

# New Convergence Criteria in the Relationship between Public and Private Investments in the CEMAC and WAEMU: Crowding Out or Driving in?

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**Abstract:-** The objective of this paper is to study the conditional effect of the new convergence criteria on the relationship between private and public investment in CEMAC and WAEMU. The data used come from a combination of three sources, the WDI database, various convergence reports in the Franc Zone and the IMF's International Financial Statistics (IFS). Using a retrospective analysis over the period 1994-2016 and the instrumental variables estimator, the results are as follows: There is a crowding out effect of public investment on investment in CEMAC and WAEMU; The adoption of the NCC in 1994 would have mitigated the crowding out effect in the dualism of public and private investment in CEMAC and WAEMU by about 0.096. The coefficients judging the crowding out are respectively -0.89 in the CAEMC and 0.599 in the WAEMU; Concerning the CAEMC countries, the respect of the public debt criterion (standard lower than or equal to 60% of GDP) would have led to a driving effect of public investment on private investment. The coefficient assigned to this cross-country variable is positive and significant at the 10% level (0.3334). The respect of the new criterion of overall budget balance (norm higher than or equal to -1.5% of GDP) since 1994 would have led to a spillover effect of public investment on private investment. The coefficient associated with the  $invpublic*dumsbg$  cross-tabulated variable is positive and significant at the 1% level and of the order of 0.59 points. The new SBG criterion (norm  $\geq -3\%$  of GDP) induces a positive and significant effect at the 10% threshold with a coefficient of 0.43. This result reflects a spillover effect of public investment on private investment in the WAEMU.

**Keywords:-** Private Investment, Conditional Effect, Convergence Criteria, Crowding Out, Crowding In.

## I. INTRODUCTION

Since the first oil crisis, the importance of the evolution of public finances has been a concern of the authorities in most countries, with the aim of resorting increasingly to borrowing to finance their expenditure. Thus, by the mid-1970s, the general government financial balance turned into a deficit and has remained so until today, except for a few. With money supply growth generally maintained at moderate rates, deficits were largely financed by the

issuance of bonds in the non-bank private sector (Touna and Kamgnia, 2001). According to Créel et al (2015), governments undertook large investment projects during boom periods that generated recurrent costs unrelated to the efficiency of public services. These measures resulted in a considerable increase in public charges at the end of the 1970s, which led to major structural imbalances in the Franc Zone economies. The corollary of these changes was the progressive and dynamic transformation of the relationship between gross domestic product and the traditional factors of production, namely physical investment, education and labour.

However, in the context of a comprehensive assessment of the long-term implications of government activity, it will be necessary to consider a number of economic implications of the financing of public expenditure through borrowing. Without going into the full range of possible impacts of public sector net borrowing requirements, this paper follows Servén (2003) in focusing on the crowding-out effects that have received particular attention from both economists and those involved in the policy debate. For Erenburg (1993), while conventional macroeconomic analysis has long recognised the possibility of crowding out, there is growing concern about its impact on the economy, not only in terms of the continuing distortion of the government's financial position, but also in terms of more sophisticated analyses of the mechanisms that lead from budget deficits to a deterioration in the economy's performance.

In fact, according to Hechler (1993), CEMAC industrial policy underwent a shift in the focus of economic development from public to private enterprises in the 1980s. Thus, in 1984, the investment code was modified to include a special regime for the craft sector and SMEs. The objective was to define a dimensioning of production units that would adapt to the capacities of the local market, thus privileging private enterprise. As noted by the World Bank (1995), given the extent of indebtedness in CEMAC<sup>1</sup> and the need to increase public savings to meet it, the possibilities of increasing public investment are rather

<sup>1</sup> Specifically Cameroon because in response to the economic recession in Cameroon since 1985/86, regulation in the formal sector has increased and many businesses have had to be closed.

limited. As a result, CEMAC must rely mainly on the private sector to boost growth.

Unfortunately, during the 1980s, the dynamism of the private sector was only due to the informal urban sector (World Bank, 1995). For Guillaumont (1998), the poor economic performance of WAEMU countries in the second half of the 1980s could not be corrected quickly enough in the early 1990s. Thus, as GDP growth remained negative, total investment (public and private) fell steadily between 1988 and 1993. Of course, most enterprises were operating below installed capacity and could not induce an increase in investment. Meanwhile, the external debt increased to worrying proportions and the budget deficit became increasingly negative.

The periods of high economic activity pushed the CEMAC and WAEMU governments to undertake large investment projects that generated enormous costs and to take social measures that were not related to the efficiency of public services. The result was a considerable increase in public burdens. For Dramani and Laye (2008), the consequences on the overall picture of the economy reflected trends of structural imbalance, namely: a relatively low rate of investment hovering around 21%, the public debt whose norm should be less than or equal to 70% of GDP is not always respected, the basic budget balance (positive or zero norm) which is widening and tending towards a deficit. The inflation rate (standard less than or equal to 3% of GDP) is not always respected and is relatively high due to expansionary credit policies.

In order to curb these macroeconomic imbalances, the states of these sub-regions had committed themselves, together with the Breton Woods institutions, to a process of adjustment of their economies and to a reform of the convergence criteria. The fundamental objectives assigned to these programmes were the restoration of major balances, the control of inflation and the achievement of healthy and

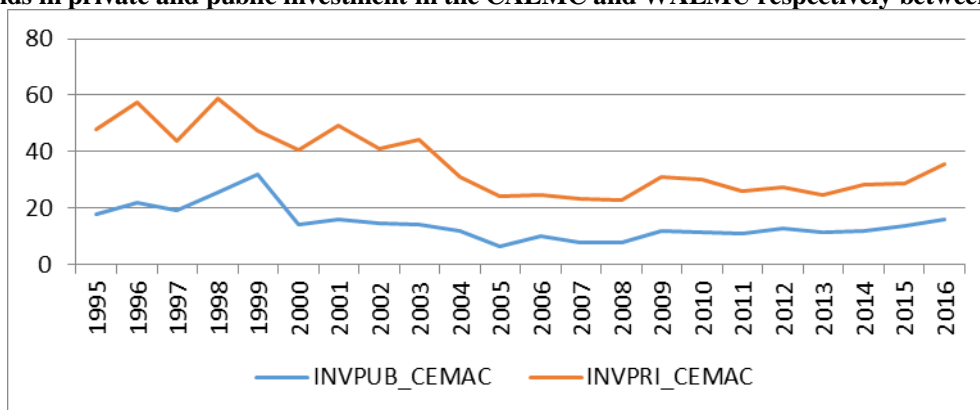
sustainable economic growth. Despite all the efforts made by the authorities, the results obtained could not restore the state's financial capacity. At least, the real effective exchange rate had appreciated substantially, posing a serious problem for the competitiveness of the economy. The consequence of all these factors in most countries has been a mixed record of the convergence criteria in place since 1994.

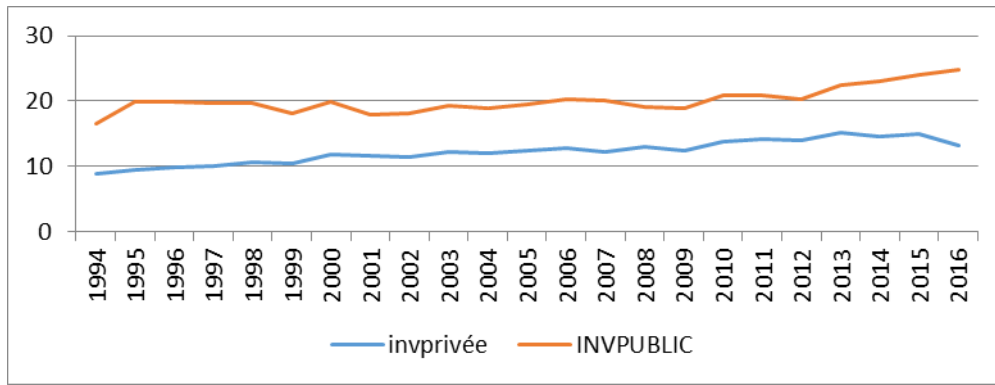
The objective of this paper is to assess the conditional effect of the new convergence criteria on the private-public investment relationship in CEMAC and WAEMU. More precisely, it aims to show that the new budget balance and public debt criteria crowd out (amplify or attenuate the crowding out effect) private investment. To our knowledge, such a problem has not yet been studied empirically in the Franc Zone. Certainly, previous studies such as Touna and Kamgnia (2001), have studied private investment behaviour in Cameroon via the tightening of the financial constraint; Kame (2008) has studied the link between public debt and private investment in Cameroon; Créel et al. (2015), have made an empirical analysis of the link between private and public investment in four OECD countries. Minea and Villieu (2009), focused on public investment and the non-linear effects of budget deficits in the OECD. All of these issues are close to ours, but different in that they do not deal with the new convergence criteria as a whole.

Framed by an introduction and a conclusion, this chapter is organised around six sections. The second section presents the stylised facts on investment. Section three presents a brief review of the literature. In section four, the methodology is presented in which we describe the chosen model, the variables, the data and their sources and the different estimation methods. Section five presents the results and makes an interpretation. Finally, the last section provides a conclusion.

## II. SOME STYLISED FACTS ON INVESTMENT

**Figure 1: Trends in private and public investment in the CAEMC and WAEMU respectively between 1994 and 2016**

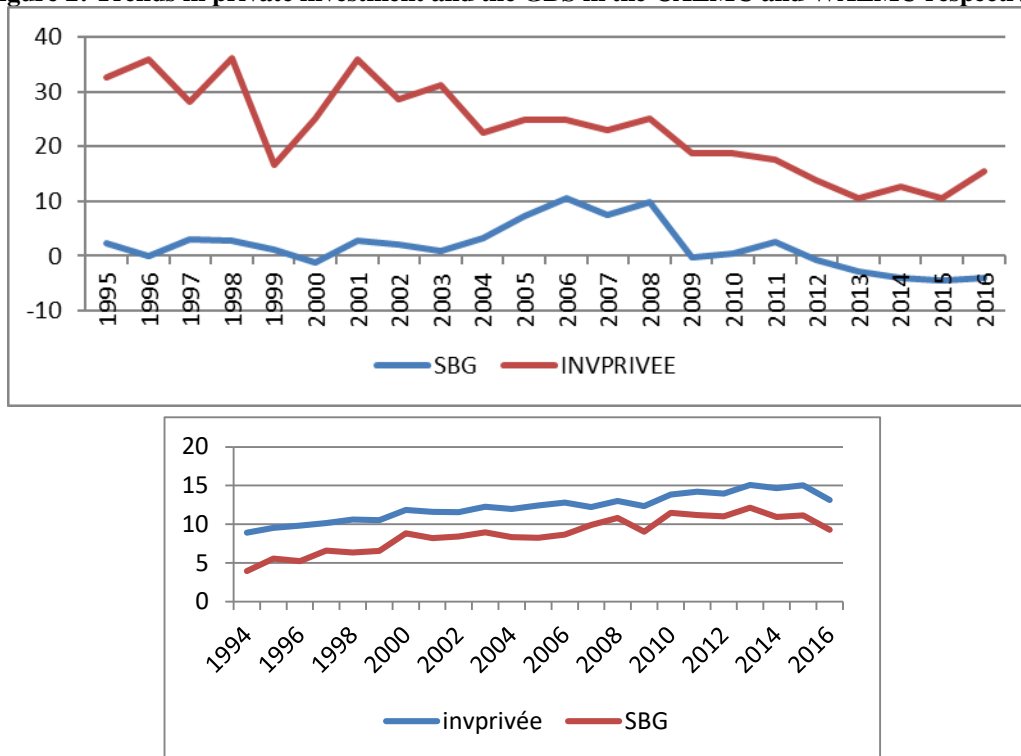




Source: Authors

Figure 1 shows a downward trend in both curves in the same direction. However, the private investment curve is steeper than that of public investment in CEMAC. While in WAEMU, private and public investment have a constant upward trend.

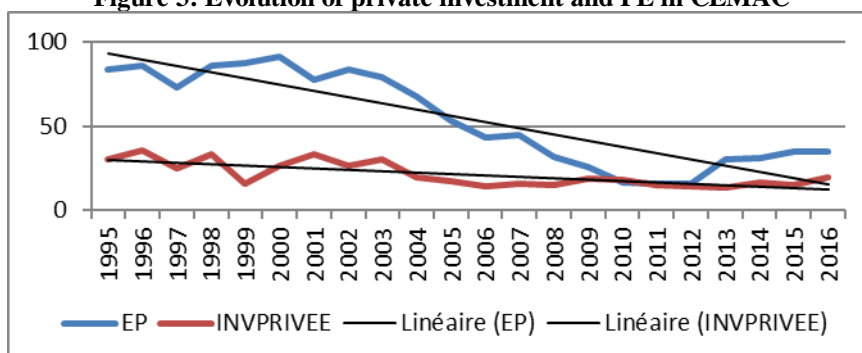
**Figure 2: Trends in private investment and the GBS in the CAEMC and WAEMU respectively**



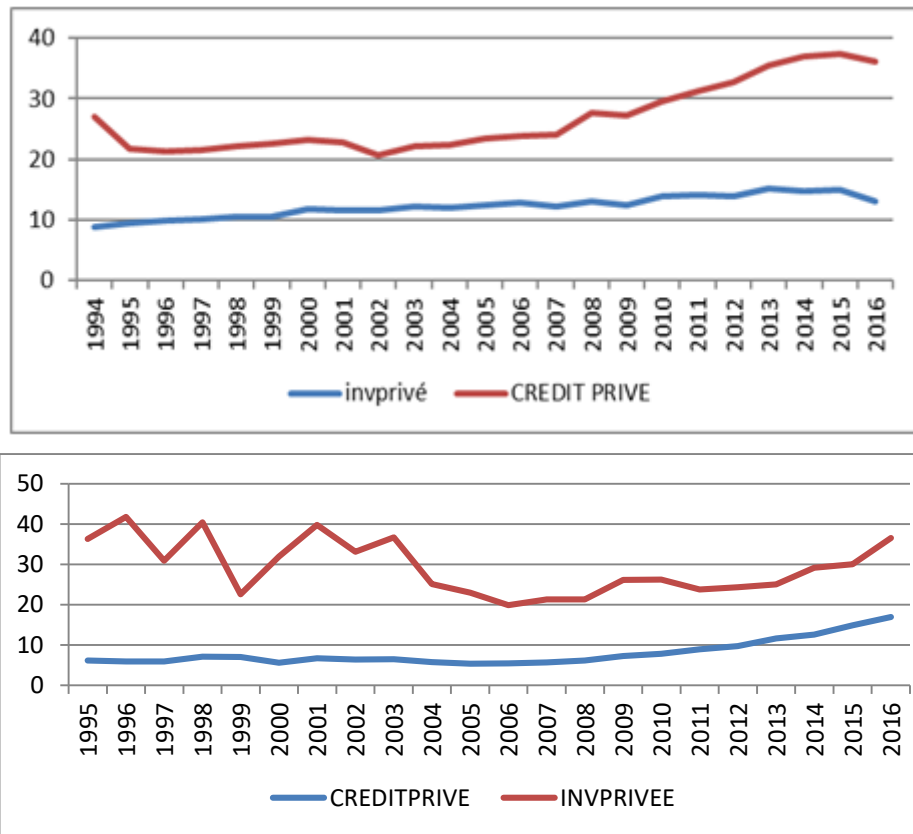
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Figure 2 shows a trend in the same direction for private investment and the overall budget balance in the two sub-regions.

**Figure 3: Evolution of private investment and PE in CEMAC**



The Figure 3 shows that private investment and public debt move in the same direction. These two curves have a downward trend until 2010 because when private investment decreases, public debt also decreases to reach a certain threshold.



**Figure 4: Trends in private sector credit and private investment in the CAEMC and WAEMU**  
Source: Authors

The figure 4 shows the relationship between private sector credit and private investment. In CEMAC, from 1995 to 2006, the investment rate fluctuated while the interest rate trend was slightly downward and relatively stable. The 2007 to 2016 phase corresponded to a simultaneous rise in private credit and investment. This trend is said to be due to the undertaking of major works throughout the Zone, hence the high credit rate. The dynamics of investment are thus explained by the classic determinants, namely variations in activity and profitability.

**III. PRIVATE INVESTMENT/PUBLIC INVESTMENT: A BRIEF REVIEW OF THE LITERATURE**

The issue of public debt is fundamental in the field of macroeconomic analysis. In fact, there are three schools of thought concerning the economic effect of public deficits or public debt. Each of them develops very divergent arguments to show that public deficits are terribly harmful, incredibly beneficial or unimportant (Khan and Reinhart, 1990).

According to the classical and even monetarist view, crowding out is inherent in any relationship between government borrowing and investment. Therefore, only capital expenditures should be financed by borrowing

because these are expenditures that can benefit future generations and it is therefore legitimate that the latter bear part of their financing. For Friedman (1983), debt reduces the level of investment necessary for economic growth.

According to the Keynesian view, governments must in some cases stimulate the economy by increasing public spending or by reducing taxes. Public deficits are therefore a solution to accelerate economic recovery in a crisis. Thus, through its leverage effect on private investment, public borrowing is important because it stimulates and drives economic growth. Debt thus becomes an instrument for achieving the main goal, macroeconomic balance (Dafflon, 1998).

Finally, according to the Ricardian conception, private agents may decide not to increase their consumption when a government, whose budgetary situation is precarious, decreases its taxes because they may think that this decrease in taxes will only be temporary and that they will undoubtedly have to face higher taxes in the not too distant future in order to allow for the repayment of the loans made as a result of the current decrease in tax revenues; the deficit caused by the decrease in taxes therefore does not modify economic growth.

However, the crowding out of private investment by public investment can be mitigated when more resources are available to finance budget deficits and public spending - a hypothesis tested by estimating the effects of the interaction of public investment crossed with these different criteria on private investment (Arizala et al., 2017).

Empirically, there are few arguments for developing countries that diverge on the issue of the relationship between public and private investment. Some empirical studies in this area have confirmed the idea that the effect depends on the degree of complementarity or substitutability between public and private investment (Khan and Reinhart, 1990; Aschauer and Lächler, 1998, Gupta et al., 2002; Mansouri, 2001, 2003a). According to these two case studies, public investment would stimulate private investment in Pakistan (Haque and Montiel, 1991, 1994) and Zimbabwe (Morandé and Schmidt-Hebbel, 1991, 1994). For other case studies, public investment would crowd out private investment as in Chile (Marshall and Schmidt-Hebbel, 1991, 1994), Colombia (Easterly, 1991, 1994), Ghana (Islam and Wetzel, 1991) and Mexico (Alberro-Semerena, 1991; Aschauer and Lächler, 1998).

In Cameroon, according to the work of Touna Mama and Kamgnia Dia (2002), external debt is determined as a reducer of the effects of credit to the private sector; public spending on investment, rather than the budget deficit, significantly and negatively affects private investment and any shock on investment observed in a given year is entirely absorbed in one year.

Minéa and Villieu (2009), attempt to account for the non-linearity of the effects of budget deficits and public investment in OECD countries. Using the threshold effects estimation method with Panel smooth transition regression (PSTR), the results reveal on the one hand that the sign of the relationship between deficit and public investment spending would be reversed in the vicinity of a public debt ratio of 120% of GDP. On the other hand, the estimates also reveal an asymmetry in the magnitude of this relationship.

Créel et al (2015), study the relationship between public investment and private non-residential investment because at the theoretical level, public investment can have two contradictory effects on private investment: a crowding out effect and a spillover effect. Using different linear empirical models, applied to four OECD countries, they seek to separate these two effects. The study focuses on a VAR model in which private investment, GDP growth and the interest rate interact and are influenced by public investment and public debt, among others. The results show that in France, the spillover effect seems to outweigh the crowding out effect, while in the US, a rather weak crowding out effect emerges. No robust results emerge from the German and British data.

#### IV. METHODOLOGICAL APPROACH

##### A. The model

The objective of this paper is to study the conditional effect of NCCs in the relationship between public and private investment, so we focus on the role of the overall budget balance and public debt criteria in crowding out the private sector. To carry out our work, we adopt a model that tests the relationship between private and public investment. Several works in the literature have tested this hypothesis of private sector crowding out by the public sector (Servén, 2003; Cavallo and Daude, 2011; Arizala et al. 2017). The study by Arizala et al. (2017) has some relative advantages. It was conducted in the context of sub-Saharan African countries and is relatively recent. However, their model does not take into account the convergence criteria for private investment. Moreover, in order to test whether NCCs are a crowding out factor, we include cross dummies between public investment and SBG, public investment and PE, public investment and INFL. The empirical model used is as follows:

$$INVP_{it}^r = \alpha_0 + \alpha_1 INVP_{it}^c + X_{it} + \varepsilon_{it} \quad (4.1)$$

The objective here is not to measure the speed of crowding out, but to assess how the effort made by Franc Zone countries to meet these new criteria would have crowded out investment. We introduce in the model (4.1) the variable Dum2001 which captures the structural effect related to the implementation of the new convergence criteria in CEMAC and WAEMU. This approach assigns the value 0 before 2001 and 1 from 2001 to the variable. The model becomes:

$$INVP_{it}^r = \alpha_0 + \alpha_1 INVP_{it}^c + \alpha_2 INVP_{it}^c * DUM2001 + X_{it} + \varepsilon_{it} \quad (4.2)$$

We capture the effect of countries' compliance with each criterion on their investment path by retaining for modelling the convergence criteria in force since 2015, because of their pre-eminence (generally considered as the first-ranking criteria) and the assessment that is made each year (data availability). These are the criterion of the overall budget balance including grants (DumSBG), the debt criterion (DumEP) and the inflation criterion (DumInfl). This approach, which is more appropriate, assigns a value of 1 to the criterion if it is met by a given country for a given year, and 0 otherwise.

The specification chosen to capture these criteria-specific effects is as follows:

$$INVP_{it}^r = \alpha_0 + \alpha_1 INVP_{it}^c + \alpha_2 INVP_{it}^c * DUMSBG + \alpha_3 INVP_{it}^c * DUMEP + \alpha_4 INVP_{it}^c * DUMINFL + X_{it} + \varepsilon_{it} \quad (4.3)$$

##### B. Description of the variables



The endogenous variable  $INVP_{it}^r$  refers to real private investment as a percentage of GDP. This variable is captured, as in the national accounts, by private sector gross fixed capital formation.

The variable  $INVP_{it}^c$  captures public investment expenditure as a percentage of GDP. The expected sign of this variable is indeterminate a priori. Indeed, this expenditure generally encourages private investment when it comes to public spending on infrastructure. On the other hand, this expenditure discourages private investment when it is made in the non-infrastructure sector (Blejer and Khan, 1984; Shafik, 1990). The negative effect of this expenditure is mitigated when there are sufficient resources at its disposal such as natural resource rents.

The interactive variable  $INVP_{it}^c * DUMSBG$  is the multiplication of the public investment variable (INVPUB) by the SBG variable (it is a binary variable which takes the value 1 if the criterion is met by country  $i$  in year  $t$  and 0 otherwise). This variable captures the conditional effect of the new SBG criterion in the public-private investment relationship. The expected sign of the coefficient of this variable is ambiguous.

The cross variable  $INVP_{it}^c * DUMEP$  is the multiplication of the public investment variable (INVPUB) by the variable capturing compliance with the PE criterion (it is a binary variable that takes the value 1 if the criterion is met by country  $i$  in year  $t$  and 0 otherwise). This variable measures the conditional effect of the new debt criterion in the public-private investment relationship. The expected sign of the coefficient of this variable is also ambiguous.

The cross variable  $INVP_{it}^c * DUMINFL$  is the multiplication of the public investment variable (INVPUB) by the variable capturing compliance with the INFL criterion. This variable measures the conditional effect of the inflation criterion on the crowding out of public investment by private investment. The expected sign of the coefficient of this variable is also ambiguous.

The vector  $X_{it}$  is a set of control variables. This vector includes: The CREDIT variable which represents the credit provided to the private sector as a percentage of GDP; The TCHER variable represents the real effective exchange rate which is stated in terms of crowding out and crowding in effects; The Inflation variable captured by the annual variation of the consumer price index is perceived as an indicator of macroeconomic stability; The TO variable which captures the degree of trade openness of a country. It is calculated by the sum of exports and imports in relation to

GDP; the natural rent variable captures the level of dependence of a country on natural resources.  $\epsilon_{it}$  represents the error term. The indices  $i$  and  $t$  represent the countries and time respectively.

### C. Data source

The sample of our study includes the 6 CEMAC countries and the 8 WAEMU countries. This study covers the period 1994-2016. We mainly use secondary data from different databases according to the variables. The dependent variable Private Investment (INVPRI) is taken from the WDI database of the World Bank. Our variables of interest INFL, SBG and EP are extracted from the various Franc Zone convergence reports. The variables, INVPUB, RENNAT, TO, TCHER, Inflation, log GDP/head, are taken from WDI. The credit variable provided to the private sector as a percentage of GDP (CREDIT) is taken from the IMF's International Financial Statistics (IFS).

### D. Estimation technique

The execution of the Sargan over-identification test, which allows us to test the validity of the instruments used, gives us, for the CEMAC countries, a probability of 0.9171 for the INVPUBLIC variable. For the WAEMU countries, the execution of the same test under Stata 13 gives us a probability of the Sargan test equal to 0.5900 for the variable INVPUBLIC.

These results lead us to conclude that we cannot reject the  $H_0$  hypothesis of the validity of the INVPUBLIC instrument. Hence, public investment is indeed endogenous in our sample.

In this context, two alternative methods can be considered. The Generalized Moment Method (GMM) and the Instrumental Variables (IV) approach. To this end, Roodman (2009) has highlighted a decision rule with regard to these two methods. For him, GMM is appropriate when the individual dimension exceeds the time dimension of the panel. In our study, the individual dimension (fourteen countries) is much smaller than the time dimension (twenty-three years). The most appropriate approach in our study is therefore that of instrumental variables.

The tables below present some descriptive statistics on our main analysis variables.

The figures show that, on average, the overall budget balance is in surplus in the CEMAC (1.76%) and in deficit in the WAEMU (-3.5%). As for public debt, the average is around 55% (below the threshold) in both zones, so this criterion is met by all the countries in the sample.

**Table 4.1: Descriptive statistics of the analysis variables: CEMAC**

Variables	Mean	SD	Minimum	Maximum	Observations
Private Investment	21.21129	19.16956	4.297195	125.2134	N = 109
Public Investment	14.45138	21.19346	1.691477	155.0151	N = 132
DUM2001	.7272727	.4470584	0	1	N = 132
SGB	1.768182	7.872615	-9.9	31	N = 132
Public debt	54.31364	46.53466	8	213.2	N = 132
DUMSBG	.5984848	.4920722	0	1	N = 132
DUMEP	.6212121	.4869331	0	1	N = 132
Inflation	5.34063	13.37575	-31.56591	64.73502	N = 132
Private credit	7.976285	4.416426	2.097239	25.0169	N = 132
Exchange rate	96.76632	19.90918	56.275	220.5428	N = 88
Trade openness	105.9777	89.75011	33.24395	531.7374	N = 132
Resources rent	27.8099	18.55867	6.167601	89.16611	N = 122

Source: Authors

1) Table 4.2: Descriptive statistics of variables: WAEMU

Variable	Mean	SD	Minimum	Maximum	Observations
Private Investment	12.36913	5.948291	1.373333	33.06735	N = 184
Public Investment	7.82255	4.87876	0	27.23492	N = 184
DUM2001	0.6956522	0.4613861	0	1	N = 184
DUMINFL	0.451087	0.4989795	0	1	N = 184
DUMSBG	0.5163043	0.5010976	0	1	N = 184
DUMEP	0.6646707	0.4735253	0	1	N = 167
Inflation	5.770714	10.21765	-9.823833	80.89968	N = 184
SBG	-3.50756	3.402886	-24.503	3.026	N = 184
Public debt	58.94098	36.9168	12.232	209.237	N = 161
Private credit	14.51376	7.58222	0.4103563	39.28411	N = 184
Trade openness	62.65845	17.97761	30.73252	125.0334	N = 184
Exchange rate	96.8482	6.613456	77.74333	108.4121	N = 46
Resources rents	9.631767	5.935666	2.425298	31.59078	N = 176

Source: Authors

Tables 4.3 and 4.4 present the results of the stationarity test for the variables in CEMAC and WAEMU respectively. It emerges that all our variables are stationary, whether at level or in difference and with constant or constant and trend. This test allows us to decide on the method to use in order to avoid spurious regressions.

2) Table 4.3 : Test of Stationarity for CEMAC variables

VARIABLES	PESARAN'S CADF Test			
	Level		First Difference	
	with constant	With constant and trend	With constant	With constant and trend
Private investment	0.863	0.999	0.036	0.083
Public investment	0.857	0.690	0.046	0.074
SBG	0.001	0.015		
Public debt	0.004	0.122		0.000
Inflation	0.011	0.068		
Private credit	0.290	0.011	0.013	
Exchange rate	0.989	1.000	0.017	0.043
Trade openness	0.440	0.742	0.000	0.000
Resources rent	0.869	0.988	0.046	0.003

Source: Authors

3) Tableau 4.4 : Test of stationnarity for WAEMU variables

TEST DE PESARAN'S CADF				
VARIABLES	Level		First difference	
	With constant	With constant and trend	With constant	With constant and trend
Private investment	0.025	0.279		0.000
Public investment	0.329	0.040	0.000	
Inflation	0.000	0.000		
SBG	0.010	0.015		
Public debt	0.012	0.117		0.000
Private credit	0.284	0.028	0.000	
Trade openness	0.158	0.529	0.000	0.000
Exchange rate	0.005	0.004		
Resources rent	0.708	0.862	0.000	0.000

Source: Authors

**V. RESULTS AND INTERPRETATIONS**

The presentation of the results in this section will be done in three steps. First, we will present the results of the estimates of the crowding-out effect in the private-public investment relationship. Next, we will present the results of the estimates of the structural effect that captures the adoption of NCCs in the public-private investment dualism. Finally, we will present the results of the estimations of the specific effect relating to the respect of the NCC crossed with public investment on private investment in CEMAC and WAEMU.

**A. Estimation results for the crowding out effect in the private-public investment relationship**

The results of the estimations recorded in tables 5.1 and 5.2 respectively in CEMAC and WAEMU show that

public investment negatively and significantly affects public investment in CEMAC and WAEMU. Such a relationship is likely to support the hypothesis of private investment being crowded out by public investment in the zone. However, infrastructure spending, such as electricity, transport and communications, has been relatively high in the Franc Zone, and one would expect a knock-on effect. Unfortunately, the various networks deteriorated in the second half of the 1980s. In fact, the lack of infrastructure is defined in the list of the main handicaps to private sector development, and ranks fifth on the list of main constraints identified by the World Bank (1996). The coefficient of the real effective exchange rate is positive in both areas where it has been specified. This indicates that a devaluation is likely to be perceived as a gain in competitiveness by the private sector and generate an increase in investment. However, this coefficient is insignificant in the WAEMU.

**Table 5.1: Crowding-out effect of public investment on private investment in CEMAC between 1994 and 2016.**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Private investment	-0.651206*	0.257756	2.526444	0.0151
Private credit	0.699240*	0.334067	2.093114	0.0420
TCHER	0.268228***	0.074685	-3.591438	0.0008
Trade openness	0.002361	0.066177	0.035674	0.9717
Inflation	0.095295	0.073616	1.294489	0.2021
Resource rents	0.072231	0.114103	0.633032	0.5299
C	30.03652**	9.004215	3.335828	0.0017
R-squared	0.874793			
Adjusted R-squared	0.858099			
F-statistic	52.40076			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	0.691230			

Note: \*\*\* p<0,01, \*\* p<0,05, \* p<0,1 correspond to significance level at 10, 5 and 10% respectively ; C : Constant

Source: Authors

**Table 5.2: Crowding-out effect of public investment on private investment in the WAEMU between 1994 and 2016**



Variable	Coefficient	Std. Error	t-Statistic	Prob.
Public investment	-0.661632*	0.378400	-1.748499	0.0903
Private credit	0.343690*	0.200055	1.717982	0.0958
TCHER	0.023189	0.116459	-0.199114	0.8435
Trade openness	-0.028728	0.067906	-0.423058	0.6752
Inflation	-0.224685	0.168807	-1.331016	0.1929
Resource rent	0.156699	0.169561	0.924142	0.3626
C	11.18004	10.34396	1.080828	0.2881
R-squared	0.301035			
Adjusted R-squared	0.165751			
F-statistic	3.416986			
Prob(F-statistic)	0.010499			
Durbin-Watson stat	1.086586			

Note: \*\*\* p<0,01, \*\* p<0,05, \* p<0,1 correspond to significance level at 10, 5 and 10% respectively ; C : Constant

Source: Authors

These results corroborate those of several authors whose studies cover both developed and developing countries (Greene and Villanueva, 1991; Touna and Kamgnia, 2001; Créel et al. 2015; Cavallo and Daude, 2011). The results obtained above are classical and our study goes beyond by interrogating the new convergence criteria hence the estimation of model 2 which captures the implementation of NCCs in both areas.

#### B. Results of the estimates of the effect of the implementation of NCCs on the private-public investment relationship

To analyse the effect of the implementation of the new convergence criteria on the relationship between private and public investment in the CEMAC and WAEMU countries, we use the panel data instrumental variables estimator. The study period is from 1994 to 2016, the structural effect is captured by a dummy variable that takes the value 1 from 1994 and 0 before 1994. 1994 is taken as the year of implementation of the NCC. The results of these estimates are reported in tables (5.3) and (5.4) below.

**Table 5.3: Estimation of the structural effect of NCCs in CEMAC**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Public investment	-0.459255*	0.273253	1.680698	0.0999
invpublic*dum2001	-0.894622***	0.201264	-4.445009	0.0001
Private credit	0.234169	0.301665	0.776255	0.4418
TCHER	-0.059304	0.077019	-0.769986	0.4454
Inflation	-0.021955	0.067366	-0.325904	0.7460
Resource rents	0.204773	0.137370	1.490660	0.1432
Trade openness	0.043801	0.074901	0.584779	0.5617
C	14.54339	8.294031	1.753477	0.0865
R-squared	0.912177			
Adjusted R-squared	0.898205			
F-statistic	73.63253			
Prob (F-statistic)	0.000000			
Durbin-Watson stat	1.068454			

**Table 5.4: Estimation of the structural effect of NCCs in WAEMU**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Pubic investment	-0.860847*	0.323739	-2.659075	0.0119
invpub*dum2001	0.599726*	0.327743	1.829865	0.0760
Private credit	0.189765	0.142382	1.332791	0.1915
TCHER	-0.128664	0.084667	-1.519654	0.1378
Inflation	-0.128376	0.085416	-1.502952	0.1421
Resources rent	0.181885	0.138935	1.309137	0.1993
Trade openness	-0.059235	0.075138	-0.788352	0.4360
C	25.21466	10.64615	2.368431	0.0237
R-squared	0.336373			
Adjusted R-squared	0.199744			
F-statistic	3.509216			
Prob(F-statistic)	0.006116			
Durbin-Watson stat	0.780641			

The results show that the crowding out effect in the public-private investment dualism in CEMAC and WAEMU is reduced with the implementation of the NCCs, as the coefficients judging crowding out are respectively -0.8946 compared to -0.6512 before the adoption of the criteria in CEMAC; and 0.59972 compared to -0.6616 in WAEMU. The other variables remained unchanged.

### C. Conditional effects of compliance with the NCC in the private-public investment relationship

Capturing the specific effects of the new convergence criteria in the private investment-public investment relationship amounts to introducing the variables of interest DumSBG, DumEP and DumINFL as shown in the specification of equation (4.3). This specification, largely inspired by the work of Arizala (2017), allows us to measure the conditional effect of NCCs in the public-private investment dualism. We test the effect of compliance with the new criteria by crossing the dummy variables DumSBG, DumEP and DumINFL (which take the values 1 when the criterion is met by country  $i$  in year  $t$  and 0 otherwise) with public investment and focus on their effects on private investment. Estimating by the IV method, we obtain the results reported in Tables 5.5 and 5.6. The estimation results show a positive and significant effect of our variables of interest (inpublic\*dumsbg and inpublic\*dumep) on private investment in CEMAC and WAEMU.

The positive effect induced by the overall budget balance proves that there is a budgetary saving because the threshold of -1.5% and -3% respectively in the two zones contributes to a mitigation of the crowding out effect. The conditional effect of the new SBG criterion in the relationship between public and private investment may therefore depend on the modes of financing the budget deficit (taxes, borrowing and seigniorage) because according to the classics, the state should not intervene in the economy, hence the non-existence of the budget deficit. The state must play its regalian role in order to crowd out economic activity. In CEMAC, the main source of financing is taxes, which in our case reduces the crowding out of private investment because the less taxes there are, the more companies have the opportunity to invest.

The positive and significant effect induced by the public debt variable poses an interest rate problem. The reduction of the debt ratio by 10% in CEMAC leads the state to a drying up of liquidity and higher bank pricing. The spillover effect of public debt crossed with public investment on private investment is linked to an increase in interest rates leading to a decrease in the quantity of credit available and which acts directly on private investment.

Table 5.5: NCC-specific effect in CEMAC

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
Public investment	0.516416*	0.297676	1.734828	0.0901
invpublic*dumsbg	0.590685***	0.131351	4.496993	0.0001
invpublic*dumep	0.333714*	0.134519	-2.480805	0.0172
invpublic*duminl	-0.368772*	0.196183	-1.879736	0.0671
Private credit	0.557965*	0.263899	2.114308	0.0405
TCHER	-0.108093	0.063863	-1.692576	0.2979
Inflation	-0.235985*	0.104799	-2.251798	0.0296
Resource rents	0.022883	0.126818	0.180436	0.8577
Trade openness	0.056479**	0.067057	0.842252	0.0044
C	15.67696	7.297120	2.148376	0.0375
R-squared	0.932064			
Adjusted R-squared	0.917507			
F-statistic	65.20893			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	1.388910			

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 are significance levels. Invpub: Public Investment, CREDPRIV: Private Credit, TCHER: Exchange Rate, C: Constant

Table 5.6: NCC-specific effect in WAEMU.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
invpub	-1.254356*	0.402542	-3.116084	0.0264
invpub*dumsbg	0.424222*	0.187927	2.257376	0.0736
invpub*dumep	0.952707**	0.232306	4.101087	0.0093
invpub*duminl	0.058394	0.175845	0.332076	0.7533
CREDPRIV	0.414170*	0.176330	2.348837	0.0657
TCHER	-0.210890	0.112814	-1.869362	0.1205
INFLATION	-0.093268	0.147689	-0.631517	0.5554
RENNAT	-0.262870	0.271997	-0.966443	0.3782
TO	-0.097238	0.064459	-1.508519	0.1918
C	33.97364	13.84315	2.454184	0.0576
R-squared	0.939423			
Adjusted R-squared	0.830385			
F-statistic	8.509310			
Prob(F-statistic)	0.014820			
Durbin-Watson stat	1.919649			

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 are significance levels. Invpub: Public Investment, CREDPRIV: Private Credit, TCHER: Exchange Rate, TO: Openness Rate, RENNT: Natural Rent, C: Constant

Other control variables were of interest to us. These are :

In the short term, credit has a positive and significant effect on private investment in the CAEMC and the WAEMU. An increase in bank credit of one percentage point of GDP leads to an improvement in the private investment rate of 0.55 points in the CAEMC and 0.41 points in the WAEMU. These results can be explained by the fact that medium and long-term loans represent a relatively large share of loans. Thus, the performance of loans granted and the relative importance of medium- and long-term loans help to show that they are used to finance economic activity, particularly in the private sector. These results are consistent with those of Gonzalez et al (2013).

Inflation has a negative and significant effect on private investment in CEMAC. Since inflation captures uncertainty, any decrease in inflation will decrease private investment if public investment is financed by money creation (seigniorage). This negative effect of inflation on private investment should discourage public investment and as a consequence amplify crowding out.

### CONCLUSION

The objective of this paper was to study the conditional effect of the new convergence criteria on the relationship between private and public investment in the CEMAC and the WAEMU. By conducting a retrospective analysis over the period 1994-2016 and using the instrumental variables estimator, the resulting results are as follows:

The adoption of the NCC in 1994 would have mitigated the crowding out effect in the dualism of public and private investment in CEMAC and WAEMU by about 0.096. The coefficients judging the crowding out are respectively -0.89 in CEMAC and 0.599 in WAEMU.

Concerning the CAMAC countries, compliance with the public debt criterion (standard less than or equal to 60% of GDP) would have led to a spillover effect of public investment on private investment. The coefficient assigned to this cross variable is positive and significant at the 10% level (0.3334). The respect of the new criterion of overall budget balance (norm greater than or equal to -1.5% of GDP) since 1994 would have led to a driving effect of public investment on private investment. The coefficient associated with the  $inpublic*dumsbg$  cross variable is positive and significant at the 1% level and of the order of 0.59 points.

The results for the WAEMU countries are similar to those for the CEMAC. The new SBG criterion (norm  $\geq$  -3% of GDP) induces a positive and significant effect at the 10% threshold with a coefficient of 0.43. This result reflects a spillover effect of public investment on private investment in the WAEMU.

Indeed, with regard to public debt, the traditional approach shows that an increase in public spending or a tax reduction financed by public borrowing has a short- and long-term effect on the economy. In the short run, increased consumer spending increases the demand for goods and services, and thus production and employment. In the long run, the decline in domestic savings caused by the tax cuts weighs negatively on the capital stock and positively on foreign borrowing. However, we recommend that the CEMAC authorities implement the criteria proposed in 2015 and ensure their respect, which could effectively contribute to the recovery of our economies through private investment. As for the WAEMU authorities, they must ensure that the SBG threshold of -3% is respected by the countries of the sub-region, under pain of sanctions.

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