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MASTER IN ECONOMICS

MASTER´S DISSERTATION

PUBLIC SPENDING AND ECONOMIC GROWTH IN ANGOLA

IFILAY ERNESTO LUÍS CAMBULO

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ABSTRACT

The relationship between public spending and national income has been subject of empirical investigation. Wagner states that public spending is endogenous to national income. However, Keynes argues the reverse and claims that public spending is an instrument of economic policy.

This dissertation investigates the causal link between public spending per capita and national income per capita in Angola using data from annual time series from 1985 to 2015.

Results indicate that variables are non stationary and that there is no long term relationship between them. There is only a short term relationship and Granger's causality test invalidates Wagner's law and validates Keynes' theory.

JEL Classification: B22, E12, E62, H50, O40,

Keywords: Keynes' theory, Wagner law, Public Spending, National Income.

RESUMO

A relação entre a despesa pública e o rendimento nacional tem sido objecto de investigações empíricas. Pois, Wagner considera que a despesa pública é endógena em relação ao rendimento nacional. Já Keynes defende o inverso, considera que a despesa pública é um instrumento de política económica.

Esta dissertação investiga a relação causal entre a despesa pública per capita e o rendimento nacional per capita em Angola. Utilizamos dados de series temporais anuais de 1985 à 2015.

Os resultados indicam que as variáveis são não estacionárias, que não existe relação de longo-prazo entre as mesmas. Existe apenas relação de curto-prazo, e os testes de causalidade a Granger invalida a lei de Wagner e valida a teoria de Keynes.

Classificação JEL: B22, E12, E62, H50, O40

Palavras-chave: Teoria de Keynes, Lei de Wagner, Gastos Públicos, Rendimento Nacional.

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1. INTRODUCTION

The link between public spending and economic growth has been the subject of several studies ever since economic science appeared. Actually this link gains importance when Adolph Wagner establishes a positive relationship between national income, development level and government expenditure Henrekson (1993). Wagner argues that as a certain economy grow up, public spending increases in a proportion in excess regarding the national income. This is the "law of the expanding state role", postulate by Adolph Wagner in 1877 Al-faris (2002).

On the other hand, John Maynard Keyes claims that in a situation of shortfall of aggregate demand, governments should increase spending and reduce taxes, so that aggregate demand can increase and that market balance can be re-established Eisner (2005). When analyzing the two authors' theories, we can verify a paradox. I.e., while the first author claims that economic growth causes an increase in public spending, the second author claims the opposite.

Empirical investigation on Wagner's law and Keynes' theory presents divergent results. Some investigations validate Wagner's law, others validate Keynes's theory and some validate both. According to Al-faris (2002) this happens because of methodological differences, model specifications, estimates and, most of all, on how you deal with new econometric techniques when approaching non stacionary variables.

In Angola the oil sector is the one which contributes the most to the increase of national income and public spending. This fact causes a positive effect between these variables. This study aims to investigate if the public spending has a positive effect on national income. However, the main focus of this study is to examine the link between

public spending per capita and national income per capita in the context of Wagner's law and Keynes' theory.

We use data from time series starting in 1985 to 2015, using the unitary root, cointegration and Granger causality tests. We verify that the variables are non stacionary and that there is no long term relationship between them, only a short term relationship. Granger causality test validates Keynes' theory. According to the results, public spending per capita causes the increase of national income per capita.

This study is organized in five sections. In section number two, after the introduction, we present a background analysis. In section three we review literature, in section four we analyse the model, methodology and results. Lastly, in section five we present the main conclusions of the investigation.

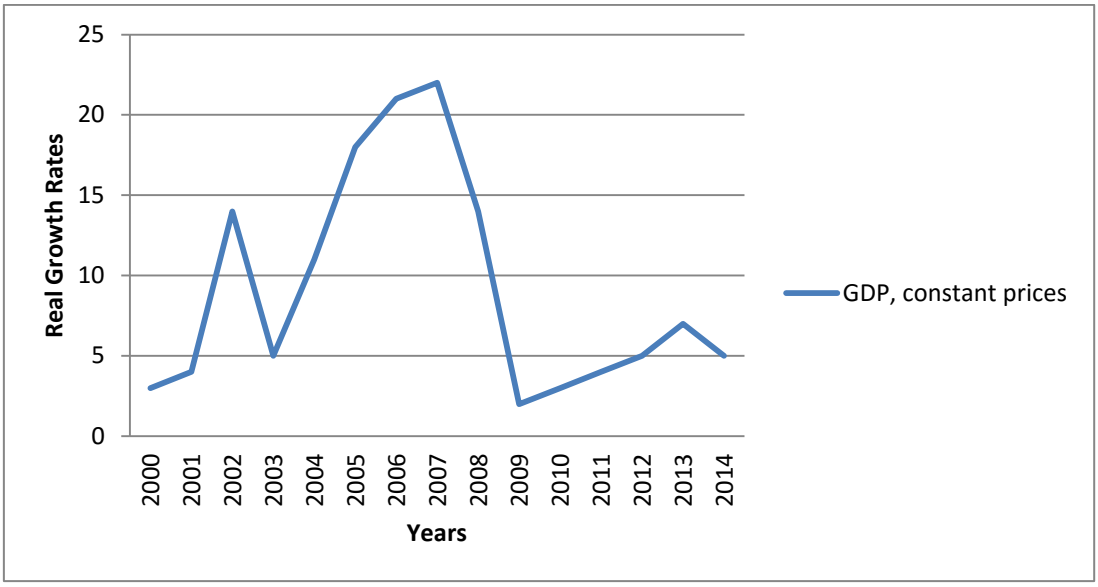
2. BACKGROUND ANALYSYS

Angola is a sub-Saharan African country with a total area of 1.246.700 square km and a population of 25.789.024[1]. Its economic structure is based on the exploitation and exportation of basic raw materials. Oil is the main product of exportation and revenue collection.

Barros et al (2015) describe the Angolan economy as being capital intensive and dependent on imports, mainly in governmental sectors such as construction and finance. However, Barros et al (2015) highlight the dual character of the Angolan economy. The oil sector grows apart from other sectors, meaning that Angola is "cursed" by its natural resources. A fact noted by Ferreira (2006), is that Angola went through a civil war for 27 years, from 1975 to 2001. As a consequence, the country lost individuals with a higher education and the national economic circuit and infrastructures were destroyed.

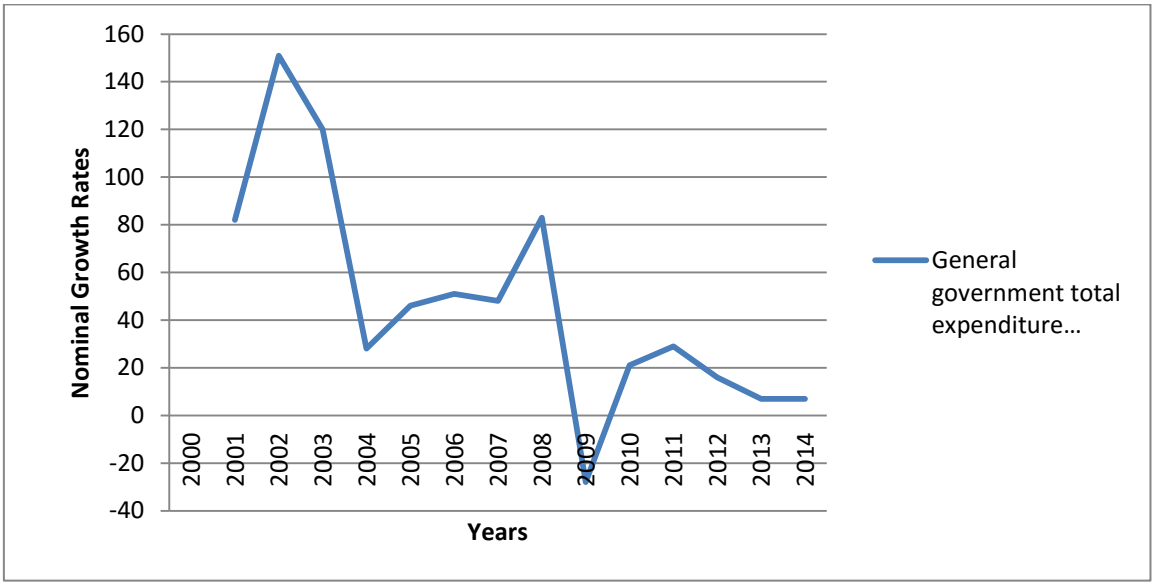
With the arrival of peace in 2002, rehabilitation and construction of infrastructures became of the Angolan government's priorities. According to Barros et al (2015), Angola signed financing agreements with Chinese banks in 2002 and with the IMF in 2003 for the rehabilitation and construction of infrastructures. According to Figure 1, from this year on the Angolan economy grows continuously until 2008. From 2004 to 2008, Angolan economy lives a glorious period of economic growth with an average real GDP growth of 12%.Them, in figure 2 public expenditure records an average nominal growth rate of 38%. With the world financial crisis growth decreases: from 2009 to 2014 the real GDP decreases 4% and nominal public spending 16%.

[1] Final data from the 2014 Population Census, by the National Institute of Statistics (INE)



Source: IMF data.

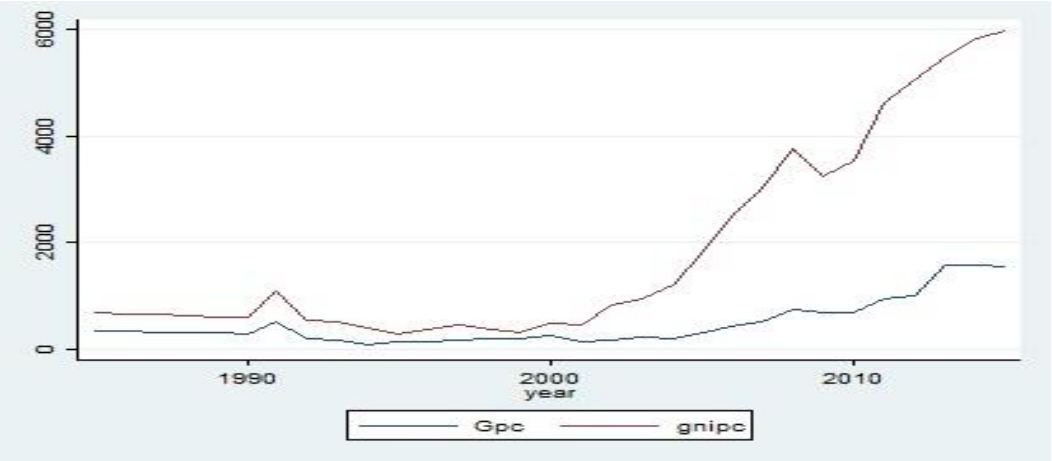
Figure 1- GDP real growth rate



Source: IMF data.

Figure 2 - General government total expenditure growth, nominal prices.

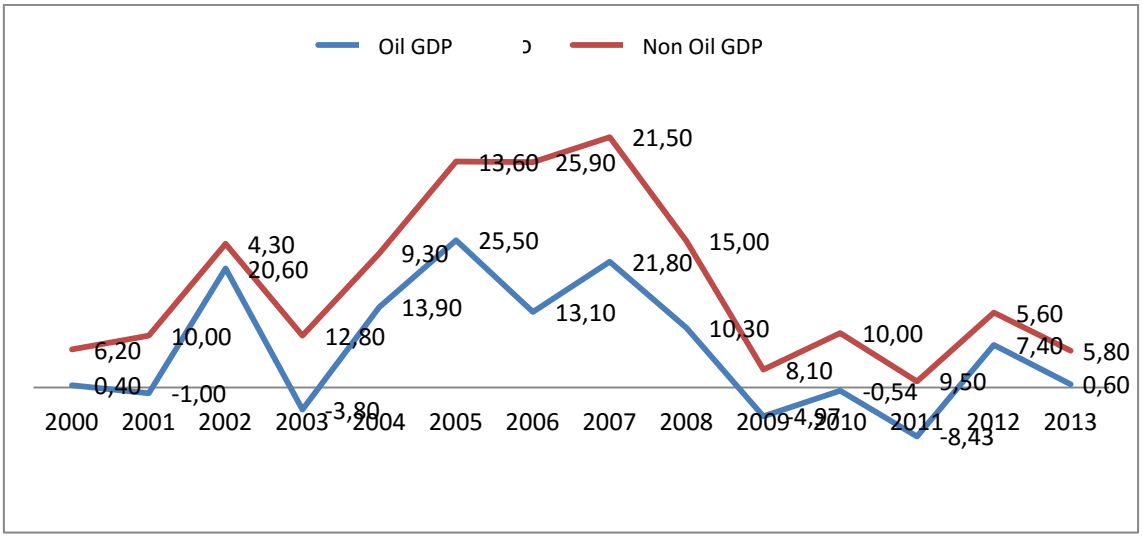
In figure 3 we can verify that the nominal level of income per capita in dollars grows since 2000, as well as the nominal public spending per capita. This happens because of the rise in oil prices and production, which led Angola to the level of middle-income countries.



Source: Our calculations based on data from the World Bank.

Figura 3 - Level of gross income per capita (gnipc) and spending per capita (gpc), nominal prices.

In figure four we can verify that non-oil GDP presents higher growth dynamics when compared to oil GDP. One of the most important factors for this growth dynamics is public investment. However, data from the IMF indicate that the average public spending was 40,82% in relation to the GDP and Angola Catholic University (2013) point that current expenditure is above fifty per cent in relation to capital expenditure, from 2000 to 2015.



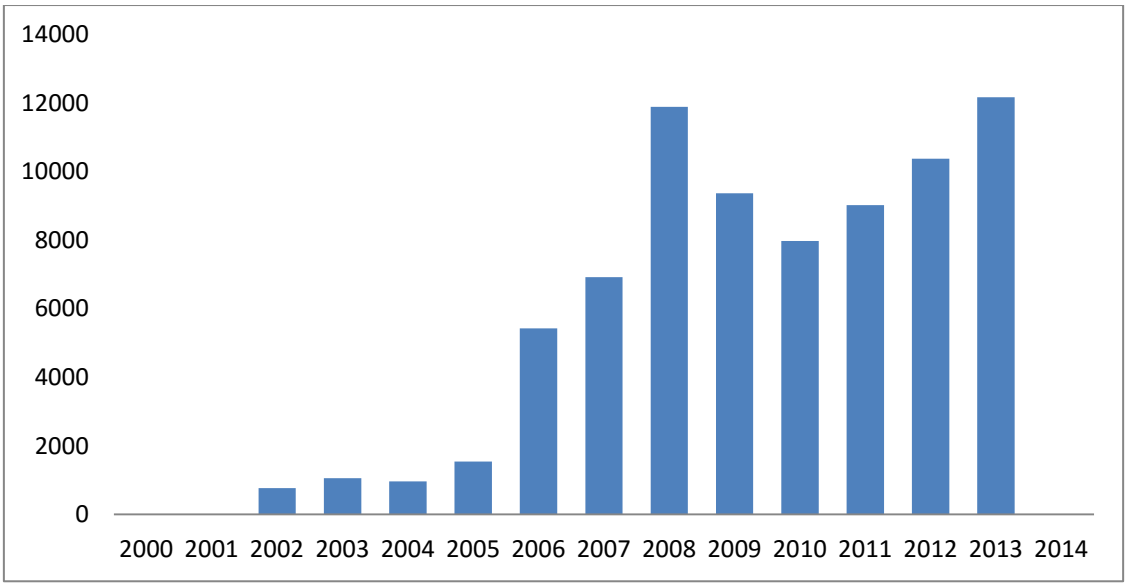
Source: Angola Catholic University

Figura 4 - Oil and Non-oil GDP Growth in %

This is due to the reach of peace and the consequent increase of the expenses with the State administration. However, the government still does not have effective means of controlling civil servants wages. According to Angola Catholic University (2013), these expenses increased also due to: the purchase of goods and services, since national economy is highly dependent on imports, interest on financing rehabilitation and construction of new infrastructures, and lastly, subsidies to public companies, caused by their inefficiency.

Overall, the Angolan government priorities related to public spending have not contributed to a sustainable economic growth. From 2001 to 2013 expenditure related to defense and security increased 15%, while with health and education it only increased 13% as pointed Angola Catholic University (2014). On that report, the institution describe that investment in physical capital is still below the Sub-Saharan average, and the sector of construction is weak, because of its dependence on raw materials from other countries, lack of qualified human resources.

In figure five we see the public investment spending from 2002 to 2013. Hence, public investment has been acting as a lever of economic growth. The State invested around US$ 56.1 billion (US$ 4,7 billion a year) from 2000 to 2011. It is estimated that the State will invest US$84.700 billion from 2012 to 2017[2].



Source: Catholic University of Angola

Figure 5- Public investment in millions of dollars

To finalize, we emphasize that public expenditure have been financed basically by oil sales, which implies that non-oil economy is not yet self-sustaining and is still a high risk, because of oil price and production volatility.

[2] Angolan Economic Report of 2012, Center of scientific Studies and Research (CEIC), Catholic University of Angola

3. LITERATURE REVIEW

3.1 Theoretical Explanation of Wagner's Law

In 1877 Adolph Wagner stated the principle of increasing state activity Wagner & Weber (1977). According to these authors, this law was based on the empirical observation carried out by Wagner, who came to the conclusion that there is a tendency for the increase of the public sector as there is more economical progress and income growth. I.e., as the real income grows during the industrialization process, public spending increases within the total spending Oxley (1994).

According to Oxley (1994), Wagner established a high correlation between public spending and per capita income. Oxley suggests three reasons for the empirical relation. Firstly, industrialization would imply replacing the public sector with the private sector. Secondly, the increase of wealth would imply an increase of welfare and cultural services, which are flexible on what concerns income. Thirdly, Wagner assumed that governmental intervention would require management and financing of natural monopolies. Abizadeh & Yousefi (1988), sustain that as a country becomes more industrialized the government responsabilities increase, i.e., as society becomes richer, the governments have to spend more to defuse industrial and economical tensions.

Ever since the sixties, Wagner's Law has been the subject of empirical research. The different views on Wagner's law can be summed up in five specifications or functional links between the public spendings and economic growth Henrekson (1993). According to Peacock & Scott (2000), the review of the relevant articles shows that Wagner's definitions of state activity and his claim that he was not engajed in making

predictions reveal ignorance. The same authors claim that the omission of public companies present in Wagner's definition implies a weak specification of the model and that the test object of his hypotheses remains obscure.

3.2 Explanation of the Keynesian Theory

It was during the Great Depression, in the thirties, that Keynes presented a new theory as a reply to the economic problems of that period. According to Eisner (2005), Keynes sustains that recession happened because of insufficient aggregate demand. I.e., there was no balance between aggregate demand and offer. In order to reestablish the balance it was necessary to increase public spending or decrease taxes, so that aggregate demand would grow and economy would regain its balance as says Eisner (2005). With Keynes' theory, public spending is regarded as an instrument of political economy, a variable which can be manipulated and that influences economic activity and contributes to economic growth.

In fact, public spending and economic growth may have a positive or negative relation. Aschauer (1989) and Barro (1990) proves the positive link between public spending and economic growth. Aschauer (1989), prove this link referring to American economy. Discriminating capital and consumption spending, the positive link is found only in the first kind of spending. On what concerns the second kind, the link is negative. The author reiterates the highly procyclical nature of public spending and that the greatest contribution for economic growth is provided by basic infrastructures, namely roads, bridges, airports, highways, sewage, water supply systems, etc. In his model of endogenous growth, Barro (1990) emphasizes the role of tax policy in economic growth, sustaining that governmental spending directly affect the productive function.

The negative link between public consumption spending and economic growth is also confirmed by Barro (1991), whose research focuses on a group of eighty-eight countries from 1960 to 1985. The research shows that the link between the public capital spending and the national income is positive, although not very significant. The insignificant relationship between public capital spending and economic growth is also detected in developing countries by Devarajan et al (1996). According to the Devarajan et al (1996), the public capital spending may become unproductive if they are excessive. Concludes that developing countries have been misallocating public spending, favoring capital spending at the expense of current expenditure, while developed countries have been doing the opposite.

3.3 Government Spending and Economic Growth: Some Empirical Evidence

Several studies test aggregated data to verify Wagner's law and Keynes' theory. On the other hand, other studies use disaggregated data to test the long term and causality link between economic growth and some components of public spending. As we argued in 3.1, these studies rely on different interpretations of Wagner's law and use several techniques and methods in empirical testing of long term and causality direction links between economic growth and public spending. These techniques and methods are the unit root test, the cointegration test and the causality test.

Several of these studies use for example the Granger causality test for time series data, while others use cross-section data and panel data. However, regardless of the type of data, the results are contradictory. For example, Ram (1987) gets contrary results when he analyses Wagner's law applied to a group of 115 countries. The results validate the hypothesis with time series data, but invalidate the cross-section data. Courakis et al (1993), also confirm the conflicting results on Wagner's hypothesis when applied to

analyze the link between the public spending components (consumption, investment and transfer spending) and the national income of Portugal and Greece. According to these results, Wagner's hypothesis is only confirmed by one different component in both countries, while it is rejected by all other components. Henrekson (1993) argues that studies which validate Wagner's law get false results because they use non stationary variables and these are non cointegrated. The same author accepts the non cointegration hypothesis between public spending and per capita GDP, therefore invalidating Wagner's law when it is applied to Sweden.

Following Henrekson's work (1993), researchers started to test cointegration between variables and subsequently, causality. Oxley (1994) used aggregated variables and found evidence of cointegration and a causal link between economic growth and public spending, which validates Wagner's law when applied to England. Kumar et al (2012), using similar data validate the law in New Zealand. Kan et al (2012) found little evidence of Wagner's law in Pakistan. Halicioglu (2003) rejects the cointegration test between aggregated variables and the causality link and found evidence of Wagner's law only in an expanded version in Turkey. I.e., in per capita income and the percentage of government spending in GDP.

In the line of research carried out in individual countries which use aggregated data, there are studies which validate both Keynes' theory and Wagner's Law. Biswal et al (1999) validate both hypothesis for Canada but in a short-term relation. Tang (2008) also validates both hypothesis for Malaysia, although the causality tests show that the causal relation between government spending and economic growth is not stable. On the other hand, researchers such as Sanches-Joares et al (2015) use five recommended specifications to test both hypothesis in Mexico. These invalidate Wagner's Law and

validate Keynes' theory. Similarly, Ighodaro et al (2010) also validate Keynes' theory and reject Wagner's Law in Nigeria, disaggregating government spending in general administration, community and social services spending, introducing variables of economic policy and political freedom in the model in order to develop the functional form.

Besides the authors referred to above, who test Wagner's Law and Keynes' theory in individual countries using modern econometric techniques, there are others who use the same and other up-to-date techniques to study groups of countries, such as Afxentiou & Serletis (1996), who analyze the convergence of public spending and its components (government consumption, transfers and benefits) within the expansion of the European Union. The Authors invalidate the convergence of public spending and its components, as well as the existence of a long-term link between these and the GDP, this ivalidates both Wagner's Law and Keynes' theory. Kolluri & Panik (2009) found evidence of a long-term relation between total public spending, its components (government consumption spending and transfers) and national income, supporting Wagner's Law. They also found evidence of a short-term relation between variables using the error regression model, which reinforces the markedly positive effect of long-term relations between government spending and national income.

Al-Faris (2002), noted the redistribution of oil profits as the main focus of public policies in the countries which are part of the Gulf Cooperation Counsil. High wages, extended government jobs and benefits required great public spending. The author performs Johansen's cointegration test and Granger's causality test to the national income and aggregated and disaggregated public spending (current per capita spending, per capita capital spending). Al-Faris' results confirm the existence of a long-

term relation between the variables and that national income causes the increase of aggregated and disaggregated public spending. These results confirm Wagner's law and refute Keynes' theory in the Gulf Cooperation Counsil countries, although the author finds a bi-directional relation between public spending and national income in Bahrain. Nevertheless, Mehrara & Amin (2012), using Pedroni's cointegration technique and Granger's causality test, find a long-term relation between oil profit, budget expenses and GDP in the eleven selected oil exporting countries. Causality tests validate Keynes' theory, i.e., budget expenses and oil profit cause economic growth.

Chang (2002) contributes to the debate on Wagner's Law and Keynes' theory using the Augmented-Dikey-Fuller and KPSS methodology to verify the integration and stationarity data order and Johnsen's cointegration test to verify long-term relation between variables. The research is carried out in three recently industrialized countries (South Korea, Thailand and Taiwan) and three industrialized countries (Japan, the United States of America and the United Kingdom), examining five different versions of Wagner's Law. He concludes that this law applies to every country but Thailand. Augmented-Dickey-Fuller methodology is also used by Ansari et al (1997) to carry out their study in three African countries (Ghana, Kenya and South Africa) using Granger and Holmes-Hutton causality technique. Ansari et al (1997) reject the long-term relation between public spending and income and invalidate Keynes' theory. Besides that, Wagner's law applies to Ghana only on the short-term.

The searched and quoted literature shows that the results of empirical research on Keynes' theory and Wagner's law are quite divergent. This is due to the choice of variables, methodology or econometric technique.[3]

[3]See in Al-Faris (2002), Ighodaro & Oriakhi (2010), Henrekson (1993),

4. MODEL, ECONOMETRIC METHODOLOGY, RESULTS AND DISCUSSION

4.1 Model

The underlying economic model is a classic in economic theory. It has been implemented in several economies. The practical example on what concerns similarity (oil dependent economies), is the analysis made by Ansari et al (1997).

We are inspired not only by those economists' model, but also by their methods. The model is Keynesian. The macroeconomic framework is all based on or sustained by the effect of the link between economic growth and public spending. Public spending is expected to have a positive effect in the whole economy and all the economic components - indirect effects[4] - should result in economic growth.

As the model sustains, the increase of public spending implies economic progress. On the other hand, in the Angolan economy, as it is common in developing countries, public spending has a marked impact on economy. Even though it also acts as a way of covering market failures, it can also limit the private sector. If the public sector is huge, public spending can also be huge, leaving little room for the growth of the private sector. This is certainly the case of Angola.

Therefore, in accordance to Ansari et al (1997), we propose the following model,

$$\boldsymbol{Y_t = \beta_0 + \beta_1 X_t + u_t, \ \ with \ t = 1, \dots, 31} \qquad \text{Eq.(1)}$$

[4]It is often necessary to address the microeconomic context in order to get macroeconomic results, so the effectiveness and efficiency of policies depend on the optimization on a macroeconomic level, to get aggregate results.

(Y_t, X_t) stand for annual data of national income and state spending per capita, respectively.

Although Eq.(1) presents a peculiar example – models which explain economic shocks – its functional form is expected to be questionable. Holmes & Hutton (1988) emphasize that the suggested model must comply with classic hypothesis, and these are not very realistic. On the other hand the authors suggest an alternative procedure based on the rank order of each variable. If there is a Granger's causality applied to the rank order of variables, it is resilient over the distribution of errors and invariant regarding the monotonic transformation of variables, even when the causality link between variables is a weak one.

In theory, if $(XcausesY)$, then Ydepends on X . Holmes & Hutton have proved that, for this case, a strictly monotonic transformation does not cancel causality nor the existent functional form. We can suggest a weak causality hypothesis, so we can present that transformation. (Y, X) can be AR(p) ordered vectors if

$(\boldsymbol{X} \rightarrow \boldsymbol{Y})$ then $\boldsymbol{Y} = \boldsymbol{f}(\boldsymbol{X})$. Eq.(2)

Since we may consider or be interested in the bilaterality of effects, $(Y \rightarrow X)$

$\boldsymbol{X} = \boldsymbol{g}(\boldsymbol{Y})$. Eq.(3)

If Xexplains Y, it is the same as $P(Y|X) \neq P(Y)$. Secondly, that relation is not spurious, i.e., it is not necessary to include Z; $P(Y|X) = P(Y|X \cup Z)$. The effect of X is the same, whether it is in the particular model or the general one, where more variables are included.

To make it clearer, although it is a model of distributed mismatch, one can include Eq.(2) and Eq.(3) in a system where all mismatches of (y_t, x_t) have been compacted in X. These are eventually included in $f(X)$ and in $g(Y)$, where (p_1, p_2) are mismatch numbers to be considered in regressors.

$$\begin{cases} \boldsymbol{Y = f(X)} \\ \boldsymbol{X = g(Y)} \end{cases} \Leftrightarrow \begin{cases} \boldsymbol{y_t = \rho_0 + \sum_{i=1}^{p_1} \rho_i y_{t-i} + \sum_{i=i}^{p_2} \beta_i x_{t-i} + u_{1t}} \\ \boldsymbol{x_t = \beta_0 + \sum_{i=1}^{p_2} \beta_i x_{t-i} + \sum_{i=1}^{p_1} \rho_i y_{t-i} + u_{2t}} \end{cases}. \quad \text{Eq.(4)}$$

4.2 Econometric Methodology

In this subsection we perform the empirical analysis using time series to study the hypothesis of the theory that was exposed in section 3. This is accomplished with the support of econometric methods, in order to obtain arguments other than the ones present in theory. Thus, our arguments are based on statistical information from a time series starting in 1985 to 2015. Therefore, we have 31 observations for both variables that are analyzed. These observations come from the World Bank data base.

Several of the analyses performed by researchers are based on real data. The aspect that we aim to highlight is that the effects to be analyzed are mainly statistic. We do not aim to present equation projections, which generally tend to give preference to real data. We use the GDP deflator rather than the nominal one to get real observations, because the deflator presents very low decimal values, over 5 decimals. Using these values to get real observations, the results suggest that economy has been decreasing with time, because the deflator presents projections made by the World Bank which do not seem to be adequate for that purpose. We resort to good sense and combine it with the need or main goal of the analysis. Under these circumstances we prefer using nominal data. Engle & Granger (1987) found a co-integration relationship between the nominal gross

national income and the quantity of M2 currency. I.e. there may be economic effects or relations which do not exist in real data. Certain instances do not require real data, since we stress again, we studied the effects in two economic variables, causal directions.

The underlying method views the model as being adequate to provide answers for the main questions related to both goals – Keynes's theory and Wagner's law.

4.2.1 Unit Root Tests

The econometric procedure aims to perform a univariate analysis to determine the behavior of public spending per capita throughout time, X, and the total national income per capita, Y, so that the properties of stability of variables can be examined. It also aims to ensure, via statistical tests, that the probability of the series structure is stationary throughout time. The usual rating is: if Y is stationary, it is represented by $Y \sim I(0)$; likewise for X. Otherwise, $Y \sim I(1)$. We assume no other factors affect the series.

The goal is to use properties which are valid over errors, u_t. It may not be reasonable, statistically, to combine both variables in the same regression equation when they have different properties[5], even though it is a common practice for several economists to impose restrictions in order to obtain results which seem to be more plausible. Secondly, with the result of the unit root we can test the existence of a long term relation. Therefore,

- If $\{y_t : t = 0,1 \dots, t\} \sim I(1)$ and $\{x_t : t = 0,1 \dots, t\} \sim I(1)$, and there is a resulting linear combination for $\beta \neq 0$, then

$$\boldsymbol{Y_t - \beta_1 X_t = u_t \sim I(0), \quad t = 1, \dots, 31} \qquad \text{Eq. (5)}$$

[5]It may happen that the integrated series is a second order one, currency M2. On the other hand, if you include series with a different integration order, it is likely that errors present a non stationary behavior, $u_t \sim (1)$.

- It is assumed that average and constant variance and autocorrelation between two variables depend only on time.

On what concerns point two, mathematically, based on Wooldridge's (2013) alternative definition, in a weak or covariant stationary stochastic process the following must be satisfied: $i)\ E(Y_t) = \mu < \infty, \forall_t;\ ii)\ Cov(Y_t, Y_{t-k}) = \gamma_k, \forall_t, k$. In order to get variance, just use $k = 0$. Under these conditions, series are asymptotically non correlated. If there is a long term relation, the parameter is given by β_1. Granger (1986) considers β_1 unique[6] for the relation of balance. Furthermore, even though the condition present in Eq. (5) is not always present, co-integration is indeed a special case involving series I(1). Therefore, it is not reasonable to assume properties of errors without testing the properties which can lead to an erroneous interpretation. The non identification of statistical properties in series may lead to estimate spurious equations. One of the possible results of spurious regressions (related to properties of errors) is that there may be several possibilities involving series $I(1)$ in $u_t \sim I(1)$.The result $u_t \sim I(1)$ is sufficient if one of the variables is $I(1)$, or Y_t or X_t, and both.

The first step is the test of the series I(1). Dickey & Fuller's (1979) test, applied to the series, must have the functional form so as to produce estimates correct interpretation; thus, we must make adjustments in order to obtain consistent results,

$$\Delta y_t = \beta_0 + \beta t + \rho y_{t-1} + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \varepsilon_t, \qquad \text{Eq. (6)}$$

Where Δ is the difference operator, β_0 the intercept, βt the time trend. We aim to test $H_0: \rho = 0\ vs\ .H_1: \rho < 0$, similarly to x_t. The goal is to get the correct specification because of the sensitivity of the test in question. Actually, $\varepsilon_t \sim N(0,1)$, there is no autocorrelation in errors due to the inclusion of past values which are differentiated

[6] There are certainly values in which the resulting relation causes $u_t \sim (0)$, but it is not long term.

from the dependent variable. Usually in annual data it is enough to use one to two lags to obtain an estimate where errors are white noise, vide Wooldridge (2013). We also included a trend term because it is evident that series have an increasing behavior. This is not necessary in some cases, for example the interest and unemployment rates. One can use a graphic analysis of the series which may be useful if there are any doubts. For variables which are observed monthly or quarterly and which have a certain deterministic seasonality, test regressions must include the respective seasonal dummies in order to produce similar tests.

On the other hand, it should be noted that the inclusion of deterministic irrelevant regressors decreases the unit root tests accuracy. With too many deterministic regressors the critical values are higher in absolute value, which makes the rejection of null hypothesis more difficult when it is false. It is necessary to warn that OLS in over parameterized equations are inefficient. Standard deviations tend to be inflated and we tend to reject the null hypothesis less. We can say that the result of the unit root tests is sensitive to deterministic regressors. Under these conditions we obtain unit root tests with strong form for both series. Therefore, there is statistical evidence of unit root in both series.

Table I: National Income per capita

Augmented Dickey-Fuller test for unit root			Number of obs =	28
Z(t) has t-distribution				
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
Z(t)	2.144	-2.492	-1.711	-1.318

P-value for Z(t) = 0.9788

Table II: National Spending per capita

Augmented Dickey-Fuller test for unit root			Number of obs =	28
Z(t) has t-distribution				
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
Z(t)	-0.429	-2.492	-1.711	-1.318

P-value for Z(t) = 0.3359

4.2.2 Cointegration

In this section we tested co-integration for the pair of series considering the co-integration equation and using two-step method Granger (1986). Firstly we estimated the co-integration equation Eq.(5) and included deterministic terms, constant and linear tendency. Secondly, we tested if the errors are $I(0)$. This way, we can get statistic results on the long term relation ou series balance. As a matter of fact, series do not perpetuate in balance, there may be periods of deviation. However, there are economic forces which influence balance values. Ansari (1997), acknowledges joint endogeneity in both series to sustain the need of estimating two co-integration regressions[7]. We formalized the test taking that observation into account. We tested two different equations separately considering the hypothesis$H_0: u_t \sim I(0) vs. H_1: u_t \sim I(1)$, i.e., under the null hypothesis of non co-integration. To get familiar with the suggested two-step method, vide Engle & Granger (1987). In that case the equation system represented in Eq.(4) is the similarity of the authors. Even with the chance of autocorrelation in errors, the estimate or the use of a static equation in the first step in order to get the residue

[7]Obviously there is no co-integration in I(0) series.

instead of an estimate on a system is super consistent. ADF statistics can be found in the next table.

Table III: National Income Per Capita

Augmented Engle-Granger test for cointegration			N (1st step) =	31
Number of lags = 2			N (test) =	28
1st step includes linear trend				
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
Z(t)	-0.932	-4.882	-4.111	-3.740

Tabela IV: National Spending Per Capita

Augmented Engle-Granger test for cointegration			N (1st step) =	31
Number of lags = 2			N (test) =	28
1st step includes linear trend				
	Test	1% Critical	5% Critical	10% Critical
	Statistic	Value	Value	Value
Z(t)	-1.468	-4.882	-4.111	-3.740

In both cases, we do not reject the null hypothesis, since there is statistic evidence of non co-integration. We can assume that there is no long term balance relation.

4.2.3 Granger's Causality

Oxley (1994) contributed methodologically, pointing out the steps to take into consideration when exploring the arguments which support Wagner's theory. Those techniques should not be very different if one aims to explore Keynes' theory.

From the results in section 5.1 and those in 5.2, we come to the conclusion that the equation model should accommodate the non super consistency due to the previous result, non co-integration. Under these conditions, VAR estimate – the first step in Granger's test, leads us to invalid statistic test results because errors are non stationary. To overcome this issue it is enough to differentiate variables in equations, getting a reparameterization which is adequate to the estimate. Of the previous results we conclude that $y_t \sim I(1)$ and $x_t \sim I(1)$. If there is no co-integration it is enough to $y_t - y_{t-1} = \Delta y_t \sim I(0)$ and $x_t - x_{t-1} = \Delta x_t \sim I(0)$, as in Eq.(6), obtained from Eq.(4). In general, it is VAR with unrestricted coefficients. Although there are issues in estimating unrestricted VAR, this criticism is based on the inefficiency of standard deviation due to the high number of parameters to estimate and to the loss of observation caused by mismatches. In this case we set the mismatch order in 2.

We aim to test in the y_t equation, $H_0: \rho_i = 0, i = 1,2,$ in other words, public per capita spending does not cause Granger income per capita. Likewise, intended to test in the x_t equation. To reject the null hypothesis means to estimate Y equations with type $\boldsymbol{X}_{t-i}$ regressors, which give us better information the current values of Y. The same applies to equations of the X variable. Based on statistic results we can argue the assumptions in Wagner's law, the possibility of unidirectional causality between national income and public spending. Conversely, we can evaluate the unidirectional aspect in Keynes – unidirectional causality of public spending in national income.

Results can also show us interdependency between both variables with bidirectional causality. Regarding the results shown in Table VI, none of the cases shows rejection of the null hypothesis. The effect of public spending per capita on income per capita is statistically significant.

According to Oxley (1994) causality exists at least in one direction and data confirm that assumption. Nevertheless, the direction of the effect is essential when choosing the theory, i.e., we should choose the theory in which the arguments are supported by the data. Based on this pre-condition, economy seems to be more influenced by the impulses of increase in public spending than the increase of income. Both theories refer to moments of industrialization in economies. It may be embarrassing or interesting for critics to choose a model to foment the economy, but it may also be incoherent or imprudent, depending on certain restrictions. The most relevant fact is that data provide concrete reasons to define the choice of the model to be followed in an expansionist policy.

Table V: Granger Causality Wald Tests

Equation	Excluded	Chi2	df	Prob>Chi2
$\Delta GNIpc$	ΔEpc	17.277	2	0.000
ΔEpc	$\Delta GNIpc$	1.6339	2	0.442

4.3Results and Discussion

Similarly to countries with an oil-dependent economy, co-integration does not collaborate with the behavior of economic variables. Data reflect no common stochastic tendency between the variables under analysis. It is possible that there is a stylized fact, but it would be necessary to analyze more countries and evaluate the common factors.

Even though there are several development and sustained growth issues in many of these countries. The choice of an economic model solely based on the fact that national income comes mainly from oil profits, and that national income is approximately close to exports profits, it may not result in the same type of economic model.

The results indicate that to stimulate the Angolan economy we must follow the Keynesian policy. However, some caution is needed in the implementation of this policy. For, the results obtained may be different than expected.

In short, there is a clear separation in Ansari et al (1997). Keynesian policy instruments are not supported by the data of the countries under analysis, so it is recommended that the instruments regarding Angola are different.

5. CONCLUSIONS AND FURTHER RESEARCHES

This dissertation tested Wagner's Law and Keynes' theory through the causal link between income per capita and public spending per capita in the context of Angolan economy. After the bibliographic review we tested the variables using modern econometric techniques. The results of this study can be summed up in three points. First, the non rejection of null hypothesis in Dickei & Fuller's (1979) test: both variables, public spending per capita and national income per capita are of order I (1). Secondly, non rejection of non cointegration between variables in Engle &Granger's (1987) test, i.e., there is no long term relationship between national income per capita and public spending per capita. Thirdly, there is a short term causal relationship and Granger's test validates Keynes' theory. Therefore, we can conclude that public spending per capita causes the increase of national income per capita.

The result of Granger's short term causality confirms that expansionist fiscal policy that has been carried out by Angola has had the desired effect on its economy. I.e., increasing public spending and, most of all, public investment. However, we should take into account that these results are only short term ones. Long term results may be different since the foundations for a sustained growth of Angolan economy are not strong enough. As we explained in section two, current expenditure still represents over fifty per cent of total expenditure and financial resources for funding public investment come from oil profit. This is liability, because of how volatile this sector may be.

On the other hand, these results converge and diverge from results obtained in quoted studies. This certainly happens because of the type of data which was used and of the new econometric techniques, as we stated in the last paragraph of section three.

However, this dissertation is a contribution to literature on the relationship between public spending and national income in Angola, using time series.

This investigation came across several obstacles. The main one was the access to data, especially data on public spending. These types of data allow a more comprehensive analysis of results. Unfortunately, we could only have access to aggregate data. We certainly hope that this study can be a motivation for further studies, where we can perform a more detailed analysis of the relationship between the several components of public spending and national income. Lastly, it is also our wish that in further studies we can present a larger number of observations, so that we can better contribute to the study of Angolan economy.

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