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# The Main Determinants of Private Investment in The WAEMU Zone: The Dynamic Approach

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## Abstract

This article investigates the main determinants of private investment 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: Dynamic Fixed-Effects, Mean Group, and Pooled Mean Group. Hausman tests show that the Dynamic Fixed-Effects Estimator is more efficient and consistent than others. Results suggest that, in the short-run, private investment in the WAEMU zone is determined by the aggregate demand conditions: gross domestic product and output gap, while, in the long-run, it is determined by gross domestic product, and political stability. The short-run elasticity of gross domestic product and output gap are statistically significant and average to 5.7 and 0.06, respectively. The long-run elasticity of gross domestic product and the semi-elasticity of political stability are statistically significant and average to 2.4 and -0.25, respectively. These finds imply that, to promote private investment in the WAEMU zone, there is a need among others for more proper design and implementation of aggregate demand management policies, and political framework stability.

**Keywords:** Private Investment, WAEMU, Dynamic Fixed-Effects Estimator.

**JEL Code :** C33, E21, F15.

## 1. - Introduction

In recent years, the West African Economic and Monetary Union (WAEMU) has experienced rapid economic growth compared to the average of African countries. While economic growth average 3.5 percent over 2000-09, it rose to an average of 5.0 percent over 2010-15 in this region. However, African countries economic growth are estimated to an average of 4.4 percent over 2010-15. This economic progress in the WAEMU zone is essentially by public investment, especially in basic economics infrastructures. The aim, according to policymakers' views, is to create conditions for private investment development and more sustainable economic growth.

It is widely recognized that public investment are not enough to address sustainable economic growth challenges in developing countries. Thus, private investment are required (United Nations, 2002). These are necessary to complete public investment. Private investment is therefore, as policymakers of this region pointed out, an essential ingredient for sustainable economic and pro-poor growth (White, 2005).

In addition, the African Development Bank believes that to facing the challenges of economic progress, African countries must raise their domestic investment to at least 35 percent of Gross Domestic Product (GDP), of which 23 percent private investment (AfDB, 2013). Thus, private sector development is one of its priorities. In the WAEMU, initiatives of African Development Bank are also complemented by those of the West African Development Bank.

However, countries in this region are struggling to exceed the required threshold of 23 percent domestic private investment.

During 2010-15, private investment in the WAEMU increased from 15.1 percent of GDP to 16.9 percent, while in the period 2000-09, it increased from 11.9 percent of GDP to 13.7 percent in 2009. Despite that, private investment is essential for sustainable economic growth that will help make real inroads into reducing poverty, there is little research on the main determinants of private investment in this zone.

Of course, economic literature has been widely debated on this subject. In general, theoretical models show that private investment would positively relate among others to expected GDP growth, capacity use, fiscal incentives, and would negatively affect by real interest rates, output gap, inflation, exchange rate, and political and economic volatility (Guimaraes and Unterberdoerster, 2006; and Roache, 2006). The empirical literature, however, reveals other factors that are specific to regions, context and data futures.

Existing studies on the area are limited to the determinants of foreign direct investment (Koukpo, 2005; Dje, 2007) or those of the private capital inflows (Kinda, 2008) or on the case of one member country (Dramani and Laye, 2008; Ouattara, 2004). Moreover, to our knowledge, there is only one study (Mbaye, 2006) that has dealt with this subject on the WAEMU.

But it, however, suffers from a methodological problem as the most of work on developing countries using panel data. As it has recently been demonstrated in the econometric literature, panel data analysis, in which both cross-sectional and time dimensions are large, present non-stationary and co-integration variables and pointed out the spurious regression problem. New estimators were then developed to correct this bias and to find both short-run and long-run relationships.

Moreover, Mbaye's study also failed to explore certain determinants highlighted recently by the theoretical models, including economic and political volatility.

In this article, we extend the literature on the private investment determinants in developing countries by exploring both short-run and long-run factors in the WAEMU region, and by using recent estimators developed in the econometric literature. The purpose is to offer a better understanding of the private sector investments in this region.

The rest of this paper is organized as follows. Next section offers an overview of the theoretical and empirical literature. Section three expose the methodological approach and section four presents results, discussion, and an analysis of the robustness. Concluding remarks and policy implications are provided in the last section.

## **2. - Overview of the literature**

Private investment behavior has been widely debated in the economic literature, as well as theoretical works and empirical studies for a variety of countries.

### *2.1. - Theory*

Theoretical models indicate that private investment, which comprises residential, non-residential investment by corporations, and inventories, will determine among others by real interest rates, cost of factors production and competitiveness, expected market-specific, aggregate demand conditions, and political volatility.

#### *2.1.1. - Real interest rates*

Neoclassical theory of investment, as first formalized by Jorgenson (1963), suggests that private investment has been negatively affected by real interest rates. For example, if interest rates high then it makes it expensive for entrepreneurs to borrow to invest. Thus, investment is relatively less attractive because the difference between the marginal return on investment and the marginal cost of capital reduces.

McKinnon (1973) and Shaw (1973), known as financial liberalization theory advocates, find the opposite effect. These authors suggest that an increase in real interest rates has a positive effect on the volume and the investment quality (Lugo, 2008) because it stimulates saving and rule out investment projects with low productivity. But there is good reason to believe, however, that, in many developing countries such a flexible response of supply in the short-run may be impossible because of bottlenecks in the supply of certain factors of production, such as skilled labor, that are essential complements to increase investment (International Monetary Fund, 1983).

In the new consensus in macroeconomic about interest rates behavior, or the so-called new Keynesian economics (Woodford, 2003; Bank of England, 2005), there is no link between real interest rate and private investment in the long-term. The real interest rate is an equilibrium and this rate is often seen to correspond to what is called the Wicksellian (1898) “natural rate” of interest rate. The equilibrium real interest rate secures output at the supply equilibrium level (zero output gap) with consistent inflation (Arestis, 2009). In the short-run, however, there is a link between real interest rate, private investment and output due to the discrepancy between actual and equilibrium rate of interest rate.

### *2.1.2. - Cost of factors production and competitiveness*

The cost and productivity of factors production and competitiveness, as the determinants of private investment, operate through three main channels: real exchange rate variability, capital good and intermediate goods, such as: oil, electricity or water, and other inputs of production such as wages. In general, if the cost of factors production increases, the marginal cost of investment will rise, and the capital stock desire will decrease and investments as well.

Theoretical models show that exchange rate volatility is positively related to private investment because it raises the expected profitability of capital, increases the desired capital stock and boosts the level of investment (Hartman, 1972). But if the volatility raises profitability of all investment projects, it makes their ranking uncertain (Bernanke, 1983).

Besides these aspects, fiscal and monetary infrastructures, such as, credit rating, and macroeconomic stability, such as less variability of government consumption, nominal money growth, and real exchange, are also positively related to private investment. Macroeconomic stability signs that the economy can support private investment because it reduces the risk of investment and promotes investment, in particular the long-run investment (Manyong and al., 2005). As the long-run private investment is largely irreversible, private investors will be unwilling to commit large expenditure to long-term fixed investment when there is economic volatility.

Recently, Pischke (2005) suggest that, if firm can increase worker productivity through investments in capital or training and claim the resulting rents, the increase in wage costs induces an increase in fixed capital investments.

### *2.1.3. - Expected market-specific and aggregate demand conditions*

Market size has been identified in the literature as an important determinant of private investment. Theoretically, the larger the market size, the higher the demand for more goods and services and the desire to capital stock progresses and investment due to the induced scale effect on the profitability.

Openness to international trade is also an important aspect of market-specific because the more open an economy, the more it attracts foreign private investment in international tradable goods due to the potential for participation in internal trade.

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### *2.1.4. - Political volatility*

Theory indicates the positive link relationship between political stability and private investment. Serven (2003) suggests that this relationship is based on the assumption that one part of private investment, for example, long-run investment or fixed investment, is irreversible. This irreversibility of investment may be subject to a credibility problem whereby a government has an incentive to change taxes or regulations ex post with the

knowledge that investors can not easily withdraw (Stasavage, 2000). One way of illustrating this is with the well-known time-consistency problem in capital taxation. Given that capital investment decisions often involve a high degree of irreversibility, governments can face incentives to raise capital taxes ex post.

The positive relationship between political stability and private investment assumes then that private investors avoid imperfect competition and decreasing to scale (Dixit and Pindyck, 1993).

Since theory pointed out political stability importance in the private investment process, it has produced very little consensus on the measures of political instability. Political instability can be measured by the frequency of revolutions, coups, or wars (Mankiw and al., 1995). It can also be computed by frequent regime changes, or political uncertainty and violence (Person and Tabellini, 2006) or by political freedom and index of democracy (Fend, 2001).

## *2.2. - Empirical evidence*

Most empirical studies about the determinants of private investment confirmed theoretical predictions. Some works, however, find contrary effects while others show mixed effects.

With regard to the real interest rate, Ghura and Goodwin (2000) suggest that, in developing countries, such as Asia, Sub-Saharan Africa, and Latin America, from 1975 to 1992, private investment is stimulated by declines in real interest rates. Greene and Villanueva (1991) find the same results in developing countries, from 1975 to 1987, while Khurshid (2015) indicates that interest rate has negative relation in the long-run but positive in the short-run on private investment in Jiangsu Province of China from 2003 to 2012.

On the other hand, Athukorala (1998) confirms financial liberalization school of thought theory. He demonstrates through an empirical inquiry into the interest rate, saving, and investment nexus in the Indian economy, from 1955 to 1995, that higher real interest rates seem to promote both financial and total savings, and stimulate private investment. Munir and al. (2010) find the same results in Pakistan during 1973 to 2007, supporting complementarity hypothesis of Mckinnon-Shaw (1973).

Osundina and al. (2014) find no strong empirical evidence that there is a link between interest rate and investment decision in Nigeria.

Others studies emphasized that the availability and not the cost of finance represents the major constraint to private investment (Wai and Wond, 1982).

Concerning the real exchange rate, Dhakal and al. (2010) suggest that exchange rate volatility has a favorable effect on private investment through foreign direct investment in China, Indonesia, Malaysia, Philippines, South Korea, and Thailand, countries that have continued to attract considerable foreign direct investment. Results are consistent with theoretical predictions.

Serven (2003) finds, however, that it has a strong negative effect on investment, after controlling for other standard investment determinants and taking into account their potential endogeneity. In addition, he indicates that there is some evidence of threshold effects, so that uncertainty only matters when it exceeds some critical level. In addition, the negative effect of real exchange rate uncertainty on investment is much larger in economies that are highly open and in those with less developed financial systems.

About other inputs of production such as wages, Cuong (2013) employs a difference-in-difference method with propensity score matching and finds no statistically significant effect on firm profits in Vietnam after a minimum wage hike of about 20 percent in 2015, while Rama (2001) suggests that an increase in wages by, for example, doubling the minimum wage, has led to a decrease in employment of 2 percent and 5 percent decrease in investment in the Indonesia.

As for the effect of macroeconomic stability, constructing an index of macroeconomic volatility that is a weighted average of three indicators: government consumption, nominal money growth, and real exchange rate, proxying for fiscal, monetary and external volatility, respectively, Aizenman and Marion (1998) find a significant correlation between macroeconomic stability and private investment in developing countries.

If empirical research demonstrates that the macroeconomic stability promotes private investment through the confident channel, it also finds that political stability is an important aspect. Guillaumont and al. (1999) have shown that political instability is a key variable to explain the systematic under-performance of African countries from 1970 to 1990. In the Middle East and North Africa region, Zouhaier and Kefi (2012) find no effect exerted by political instability on private investment and economic growth, but they, however, indicate a negative interaction between political instability and investment from 2000 to 2009..

### 3. - Methodology and Data

#### 3.1. - Model Specification

Historically, studies addressing the determinants of private investments in developing countries have treated internal country-specific factors, external factors and policy management factors as we discuss in the above. McNabb and LeMay-Boucher (2014) pointed out that estimation of most economics models requires heterogeneous coefficients, in particular the studies addressing development economics. According to this evolution in the literature, our private investment equation is assumed to take the following representation:

$$\begin{aligned} y_{i,t} &= \beta_i x_{i,t} + \mu_{i,t} \\ \mu_{i,t} &= \alpha_i f_t + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The heterogeneous coefficients are randomly distributed around a common mean,  $\beta_i = \beta + v_i$ ,  $v_i$  is independent and identically distributed (i.i.d) with mean zero and finite variance  $\sigma^2$ .  $f_t$  is an unobserved common factors and  $\alpha_i$  a heterogeneous factor.

$Y_{i,t}$  represents the private investment ( $Ip_{i,t}$ ) of country  $i$  in time  $t$ .  $X_{i,t}$ , potentials determinants such as public investment ( $Ig$ ), real gross domestic product (GDP), output gap (GapGDP), real interest rate (R), inflation rate (INFL), domestic credit to private sector (CRED), government consumption (GOUV), terms of trade (TOT), degree of openness to international trade (OUV), and political stability (POLs).

$Ip$ ,  $Ig$ , GDP, CRED, GOUV, are treated in logarithm form. Thus, their coefficients represent public investment, gross domestic product, domestic credit to private sector, government consumption elasticities to private investment, respectively, while others coefficients capture the semi-elasticities of output gap, real interest rate, inflation, terms of trade, degree of openness to international trade, and political stability.

### 3.2 - Data Description and Pre Diagnostic Tests

The data set consist of annual observations, from 1995 to 2014, and cover seven member countries of the WAEMU region: Benin, Burkina Faso, Ivory Coast, Mali, Niger, Senegal, and Togo. Guinea-Bissau is excluded, due to data unavailability. Real interest rate have been gained from the Central Bank of West African States database, political stability, from the Global Economy database while others data were obtained from the data set of World Development Indicators (See Appendix A for definitions and sources of variables).

As a common wisdom in panel data analysis, econometric method involves a battery of pre and post diagnostic tests, checking for unit root and co-integration. The results of panel unit root tests, supporting unbalanced panel data, of Im, Pesaran and Shin (2003); and Maddala and Wu (1999), and Choi (2001), indicate certain variables are stationary in level, while others are stationary in first difference (Table 1). In addition, Westerlund (2007) tests largely conclude that the null hypotheses of no co-integration are rejected for gross domestic product, domestic credit to private sector, and government consumption (Table 2).

**Table 1:** Summary Results of Panel Unit Root Tests

| Variables                         | Im, Pesaran and Shin | Maddala and Wu | Order of integration |
|-----------------------------------|----------------------|----------------|----------------------|
| Ip, first difference with trend   | -6.3***              | 3.0***         | I (1)                |
| Ig, first difference with trend   | -6.1***              | 11.4***        | I (1)                |
| GDP, first difference with trend  | -5.5***              | 11.9***        | I (1)                |
| CRED, first difference with trend | -5.9***              | 6.0***         | I (1)                |
| GOUV, with trend                  | -3.9***              | 3.7***         | I (0)                |
| GapGDP, level                     | -5.6***              | 13.6***        | I (0)                |
| INFL, level                       | -6.8***              | 18.5***        | I (0)                |
| TOT, level                        | -5.5***              | 11.4***        | I (0)                |
| OUV, first difference with trend  | -5.1***              | 1.3*           | I (1)                |
| R, level                          | -4.6***              | 3.8***         | I (0)                |

*Source:* Author, \*\*\*, \*\*, 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.



**Table 2:** Westerlund Error Correction Based Panel Co-integration Tests

| Variables | Private Investment, Ip |      |        |        | Co-integrated |
|-----------|------------------------|------|--------|--------|---------------|
|           | Gt                     | Ga   | Pt     | Pa     |               |
| Ig        | -1,8                   | -6,7 | -3,7   | -4,2   | No            |
| GDP       | -2,4**                 | -9   | -5,2*  | -7,3** | Yes           |
| CRED      | -2,2*                  | -6,3 | -6,1** | -6,8** | Yes           |
| GOUV      | -1,6                   | -7,9 | -4,3   | -7**   | Yes           |
| GapGDP    | -0,2                   | -0,4 | -2,6   | -1,5   | No            |
| INFL      | -0,2                   | -0,4 | -1,9   | -1     | No            |
| TOT       | -0,4                   | -0,7 | -2,7   | -1,6   | No            |
| OUV       | -1                     | -2,4 | -3,6   | -2,9   | No            |
| POLS      | -0,4                   | -0,9 | -3,5   | -2,5   | No            |
| R         | -1,2                   | -3,1 | -3,8   | -2,4   | No            |

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

### 3.3. - Estimation Techniques

This feature of the 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:

$$\Delta y_{i,t} = \gamma_i (y_{i,t-1} - \theta_i x_{i,t}) + \gamma_{0,i} + \delta_i \Delta x_{i,t} + \varepsilon_{i,t} \quad (2)$$

The parameter  $\gamma_i$  is the error-correcting speed of adjustment term. If  $\gamma_i = 0$ , 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.

The recent literature on dynamic heterogeneous panel estimation, in which both cross-sectional and time dimensions 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.

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).

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.

**4. - Results, Analysis and Discussion**

Results show that the Pooled Mean Group estimator, the efficient estimator under the null hypothesis, is preferred to Mean Group estimator. The calculated Hausman statistic is 3.69 and is distributed Chi2. But it's also confirm 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 4,339.76 with a corresponding p-value of zero (Table 3). In addition, residuals of the models are checked and the skewness and kurtosis suggest normally distributed residuals, implying the robustness of models.

**Table 3:** Hausman's models Specification Tests, Optimal Estimator

|                | MG vs PMG | DFE vs PMG  |
|----------------|-----------|-------------|
| Chi2 Statistic | 3.69      | 4,339.76*** |
| P-value        | 0.30      | 0.00        |

*Source:* Author, \*\*\*, \*\*, and \* indicate that the statistic is statistically significant at the 1%, 5%, and 10% levels, respectively.

Moreover, the error correction term, the adjustment coefficient, has a negative and statistically significant value (-0.60). This infers that, the model is dynamically stable, and private investment in the WAEMU adjusts fast to equilibrium levels in the current period, from a disequilibrium experienced in the earlier period after a shock to any of its determinants. Furthermore, the significant coefficients do not change when we remove certain candidate variables, confirming the robustness of the model taking to account omitted variables bias problem.

The Dynamic Fixed-Effects results (Table 4, short-run, and Table 5, long-run) suggest that, in the short-run, private investment in the WAEMU zone is determined by the aggregate demand conditions: gross domestic product and output gap, while, in the long-run, it is determined by public investment, gross domestic product, and political stability.

The short-run elasticity of gross domestic product and output gap are statistically significant and average to 5.7 and 0.06, respectively. These finds imply that a one percentage point increase in gross domestic product may rise in overall 5.7 percentages points of private investment in the short-run. Furthermore, in the short-run, private investment evolves in the same direction of the business cycle with 0.06 elasticity. For example, if the output gap falls of 10 percentages points, private investment decreases by 0.6 percentage point. These results confirmed the theoretical models, in particular the accelerator principle, an idea suggests that

aggregate net investment by firms is dependent on firms expectations about changes in outputs.

The long-run elasticity of gross domestic product and public investment are statistically significant and average to 2.4 and -0.16, respectively, and the semi-elasticity of political stability is -0.25. The statistical significant of gross domestic product and political stability coefficients do not change when we remove certain candidate variables, confirming the robustness of their effects, while public investment losses its significance. These results show that a one percentage point increase in gross domestic product may rise in overall 2.4 percentage points of private investment in the long-run. Moreover, when the economies of the WAEMU zone make an effort of 10 units raking to stabilize their political framework, it promotes private investment about 2.5 percentage points.

These finds are consistent with the theoretical predictions of the long-run relationship between private investment and output and political stability. But theoretical models suggest that public investment may be negatively affected private investment because it increases the opportunity cost of borrowing money through interest rates rising, the so-called “crowd out effect”. However, the empirical work undertaken by Keho (2016) suggests that public deficits do not affect private consumption in the WAEMU region during 1970 to 2013.

The results also show, however, that there is no statistical evidence, both in short-run and long-run, impact of inflation, terms of trade, real interest rate, and degree of openness to international trade in the WAEMU region from 1995 to 2014.

**Table 4.** Short-Run Dynamic Fixed-Effects Estimation of the Private Investment Determinants

| VARIABLES | M1                     | M2                     | M3                     | M4                     |
|-----------|------------------------|------------------------|------------------------|------------------------|
| EC        | -0.602***<br>(0.0815)  | -0.580***<br>(0.0834)  | -0.581***<br>(0.0824)  | -0.576***<br>(0.0734)  |
| D.IG      | -0.0355<br>(0.0879)    | -0.0414<br>(0.0856)    | -0.0387<br>(0.0862)    | -0.0344<br>(0.0871)    |
| D.GDP     | 6.464***<br>(1.954)    | 5.807***<br>(1.778)    | 5.260**<br>(2.158)     | 5.091***<br>(1.905)    |
| D.GAPGDP  | -0.0691***<br>(0.0198) | -0.0591***<br>(0.0194) | -0.0535**<br>(0.0268)  | -0.0506**<br>(0.0251)  |
| D.R       | 0.0142<br>(0.0102)     | 0.00581<br>(0.00432)   | 0.00741*<br>(0.00385)  | 0.00706**<br>(0.00353) |
| D.INFL    | 0.00725<br>(0.00991)   |                        |                        |                        |
| D.CRED    | 0.0249<br>(0.0175)     | 0.0259<br>(0.0167)     |                        |                        |
| D.TOT     | 0.000270<br>(0.000245) | 0.000214<br>(0.000249) | 0.000188<br>(0.000271) |                        |
| D.OUV     | -0.000137<br>(0.00566) | 8.39e-05<br>(0.00555)  | 0.00320<br>(0.00661)   | 0.00347<br>(0.00626)   |
| D.GOUV    | 0.126**<br>(0.0627)    | 0.132***<br>(0.0446)   | 0.138***<br>(0.0533)   | 0.148***<br>(0.0488)   |
| D.POLS    | 0.0603<br>(0.0658)     | 0.0401<br>(0.0702)     | 0.0505<br>(0.0676)     | 0.0347<br>(0.0721)     |

*Source:* Author, Robust standard errors (in parentheses) and cluster the standard errors at country level \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 5.** Long-Run Dynamic Fixed-Effects Estimation of the Private Investment Determinants

| VARIABLES | M1                      | M2                      | M3                      | M4                    |
|-----------|-------------------------|-------------------------|-------------------------|-----------------------|
| Ig        | -0.195**<br>(0.0931)    | -0.166<br>(0.102)       | -0.140<br>(0.0953)      | -0.127<br>(0.0811)    |
| GDP       | 2.414***<br>(0.718)     | 2.136***<br>(0.748)     | 2.510***<br>(0.696)     | 2.469***<br>(0.698)   |
| GapGDP    | 0.0461<br>(0.0356)      | 0.0441<br>(0.0344)      | 0.0468<br>(0.0315)      | 0.0436<br>(0.0333)    |
| R         | -0.00495<br>(0.0147)    | -0.0137<br>(0.0146)     | -0.0153<br>(0.0145)     | -0.0146<br>(0.0138)   |
| INFL      | 0.0178<br>(0.0195)      |                         |                         |                       |
| CRED      | -0.00935<br>(0.0208)    | -0.0130<br>(0.0225)     |                         |                       |
| TOT       | -0.000478<br>(0.000606) | -0.000508<br>(0.000729) | -0.000717<br>(0.000695) |                       |
| OUV       | 0.0122<br>(0.00947)     | 0.0122<br>(0.00960)     | 0.00797<br>(0.00958)    | 0.00868<br>(0.00937)  |
| GOUV      | 0.125<br>(0.336)        | 0.211<br>(0.368)        | -0.122<br>(0.195)       | -0.109<br>(0.196)     |
| POLS      | -0.254**<br>(0.0994)    | -0.248**<br>(0.104)     | -0.258***<br>(0.0835)   | -0.247***<br>(0.0783) |
| CONS      | -8.158***<br>(2.692)    | -6.863**<br>(2.785)     | -7.475**<br>(2.997)     | -7.318**<br>(2.902)   |

*Source:* Author, Robust standard errors (in parentheses) and cluster the standard errors at country level \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## 5. - Conclusion and Policy Implications

Private investment is recently identified as the important way of developing countries to discuss their sustainable economic growth challenges. While WAEMU region has experienced rapid economic growth compared to the average of African countries, this economic progress has been driven essentially by public investment. The aim, according to policymakers' views, is to create conditions for private investment development and more sustainable economic growth. It is therefore important to look into ways that can stimulate private sector and private investment of this area.

To contribute to this reflection, this paper investigates the main determinants of private investment in this region with a dynamic approach by exploring both short-run and long-run factors in this zone, and by using recent estimators developed in the econometric literature.

Results suggest that, in the short-run, private investment in the WAEMU region is determined by the aggregate demand conditions: gross domestic product and output gap, while, in the long-run, it is determined by gross domestic product, and political stability. The short-run elasticity of gross domestic product and output gap are statistically significant and average to 5.7 and 0.06, respectively. The long-run elasticity of gross domestic product and the semi-elasticity of political stability are statistically significant and average to 2.4 and -0.25, respectively. As policy implications, these finds imply that, to promote private investment in the WAEMU zone, there is a need among others for more proper design and implementation of aggregate demand management policies, and political framework stability.

## References

- Arestis, P. (2009). New Consensus macroeconomics and Keynesian critique. Macroeconomic policies on shaky foundations-Whither mainstream economics.
- Athukorala, P. C. (1998). Interest Rates, Saving, and Investment: Evidence from Indian. Oxford Development Studies, Vol.26, No-2, pp. 153-169.
- Bank of England. (2005). The Bank of England Quarterly Model, London: Bank of England.
- Bernanke B. (1983). Irreversibility, Uncertainty and Cyclical Investment. Quarterly Journal of Economics, Vol. 98, pp. 85-106.
- Bosco N. J. & Emerence, U. (2016). Effect of GDP, Interest Rate and Inflation on Private Investment in Rwanda. International Academic Journal of Economics, Vol. 3, No. 1, 2016, pp. 1-17.
- Blackburne, E. F. and M. E. Frank. (2007). Estimation of Nonstationary Heterogeneous Panels. Stata Journal, 7, pp. 197-208.
- Choi, I. (2001). Unit Root Tests for Panel Data. Journal of International Money and Finance, Vol. 20, pp. 249-72.
- Chudik, A. and M. H. Pesaran . (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors. Journal of Econometrics, 188, 393-420.
- Cuong, N. V. (2013). Do minimum wage increases matter to firm profitability? The case of Vietnam. Journal of International Development.
- Dhakal, D., Nag, R., Pradhan, G., & Upadhyaya, K. P. (2010). Exchange rate volatility and foreign direct investment: Evidence from East Asian countries. The International Business & Economics Research Journal, 9(7), 121.
- Dixit, A. K., & Pindyck, R. S. (1994). Investment under uncertainty. Princeton university press.
- Dje P. (2007). Les déterminants des investissements directs étrangers dans les pays en développement : leçons pour l'UEMOA. Banque Centrale des Etats de l'Afrique de l'Ouest. Document d'Etude et de Recherche, N° DER/07/03.
- Dramani L. & Laye, O. (2008). Les déterminants de l'investissement privé au Sénégal: une approche VAR structurel. République du Senegal, Ministère de l'Economie et des Finances.
- Feng, Y. (2001). Political freedom, political instability, and policy uncertainty: A study of political institutions and private investment in developing countries. International Studies Quarterly, 45(2), 271-294.
- Ghura, D., & Goodwin, B. (2000). Determinants of private investment: a cross-regional empirical investigation. Applied Economics, 32(14), 1819-1829.
- Greene, J., & Villanueva, D. (1991). Private investment in developing countries: an empirical analysis. Staff Papers, 38(1), 33-58.
- Guillaumont, P., Jeanneney, S. G., & Brun, J. F. (1999). How instability lowers African growth. Journal of African Economies, 8(1), 87-107.
- Guimaraes, R. and O. Unteroberdoerster. (2006). What's Driving Private Investment in Malaysia? Aggregate Trends and Firm-Level Evidence. IMF Working Paper, No. 06/90. Washington, D.C.: International Monetary Fund.
- Haepf, T., & Lin, C. (2015). How Does the Minimum Wage Affect Firm Investments in Fixed and Human Capital? Evidence from China. In Society of Labor Economists-European Association of Labour Economists World Conference, Montreal, Canada.

- Hartman, Richard. (1972). The Effects of Price and Cost Uncertainty on Investment. *Journal of Economic Theory* 5(2): 258– 66.
- Im, K. S., M. H. Pesaran, & Y. Shin. (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, 115: 53-74.
- IMF. (1983). Interest rates policies in developing countries. Occasional paper. Research Department of The International Monetary Fund.
- Jorgenson, D. W. (1963). Capital theory and investment behavior. *The American Economic Review*, 53(2), 247-259.
- Keho, Y. (2016). Impact of Budget Deficit on Private Consumption in WAEMU Countries: Evidence from Pooled Mean Group Estimation. *International Journal of Economics and Finance*, 8(3), 189.
- Khurshid A. (2015). The effect of interest rate on investment; Empirical evidence of Jiangsu Province, China. *Journal of International Studies*, Vol, 8(1).
- Kinda T. (2008): Les déterminants des flux de capitaux privés dans l'UMOA: Une approche empirique sur données de panel. *Revue de la Stabilité Financière dans l'Union Economique et Monétaire Ouest-Africaine*, Vol. 2, pp. 41-68.
- Koukpo M. (2005). Analyse des déterminants des investissements directs étrangers dans les pays de l'UEMOA. Institut Africain de Développement Economique et de Planification.
- Lugo, O. A. M. (2008). The differential impact of real interest rates and credit availability on private investment: evidence from Venezuela. In *Participants in the meeting*.
- Levin, A., Lin, C. F. & C. Chu. (2002). Unit Root Tests in Panel data: Asymptotic and Finite-sample Properties. *Journal of Econometrics*, Vol. 108, pp. 1-24.
- Maddala, G.S. & Wu, S. (1999). A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics*, Vol. 61, pp. 631-52.
- Mankiw, N. G., Phelps, E. S., & Romer, P. M. (1995). The growth of nations. *Brookings papers on economic activity*, 1995(1), 275-326.
- Manyong, V. M. (2005). Agriculture in Nigeria: identifying opportunities for increased commercialization and investment. IITA.
- Mbaye A. (2006). Les Déterminants de l'investissement privé dans les pays de l'UEMOA. Institut Africain de Développement Economique et de Planification.
- McKinnon, R., I. (1973). *Money & Capital in Economic Development*. Washington, DC: The Brookings Institution.
- McNabb, K. and P. LeMay-Boucher. (2014). Tax Structures, Economic Growth and Development. ICTD Working Paper, 22.
- Munir R., Awan, R. U. & Hussain, Z. (2010). Investment, Savings, Interest Rate and Bank Credit to the Private Sector Nexus in Pakistan. *International Journal of Marketing Studies*, 2(1), 140.
- Osundina J.A. and Osundina C. K. (2014). Interest Rate as a Link to Investment Decision in Nigeria. *IOSR Journal of Economics and Finance*. Volume 2, Issue 4, pp 08-14.
- Ouattara, B. (2004). Modelling the long run determinants of private investment in Senegal. Centre for Research in Economic Development and International Trade, University of Nottingham.
- Persson T. & Tabellini G. (2006). Democratic capital: The nexus of political and economic change, No. w12175. National Bureau of Economic Research.
- Pesaran, M. H., & R. P. Smith. (1995). Estimating Long-run Relationships From Dynamic Heterogeneous Panels. *Journal of Econometrics* 68: 79-113.

- Pesaran, M. H., Y. Shin, & R. P. Smith. (1997). Estimating Long-run Relationships in Dynamic Heterogeneous Panels. DAE Working Papers Amalgamated Series 9721.
- Pesaran, M. H., Y. Shin, & R. P. Smith. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association* 94: 621-634.
- Pesaran, M. (2006). Estimation and inference in large heterogeneous panels with a multifactor error structure. *Econometrica*, 74, 967-1012.
- Pischke, J. S. (2005). Labor market institutions, wages, and investment: Review and implications. *CESifo Economic Studies*, 51(1), 47-75.
- United Nations (2000), Report of the International Conference on Financing for Development, Monterrey.
- Rama M. (2001). The Consequences of doubling the minimum wage: The case of Indonesia. *Industrial and Labor Relations Review* 54(4): 864–881.
- Roache, S. K. (2006). Domestic Investment and the Cost of Capital in the Caribbean. IMF Working Paper 06/152. Washington, D.C.: International Monetary Fund.
- Serven, L. (2003). Real-exchange-rate uncertainty and private investment in LDCs. *Review of Economics and Statistics*, 85(1), 212-218.
- Shaw E. (1973). *Financial Deepening in Economic Development*. New York: Oxford University Press.
- Stasavage D. (2000). *Private investment and political uncertainty*. Vol. 2000
- Svensson J. (1999). *Investment, Property Rights and Political Instability: Theory and Evidence*. *European Economic Review*.
- Wai, U. T., & Wong, C. H. (1982). Determinants of private investment in developing countries. *The Journal of Development Studies*, 19(1), 19-36.
- Westerlund, J. (2007). Testing for Error Correction in Panel Data. *Oxford Bulletin of Economics and Statistics* 69: 709–748.
- Wicksell, K. (1898), *Geldzins und Güterpreise*, Verlag Gustav Fischer: Frankfurt. English translation in R.F. Kahn (1965), *Interest and Prices*, Kelley: New York.
- White, S. (2005). *Enhancing private investment for development, Policy guidance for development agencies*.
- Woodford, M. (2003), *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton: Princeton University Press.
- Zouhaier H. & KEFI, M. K. (2012). Interaction between political instability and investment. *Journal of Economics and International Finance*, 4(2), 49.

## Appendix

### Appendix A: Definitions and Sources of Variables

| Variables                                 | Definitions  | Sources  |
|---|--|--|
| Private investment                        | $I_p = \ln$ [Gross fixed capital formation, private sector]  |  |
| Public investment                         | $I_g = \ln$ [Gross fixed capital formation, public sector]   |  |
| Gross domestic product                    | $GDP = \ln$ [Gross domestic product (constant 2005)]   |  |
| Domestic credit to private sector         | $CRED = \ln$ (Credit to Private Sector / GDP)  |  |
| Government consumption                    | $GOUV = \ln$ (General government final consumption expenditure)  | World Development Indicators (WDI) of the World Bank |
| Output gap                                | $GapGDP = [(GDP - Potential\ GDP) / Potential\ GDP]$ in percentage. Potential GDP is calculated using the Hodrick-Prescott Filter. |  |
| Inflation                                 | $INFL =$ Consumer prices (annual percentage)   |  |
| Terms of trade                            | $TOT =$ Annual percentage of Net barter terms of trade index (2000 = 100)  |  |
| Degree of openness to international trade | $OUV = (Exportation + Importation) / (2 * GDP)$ in percentage  |  |
| Political Stability                       | $POL =$ Political stability index  | The Global Economy Database                          |
| Real interest rate                        | $R = (Annual\ Average\ Credit\ Interest\ Rate - Inflation\ Interest\ Rate)$  | BCEAO Database Eden                                  |

*Source: Author*