SOVEREIGN DEBT, INVESTMENT AND ECONOMIC GROWTH IN CAMEROON

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Abstract

Today the conduct of fiscal policy or more generally the level of the budget balance is the source of economic crises in the developed countries with the risk of contamination to the world economy. Despite the cancellation of public debt of developing countries through the Heavely Indebted Poor Countries (HIPC) initiative, the economic situation in Europe and the United States requires that we question about the implementation of fiscal policy in developing countries generally and in Cameroon in particular, in terms of debt management. We analyse the impact of fiscal policy conducted by the Cameroon government on the economy. Using a vector model applied to macroeconomic data from Cameroon in the period 1980 - 2010, we find with the Johansen test that there exists a cointegration or long run relationship between the level of debt, growth, investment and current account balance. In addition, there is a mechanism of error correction. Thus we note that the debt has a negative effect on exports and growth both in long and short term. But this impact on investment is negative in short term but positive in the long term. The results of this study confirms the traditional approach of sovereign debt, which suppose that budget deficits today are a burden to future generations.

Keys words: *sovereign debt, economic growth, cointegration, Error correction model, Johansen test, Cameroon.*

Introduction

The global economic environment was marked in recent years by several crises that have severely hindrance economic growth in most countries of our globe. First, the second oil shock in 80 years that has induced an overall decline in commodity prices. Then there is the international financial crisis that turned into an economic crisis in 2009 and has led to an world economic recession (-0.5%). Only the emerging and developing countries have escaped this recession (+2.7%). More recently, the sovereign debt crisis in Europe and in United States has again shown the vulnerability of the global economy deal with systemic crises. This crisis calls attention to the problem of public debt management by the various states. She highlighted the various setbacks led by some states at the public financial

management, and especially the potential impact of fiscal policy on economic activity. Developing countries (DCs) are also face of this problem of public finance management experienced by advanced economies, and this in at least two titles. First proper management of these countries in fiscal policy, and secondly the impact of economic policies in developed countries (major trading partners) on the DCs. So after the cancellation of debt in several developing countries through the HIPC initiative, we want involved in the management of fiscal policy in one of its countries, especially Cameroon economy, and appreciate the impact that this policy has had or will have on economic activity in this country. Endeed, nearly 50% of public debt in Cameroon is expressed in a other currency that euro and CFA.

In the remainder of this paper, we give a brief review of the literature on the impact of debt on economic growth, then a presentation of some macroeconomic aggregates is performed followed by the methodology. And finally we present the empirical results obtained.

1. Literature review

Although the assessment of the impact of budget deficits, financed by debt, on the economic growth is a major issue in the economic policy debate for several decades due to various crises. Few studies have analyzed the impact of fiscal policy pursued by the Government on economic activity in Cameroon.

two approaches of public debt analysis have emerged in economic theory. The first approach called traditional approach to public debt, which shows that increasing the budget deficit (tax cuts for example) results in the short term: increased consumer spending, and therefore of production and employment. In addition, rising interest rates resulting from the decline in saving causes a decline in investment and increased foreign capital, which negatively affects the external competitiveness of local businesses due to higher rates exchange. The decline of national saving affects negatively the stock of capital and the positively foreign borrowing at long-term. This induces a decrease in domestic production. Ultimately, current generations (short term) benefit from an increase in consumption, production and employment while future generations (long term) should support today's budget deficits and debt to abroad, since the capital stock is down.

The second approach (Ricardian approach) reported that a budget deficit induced by a tax reduction does not stimulate consumer spending because consumers are forward looking. The level of spending is then based not only on their current income but also on their future income. A tax cut today without reducing public spending would result in a tax levy in the future for debt repayment. Permanent income remains unchanged and could have no impact on consumption.

2. Evolution of some macroeconomic aggregates in Cameroon

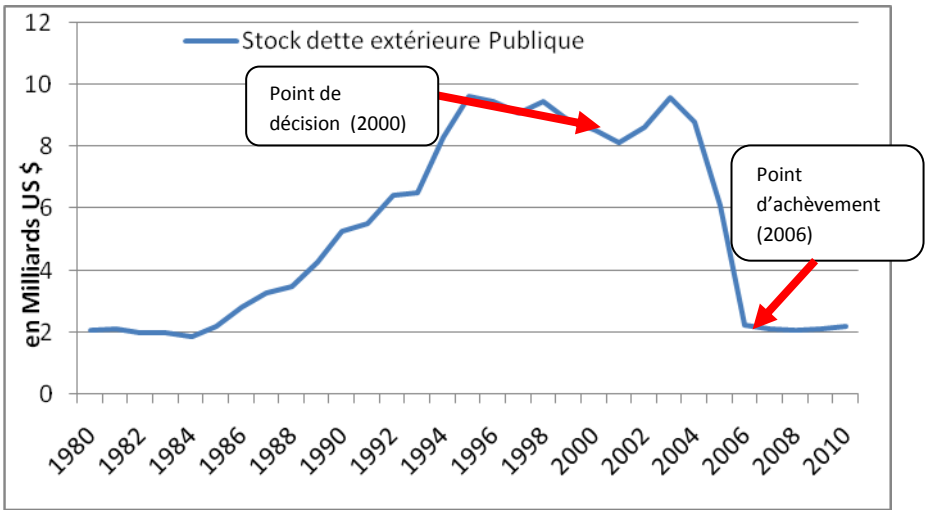
Cameroon adopted in 2009, the Growth and Employment Strategy Paper (GESP), the reference document of Government policy on the period of 2010 to 2020. The country aims by 2020 to have an economic growth rate of 5.5% on average and

significantly reduce the level of underemployment, while pursuing a prudent debt policy and consistent with the macroeconomic framework. We will, before showing any impact of debt on economic growth, highlight the evolution of some macroeconomic aggregates of Cameroon since 1980.

- Public debt

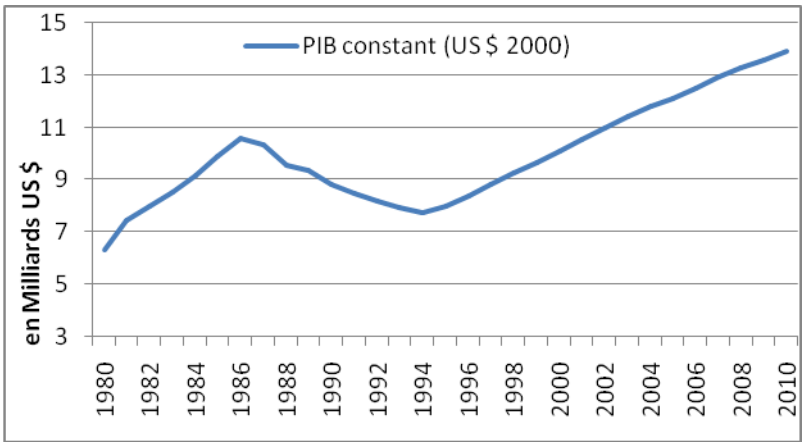
In the 1980s, Cameroon's debt to more than U.S. $ 2 billion. Because the global economic crisis, which induced a recession of the Cameroonian economy and lower commodity prices, has made it difficult for repayment of the debt this country for the first time made use of the Bretton Woods, Cameroon's public debt has increased significantly until 1995. Debt then stood at over U.S. $ 9.6 billion, and has stabilized above U.S. $ 8 billion up to 2004. But reaching the completion point under the Heavily Indebted Poor Countries Initiative (HIPC) in 2006 has reduced the public debt to levels pre-crisis year of 1986.

Also one can note the vulnerability of public debt in Cameroon face to fluctuation of international economic conditions, through the exchange rate given that nearly 50% of this debt in 2010 was expressed in a currency other than euro and the CFA (dollar, yen, DTS, etc.).



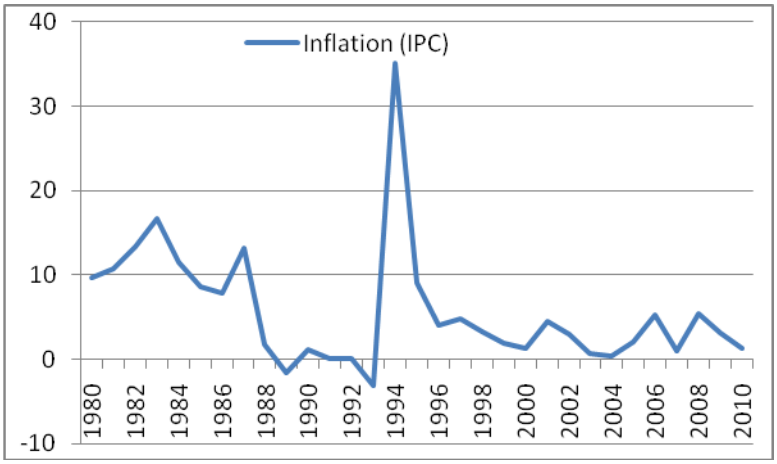
- GDP

Real Gross Domestic Product (GDP) of Cameroon over the past 30 years evolved into several phases. There is a significant growth between 1980 and 1986, with growth rates above 7%. This dynamic was mainly driven by oil production. From 1986 until 1994, there was a recession continues to Cameroon's economy with negative growth rates. Cameroon has indeed been hit by a major economic crisis that originated the second oil crisis of the early '80s that resulted in a significant drop in oil prices. Enhanced by the difficulties of managing public finances and macroeconomic stabilization, is the devaluation of the CFA which helped reverse the downward trend of the country's economic activity, which then returned to growth after 1995. GDP has grown at an average of 3.8% between 1995 and 2010.



- Inflation

Inflation as measured by the price consumption index (CPI ,remained at high levels in Cameroon in the early 80s, at over 10% between 1980 and 1986. In particular because of the economic crisis that the country knows, there has been a decline of the rate of price growth that leads to a deflation in 1989 (-1.7%) and 1993 (-3.2%). But the 1994 devaluation induced a level of inflation ever recorded in the country with a rate greater than 35% primarily due to higher imported inflation. But since 1996, inflation is contained between 0 and 5%.

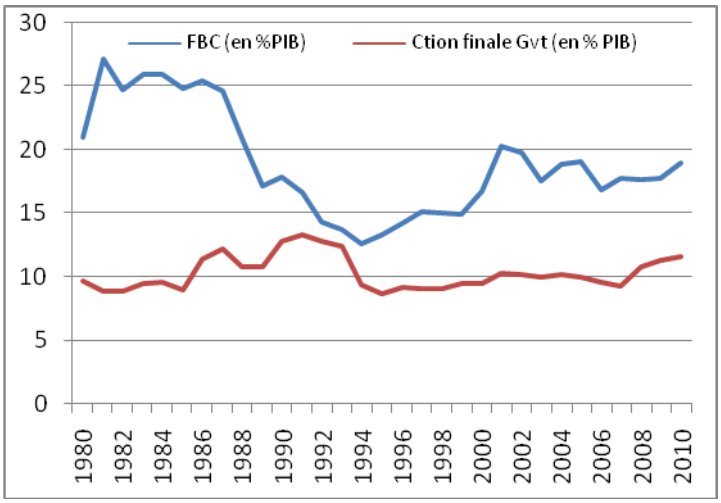


- Investment rate and final consumption of Government

The period before the crisis was marked by a relatively high investment rate, at over 25% between 1980 and 1986. But the crisis that led to an overall slowdown in economic activity reduced the level of investment to lower the rate of investment reaching the lowest in 1994 (12.6%) before changing trend after the devaluation. In 2010, this rate is near 19%, reflecting the resumption that knows the economy of Cameroon.

Regarding the final consumption expenditure of government, there is a percentage of GDP than they were relatively low before the crisis, but that in it they were on the rise, reaching their highest level since 1980 in 1992 (13.2%). This increase in times of crisis arises not

only from the fall in GDP but also counter-cyclical policies pursued by the Government to restore growth in economic activity. A similar phenomenon is observed in 2008 and 2010 when the government final consumption has averaged 10.8% of GDP, against 9.5% on average between 1995 and 2007.



1. Methodology

A random process $\{X_t, t \in I\}$ is stationary if the moments of this process are independent of time ($X_t \sim I\ (0)$). A process is said integrated in order d, if the series of difference of order d is stationary and that all differentiated series of order $k < d$ are non-stationary.

Engel and Granger (1987) show that if there is a stationary linear combination $Z_t = aX_t + bY_t$ of two series X_t and Y_t with the same order of integration then the series X_t and Y_t are cointegrated where (a, b) is the cointegrating vector and is considered as the base of the cointegrating space. In others words, there is a long-run relationship between X_t and Y_t such that the variable Z_t is stationary. X_t and Y_t will tend to vary together in time and can be subject of momentary deviations, but can't diverge without limit. This definition can be generalized to k process, with k ≥ 2.

Two approaches are commonly used to test the cointegration hypothesis of several series: the two-step methodology of Engel and Granger (1987) and the multivariate approach (VAR) Johansen (1988, 1991) and Johansen-Juselius (1990). In this work, we use the second approach. The Johansen cointegration test permits to determine the number of long-run equilibrium relationship between integrated variables of the same order of integration.

The first step of this process is to determine the order of integration of the series with a unit root test, using the Augmented Dickey-Fuller (ADF) test. ADF test is a test of non-stationarity as it considers null hypothesis that the series is not stationary. Consider a process X_t. The general Vector Autoregressive (VAR) model for testing the non-stationarity of the process, or the presence of a unit root $(\rho = 1)$ from the ADF test can be written as follows:

$$\Delta X_t = (\rho - 1)X_{t-1} + \sum_{i=1}^{p} \theta_i \Delta X_{t-i} + c + bt + \varepsilon_t \quad \textbf{(1)}$$

Where $\Delta X_t = X_t - X_{t-1}$, p is autoregressive lag length. If we find that the series X_t is non-stationary, we consider the first difference, and we remake the test.

The second step involves examining cointegration relationships between variables using the VAR approach of Johansen. Let Y_t be a vector $(n \times 1)$, of variables integrated at the same order, satisfying the VAR (p) model as follows:

$$Y_t = \prod_0 + \prod_1 Y_{t-1} + \cdots + \prod_p Y_{t-p} + \psi w_t + \varepsilon_t \quad (2)$$

$\prod_1 \ldots \prod_p$ represents matrices $(n \times n)$ of lag coefficients, ε_t is the $(n \times 1)$ vector of disturbance terms and $\varepsilon_t \backsim N(0,\Omega)$, w_t is a vector of exogenous variables.

We can rewrite the structural VAR as:

$$\Delta Y_t = \prod^* Y_{t-1} + \sum_{i=1}^{p-1} \prod_i^* \Delta Y_{t-i} + \psi w_t + \varepsilon_t \quad \textbf{(3)}$$

Where $\prod^*$ is the matrix of dimension $(n \times n)$ that captures the long-run relationship and $\prod_i^*$ is a matrix of dimension $(n \times n)$ that establishes the short-term dynamics (mechanism of error correction). The number of cointegrating relationship is equal to the rank r of matrix $\prod^*$. If $r = n$, all variables in the VAR are stationary and the cointegration problem does not arise. If $r = 0$ then $\prod^* = 0$ and ΔY_t is stationary. The most interesting case is when $1 \leq r \leq n-1$, then there exists r cointegrating relationships. In this case $\prod^*$ can be decomposed as:

$$\Pi^* = \alpha\beta' \quad (4).$$

where α and β are matrices of full rank of order $(n \times r)$ and represent respectively the matrix of short term adjustment parameters and the cointegration vector.

Two tests are commonly used to determine the number r of cointegrating relationships in the Johansen test, where the null hypothesis is $H_0: r = r_0$ against $H_1: r > r_0$. These two tests are the maximum eigenvalue test and the trace test. The test statistics are respectively:

$$\lambda_{max}(r) = -T\log(1 - \lambda_{r+1}^*) \quad (5)$$

$$Trace = -T\sum_{i=r+1}^{n} log\,(1 - \lambda_i^*) \quad (6)$$

T is the number of observations and n the number of variables in the VAR. The lag length of VAR is obtained by using information criteria. In this work we will focus on the Schwartz Information Criterion (SIC).

The third step, if there is at least one relationship of cointegration a Vector Error Correction Model (VECM) would be to construct. This is possible if α of the equation $\Pi^* = \alpha\beta'$ (4) $\Pi^* = \alpha\beta'$ (4 is significant and less than 0.

2. Empirical results

Our empirical study uses the times data of GDP, exports of goods and service, import of goods and service, investment rate and public debt. All this variables are transform in logarithmic form to reduce the scale.

The data are proceed from the World Bank Indicators data base

4.1. Unit root tests

Table 1 presents the summary of ADF unit root test on logarithmic transformation of the Levels and first differences of the times series. The null hypothesis tested in Model 3 (trend, constant) is LnPIB can not be rejected at the 5% level of significance. Similarly, tests on Lndette_pub, LnTx-Invest, LnExport and LnImport do by rejecting the null hypothesis of non stationarity of the series. Repeating the tests on differentiated forms of each variables, we obtain that LnPIB, Lndette_pub, LnTx-Invest, and LnExport LnImport are all integrated of order one (I (1)). We will now test the existence of a cointegrating relationship between its variables.

Table 1: Summary ADF Unit roots tests

Variables		trend, constant	Constant, no trend	No Constant, no trend
	Optimal lag p	t-statistic	t-statistic	t-statistic
level				
Lnpib	1	-3,069769		
Lndette_pub	1	-1,024423	-1,576696	-0,0212266
LnTx_Invest	5	-2,860515	-3,389475	-0.487559
LnExport	0	-1,162623	-0.181560	1,355489
LnImport	0	-1,584811	0,166426	1,261682
first difference				
dLnpib		-3,350556	-2,041891	-1,968758*
dLndette_pub		-3,524162	-3,278460	-3,338523*
dLnTx_Invest		-5,685274*		
dLnExport		-6,569380*		
dLnImport		-5,274288*		

* denote the rejection of null hypothesis at 5% level of significance.

4.2. cointegration Test

Before performing the cointegration test, it is first necessary to determine the optimal number of lag VAR. This choice is made according to information criteria. To capture the crisis period from 1986 to 1994, a dummy (d8694) was introduced as stationary exogenous variable. d8694 = 1 over the period 1986 to 1994 and d8694 = 0 elsewhere. From Table 2 the number of delay is 1 according to the SIC criterion.

Table 2: Selection of optimum lag length

Included observations: 28

Lag	LogL	LR	FPE	AIC	SC	HQ
0	49.53261	NA	4.09e-08	-2.823758	-2.347971	-2.678305
1	178.0764	192.8157	2.65e-11	-10.21974	-8.554486*	-9.710656
2	203.3534	28.88800	3.30e-11	-10.23953	-7.384803	-9.366810

3	257.9497	42.89708*	7.85e-12*	-12.35355*	-8.309355	-11.11720*

* indicates lag order selected by the criterion

The results of the Johansen cointegration test are presented in Table 3. The selected model assumes that there is a deterministic linear trend in the VAR. According to the trace test, the null hypothesis of existence of a cointegrating relationship is not rejected, and leads to the conclusion that there is a cointegrating relationship. On the other hand, the test of the maximum eigenvalue can rather lead to the existence of two cointegrating relations successively rejecting the null hypotheses of 0 and 1 cointegrating relationship.

But in the remainder, we consider that there is one cointegrating relationship between government debt, GDP, the rate of investment, exports and imports, as given by the trace test.

Table 3: Johansen and Juselius cointegration test

Trace Test ()				
Number of cointegration	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.790445	91.34494	69.81889	0.0004
At most 1	0.615195	46.02462	47.85613	0.0736
Maximum Eigenvalue Test				
	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.790445	45.32032	33.87687	0.0014
At most 1 *	0.615195	27.69556	27.58434	0.0484
At most 2	0.339816	12.04186	21.13162	0.5435

* denotes rejection of the hypothesis at the 0.05 level

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

Estimation of the vector error correction model allows to obtain the long-run relationship (Table 4) as follows:

$$LnDette\_Pub_t = -3{,}51LnExport_t - 0{,}31LnPib_t + 2{,}65LnImport_t - 1{,}80LnTx\_Invest_t + 53{,}20 \quad \textbf{(7)}$$

This relationship reveals the negative relation between public debt, GDP, exports and investment rates and the positive relationship between public debt and imports. In other words, government debt has a negative impact on growth and

investment at long-term, it also reduces the current account balance.

The results of the estimated error correction model (ECM) are summarized in Table 5.

We will retain only the relationship which has a negative return force and significantly different from 0 to 5%. We then have the relationship:

$$\Delta LnExport_t = -0{,}2216\varepsilon_{t-1} + 0{,}07\Delta LnDette\_Pub_{t-1} + 0{,}08\Delta Lnexport_{t-1} + 0{,}103\Delta LnPib_{t-1} - 0{,}163\Delta LnImport_{t-1} - 0{,}047\Delta LnTx\_Invest_{t-1}$$

(8)

We observe that in the short term, public debt has a positive impact on exports and thus on the trade balance. This is also true for economic growth.

The analysis of impulse response functions shows that a shock on the public debt (significant increase for example) would result in a continuous decline in exports stabilizes five years later. On the other hand, an increase in GDP would lead to a very slight increase in the level of debt and the effect is stabilizing during the second year. Similarly an increase in public debt would result in an increase in the investment rate, which stabilized after four years.

It can be seen from the analysis of variance decomposition that variability in the level of public debt in period t is due to more than 95% by the level of debt 10 years earlier and that the variability of GDP is nearly 7% of the variation in the level of public debt of the current year. Similarly changes in the investment rate explain nearly 10% of the public debt and only 3.6% in GDP.

5. Conclusion

This paper analyzes the relationship between public debt economic growth, investment and trade balance from a VECM. We have established a long-term relationship (cointegration) between these macroeconomic aggregates, but also that there is a short-term dynamics with an adjustment mechanism for the long-run equilibrium. We have found that the crisis of the 1980s have resulted in devaluation of the CFA in 1994 has significantly affected the Cameroonian economy. Furthermore, we note that the level of public debt in Cameroon positively affects the trade balance and economic growth in the short term. But this impact becomes negative in the long term, not only for the two previous aggregates but also on the investment rate.

These results allow us to say with the traditional approach of public debt, and in terms of the Cameroonian economy that the state incurs debt today is a burden on future generations. That debt today could mean a tax increase in the coming years. Thus in the context of implementing developmental projects planned in the GESP and instability of the global economic environment, the Government should abide scrupulously by its obligations in terms of prudent debt in line with the macroeconomic framework, to reduce the perverse effect that public debt could have on the economic situation of today and ensure a better situation for future generations.

This study could be extended to several other countries, especially those in the CEMAC region, to incorporate aspects of the common monetary policy with the assistance of the Central Bank to States in order to capture potential interactions between monetary policy and management of public debt. This study is important, since at the level of the euro area, these

interactions justify the duration of the current debt crisis.

REFERENCE

Glasure, Y.U., Lee, A.R., 1998. Cointegration, error correction and the relationship between GDP and energy: the case of South Korea and Singapore. Resource and Energy Economics 20, 17–25.

Granger, C.W.J., 1969. Investigation causal relation by econometric model and cross-spectral methods. Econometrica 37, 424–438.

Granger, C.W.J., Weiss., A.A., 1983. Time series analysis of correcting models, studies in econometrics time series and multivariate statistics. Academic Press, New York 255–278. HPSF, 2009.

Johansen, S., 1988. Statistical analysis of cointegrating vectors. Journal of Economic Dynamics and control 12, 231–254.

Johansen, S., 1991. Estimation and hypothesis testing of cointegration vectors in Gaussian vectors autoregressive models. Econometrica 59, 1551–1580.

Johansen, S., Juselius, K., 1990. Maximum likehood estimation and inferences on cointe´ gration with application to the demand for money. Oxford Bulletin of Economics and Statistics 52, 160–210.

J. Tinbergen The Notions of horizon and Expectancy in Dynamic Economics, Econometrica, Vol 1, 1993, pp 247 -52, 259 – 64.

G. ManKiw, Macroéconomie, 7e edition pp 582 – 600

D. Hendry and M. Morgan, The Foundations of Econometric Analysis, pp 193 – 233, PP 309 - 351

The Growth and Employment Strategy Paper (GESP), Cameroon 2009.

ANNEX

Table 4: Long-run relationship

Cointegrating Eq:	LNDETTE_PUB (-1)	LNEXPORT (-1)	LNPIB (-1)	LNIMPORT (-1)	LNTX_INVEST (-1)	C
CointEq1	1.000000	3.507427	0.306826	-2.645018	1.803625	-53.19640
		(0.31709)	(0.72526)	(0.37597)	(0.27833)	
		[11.0614]	[0.42306]	[-7.03511]	[6.48013]	

Table 5: Error Correction Model

Error Correction:	D(LNDETTE_PUB)	D(LNEXPORT)	D(LNPIB)	D(LNIMPORT)	D(LNTX_INVEST)
CointEq1	-0.052649	-0.221640	0.023179	0.066834	0.073157
	(0.11077)	(0.06609)	(0.01041)	(0.07243)	(0.03847)
	[-0.47530]	[-3.35368]	[2.22619]	[0.92273]	[1.90183]
D(LNDETTE_PUB(-1))	0.367005	0.070098	-0.013685	-0.141019	0.016563
	(0.22268)	(0.13286)	(0.02093)	(0.14561)	(0.07733)
	[1.64814]	[0.52762]	[-0.65383]	[-0.96849]	[0.21419]
D(LNEXPORT(-1))	0.041688	-0.086969	-0.006007	-0.321956	-0.119228
	(0.38400)	(0.22911)	(0.03610)	(0.25110)	(0.13335)
	[0.10856]	[-0.37959]	[-0.16641]	[-1.28220]	[-0.89408]
D(LNPIB(-1))	0.910514	-0.103515	0.412561	0.692662	0.369792
	(1.20467)	(0.71874)	(0.11323)	(0.78772)	(0.41834)
	[0.75582]	[-0.14402]	[3.64341]	[0.87933]	[0.88394]
D(LNIMPORT(-1))	-0.158155	-0.162785	-0.020769	0.348562	0.204219
	(0.37028)	(0.22092)	(0.03480)	(0.24212)	(0.12859)
	[-0.42713]	[-0.73685]	[-0.59674]	[1.43963]	[1.58820]
D(LNTX_INVEST(-1))	-0.442983	-0.047446	0.005122	-0.650177	-0.314194
	(0.68892)	(0.41103)	(0.06476)	(0.45047)	(0.23924)
	[-0.64301]	[-0.11543]	[0.07910]	[-1.44331]	[-1.31330]
C	-0.067778	0.103994	0.025947	0.050302	0.006195
	(0.07186)	(0.04287)	(0.00675)	(0.04699)	(0.02495)
	[-0.94319]	[2.42555]	[3.84128]	[1.07051]	[0.24825]
D8694	0.148607	-0.151694	-0.045464	-0.105274	-0.104461
	(0.12746)	(0.07605)	(0.01198)	(0.08334)	(0.04426)
	[1.16592]	[-1.99476]	[-3.79474]	[-1.26314]	[-2.36003]

Sovereign Debt, Investment and Economic Growth in Cameroon

Table 6: Results of the diagnostic test of residuals.

Normality	Chi-sq	df	Prob
Skewness	12,117	5	0,0332
Kurtosis	18,098	5	0,0028
Jarque Bera	30,216	10	0,0008
Serial correlation H0: no serial correlation			
Heteroscedasticity H0: homoscedasticity	192,7483	195	0,5321