

## **RELATIVE EFFECTS OF PUBLIC AND PRIVATE INVESTMENT ON CÔTE D'IVOIRE'S ECONOMIC PERFORMANCE**

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**Abstract:**

This paper investigates the impact of public and private investment on Côte d'Ivoire's economic performance (GDP growth) over the period 1969-2001, using an autoregressive-distributed lag (ARDL) Error Correction Model (ECM). The results show that in the short run an increase in private investment by 100% enhances economic growth by 28%, while 100% increase in public investment lead to only 7% increase in real GDP. In the long run nevertheless the impact of public investment on GDP growth has been higher than private investment, 100% increase in private investment lead to 25% increase in GDP, while public investment impacts growth by 37%. On the other hand, 100% increase in employment lead to 38% increase in long run GDP growth. The main findings indicate that while the short run efficiency of public capital can be further improved in Côte d'Ivoire, in the same time the efficiency of private investment can be improved in the long run.

JEL Classification: C22, C51, O47

Keywords: Public and Private Investment, GDP Growth, ECM.

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### **1. Introduction**

The relationship between public investment, private investment and growth has been a key issue in the growth process of African countries as these two components of total investment can have diverse impacts on economic growth. Recently, African economies have been urged by international institutional partners in development to change their development strategies with regards to the bad performance of their state-based growth process, noting that in a market economy, private investment is the driving force of economic growth. This paper is an attempt to investigate the relative impacts of an increase of public investment relatively to private investment in a good representative country as Côte d'Ivoire where capital accumulation has been based on income from exports of raw material products managed by government, which has concentrated the financial resources in its hands, modeling thus the path of the economic growth. Does public investment complement or displace private capital formation in Côte d'Ivoire?

Economic theory suggests that public investment, financed by borrowing, by driving up interest rates, reduces the available funds for private investment, which level is thus reduced. If the positive impact of increased public investment outweighs the negative impact of reduced private investment then economic growth will increase. But, on the other hand 'crowding out' argument states that the negative impact of reduced private investment completely cancels the positive impact of increased public investment, and economic growth will remain weak. The main empirical crowding out literature with mixed findings (see Evans (1985), Aschauer (1989) and Ardagna and al. (2004)) concerns the United States and other OECD countries. Another group of studies concerns developing countries (Khan and Kumar, 1997, Ghali, 1998, Ramirez, 2002), but to our knowledge no empirical work related to this issue has concentrated particularly on African Franc zone countries. In this paper we aim at complementing the existing

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empirical literature on this matter, with a special emphasis on Côte d'Ivoire's experience, which is one of the major countries (especially the Western area) of Franc zone<sup>2</sup>?

Our main empirical findings are as follows. We find differential impacts of the two components of investment on growth in Côte d'Ivoire. In the short run we find that 100% increase in private investment enhance growth more than public investment. In the long run, the impact of public investment on GDP growth overcomes the one of private investment. On the other hand, in the long run an increase in employment leads to a higher impact on GDP growth than both public and private investment. The remaining of the paper is organized as follows. Section 2 presents a brief overview of Côte d'Ivoire's economy while Section 3 describes the model and discusses the empirical findings. Finally Section 4 concludes.

## **2. Côte d'Ivoire's Economic Growth: 1960-2001**

Since the early years of its sovereignty in 1960 Côte d'Ivoire developed a growth strategy based on the rest of the world (ROW) to (i) provide skilled labour; (ii) provide manufactured goods and capital; and (iii) buy raw material from the country's primary sector dominated by forest products, where cocoa and coffee represented about 45% of total exports in 1995. At the peak of its economic prosperity characterized by a relatively long period of growth during 1960-1979, GDP grew at an average annual rate of 5.7%. During this period "State Capitalism" characterises the economy with several state-own enterprises created relatively to various investment projects. Some observers qualified this period of sustained growth the "Ivorian Miracle". In 1969, services represented 51% of GDP while agriculture and Industry only represented 34% and 15% respectively. In 1998 the relative share of industry grew to 28% overcoming the share of agricultural value added in GDP. The share of services in GDP still remained predominant around 44%.

This economic structure led to a growth in agricultural exports and revenues then managed by the CAISTAB<sup>3</sup> (a public marketing board). These revenues enabled the government to undertake various investment programmes in all sectors of the economy. Total investments represented more than 15% of GDP and grew at a rate of 20% per year over the period 1969-1982 (see Table 1). Compare to other developing regions in the world (Latin America and East Asia) over the period 1990-1995, we notice that the share of total investment in GDP and its two components are very low in Côte d'Ivoire (see Table 2). The growth process slowed down by the end of 1979 due to the decline in the prices of agricultural products and was exacerbated by both the 1973 and 1978 oil crises coupled with the deterioration of terms of trade. Since the early 80s the macroeconomic situation worsened, and the emergence of persistent budget deficits constrained the government to reduce its investment efforts for development programmes previously initiated in several sectors such as Health and Education. As an example, while Education represented 35.6% of the budget and 6.3% of the GDP in 1992, these shares dropped to 15.5% of the budget and 4.1% of GDP in 1997.

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<sup>2</sup> Composed of Western Africa Economic and Monetary Union (WAEMU) including 8 countries (Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, and Togo), and Central Africa Economic Union (CAEU) including 7 countries (Cameroon, Congo, Gabon, Guinea equatorial, Centre African Republic and Chad).

<sup>3</sup> Caisse de Stabilisation et de Soutien du prix des produits agricoles.

**Table 1: Investment as a Share of GDP (%), Côte d'Ivoire 1970-2001**

Year	Private	Public	Total
1969	10.00	7.32	17.32
1970	13.42	7.23	20.65
1971	13.34	7.63	20.97
1972	14.09	6.12	20.212
1973	15.04	6.76	21.80
1974	13.09	6.34	19.43
1975	12.82	9.21	22.03
1976	12.73	9.45	22.19
1977	15.05	10.77	25.83
1978	16.31	13.34	29.66
1979	13.80	13.30	27.10
1980	12.95	11.39	24.35
1981	13.86	10.50	24.36
1982	9.48	12.18	21.66
1983	7.08	10.63	17.72
1984	8.58	4.38	12.96
1985	8.02	3.74	11.77
1986	7.93	6.91	14.84
1987	6.69	7.38	14.07
1988	6.77	7.00	13.77
1989	5.94	6.30	12.24
1990	4.91	3.58	8.50
1991	5.12	3.44	8.57
1992	4.67	3.81	8.49
1993	4.11	3.71	7.83
1994	7.00	4.11	11.11
1995	9.45	4.16	13.61
1996	11.09	4.16	15.25
1997	10.09	5.29	15.38
1998	11.08	5.71	16.80
1999	11.98	4.42	16.40
2000	9.65	2.69	12.34
2001	10.15	2.61	12.77

**Table 2: Investment as a Share of GDP (Average %)**

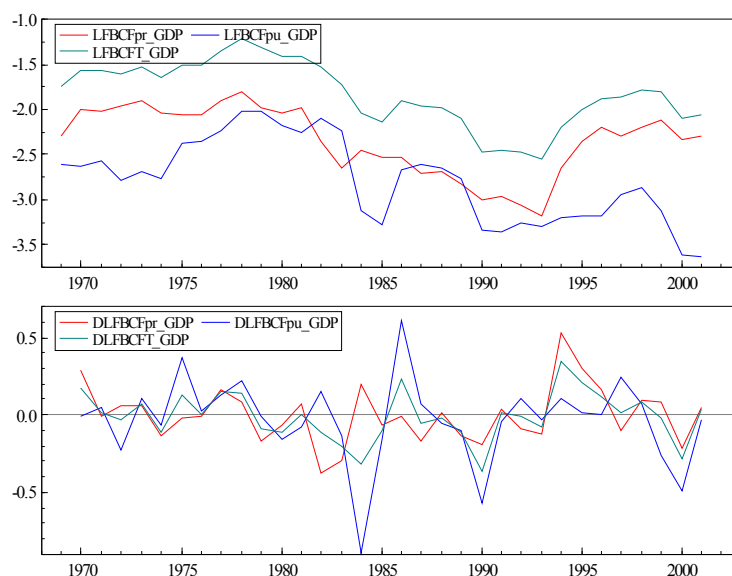
Year	1990	1991	1992	1993	1994	1995
<b>Private Côte Iv.</b>	4.9	5.1	4.6	4.1	7	9.4
<b>Invest. Latin Am.</b>	11.6	11.5	12.6	13.9	13.3	13.8
<b>East Asia</b>	23.8	24.1	22.3	21.8	22.1	23.4
<b>Public Côte Iv.</b>	3.6	3.4	3.8	3.7	4.1	4.2
<b>Invest. Latin Am.</b>	5.2	5.7	6.1	5.9	5.4	5.0
<b>East Asia</b>	7.3	7.5	8.1	8.4	8.0	8.2
<b>Total Côte Iv.</b>	8.5	8.5	4.4	7.8	11.1	13.6
<b>Invest. Latin Am.</b>	16.8	17.2	18.7	19.7	19.2	18.8
<b>East Asia</b>	31.1	31.6	30.3	30.1	30.1	31.6

**Note:** Data for Côte d'Ivoire are computed from WDI database, Latin America and East Asia data are from Glen and Sumlinski (1996, pp. 16-8, Table A2.11).

It could be seen from Table 2 that the share of investment (private, public and total) in GDP is lower in Côte d'Ivoire compare to Latin America and Asia region. In all cases the share of private investment in GDP is higher than public investment share of GDP indicating that these economies are fundamentally private investment driven. The economic policy choice during 1970-1979 was the diversification and modernization of the agricultural sector in order to diversify the export revenue base. Unfortunately, the end of the decade was marked by an economic crisis and the deterioration of the terms of trade. Faced with a persistent decline in the international prices of agricultural products, the government was engaged in Structural Adjustment Programmes (SAPs) that lasted throughout the 1980s and were financed by the World Bank (WB) and International Monetary Fund (IMF), in an attempt to restore macroeconomic equilibrium, improve the efficiency of the economy and foster growth. These programmes failed to restore the health of the economy and instead worsened the economic situation of the country.

We can observe from Figure 1 that in Côte d'Ivoire private investment, public investment and total investment as a share of GDP expand from 1969 to 1978 (the period of rapid growth in Côte d'Ivoire), and decline from 1979 to 1993. From 1994 the expansion of the 3 variables could be due to the devaluation of Franc CFA by 100%<sup>4</sup> in 1994.

**Figure 1: Public, Private and Total Investment as Share of GDP in Côte d'Ivoire (Log Level and growth rate),**



In the beginning of the 1990s, the International Institutions and partners in development urged the privatization of several public enterprises and a freeze in the wage bill. In addition, they suggested the liberalization of agricultural sector mainly cocoa and coffee, which represented the heart of the country's finances. In the meantime the Franc CFA was devalued by 100% in 1994, followed by the suppression of the CAISTAB in January 1999, just 4 months before the first Coup. The application of economic

<sup>4</sup> The rate of devaluation is computed as follows:  $(100 \text{ FCFA} - 50 \text{ FCFA}) / 50 \text{ FCFA} = 1 * 100 = 100\%$ . Note that the Franc CFA is linked to Euro through the French Franc with parity 1 euro= 655.957 FCFA, as 1 euro= 6.559 French Franc.

adjustment policies in Côte d'Ivoire, led to cuts in public spending that have generated reductions in the level of public investment in education, health and other infrastructures. In fact these investments usually complement, rather than crowd out private investment, and their neglect may undermine the gains expected by the ongoing liberalization process in the country. Diminishing the government's involvement in economic affairs through privatization policies could have endangered the optimal performance of the economy, namely, the provision of social and economic infrastructure essential to a market economy, and since September 19, 1999 Côte d'Ivoire has been experiencing political and social turmoil that started with its first Coup d'Etat followed by a war that has not ended yet.

### 3. Theoretical Model and Econometric Results

We assume a simple Cobb Douglas (CD) production function given by:

$$Y_t = A_t K P_t^\alpha K G_t^\beta L_t^\gamma \quad \text{with } \alpha + \beta < 1 \text{ and } \gamma = 1 - (\alpha + \beta) \quad (1)$$

where:  $Y_t$ : Real Domestic Product (Income),  $A_t$ : Efficiency parameter,  $K P_t$ : Private Investment,  $K G_t$ : Public Investment,  $L_t$ : Labor (Employment),  $\alpha$ ,  $\beta$  and  $\gamma$ : Elasticities  
Expressing equation (1) in per capita (per employee) terms it becomes:

$$y_t = A_t k p_t^\alpha k g_t^\beta L_t^{\alpha + \beta + \gamma - 1} \quad (2)$$

Taking the log of equation 2 we get the following linear equation:

$$\ln y_t = \ln A_t + \alpha \ln k p_t + \beta \ln k g_t + (\alpha + \beta + \gamma - 1) \ln l_t \quad (3)$$

Next, assuming that  $A_t = A_0 e^{\mu t}$ , where  $A_0$  is the initial level of technology and  $\mu$  the rate of technical progress and  $t$  the time, equation 3 becomes:

$$\ln y_t = \ln A_0 + \alpha \ln k p_t + \beta \ln k g_t + (\alpha + \beta + \gamma - 1) \ln l_t + \mu t \quad (4)$$

Equation 3 can be estimated and the derivatives  $\frac{\partial \ln y_t}{\partial \ln x_t}$  give the output elasticities with respect to the production factors at the right-hand side of equation 4. In practice we will estimate the following long-run equation:

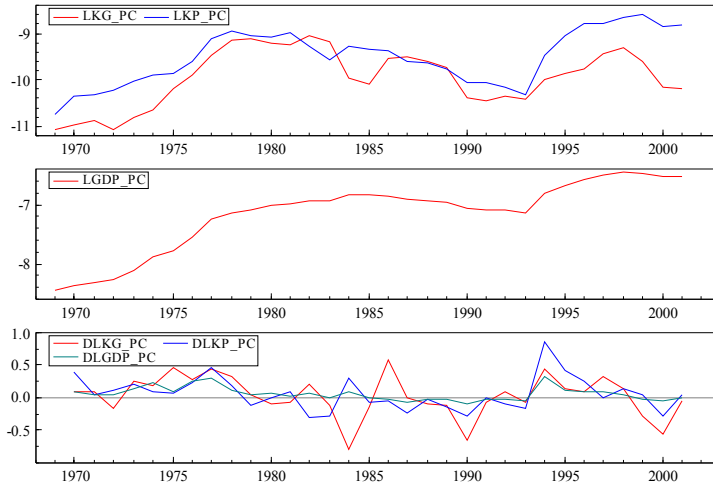
$$\ln y_t = \ln A_0 + \alpha \ln k p_t + \beta \ln k g_t + \mu t \quad (5)$$

and then we derive the coefficient  $\gamma = 1 - (\hat{\alpha} + \hat{\beta})$  from the estimated parameters.

To estimate the model we use yearly data for Côte d'Ivoire from World Development Indicators (WDI) covering the period 1969–2001. Public investment ( $KG$ ) is measured by Public investment per employee, while private investment ( $KP$ ) is Private investment per employee. Economic performance ( $Y$ ) is measured by real GDP per employee. Figure 2 contains the log of Public investment, Private investment and GDP (top and middle panel) and the growth rate of the 3 variables (bottom panel). We observe that both public and private investment grow from 1970 to the peak around 1981 in Côte d'Ivoire and decline from 1982 to the trough around 1990 for public investment and around 1993 for private investment. In average private investment has been higher than public investment in Côte d'Ivoire, but their evolution has been much closed. It could be observed from Figure 2 that in Côte d'Ivoire private investment per employee expands relatively to

public investment per employee from 1993, which could be due to the devaluation of Franc CFA in 1994.

**Figure 2: Public and Private Investment and GDP in Côte d’Ivoire (Per Employee level and growth rate)**



The estimation is performed using an unrestricted general to specific Hendry type error correction model (ECM) where the long run relationship is embedded within the dynamic specification, including lagged dependent and independent variables as follows:

$$\Delta \ln y_t = \gamma_1 \Delta \ln kp_t + \gamma_2 \Delta \ln kg_t + \gamma_3 (\ln y_{t-1} - \ln A_0 - \alpha_1 \ln kp_{t-1} - \alpha_2 \ln kg_{t-1}) + u_t \quad (6)$$

The model is re-parameterized in the estimable form:

$$\Delta \ln y_t = \ln A_0 + \gamma_1 \Delta \ln kp_t + \gamma_2 \Delta \ln kg_t + \gamma_3 \ln y_{t-1} + \gamma_4 \ln kp_{t-1} + \gamma_5 \ln kg_{t-1} + u_t \quad (7)$$

The final estimated dynamic ECM is reported in Table 3 with the diagnostic tests and the long run elasticities of variables and their t-ratio. The dynamic ECM equation is reported as follows:

$$\Delta \ln y_t = 0.28 \Delta \ln kp_t + 0.07 \Delta \ln kg_t - 0.08 \ln y_{t-1} + 0.02 \ln kp_{t-1} + 0.03 \ln kg_{t-1} \quad (8)$$

This equation indicates that in the short run, 100% increase in private investment enhance growth by 28%, while 100% increase in public investment lead to only 7% increase in real GDP. These results show that the short run efficiency of public capital can be improved relatively to private investment, which has an important impact on growth. The long run equation derived from the dynamic ECM is the following:

$$\ln y_t = 0.25 \ln kp_t + 0.37 \ln kg_t \quad (9)$$

Thus the elasticities are  $\frac{\partial \ln y_t}{\partial \ln kp_t} = \alpha = 0.25$ ,  $\frac{\partial \ln y_t}{\partial \ln kg_t} = \beta = 0.37$  and  $\gamma = 1 - (\hat{\alpha} + \hat{\beta}) = 0.38$ .

The complete final long-run equation is therefore:

$$\ln y_t = 0.25 \ln kp_t + 0.37 \ln kg_t + 0.38 \ln l_t \quad (10)$$

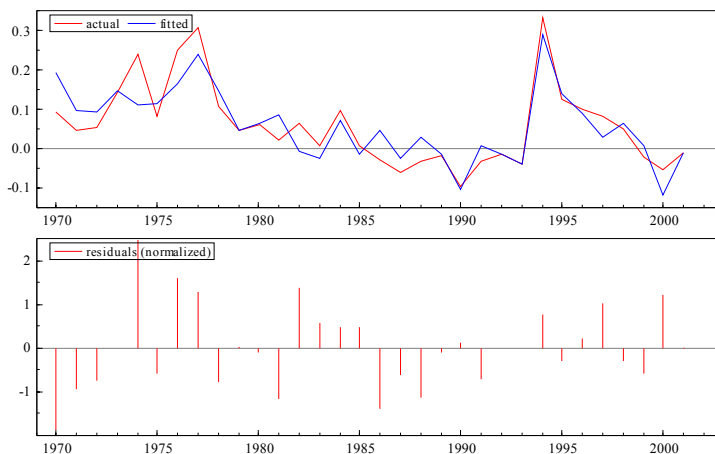
and the resulting production function is expressed as follows:

$$Y_t = KP_t^{0.25} KG_t^{0.37} L_t^{0.38} \tag{11}$$

**Table 3: Model Estimation, OLS 1970-2001 (Dependent variable: Dln y)**

		<i>Coefficients</i>	<i>Std. Error</i>	<i>t-value</i>
	<i>Dln kp</i>	0.282	0.041	6.828
	<i>Dln kg</i>	0.077	0.036	2.112
	<i>Ln y_1</i>	-0.084	0.028	-3.032
	<i>Ln kp_1</i>	0.022	0.031	0.707
	<i>Ln kg_1</i>	0.035	0.026	1.350
<i>RSS</i>	<i>0.077 sigma</i>	<i>0.053 R<sup>2</sup></i>	<i>0.77 Log-Lik.</i>	<i>96.449 AIC -5.715</i>
<i>Nb. Observ.</i>	<i>32</i>	<i>p</i>	<i>5</i>	

**Figure 3: Estimated Model and Residuals**



These equations 10 and 11 show that in the long run, 100% increase in private investment lead to 25% increase in GDP growth, while public investment has a higher impact (37%) on GDP growth than private investment. On the other hand, 100% increase in employment lead to 38% increase of real GDP growth. These results indicate that public investment does have a substantial effect on Côte d'Ivoire economic performance. The findings indicate also that the efficiency of private investment can be improved in the long run. Moreover, the diminishing of public investment through privatization of state-owned activities should be reconsidered in this country as public investment does have a markedly stronger impact on Côte d'Ivoire economic growth. In effect, public investment is largely composed by infrastructure investment (education, health, transport, electricity) that is undertaken by the state and the expansion of public enterprises may complement the private sector.

**4. Conclusion**

This paper has investigated the impact of public and private investment on Côte d'Ivoire's real GDP growth over the period 1969-2001. These public-private-investment and growth relationships are analyzed using an autoregressive distributed lag ECM approach. We find differential impacts of the two components of investment on GDP growth. In the short run we find that an increase in private investment enhances growth more than public investment. In the long run, the effect of public investment on GDP growth is higher than the impact of private investment. On the other hand the impact of employment overcomes the effects of both private and public investment. These empirical findings suggest that for the period under study although private investment does have a significant impact on the short run growth, in the long run Labor and public capital have been the major contributors to Côte d'Ivoire's economic performance, overcoming the effect of private investment on GDP growth. The results indicate that the short run efficiency of public capital can be improved relatively to private investment, while in the long run it is the efficiency of private investment that can be improved. Thus policymakers concerned with new growth path in this country should take into account the fact that public investment does have a markedly substantial impact on long run growth and reconsider the reduction of the government's involvement in economic affairs through privatization and liberalization policies namely, the provision of social and economic infrastructure essential to Côte d'Ivoire's market economy, while promoting the long run efficiency of private investment.

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