Determinants of Economic growth in CEMAC Countries: Case of Congo

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Abstract

This article analyzes the determinants of economic growth in the Congo during the period 1995-2016. By using the Vector Error Correction Model (VECM), the results of this study reveal two categories of variables with nuanced effects. The first category consists of gross fixed capital formation, public spending and the degree of fiscal freedom, which have a positive impact on economic growth; the second category consists of the price of oil and the overall index of political rights, which have a negative effect on growth. Thus, to put the Congolese economy on a path of sustainable growth, the Congolese Government must reduce the heavy dependence of the Congolese economy on oil resources by applying the policies of transformation of the economic structure. Similarly, the Congolese Government must improve the investment climate, by increasing productive public spending, reducing the tax burden and promoting democracy.

Keywords: Determinant of growth, vector error-correction model, Congo.

JEL codes: O47, C32, O55

1. Introduction

Nicolas Kaldor in his magic square makes growth one of the four objectives of economic policy. However, economists have a different view of its determinants. According to the theorists of endogenous growth, growth has four determinants, namely the accumulation of knowledge (Romer, 1986); human capital (Lucas, 1988); technological accumulation and research and development (Romer, 1986); spending on public infrastructure (Barro, 1990). However, in Solow's (1956) model, growth depends on factors that are independent of the economic sphere, but it is balanced. To this end, growth depends on two main factors which are, on the one hand, the amount of labor (itself dependent on the rate of growth of the population), on the other hand, technical progress. Keynesians, on the other hand, believe that demand plays a role in economic growth. However, Keynes' (1936) analysis is based on the short term. On the other hand, some Keynesians, like Harrod (1939) and Domar (1947), think that the Keynesian analysis must be revised, taking into account two effects induced by the investment: a demand effect and a capacity effect. As a result, they support the idea that growth is unbalanced. Harrod (1939) and Domar (1947), and these imbalances are explained by the combined play of the accelerator and the multiplier. To remedy these imbalances, both authors advocate the intervention of public authorities. They have a role to play in long-term growth by ensuring that it is balanced. More specifically, the authorities must use cyclical stabilization policies so that aggregate demand is in line with overall supply. However, the theories of growth discussed above are limited by, among other things, the inability to explain large income gaps between countries. Geographical (Diamond 2000, 1997) or institutional (Barro, 1996, Rodrik, 1999) factors explain these differences. Indeed, these two factors are prerequisites for wealth creation. Although the virtues associated with the growth of production are subject to discussion, the growth of production is still sought either to reduce unemployment or to increase per capita income.

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In addition, Okun's law reflects the dilemma between the unemployment rate and the GDP growth rate. According to this law, when production is high, unemployment tends to decrease. In this logic, objective 8 of the OSD[2] preaches the promotion of a sustainable, shared and durable economic growth, the productive full employment and a decent work for all. Thus, Congo, a developing country, member of the CEMAC[3], oil producer, facing the problem of diversification of its economy, living conditions of populations and youth unemployment[4] is entitled to seek sustainable growth, in order to guarantee stable employment to the population.

Thus, the purpose of this article is to search for explanatory factors of growth in the Congo. In other words, the objective pursued in our research is to analyze the impact of economic and institutional factors on economic growth. Assuming that economic growth is explained by economic, demographic and institutional factors, the present reflection will be organized into three sections. The first deals with the analysis of stylized facts; the second deals with the literature review; the last section is devoted to econometric estimation.

2. Stylized facts of the growth in Congo

The growth rate, a key macroeconomic variable in economic analysis, reflects the state of a country's economic health. Based on statistics from the Central African State Bank (BEAC), the average growth rate for the period 1995 to 2016 is 4.33%. This rate is below the 7%[5] threshold needed for poverty reduction. In the sub-period 2011 and 2015, the average growth is 4%, well below 7%. In the sub-period 2011 and 2015, the average growth is 4%, well below 7%. This level of growth can be explained by the poor performance of the oil sector, which experienced a drop of 5.4% over the same period; this reinforces the need to know the factors necessary to drive growth around the 7% threshold for several years. In addition, the annual growth rate of the highest real GDP is 8.75% recorded in 2010. On the other hand, the lowest real GDP growth rate of (-2.58%) was observed in 1993. It should be noted that the year 2010 was favorable to the Congolese economy, thanks to the oil shock, whereas the year 1999 was characterized by the fall of the price of oil and the repercussions of the negative effects of the civil war of 1997 on the investment climate in Congo.

Graph: Evolution of the real GDP in Congo
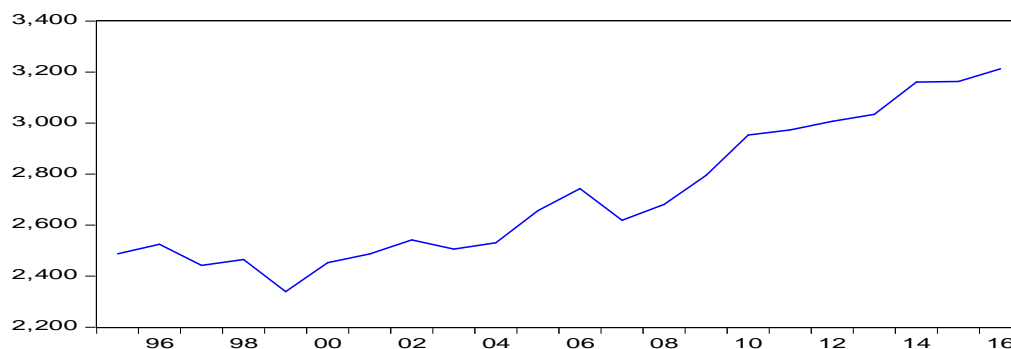
Source: Authors starting from the data of the BEAC

The data review shows that average real GDP in the 1995-1999 and 2000-2016 sub-periods is $ 2451.8 billion and $ 2796.7 billion, respectively. In addition, the observation of the graph shows two distinct phases in the evolution of GDP.

The first phase refers to the 1995-1999 sub-period, during which GDP is slowly declining; the second phase concerns the sub-period 1999-2016 through which, the evolution of Congo's GDP is growing. To better understand the different trends in the evolution of GDP, it is necessary to take into account the various shocks that hit the Congolese economy as well as the economic policies that have been conducted since the years 1995 until 2016.

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[2] Objective of sustainable development.

[3] Economic and Monetary Community of Central African States.

[4] According to the report of African Economic Outlook 2012, the unemployment rate in Congo is estimated at 16%, of which 25% are young people aged 15 to 29.

[5] This rate of 7% is one of the targets of the Millennium Development Goals, which African countries must achieve for several years, cumulatively, to reduce poverty.

The downward trend observed in the 1995-1999 sub-period can largely be explained by the drop in the price of a barrel of oil. As the Congo is an oil exporting country, a drop in the price of a barrel induces a fall in export earnings and, consequently, in nominal GDP. Another explanation for this trend is found in Congo's implementation of the structural adjustment programs proposed by the World Bank and the IMF, which had led to a decrease in demand. The addition of the oil price falls with the structural adjustment programs and the civil war of June 5, 1997 resulted in a slowing of GDP growth. As for the upward trend recorded in the 2000-2016 period, it can be explained by the increase in the price of a barrel of oil and the emergence of certain sectors such as telecommunications (with the remarkable evolution of NCIT) and the building sector.

3. Economic factors and institutional of the growth: a literature review

Prior to the presentation of empirical work, let us review theoretical literature initially.

3.1. Theoretical literature

On the theoretical level, the analysis of the determinants of the growth was based during long time on the neo-classic model developed by Solow (1956). Within the framework of this model the growth draws its source from technology, the capital and the volume of labour. The Neo-classic faithful ones to the Law of Say estimate that the increase in the production does not suffer from any problem of outlets and, evoke the idea of a balanced growth. On the other hand, Harrod (1939) and Domar (1947), two economists inspired by the Keynesian theories regard the investment as a determining factor of the growth and, support the idea of the existence of an unbalanced growth.
For the theorists of the endogenous growth, the growth is supported by the factors which are the accumulation of knowledge (Romer, 1986); the human capital (Lucas, 1988); technological accumulation and research development (Romer, 1986); the expenditure in public infrastructure (Barro, 1990).

However, the neoclassical growth model and those of endogenous growth do not explain the gap in terms of accumulation and innovation between nations. Thus, from the mid-1990s, the analyzes of the economist Douglass North of the Washington University and the Nobel laureate in 1993 will inspire several empirical studies to take into account institutional factors as important variables of Economic Growth.

3.2. Empirical literature

At the empirical level, two groups of work emerge. The first group concerns studies that have considered economic factors as determinants of growth; the second group consists of authors who have retained institutional factors as determinants of growth. Regarding the first group, several studies have first shown, from annual data, that public spending has a positive effect on growth (Gyimah-Brempong, 1998, Reinikka and Svensson, 2004, Ngakosso, 2016, Okombi, 2016) with different estimation methods such as the MCE (Ngakosso, 2016, Okombi, 2016), the fixed-effect panel model (Reinikka and Svensson, 2004). Secondly, other studies show that foreign direct investment and human capital have a positive impact on economic growth in high-growth UEMOA's Countries (Dedewanou, 2015). The positive effect of foreign direct investment on economic growth was also found by Yosra et al., (2014). However, before Dedewanou (2015), Moulimvo (2007); Nkouka (2009) had already shown that the human capital had a positive effect on the growth in Congo. While also based on Congo, Bouloud (2013) concluded on the existence of a positive effect of the commercial opening on the growth in Congo.

In addition, Tsassa and Yamb (2001) have shown that oil contributes positively to economic growth in Congo. This conclusion contrasts with the findings of Bhattacharya and Ghura (2006), who did not find a significant effect of oil on growth in Congo. In the second group, economists have focused their attention on deep variables, in particular institutional variables. In this context, Mauro (1995), Knack and Keefer (1995) are the first to use the relevant indicators to capture the impact of institutional factors on growth. They showed that countries with good institutions are those with higher rates of economic growth. In Sub-Saharan Africa, several authors have highlighted the role of institutions in determining growth (Rodrik 1999, Tsassa and Yamb 2001, Ekomié and Kobou 2003, Bhattacharya and Ghura 2006, Bouloud 2013). Many indicators are used as proxy for institutional variables, among which are democracy (Ekomié and Kobou), political instability (Tsassa and Yamb, 2001, Bhattacharya and Ghura, 2006), good governance (Rodrik, 1999) and the degree of public freedom (Bouloud, 2013). However, it should be noted that in the empirical literature to our knowledge, there is no study on the actual contribution of the global index of political law and the degree of fiscal freedom on economic growth.

Starting from the fact that election results are often disputed in Central Africa, coupled with the fact that Congo's tax burden rate is in the 45-50 class well above 10 considered the lowest rate, it appears timely in the framework of our study to take into account the global index of political right and the degree of fiscal freedom.

4. Econometric estimate of the determinants of the economic growth

In this part, our work is devoted to the empirical identification of the determinants of the economic growth in Congo. For this purpose, we start first of all with the specification of the model before carrying out the description of the data, the presentation of the methodology of estimate and the presentation of the results of the estimate.

4.1. Specification of the econometric model

In keeping with Barro's logic (1990), we will add to the growth model of Solow increased, other determinants of economic growth. Thus, we start from the production function of the Cobb-Douglas type, which is written as follows: $Y_t = Ak_t^{\alpha}I_t^{\beta}H_t^{\gamma}$ (1). Parameters α, β and γ correspond respectively to the elasticities of private capital, labor and public capital. For this purpose, $\alpha + \beta = 1$ et $\alpha + \beta + \gamma > 1$. First, replace Y with real GDP (GDP), K with gross fixed capital formation (FBCF), and I with population (PO); then, substituting H for public expenditure (DP), oil price (PPETR), the global index of political law (IGDP) and the degree of fiscal freedom (DLF); finally, by introducing the logarithm (L), equation (1) becomes:

$LGDP_t = \beta_0 + \beta_1LFBCF_t + \beta_2LPO_t + \beta_3LDP_t + \beta_4LPPETR_t + \beta_5LIGDP_t + \beta_6LDLF_t + U_t$ (2).

First of all, with regard to the population, it is represented by the total population. Its consideration is justified by the fact that demographic pressure can be a factor of increase in demand and production. Thus, economic growth and population growth are compatible. The gross fixed capital formation that we approximate to investment is introduced because it constitutes the purchase of machinery or buildings. These contribute to the production of goods and services. In addition, there appears to be a positive and significant relationship between investment and growth (Mengue, 2013).

Consideration of public expenditure is justified by the fact that they constitute, on the one hand, a component of aggregate demand; on the other hand, they have a positive impact on growth because of the positive externalities they generate. These externalities have a positive effect on the investment of private firms, and hence on economic growth. The oil price is taken into account because the Congo exports this product. In a context where the link between the oil sector and the rest of the economy is linked to the state budget, an increase in the price of a barrel of oil leads to an increase in the revenue needed to finance productive public expenditure. The global index of political right and the degree of fiscal freedom are used to capture the contribution of institutional factors. These factors are "market-creating" (Rodrik and Subramanian, 2003). In their absence the markets do not exist or work very badly. They promote long-term economic development by improving the investment climate. Based on the theoretical economic literature and the empirical work (Mengue, 2013 and Ngakosso, 2016) on growth, the coefficients are expected to have the following signs: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$, $\beta_5 > 0$ et $\beta_6 > 0$.

4.2 Description of the data

The data we use in the estimates comes mainly from four sources. Data on real GDP, population and gross fixed capital formation come from the World Bank (World Development Indicators 2016); public expenditure comes from the Head Office of the Budget; the price of oil is extracted from the database of the US Energy Information Agency (EIA); The Global Index of Political Law is taken from the official website of the international NGO Freedomhouse and the degree of tax freedom comes from the Heritage Foundation database. At this level, political right refers to the holding of fair elections, the presence of opposition parties that can play an important role, as well as respect for the rights of minority groups. Different notes are given to countries. The first note relates to political rights, the second concerns civil rights. Each of the two notes is between 1 and 7. Thus, 1 represents the best situation and 7 the worst. This rating is based on the annual freedom in the world studies prepared by Freedom House. For the degree of fiscal freedom, a level close to 100 indicates that the tax burden is low: households and enterprises have little tax to pay. All these data have an annual dimension and cover the period 1995-2016, ie 21 observations. In this respect, it should be noted that econometrics is based on conditions necessary for the validation of estimation results. This is particularly the case with the length of series which is often a handicap in developing countries. In such a situation, it appears necessary to transform the quarterly data into annual data. To achieve this, we use the method of Denton (1971). It should be noted that this method is more used by IMF economists.

In addition, the logarithm is not introduced at the level of the price of oil, the global index of political right and the degree of fiscal freedom, because their values are already small.

4.3. Econometric methodology

Before proceeding to the choice of the technique of estimate of the equation (1), series of tests of checking of the reliability of the series used is essential. To determine the order of integration of the variables selected, we have used the test of augmented Duckey-Fuller (ADF). The results of this test show that the variables are integrated of order 1[6]. Thereafter, we passed to the determination of optimal Lag, it appears that optimal Lag is equal to 2[7]. Finally, the test of cointegration of Johasen (1988) carried out on the variables of the model, indicates 2 level of cointegration. From previous point, our choice is oriented to vectorial at correction of error model (VCEM) to estimate the equation (1). Indeed, the (VCEM) aims to describe the interdependences between a set of short-term and long-term variables.

4.4. Presentation of the results

The results of this modeling enabled us to determine two relations of cointegration[8] between the studied variables. However, we carry out a particular glance to the relation relating to the economic growth in Congo (LGDP). In addition, the growth being a phenomenon of long run, only the relation of long run holds our attention. The results of this model are as follows:

$$LGDP_{t-1} = 0,00815LFBCF_{t-1} + 0,00432LDP_{t-1} - 0,000017PPETR_{t-1} - 0,00313IGDP_{t-1} + 0,00044DLF_{t-1} - 5,76761 \quad (3)$$
.   [3,80495]   [16,51934]   [-1,73384]   [-13,90435]   [8,25244]

The statistical tests[9] provide results of good quality, because, the value of Durbin Watson is close to 2, which leads us to accept the assumption of noncorrelation of the errors. In other words, the estimates obtained are optimal (Blue); the test of ARCH shows that probability related to it is higher than 5%, which leads us to say that the errors are homocedastic. The test of White enables us to accept the assumption of homocedasticity of the errors, because the probability is higher than 5%; the test of Breusch-Godfrey shows us that there is not correlation of the errors; finally, the test of Cusum and Cusum squared made it possible to give an account owing to the fact that the model is structurally and punctually stable.

In addition, the test relating to the specification of the model is conclusive and satisfactory owing to the fact that the coefficient of the term of correction of error is significantly negative[10], thus supporting the idea that the relation between the economic growth and its explanatory variables in Congo can be estimated starting from a vectorial model at correction of error. The results presented through the equation (2) enable us to release two categories of variables with moderate effects.

The first category is made up by the gross fixed capital formation, the public expenditure and the degree of taxation freedom; the second category as for it is constituted by the oil price and the global index of political right. In fact, results of our estimates lead to make the following remarks:

1) gross fixed capital formation contributes positively to economic growth in the Congo. Such a result is in harmony with the Keynesian theory for which private investment has a positive effect on growth. In addition, this result corroborates the conclusions of Mengue's (2013) work who had already shown that there was a positive effect of private investment on economic growth in the Congo.

Public spending has a positive effect on economic growth. This conclusion validates the endogenous growth theory of Barro (1990) for which, investment has a positive effect on growth. In addition, these results are in line with Ngakosso's (2016) conclusions, which showed that public spending has a positive effect on growth. The degree of fiscal freedom has a positive impact on economic growth in Congo. This is obvious, since the Congo's score for this index varies between 49 and 66, well below 100. Thus, an increase in the degree of fiscal freedom in the Congo has the consequence, the improvement of its rating and consequently, improving the investment climate.

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[6] See Appendix 1

[7] See Appendix 2

[8] See Appendix 4

[9] See Appendix 5

[10] See Appendix 4

2) The price of oil contributes negatively to economic growth in Congo. Indeed, its coefficient is significant at the 10% threshold. A plausible explanation for this result may be the existence of the phenomenon of Dutch disease. Indeed, the rise in the price of a barrel of oil leads to a strong inflow of currencies, which fuel inflation which is detrimental to economic growth. In addition, the link between the extractive sector and the rest of the economy depends on the state budget that recovers a portion of the resources. Finally, the impact of the increase of the oil income in the rest of the economy depends on the way in which the State spend them. If returns are not assigned to the finance of the productive expenditure, the effect of return coming from the rise of the oil barrel price can only be negative.

The global index of political rights also has a negative impact on growth. Such a result is justified by the fact that the Congo's score in relation to the overall index of political right is very bad in the Congo, being between 3 and 7 above the score between 1 and 2, granted to countries that respect the holding of fair elections, with the presence of opposition parties that can play an important role, as well as respect for the rights of minority groups. Thus, an increase in the global political right index destroys the investment climate and, as a result, deters companies from investing in the Congo.

5. Conclusion and recommendations

The main objective of this study was to identify the main explanatory factors of the economic growth in the Congo in the period from 1995 to 2016. A Vector Error Correction Model was estimated for this purpose. Thus, with the exception of the price of oil and the total index of political rights, which have a negative effect on growth in the Congo, it appears that the economic growth in the Congo is mainly explained by the gross fixed capital formation, public spending and the degree of fiscal freedom. In order to contribute to a better elaboration and application of measures in the direction of favoring economic growth in the Congo, the following actions seem relevant:

a) use revenues from the oil sector to finance a category of public expenditures that improve the productivity of the Congolese economy. Specifically, oil revenues must be used to finance capital expenditures, such as health or education infrastructure (hospitals, schools, universities), communication infrastructure (roads, telecommunication networks) or current expenditures such as protection of property and people (police, justice, national defense) or property rights.

b) reduce the tax burden to promote economic growth. More specifically, the state can, on the one hand, reduce the tax burden of households, in order to improve households' disposable income and, consequently, their level of consumption; on the other hand, the state must reduce the tax burden of companies to encourage them to invest.

c) promote democracy to improve the investment climate. Thus, the Congolese government should respect the following criteria: the organization of fair elections, the presence of opposition parties that can play an important role, as well as respect for the rights of minority groups. In this way, investors will be reassured of the security of their investments in Congo.

Appendices

Appendix 1: Variables stationarity test results (ADF)

Variables	ADF Test			Order of integration
	ADF statistics at level	First difference statistics	Critical value of Mckinon	
LGDP	0.082027	-2.988988	-2.898623	**I(1)**
LFBCF	-0.543003	-3.048286	-2.898623	**I(1)**
LDP	1.156573	-2.055195	-1.944969	**I(1)**
PPETR	-1.794580	-3.193262	-2.896779	**I(1)**
IGDP	-0.381053	-5.033223	-1.944915	**I(1)**
DLF	-1.056737	-3.482724	-2.898623	**I(1)**

Source: author from Eviews

Appendix 2: Determination of Optimal Lag

Endogenous variables: LGDP LPO LFBCF IGDP DLF PETR LDP						
Sample: 1995Q1 2016Q4						
Included observations: 78						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-274.1215	NA	3.19e-06	7.208243	7.419742	7.292910
1	605.0492	1577.999	1.82e-15	-14.07819	-12.38619	-13.40085
2	812.5096	335.1282	3.23e-17	-18.14127	-14.96878*	-16.87126*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Source: author from Eviews

Appendix 3: Determination of the Cointegration Rank

Sample (adjusted): 1996Q3 2016Q4				
Included observations: 82 after adjustments				
Series: LGDP LPO LFBCF IGDP DLF PETR LDP				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.406758	144.3414	125.6154	0.0022
At most 1 *	0.389532	101.5249	95.75366	0.0189
At most 2	0.312340	61.05543	69.81889	0.2044
At most 3	0.175192	30.34965	47.85613	0.7010
At most 4	0.114081	14.55609	29.79707	0.8080
At most 5	0.053930	4.623407	15.49471	0.8474
At most 6	0.000944	0.077446	3.841466	0.7808
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: author from Eviews

Appendix 4: Result of the vector model with error correction

Vector Error Correction Estimates							
Sample (adjusted): 1996Q3 2016Q4							
Included observations: 82 after adjustments							
Standard errors in ( ) & t-statistics in [ ]							
Cointegrating Eq:	CointEq1	CointEq2					
LGDP(-1)	1.000000	0.000000					
LPO(-1)	0.000000	1.000000					
LFBCF(-1)	-0.066345	-0.068919					
	(0.02286)	(0.04145)					
	[-2.90199]	[-1.66286]					
LDP(-1)	-0.035170	0.031724					
	(0.00810)	(0.01469)					
	[-4.34154]	[2.16013]					
PETR(-1)	0.000135	-0.001759					
	(0.00030)	(0.00054)					
	[0.45568]	[-3.26240]					
IGDP(-1)	0.025445	-0.012113					
	(0.00696)	(0.01262)					
	[3.65428]	[-0.95956]					
DLF(-1)	-0.003562	-0.028302					
	(0.00164)	(0.00298)					
	[-2.16887]	[-9.50622]					
C	-5.767610	-11.44293					
Error Correction:	D(LPIBR)	D(LPO)	D(LFBCF)	D(LDP)	D(PETR)	D(IGDP)	D(DLF)
CointEq1	-0.122831	0.057909	0.733757	1.624431	18.99689	-3.015310	-1.176622

	(0.03228)	(0.02921)	(0.29134)	(0.45874)	(19.4469)	(0.97884)	(3.78610)
	[-3.80495]	[1.98241]	[2.51858]	[3.54105]	[0.97686]	[-3.08049]	[-0.31077]
CointEq2	-0.010686	-0.022887	0.115857	-0.143762	16.94877	0.825127	10.14831
	(0.01769)	(0.01601)	(0.15963)	(0.25135)	(10.6553)	(0.53632)	(2.07447)
	[-0.60416]	[-1.42993]	[0.72579]	[-0.57195]	[1.59065]	[1.53849]	[4.89200]
D(LGDP(-1))	0.675389	0.033938	1.157277	1.327819	25.74423	-2.346669	11.17266
	(0.13119)	(0.11871)	(1.18397)	(1.86429)	(79.0305)	(3.97792)	(15.3864)
	[5.14816]	[0.28588]	[0.97745]	[0.71224]	[0.32575]	[-0.58992]	[0.72614]
D(LGDP(-2))	-0.011310	0.003591	-0.982209	-0.761969	-39.53943	4.788344	-2.292972
	(0.13480)	(0.12198)	(1.21658)	(1.91564)	(81.2072)	(4.08749)	(15.8102)
	[-0.08390]	[0.02944]	[-0.80735]	[-0.39776]	[-0.48690]	[1.17146]	[-0.14503]
D(LPO(-1))	0.088679	0.811477	-1.026322	-0.862601	-47.03875	1.022628	-14.83847
	(0.17341)	(0.15691)	(1.56497)	(2.46421)	(104.462)	(5.25801)	(20.3377)
	[0.51139]	[5.17149]	[-0.65581]	[-0.35005]	[-0.45029]	[0.19449]	[-0.72960]
D(LPO(-2))	-0.055579	-0.097552	-1.381774	-1.394618	-80.18490	-0.075787	-14.66734
	(0.17929)	(0.16224)	(1.61807)	(2.54783)	(108.007)	(5.43642)	(21.0278)
	[-0.31000]	[-0.60129]	[-0.85396]	[-0.54738]	[-0.74241]	[-0.01394]	[-0.69752]
D(LFBCF(-1))	0.009321	0.003696	0.547268	-0.052610	-12.99249	0.040140	-3.000286
	(0.02243)	(0.02030)	(0.20246)	(0.31880)	(13.5146)	(0.68024)	(2.63114)
	[0.41548]	[0.18209]	[2.70303]	[-0.16503]	[-0.96137]	[0.05901]	[-1.14030]
D(LFBCF(-2))	-0.011579	0.008980	-0.209795	-0.055895	-4.528683	-0.312217	0.824532
	(0.02244)	(0.02031)	(0.20256)	(0.31895)	(13.5208)	(0.68056)	(2.63236)
	[-0.51589]	[0.44217]	[-1.03573]	[-0.17525]	[-0.33494]	[-0.45877]	[0.31323]
D(LDP(-1))	-0.002636	-0.004902	0.058464	0.772285	3.904627	0.076381	1.038211
	(0.01316)	(0.01191)	(0.11874)	(0.18697)	(7.92609)	(0.39895)	(1.54312)
	[-0.20032]	[-0.41169]	[0.49236]	[4.13047]	[0.49263]	[0.19145]	[0.67280]
D(LDP(-2))	0.002536	-0.005304	0.006632	-0.068382	-0.525816	0.124314	0.206640
	(0.01301)	(0.01178)	(0.11745)	(0.18493)	(7.83954)	(0.39460)	(1.52628)
	[0.19484]	[-0.45039]	[0.05647]	[-0.36977]	[-0.06707]	[0.31504]	[0.13539]
D(PETR(-1))	1.37E-05	3.06E-05	0.000999	-0.000570	0.907879	0.000560	0.006627
	(0.00027)	(0.00025)	(0.00245)	(0.00385)	(0.16330)	(0.00822)	(0.03179)
	[0.05071]	[0.12481]	[0.40815]	[-0.14800]	[5.55951]	[0.06818]	[0.20845]
D(PETR(-2))	-0.000103	-1.05E-05	0.002080	0.002225	0.018639	0.000742	0.024544
	(0.00029)	(0.00026)	(0.00259)	(0.00407)	(0.17270)	(0.00869)	(0.03362)
	[-0.35777]	[-0.04056]	[0.80411]	[0.54627]	[0.10792]	[0.08531]	[0.72998]
D(IGDP(-1))	-2.55E-05	0.001203	-0.029096	0.013523	-1.294474	0.816206	-0.403791
	(0.00500)	(0.00452)	(0.04513)	(0.07106)	(3.01230)	(0.15162)	(0.58646)
	[-0.00509]	[0.26593]	[-0.64475]	[0.19031]	[-0.42973]	[5.38319]	[-0.68852]
D(IGDP(-2))	0.004775	-0.002478	-0.073881	-0.079094	-2.994702	0.027329	0.511107
	(0.00556)	(0.00503)	(0.05021)	(0.07907)	(3.35180)	(0.16871)	(0.65256)
	[0.85818]	[-0.49213]	[-1.47133]	[-1.00034]	[-0.89346]	[0.16199]	[0.78323]
D(DLF(-1))	-0.000115	0.000494	0.000585	0.009899	-0.190921	-0.009533	0.677231
	(0.00104)	(0.00094)	(0.00936)	(0.01474)	(0.62481)	(0.03145)	(0.12164)
	[-0.11084]	[0.52657]	[0.06248]	[0.67162]	[-0.30557]	[-0.30312]	[5.56735]
D(DLF(-2))	-0.000849	-0.000153	-0.003025	0.005554	0.250807	0.015909	0.110735
	(0.00114)	(0.00103)	(0.01026)	(0.01616)	(0.68510)	(0.03448)	(0.13338)
	[-0.74653]	[-0.14888]	[-0.29477]	[0.34363]	[0.36609]	[0.46135]	[0.83022]
C	0.000961	0.002106	0.033712	0.025854	1.396393	-0.013845	0.239182
	(0.00141)	(0.00128)	(0.01272)	(0.02004)	(0.84932)	(0.04275)	(0.16535)
	[0.68168]	[1.65094]	[2.64947]	[1.29042]	[1.64412]	[-0.32385]	[1.44648]
R-squared	0.644496	0.552485	0.557021	0.538491	0.641781	0.590415	0.630133
Adj. R-squared	0.556987	0.442328	0.447980	0.424889	0.553604	0.489594	0.539089
Sum sq. resids	0.001537	0.001259	0.125224	0.310479	557.9474	1.413569	21.14841
S.E. equation	0.004863	0.004401	0.043892	0.069113	2.929813	0.147469	0.570404
F-statistic	7.364927	5.015411	5.108359	4.740147	7.278315	5.856068	6.921189
Log likelihood	329.9048	338.1003	149.5064	112.2778	-194.9723	50.13171	-60.79163
Akaike AIC	-7.631825	-7.831715	-3.231862	-2.323849	5.170057	-0.808090	1.897357
Schwarz SC	-7.132871	-7.332761	-2.732908	-1.824895	5.669011	-0.309136	2.396311
Mean dependent	0.003028	0.007819	0.023218	0.033552	0.301220	0.024390	0.226829
S.D. dependent	0.007307	0.005893	0.059076	0.091135	4.385101	0.206416	0.840183
Determinant resid covariance (dof adj.)	3.43E-17						
Determinant resid covariance	6.74E-18						
Log likelihood	806.5931						
Akaike information criterion	-16.42910						

|			
Schwarz criterion	-12.52552		
F-statistic	7.364927	Durbin-Watson stat	2.100897
Prob(F-statistic)	0.000000		

Source: author from Eviews

Appendix 5: Statistical Tests

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.663924	Prob. F(2,63)	0.1976
Obs*R-squared	4.114161	Prob. Chi-Square(2)	0.1278

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.717142	Prob. F(21,60)	0.7989
Obs*R-squared	16.45241	Prob. Chi-Square(21)	0.7437
Scaled explained SS	19.85207	Prob. Chi-Square(21)	0.5306

Heteroskedasticity Test: ARCH			
F-statistic	0.076397	Prob. F(1,79)	0.7830
Obs*R-squared	0.078255	Prob. Chi-Square(1)	0.7797

Heteroskedasticity Test: White			
F-statistic	0.718049	Prob. F(21,60)	0.7980
Obs*R-squared	16.46906	Prob. Chi-Square(21)	0.7427
Scaled explained SS	19.87215	Prob. Chi-Square(21)	0.5294
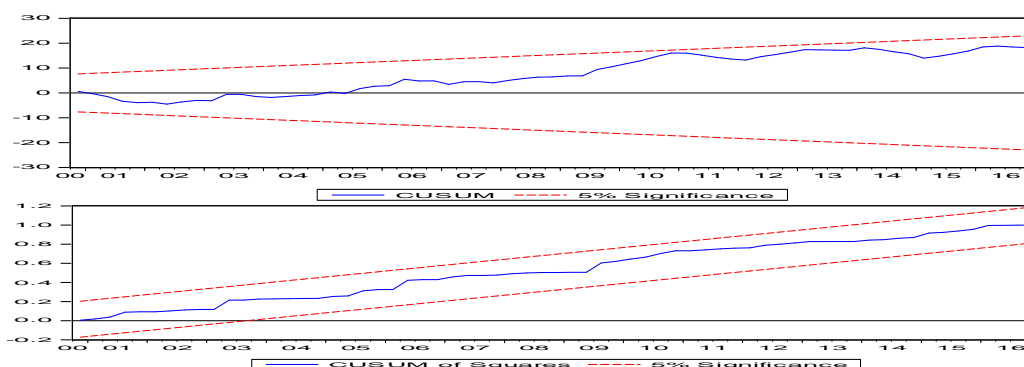
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