DETERMINANTS OF PUBLIC INVESTMENT
IN THE CEMAC SUB-REGION

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Abstract

This research examines the determinants of public investment in the CEMAC sub-region. The objective is to determine the extent or sensitivity of the economic, structural and politico-institutional factors of public investment in CEMAC (Cameroon, Republic of Congo, Chad, Equatorial Guinea, Gabon, and Central African Republic) from 1980 to 2010. To achieve this objective, the Panel EGLS and the Panel Two-Stage EGLS methods applied to multiple regression models allowed us to obtain the results: the magnitude of the economic determinants of public investment is greater than those of structural and politico institutional determinants, whether in the global case or in the individual case. In fact, national income, government savings, private investment, control of corruption and the population significantly influence public investment. We recommend that CEMAC reconsider further the structural and institutional determinants, which could not only influence public investment, but create positive externalities for enhancing the expected impact of economic determinants on public investment and economic growth. .

Keywords: Public Investment, Determinant, CEMAC sub-region, Panel EGLS, Panel Two-Stage EGLS

INTRODUCTION

In the wake of the independence of the countries of the Central African Economic and Monetary Community (CEMAC) until the first half of the 1980s, State intervention was very important through the macroeconomic recovery policy (political expansionary budget). An economic situation marked by planning, as in the case of the five-year plans highlighted in Cameroon

between 1960 and 1991. The public investment expenditure was mostly oriented towards the development of the rural sector because these countries depended on the export of raw materials (cocoa, cotton, coffee, etc). It was indeed at the end of the 1970s that some countries depended not only on the raw materials mentioned, but also on oil resources. Five out of six countries are oil producers in CEMAC (BEAC, 2011).

Despite this planning policy, the CEMAC (Cameroon, Central African Republic, Republic of Congo, Chad, Equatorial Guinea, Gabon) experienced the economic crisis in the early 1980s. A situation caused by the fall in oil prices (oil shock), the economic crisis in developed countries (lower demand for non-oil commodities), the deterioration of the terms of trade, etc. It led the CEMAC to change its behavior with respect to stimulus policies, which is why the agreement of the Structural Adjustment Programs (SAPs) in the early 1990s lowered public spending, and even public investment. During this period, there is a contrasting evolution between public and private investment. Thus, the gross fixed capital formation (GFCF) of the public sector compared to the private sectors is too low. In Cameroon, it averages between 1990-1999 of 2.9 compared to 11.7 in the private sector; in the Congo of 3.9 against 23.9, in Guinea of 6.9 against 52.6; in Gabon 6.5 versus 18.9 and the exception of the RCA, where the reverse trend is 7.4 versus 4.3 over the same period (WDI, 2012).

Figure 1. Evolution of the public and private investments in CEMAC
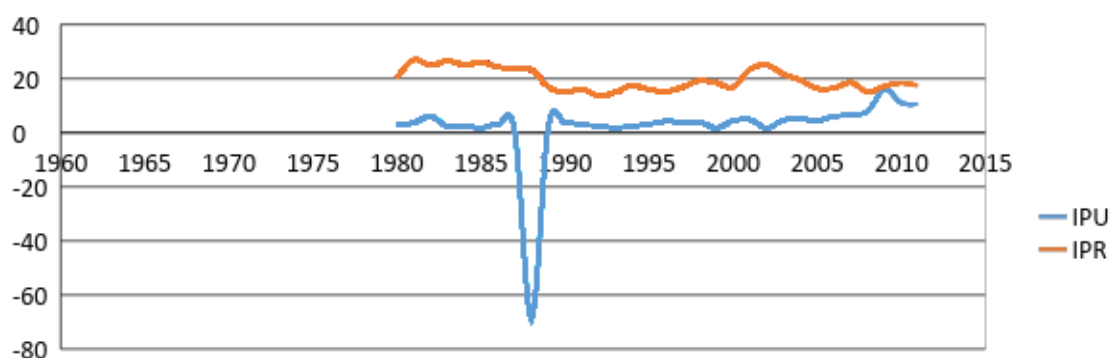
Source: L'auteur à partir des données de la Banque Mondiale

This contrasting evolution makes it possible to question the sources of financing for public investment or their determinants. Public investment is prima facie funded by the state budget; secondly, influenced by economic, structural and politico-institutional variables. Sturm (2001) shows that interest rates, indebtedness, savings and population influence public investment. He believes that no state can remain indifferent in terms of stimulating public investment in the face

of a growing population (about 45 million inhabitants in the CEMAC). In addition to these variables, the political context, business climate and good governance effectively influence public investment, according to Tanzi and Davoodi (1997).

The graph below shows the contrasting evolution of the rate of public and private investment. Indeed, private investment is above public investment. The difference between these two variables is not very large and they tend to be significantly merged between 2008 and 2009. We note a downward trend in private investment between 1985 and 1999 and an increase between 2000 and 2005. By compared to public investment, we note a downward trend from 1980 to 1985, from 1985 to 1990 public investment is negative to recover from this period until 2010. The public investment rate varies from one country to another because the factors that influence it are heterogeneous. Also because public investment decisions are not commonly made effectively by the CEMAC states. These investments are defined according to the priorities of each State. The heterogeneous action on public investment leads us to determine the extent of the factors that influence it.

In view of the contrasting evolution between public and private investment, the volatility of economic growth known due to the instability of oil prices on which five countries depend for the financing of their public investment, it is incumbent on us to study the extent of the economic, structural and politico-institutional determinants of public investment in CEMAC. This study is organized around the following sections: Section 2 deals with the literature review; section 3 of the methodology; section 4 of the results and discussions and section 5 is interested in the conclusion.

REVIEW OF THE LITERATURE

Theoretical review

There are controversies around the factors of investment. it is defined as the acquisition of equipment favorable to the production of goods and services. Private investment is an activity developed by the private sector and public investment is led by the public sector. Public investment takes many forms: road construction, construction of schools and hospitals, social housing, etc. these investments are influenced by factors such as: interest rate, anticipated demand, savings, debt, budgetary revenues and donations. This is why the Keynesian, neoclassical and many other currents explain the investment

Keynes' (1973) current of thought explains investment by the accelerator principle. He thinks that the anticipation of the demand formulated by companies is the main determinant of investment. In times of recession, companies anticipate that demand will be poor and adopt a conservative strategy by reducing their production capacity; in times of sustained growth, they

invest to increase their production capacity, in order to benefit from the increase in demand. It states that it is the comparison between the marginal efficiency of capital or the internal return of the investment, and the interest rate that makes it possible to know whether an investment project can be realized. It will only be realized if the marginal efficiency of capital is higher than the interest rate. In the ISLM model, in the IS market for goods and services, Keynesian analysis shows that investment is a function of the interest rate. Indeed, there is an inverse relationship between the interest rate and the investment. The equilibrium is reached in this market when the investment expressed as a function of the interest rate is equal to savings, which is expressed in terms of income. So in addition to the interest rate, we also have the savings that influence the investment. In this same logic, Harrod and Domar highlight a model of economic growth characterized by fixed and complementary factors, in a closed economy. Domar (1946) explains the ambivalent nature of the investment by saying that it can create an effect on income and an effect on supply capacity. On the one hand, investment creates a multiplier effect on income, which has a positive effect on demand, which increases tax revenues that can in turn finance public investment. On the other hand, it increases the supply or the national production which plays the same as the preceding case on the public investment. Unlike Keynes, Neoclassical work has led to the introduction of the concept of profitability, which consists of comparing the return on investment to that of financial investments. Thus profitability expresses the difference between the financial profitability of the investment and a financial return of reference. As soon as the difference is positive, it becomes interesting to invest, hence the leverage effect. Conversely, when the real interest rate rises, companies are forced to give up investments deemed unprofitable, hence the club effect. The neoclassical analysis of the user cost of capital was highlighted by Jorgenson to answer the question of whether the interest rate was considered as the best indicator of the cost of capital. Investment is possible when there is equality between the marginal productivity of capital and its cost, which maximizes profit. In the goods and services market, the investment is a function of the interest rate, which is in the same direction as the Keynesian analysis, and unlike this school, the balance is reached when the savings explained in function interest rate is equal to the investment also expressed as a function of the interest rate.

In another register, the theoretical model called Tobin's Q makes the link between the choice of investment and the market valuation. The basic idea of this model is as follows: the entrepreneur invests in new projects if the market values them beyond what they cost; the investment is profitable as long as the increase in the value of the firm remains higher than its cost. A Q ratio greater than unity means that the company has an interest in investing.

Malinvaud (1987), broadens the analysis by incorporating the notions of uncertainty and irreversibility of investments. He thinks that production capacities cannot adapt instantly to the inflections of the economy. The decision to invest then consists in determining, taking into account the financial profitability of the investment and the real interest rate, a rate of utilization of the average production capacity on the basis of anticipated demand and a risk related to the error of anticipation. Profitability will be even lower if anticipated demand is modest and uncertain; and the current return required to invest the higher the uncertainty associated with the investment project will be strong. According to Malinvaud (1987), the decision to invest also depends on the heterogeneity of the situations in which companies find themselves in the face of the individual shocks that they undergo and to which they try to react by investing, by firing, by modifying their prices

In the end, whether it is the Keynesian approach, the neoclassical approach or that of the other authors, the determinants that embody a leading role are: demand, profit and technical factors; those who advocate a certain constraint are: the interest rate, indebtedness and taxation. These theoretically defined factors are verified on both sides when it comes to public or private investment. These theoretical approaches are limited by the fact that they do not highlight the political-institutional and structural determinants, despite the fact that some authors show that the quality of the institutions, the political regime, the political stability, the demographic growth and the urbanization are elements to be taken into account so as not to fall into the problem of inadequate or inadequate public investment. The economic determinants defined for the most part are developed and verified in companies (private investment). But that does not matter, variables such as interest rate, savings, debt, credit, taxation, business climate, the consolidation of public finances are considered as the determinants of public investment. What about the empirical aspect of these determinants?

Empirical review

The research work on investments revolves around their impact on economic growth, the potential link between public and private investment and finally the determinants of investment. There is also an important literature on the determinants of private investment, as well as public investment. But regardless of the economic, structural and politico-institutional variables, they influence public investment in one way or another.

Victoria (2014) conducted a study on the analysis of macroeconomic determinants of public capital expenditure in Nigeria. The error correction mechanism shows that there is a long-term relationship between the variables. Gross domestic income, budget deficit, government debt, economic openness, private investment, foreign direct investment explain public capital

expenditures and the degree of urbanization has no effect on this variable. Välilä and Mehrotra (2005) follows the same logic as Victoria, studying the evolution and the economic determinants of public investment in Europe. Using the ordinary least squares fixed-effect method, he finds that public investment is influenced by national income, fiscal and fiscal policy. Thus, the significant downward trend in the evolution of public investment as a percentage of GDP in countries is explained by multiple periods of fiscal consolidation. Gulzar (2015) conducted a study in Pakistan on the drivers of public investment in the manufacturing sector. Starting from the accelerator model, the ARIMA model was highlighted, which method allowed it to obtain the results according to which, the investment of the manufacturing sector delayed by a period, the added value, the price index capital, the variation in domestic credit available to the public sector, political stability, and favorable economic conditions play a significant role in public investment in the manufacturing sector. He recommends that the state must create sufficient demand by increasing purchasing power and exports. The study states that the conditions of political stability are favorable for rapid economic growth and investment. Zobayer et al (2012) conducted a study on the macroeconomic determinants of investment in Bangladesh. This study looks at the relationship between investment and four macroeconomic variables. The result of the analysis showed that investment is influenced successively by GDP growth, borrowing interest rate, inflation and the exchange rate. These variables are macroeconomic determinants, and from the Johansen cointegration test and the error correction model, there is a stable long and short term association between investment and macroeconomic variables.

Fan and Rao (2003), based on the study on public expenditure in developing countries: evolution, determinant and effect; Structural and economic variables were highlighted in 43 countries, and analysis of panel data provided evidence that government revenue and structural adjustment significantly influence public investment. Clements et al (2003) find in their study a negative coefficient of urbanization. The change in the urbanization of a unit leads to a change in public investment in the opposite direction of 0.216 units.

Turrini, A. (2004) conducted a study on public investment and tax structure in the European Union. He is interested in economic and institutional variables. The application of the panel data analysis yielded the findings that GDP growth, public debt and EMU affect public investment. Wautabouna (2010) conducted a study on corruption, public investment and growth. The purpose of this study was to determine the effect of corruption on public and private investment in Côte d'Ivoire and beyond, to examine their different impacts on economic growth in this country. Thus, corruption has led to an increase in public investment, which itself has not had any positive and significant effects on Ivorian economic growth. This confirms the argument that corruption is an evil that must be combated. It is thus the place to invite, according to the

author, the public authorities to set up a national authority which would be endowed with exceptional powers of sanction. The perverse effects of corruption and socio-political instability have affected the management of these resource mobilization structures and reduced private investment by households. Public investments have a crowding out effect on private investment. Yet, in the economic literature and in fact, the private sector is recognized as a driving force for economic growth. According to David and Clara (2007), widespread corruption constitutes a major obstacle to the catching up of rich countries by poor countries. Mauro (1997), Tanzi and Davoodi (1997) show that public investment expenditure on education is lower in countries with high levels of corruption. Conversely, Gupta, Sharan and de Mello (2000) believe that corruption increases the share of not only military spending but also public service spending (energy, culture) in relation to education and health spending. which has been confirmed by Delavallade (2006). Tanzi and Davoodi (1997) recognize corruption as one of the institutional politico-factors of public investment, in addition to the economic factors identified such as per capita income and government income

Sturm (2001) will focus on economic, structural and institutional-political variables in a study of the determinants of developing countries from 1970 to 1998. Using a panel of 123 non-OECD countries, he shows that politico-institutional variables such as ideology, political cohesion, political stability and political business cycles do not seem to be important in explaining the formation of government capital in developing countries. On the other hand, variables such as fiscal deficits, private investment and foreign aid are significantly related to public capital spending.

In the context of CEMAC, Makouezi (2010) conducted a study on Domestic Investment and the Recovery of CEMAC Petroleum Economies using the Multiple Regression Method. 1% increase in tax revenues induces 2.47% of domestic investment. He believes that CEMAC countries need to broaden their base to increase the volume of domestic investment because tax revenues have an increasing return on domestic investment. The 1% increase in domestic savings led to a 1.86% increase in domestic investment. The mobilization of domestic savings has a positive impact on domestic investment and returns. Public spending also has a positive impact on domestic investment as the 1% increase in public spending leads to a 0.98% increase in domestic investment. CEMAC's total exports negatively and significantly affect total domestic investment. On the other hand, national savings, government revenues and oil exports have no influence on investment, and according to the author, the non-significance of oil exports should call on the CEMAC authorities to further diversify their economies, and hence exports, which is why domestic investment (public and private) must be promoted. Ngouhouo (2008), in a study of the attractiveness of foreign direct investments, find that domestic private investment,

saving, natural resource, openness and business climate are real determinants of these foreign investments.

In the end, it is important to note that several factors explain public investments. The magnitude of these factors varies from country to country and from author to author, and the degree of effectiveness of a factor also depends on the data processing techniques highlighted. All of this work, for the most part, has been done in individual country cases. And in the case of country groups, this work has been stigmatized by the fact that they do not do the prior studies like the group unit root test. The lack of structural and institutional political determinants is recurrent both theoretically and empirically. Given these limits, we will start from a panel case where we will have to highlight the three types of determinants, and for which type of methodology?

METHODOLOGY

Model specification

A model for analyzing the determinants of investment was defined in the case of CEMAC countries by Makouezi (2010). This model was inspired by those of Ngouhouo (2008), Dupuch and Milan (2002). Models defined by focusing on foreign direct investment as a variable explained in the case of CEMAC. Our model is defined by the models defined above, with a focus on public investment as the dependent variable. More specifically, we highlight a following panel data regression model:

$$IPU_{it} = \alpha_0 + \alpha_1 RNH_{it} + \alpha_2 IPU_{it-j} + \alpha_3 EPA_{it} + \alpha_4 TIN_{it} + \alpha_5 TCH_{it} + \alpha_6 OUV_{it} + \alpha_7 TAI_{it} + \alpha_8 POP_{it} + \alpha_9 EFG_{it} + \alpha_{10} CCO_{it} + \alpha_{11} SPO_{it} + \alpha_{12} DEG_{it} + \alpha_{13} IPR_{it} + \alpha_{14} APD_{it} + \alpha_{15} REC_{it} + \mu_{1t} \quad ....(1)$$

$$IPU_{it} = \alpha_{16} + \alpha_{17} RNH_{it} + \alpha_{18} IPU_{it-j} + \alpha_{19} EPA_{it} + \alpha_{20} TIN_{it} + \alpha_{21} TCH_{it} + \alpha_{22} OUV_{it} + \alpha_{23} DEG_{it} + \alpha_{24} IPR_{it} + \alpha_{25} APD_{it} + \alpha_{26} REC_{it} + \mu_{2t} \quad ....(2)$$

$$IPU_{it} = \alpha_{27} + \alpha_{28} TAI_{it} + \alpha_{29} POP_{it} + \mu_{3t} \quad ....(3)$$

$$IPU_{it} = \alpha_{30} + \alpha_{31} EFG_{it} + \alpha_{32} CCO_{it} + \mu_{4t} \quad ....(4)$$

With i the country, t the study period from 1980 to 2010 and µ the error term t-j the number of late

IPU: Public investment as measured by gross capital formation as a percentage of GDP

RNH: National income per capita as a percentage of GDP

EPA: Public Savings as a Percentage of GDP

TIN: Interest rate

TCH: Exchange rate

OUV: measured as the sum of export and import as a percentage of GDP

TAI: State size measured by public consumption as a percentage of GDP

POP: Population

EFG: Government Effectiveness

CCO: Corruption Control

SPO: Political stability

DEG: Government debt as a percentage of GDP

APD: Official Development Assistance

REC: Tax revenue or taxes

Equation (1) highlights all determinants of public investment, equation (2) integrates only economic determinants, equation (3) structural determinants and equation (4) political-institutional determinants

Nature and sources of data

The data used are of the secondary type collected from national and international institutions. Public investment, government savings, government debt, the exchange rate, the interest rate and the national per capita income come from the World Bank's national accounts and the national accounts data files of the World Bank. OECD. Political stability, government effectiveness, control of corruption are the global governance indicators that come from the base of the African Socio-Economic Union of the Central Statistical Agency of Ethiopia. Cross-sectional data analysis is shown over the period from 1980 to 2010. This period is chosen because, public investment has been influenced by socio-economic factors such as: the economic crisis triggered in the 1980s; the policy of restrictive public spending during the 1990s and poverty reduction strategies, coupled with structuring projects set up to achieve emergence by 2025. The E-views software is used to process the data.

Estimation techniques

In order to avoid the case of fallacious regressions, we will review the stationarity test in the case of panel data from six countries. The simplest test to do this is the one proposed by Engle and Granger, namely the increased Dickey-Fuller test, which admits the possibility of autocorrelation of residues. This test is used because of the generalization of the critical values by the econometric software "Eviews" which facilitates the interpretation of significance. The

estimation of the equation used the Panel EGLS and the Panel Two-Stage EGLS (Period random effects), which allowed us to have significant results.

RESULTS AND DISCUSSIONS

Common unitary root

It is important to know that in the null hypothesis there is no unit root and that in the alternative hypothesis there is a unit root. Table 1 shows that the panel data are stationary at 1% and 5% from the methods of Levin, Pesaran, ADF and Phillip Perron. In other words, there is a lack of a common unit root. Fisher's probabilities are calculated using the Chi2 distribution, while the other tests assume an asymptotic normality.

Table 1: Common unitary root result

Null hypothesis: common unitary root

Delay considered: 1

Sample: 1980-2011

Méthode utilisée	Test Statistics	Probability	Cross-section	Observations
Levin, Lin & Chu t*	-4.75951	0.0000 (*)	7	210
Im, Pesaran and Shin W-stat	-2.81918	0.0024 (*)	7	210
ADF - Fisher Chi-square	28.8111	0.0111 (**)	7	210
PP - Fisher Chi-square	26.5501	0.0220 (**)	7	217

Significant to [***]10% ; [**] 5% ; [*]1%

Global determinants of public investment

Determinants influence public investment at 55.25% and there is no autocorrelation of residues because the durbin watson value is 2.09.

Per capita income (RNH), public investment delayed by one (IPU-1), government savings (EPA), economic openness (OUV), private investment (IPR), revenue of the state (RCE), control of corruption (CCO), political stability (SPO) influence statistically significantly on public investment; which corroborates with the work of Fan and Rao (2003) Turrini, A. (2004) and Sturm (2001).

On the other hand, some interesting variables in each group of factors which, oddly enough, do not influence the public investment at the CEMAC level. This is the interest rate that keeps the expected sign, the population that has a positive relationship with public investment, Government effectiveness keeps a positive relationship, although not significant in terms of public investment in the CEMAC .

National per capita income (RNH) is positive and significant at 5%. The increase of one point of the RNH entails all things being equal an increase of the public investment of 0.0000659 point. A very small but very important increase for developing countries (DCs) like those in CEMAC because it is easier for nationals who invest elsewhere to repatriate their income. In addition we are sure that those who invest in the territory will encourage the reinvestment of their profits or their additional income, likely to increase the resources of the State and indirectly public investments

Public investment delayed by one period positively and significantly influences public investment by 10%. Its one-point increase leads, all things being equal, to an increase in public investment. This can be explained very well in the case of CEMAC, which is part of the emergence movement in 2025. In fact, asphalting of roads in CEMAC in year n could in year n +1 give access in the construction project of schools and hospitals in rural areas. This is to say that indeed a public investment undertaken a year ago has an impact on future public investment.

Public savings (EPA) for its part is considered a source of financing for public investment projects, despite its mediocrity. There is a positive relationship between public savings and IPU. Its coefficient is significant at 10%. It is true that in the CEMAC this savings is insufficient to be able to answer to the major concerns of the State with regard to IPU, reason for which these countries do not miss to resort to the foreign capital, to see the indebtedness, the public aid development, bond issues, etc. In this same logic, the CEMAC in the process of financing its public investments has set up the regional economic project (PER), which traces the possibilities of the means of financing, large public investment projects to be able to reach the emergence in 2025.

Official Development Assistance (APD) is significant at 10% with a positive relationship with the IPU. This situation can be explained by the fact that the list is far from being exhaustive on the states' gains in cooperation with the outside world. We note the case of multilateral cooperation with donors (IMF and World Bank) and C2D, which have not failed to support the CEMAC countries in terms of investment in education, health, education and training. agriculture and infrastructure; bilateral cooperation except the oldest with France, new development partners such as China, Japan, Russia and others in the same areas mentioned above.

The government's debt is part of the same logic of financing IPUs. Despite the fact that indebtedness is not significant, we note the existence of a negative sign that generally invalidates the hypothesis. In this case, when the debt increases, the public investment decreases what is paradoxical, and that is why the countries of the CEMAC, long in debt, fail to

return the trend of poverty through investments public. One could think of a debt intended to finance the armament which is a form of public investment and especially intended for the consumption of the government or still obviously of the projects of public investments not carried out because of multiple misappropriations (corruption).

Tax revenue (RCE) represents a significant share of the CEMAC State's non-oil revenue. It is negatively and statistically significant at 5%. Thus, the increase in tax revenue by one point leads, all things being equal, to a decrease in public investment of 0.188 points. The explanation of the CEMAC goes in the same direction as that of the indebtedness. Thus, we could talk about the diversion of resources that are intended to finance the IPU projects and the under-consumption of the IPU budgets, which is the particular characteristic of the CEMAC countries. In Cameroon, for example, to deal with this problem of under-consumption of the IPU budget, the resources budget is replaced by the program budget which is supposed to seek efficiency and results.

Private investment (IPR) for its part is negatively linked to public investment. It is statistically significant at 1%. This is explained by the fact of the economic liberalization undertaken during the 1990s by the CEMAC. A situation in which the state must accompany the private sector in the process of creating wealth. So in terms of production, the IPR replaces the IPU. There is of course a substitution effect between IPR and IPU in the production of goods. During the 2000s, the promotion of the partnership between the public and private sector suggests the encouragement of a complementary effect between these variables.

CEMAC can not live on its own, so the economic openness advocated by donors has a positive and significant impact on IPUs. The economic openness measured by the sum of exports and imports as a percentage of GDP is significant at 1%. Thus, when the opening increases by one point, the IPU increases by 0.1766 point (ceteris paribus). CEMAC has undertaken an externally oriented policy because it believes that, if there is a gap between it and the emerging countries, it is because it has long advocated an inward-looking policy, unlike the others. who have quickly benefited from globalization with openness to international trade. In short, it is clear that the 1987 crisis significantly reduced public investment with the closure and liquidation of several state-owned companies. However, due to the devaluation of the 1994 FCFA, the CEMAC is progressively moving towards the growth path thanks firstly to the promotion of public investments in well-oriented sectors (education, health, infrastructure) and other not only to the orientation of the private sector in the productive field but also the promotion of public-private partnership.

It is obvious that the interdependence between economic, structural and politico-institutional variables is not to be neglected. This is to say that the effectiveness of the economic

variables may depend on the introduction or omission of the other variables in the model. In this regression, the control of corruption is positive and significant at 10% in the CEMAC. It is clear that the sub-region is not on the fringe of the fight against corruption for a real consolidation of public spending. In each country, there is at least one structure for promoting good governance and combating corruption, because corruption is thought to reduce public investment. Using the Corruption Control Index (CCO), it appears that when this indicator increases by one point, public investment increases by 2.06 points, all other things being equal. So the fight against corruption is in the overall case of CEMAC effective, although this is not generally the case in some countries of the sub-region. It is of great interest for CEMAC to continue the fight against corruption for fear that its emergence in 2025 will be disrupted.

Political stability (SPO) for its part is considered as a guarantee of the economic growth and by ricochet of promotion of the IPU. It is true that it prevails on both sides of the CEMAC political instability that hampers the economic take-off of these countries due to the decline of the IPU or other missions allocated to IPU, but the CEMAC seeks always to master all situations of political crisis, war or insecurity, which is why the political stability that prevails is significant and positive at 10%. When CEMAC gains the political stability of one point, it supposes an additional IPU of 2.84 all things being equal. We have a coefficient of substantially the same unity as the control.

This analysis shows that the economic determinants influence public investment more than others, despite the fact that there are only two political-institutional determinants and none of the structural determinants. These empirical results do not call into question the goodness of the model because it does not suffer from any recurrent problem (auto correlation and heteroscedasticity).

If there are key determinants of investment that do not influence public investment such as the interest rate, this could be due to multi-collinearity problems that we have not been able to solve, but the sense that the theory explains itself very well.

On the other hand, the same problem may explain the fact that no structural determinant is verified. In the specific case of the population, even if the significance is to be reviewed, we must note that the sign is positive, which shows that when the population increases, the investment must follow all other things being equal. To this end, CEMAC can not remain indifferent in terms of investment following the increase in the population. Does the omission of the other determinants have an influence on the determinants taken individually?

Table 2: Overall Determinants

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variable: IPU				
Method: Panel EGLS (Period random effects)				
Sample (adjusted): 1981-2011				
C	2.722460	4.957589	0.549150	0.5835
RNH	**0.000659**	**0.000213**	**3.090137**	**0.0023****
IPU(-1)	**0.220287**	**0.125437**	**1.756163**	**0.0806****
EPA	**0.053040**	**0.023593**	**2.248129**	**0.025*****
TIN	-0.027448	0.042014	-0.653309	0.5143
TCH	-0.002620	0.004782	-0.547869	0.5844
OUV	**0.176683**	**0.042674**	**4.140251**	**0.0001***
TAI	-0.009894	0.061195	-0.161686	0.8717
POP	0.727241	1.273059	0.571254	0.5685
EFG	1.301600	1.828542	0.711824	0.4774
CCO	**2.056555**	**0.752389**	**2.733369**	**0.006*****
SPO	2.847829	2.186571	1.302418	0.1943
DEG	-1.64E-05	0.014976	-0.001093	0.9991
IPR	**-0.446662**	**0.093148**	**-4.795188**	**0.0000***
APD	1.22E-14	8.07E-15	1.512590	0.1320
REC	**-0.188235**	**0.083042**	**-2.266749**	**0.0245****
R^2 = 0.55 Durbin-Watson stat : 2.09				

Significant   to [***]10% ; [**] 5% ; [*] 1%

Economic determinants of public investment

Economic determinants account for the 59% IPU, which is slightly higher than the previous result, which incorporates all the determinants. We also note the absence of auto correlation because the value of Durbin Watson is substantially equal to 2, which is the goodness of the model. The omission of the structural and politico-institutional determinants does not substantially modify the results of those obtained previously. Thus, per capita national income, public savings, economic openness, private investment, tax revenues keep the same signs as before and are at the same time statistically significant and the explanations go in the same direction. Apart from the variables that remained insignificant in the first case, the lagged IPU of one period and the official development aid are insignificant.

It is concluded that the insignificant variables are negligible because the results are not globally altered and therefore the structural and politico-institutional determinants do not have a significant influence on the economic determinants.

Table 3: Economic determinants

Dependent Variable: IPU

Method: Panel Two-Stage EGLS (Period random effects)

Sample (adjusted): 1982-2011

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.084069	3.136146	-0.664532	0.5071
RNH	**0.000906**	**0.000196**	**4.615865**	**0.0000***
EPA	**0.035775**	**0.014951**	**2.392831**	**0.0177****
TIN	-0.035109	0.043550	-0.806189	0.4211
TCH	-0.005037	0.006139	-0.820545	0.4129
OUV	**0.205924**	**0.040291**	**5.110969**	**0.0000***
DEG	0.003567	0.016867	0.211498	0.8327
IPR	**-0.478798**	**0.064242**	**-7.453058**	**0.0000***
APD	7.42E-15	7.66E-15	0.969745	0.3334
REC	**-0.222110**	**0.084688**	**-2.622680**	**0.0094***
IPU(-1)	0.169144	0.122002	1.386404	0.1672
R^2 = 0.59	Durbin-Watson stat : 1.97			

Significant to ***10% ; **5% ; *1%

Structural determinants of public investment

Structural determinants explain public investment at 38%. It is therefore that method that fished with a relatively low coefficient of determination. Despite this limitation, we are optimistic that these results are not misleading because the model is not tainted by any problem in this type of study, namely heteroscedasticity and autocorrelation. The value of durbin watson is better and, is equal to 2.07. The delayed IPU of one and two periods are respectively significant at 5% and 1% with the same sign. This leaves us to say that the public investment of the future will be affected by that of today. To this end, if the State plans to build health and school infrastructure in rural areas in the future, the opening up of this area today will have an impact in the construction of these infrastructures, if only at the level of facilitating the transport of building materials. The impact could also be seen in terms of the turnaround time of public investment projects. The population and the IPU vary in opposite directions. It is statistically significant at

10%. Thus, an increase in the population of one point leads, all other things being equal, to a decrease in the IPU of 1.18 points. This explains the weight of demography in an economy.

Finally, it must be recognized that the non-significance of the population in the first case is explained by the presumption of a strong multi-collinearity between the independent variables, thus absorbing the effect of the population on public investment.

Table 4: Structural Determinants of IPU

Dependent Variable: IPU				
Method: Panel Two-Stage EGLS (Period random effects)				
Sample (adjusted): 1983-2011				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.651520	4.486991	2.151000	0.0327
TAI	-0.073526	0.065135	-1.128823	0.2604
POP	**-1.885721**	**1.237639**	**-1.523644**	**0.1292*****
IPU(-1)	**0.254675**	**0.117203**	**2.172947**	**0.0310****
IPU(-2)	**0.104030**	**0.025095**	**4.145389**	**0.0001***
$R^2 = 0.38$	DW : 2.07			

Significant to [***]10% ; [**] 5% ; [*] 1%

Political-Institutional Determinants of Public Investment

They explain public investment at 38%. The delayed public investment of one and two periods is significant and all the determinants used are insignificant, yet the control of the corruption is significant in the first model. This situation could be explained by the strong multi-collinearity that exists between these variables, reducing the individual effect of these determinants.

Table 5: Political-Institutional Determinants

Dependent Variable: IPU				
Method: Panel Two-Stage EGLS (Period random effects)				
Sample (adjusted): 1983 2011				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.882154	4.810606	1.014873	0.3114
EFG	1.807662	2.919472	0.619174	0.5365
CCO	-0.962271	1.749825	-0.549924	0.5830
IPU(-1)	**0.264700**	**0.114736**	**2.307032**	**0.0221****
IPU(-2)	**0.092507**	**0.032937**	**2.808609**	**0.0055***
$R^2 = 0.38$	Durbin-Watson stat : 2.07			

Significant to [***]10% ; [**] 5% ; [*] 1%

CONCLUSION

The purpose of this study was to determine the extent of the economic, structural and politico-institutional determinants in the CEMAC zone. After clarifying the concept and presenting trends in public investment, the literature review allowed us to identify the theoretical and empirical fundamentals underlying the determinants. Among the theoretically defined factors, those who advocate institutional and structural politico factors are rare. To achieve the objective, the methodology identified four multiple regression equations, and after reviewing the unit root test, we proceeded to the generalized double least squares and generalized least squares estimation. These have allowed us to arrive at the results according to which the magnitude or sensitivity of the economic determinants is greater than other determinants, whether in the global case or in the individual case; which corroborates with the results of Sturm (2001). Note that the population (individual case) and the control of corruption (global case) significantly influence public investment. CEMAC, as in all developing countries, the lack of statistical data is the main limitation encountered by researchers and this study is no exception. We recommend to CEMAC to put more emphasis on structural and politico-institutional factors because they are likely not only to influence public investment, but also can create positive externalities, capable of reinforcing the expected effect of factors economic.

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