statistic is statistically significant at the 1%, 5%, and 10% levels, respectively. Pooled Mean Group estimator is preferred than Mean Group estimator. But, Dynamic Fixed-Effects estimator is efficient and consistent than Pooled Mean Group estimator.