Estimating the Tax Buoyancy of Non-Hydrocarbon Direct And Non-Hydrocarbon Indirect For ALGERIA During 1993-2011

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Abstract :

We have use in this study a technic of Error Correction Model (ECM) to estimate the tax buoyancy of the non-hydrocarbon direct tax and the non-hydrocarbon indirect tax in the tax system of Algeria during the 19 years through 1993 till 2011 .

The Non-hydrocarbon taxes characterized by stability, especially that the hydrocarbon tax revenue often exposed to shocks reflected raised a negative impact on the development process. Which is evident by the decline witnessed in oil prices and its consequences on the economies of countries like Algeria- based heavily on hydrocarbon tax revenue.

Results of the study show that the tax buoyancy estimated of non-hydrocarbon direct taxes for a period of study was flexible, that is, an increase in the non-hydrocarbon gross domestic product by 1% lead in the long run to an increase of 1.43% in the non-hydrocarbon direct taxes; while the tax buoyancy estimated of non-hydrocarbon direct taxes for a period of study was flexible few, that is, an increase in the non-hydrocarbon GDP by 1% resulting in long-term increase is less than 0.93% in total non-hydrocarbon indirect taxes

Keys Words : Tax buoyancy, Non-Hydrocarbon Indirect tax, Non-Hydrocarbon Direct tax, Error Correction Model.

ملخص: نستخدم في هذه الدراسة تقنية نموذج تصحيح الأخطاء ECM لتقدير المرونة الشاملة للضرائب العادية المباشرة و غير المباشرة للنظام الضريبي الجزائري لفترة 19 سنة بداية من 1993 إلى 2011، وذلك لما تتميز به الضرائب العادية من استقرار، خاصة و أن الجباية البترولية غالبا ما تتعرض لهزات تنعكس أثارها سلبا على العملية التنموية. الأمر الذي يتضح جليا جراء الانخفاض الذي تشهده أسعار النفط و تبعاته على اقتصاديات الدول على غرار الجزائر المعتمدة بشكل كبير على الجباية البترولية.

توضح نتائج الدراسة أن معامل المرونة الشاملة المقدر للضرائب العادية المباشرة لفترة الدراسة كانت مرنة، أي أن زيادة في الناتج المحلي الخام خارج المحروقات بنسبة 1% تؤدي في المدى الطويل إلى زيادة قدرها 1.43% في الضرائب العادية المباشرة؛ و أن معامل المرونة الشاملة المقدر للضرائب العادية غير المباشرة لفترة الدراسة كانت قليلة المرنة، أي أن زيادة في الناتج الداخلي خارج المحروقات بنسبة 1% ينتج عنها في المدى الطويل زيادة أقل من الواحد 0.93% في إجمالي الضرائب العادية غير المباشرة.

الكلمات المفتاحية:المرونة الشاملة، الضرائب العادية المباشرة، الضرائب العادية غير المباشرة، الناتج الداخلي خارج المحروقات، نموذج تصحيح الخطأ.

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1. Introduction:

Occupies taxes an important position in all modern societies as the most important internal source of funding depends upon the state to cover its expenses, as they represent the most important means used by the state to achieve economic and social objectives and political; and increased importance with the breadth and the increasing role and the degree of state intervention in economic spheres and social, but it varies from state to state depending on the nature of the economic system and social prevailing in each country and the degree of development and the importance of its resources and potential. Which made the nations striving to find elaborate efficient tax system contributes to raise revenue on the one hand, and helps to improve the pace of development on the other hand, in the context of achieving social justice

And Algeria, like most countries seeking access to elaborate efficient system liberate from dependency of hydrocarbon tax revenue, especially in light of the repeated shocks you know oil prices, such as those in Algeria in 1986, where the price of crude has fallen from $ 42 to $ 12 a barrel; which had a deep impact on oil revenues, which accounted for 98% of Algeria's exports, where oil revenue has moved from 50 954 million dinars in 1981 to 20459 million dinars in 1986, a decrease of 49%. And in the context of work on improving the income from non-hydrocarbon taxes have been taken a number of measures and amendments through financial laws for re-consideration of the non-hydrocarbon to reduce the impact of fluctuations in oil prices on the development process. And is the most important tax reform brought by the Finance Act of 1991 and the adoption of the new structure of the tax system by adopting three new taxes (TVA, IBS, IRG).

Again, seeing oil prices sharply lower and unexpectedly at the end of 2014, where the price of crude dropped to around $ 40 a barrel; which will have a deep petroleum revenues represented 97% of Algeria's exports and is would be reflected negatively impact projects development, especially that of petroleum revenues cover a large proportion of the processing expenses. And in light of this situation, showing the importance of non-hydrocarbon tax revenue due to its stability. To ensure this stability must be characterized by the latter flexibility, any response to economic changes, and sees interested and specialists in the fiscal area, the high flexibility of

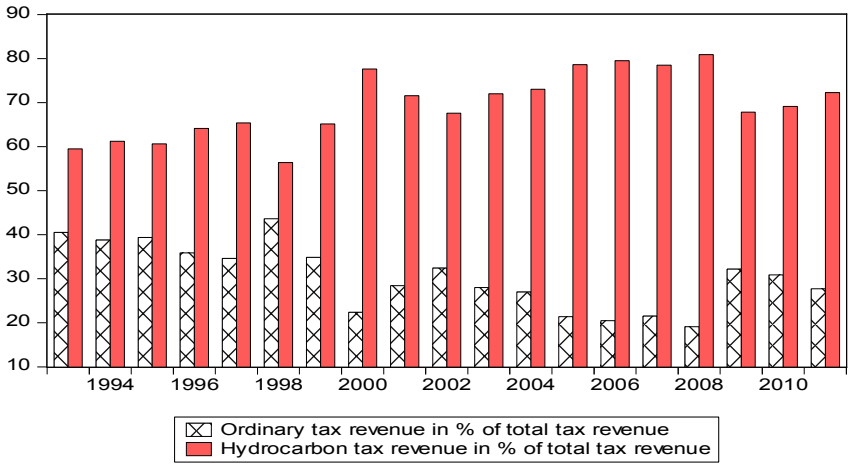
income tax will allow the financing of development by raising fiscal revenue, without the need to take action and fiscal measures may be difficult to accept by contributable; and on the other hand if the elasticity of tax revenue is low, it pays the authorities to search for additional revenue by taking action and fiscal measures such as raising tax rates, the search for new vessels tax, new taxes, or to work on improving the performance of tax administration. And in this study we will try to see how regular direct taxes, lending and indirect response to changes in the non-hydrocarbon gross domestic product and through the division of this research to the following themes:

- Tax Levels and Tax structure in ALGERIA.
- Study methodology
- Economitric study
- Conclusion

2. Tax Levels and Tax Structure in ALGERIA.

The evolution of the public revenue and tax ratio to GDP has been an upward trend, but it is not stable, where tax revenue ratio rise to GDP from 26.68% in 1993 were recorded total tax revenues 320 billion dinars to 39.03% in 2011 and achieved the total tax revenue was 5790 Billion Dinars. This percentage increase is mainly due to the upward trend in hydrocarbon tax revenue which increased from 185 billion dinars in 1993 to 3980 billion dinars in 2011, marking the highest value in the year 2008 to 4089 billion dinars; and this can be illustrated by the following figure:

Figure 1: Evolution of Ordinary Tax Revenue and Hydrocarbon Tax Revenue in Algeria during the Period of 1993-2011:



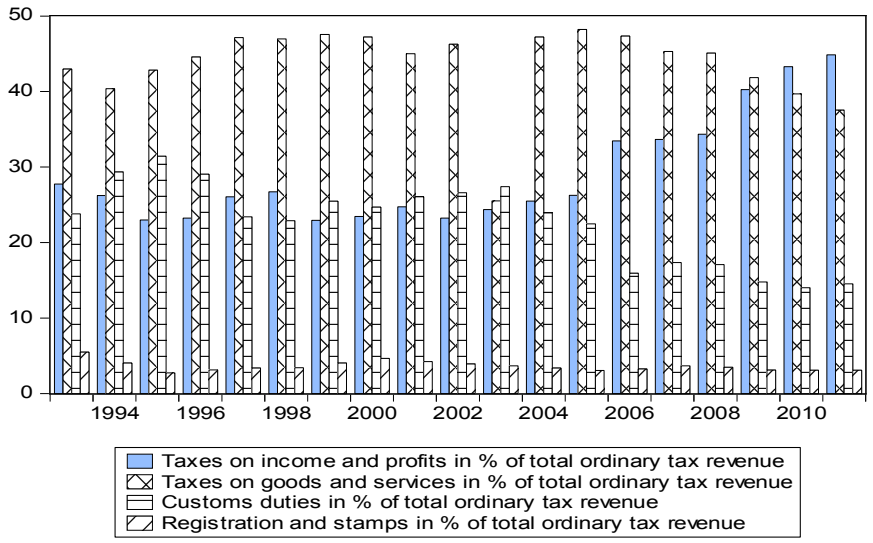
Source: Prepared by Authors Based on IMF Data.

What we can see from the above figure is the domination of hydrocarbon tax revenue on the total tax revenues by between 56.36% in 1998 and 80.9% in 2008 with an average of 69.52% for the period 1993-2011, which confirms the sustainability of Algeria's dependence on hydrocarbon tax income as a main resource to finance the Treasury State making them vulnerable to the vagaries of the black gold prices and this confirms the inability of the Algerian economy for liberation of this dependency and reforms failed to achieve the independence from hydrocarbons taxes income.

.1. 2.1.Ordinary Tax Structure (Non Hydrocarbon Tax):

Through the recent reforms in 1991, ordinary tax in Algeria has been a great interest by the Algerian authorities because of its importance as a resource which characterized by relative stability to mobilize a necessary Public Revenues in order to finance development's requirements, in addition to its role in achieving a set of economic and social goals, we are trying to stand on the ordinary tax revenue structure in Algeria.

Figure 2: Various Categories of Tax as Percent of Total Ordinary Tax Revenue in Algeria During 1993 To 2011:



Source: Prepared by Authors Based on IMF Data.

From this figure we note that the domination of indirect tax revenues from the total ordinary tax revenues, that taxes were on goods and services are recorded alone an average of 43.61% of the ordinary tax revenues during the period from 1993 to 2011, which show that Algeria rely on indirect taxes as one of the important means for the non hydrocarbon tax revenues and achieve many economic and social goals , as one of the effective tools that can be used by the government to achieve a balance between demand and supply.

Revenues that comes from customs duties as an indirect Tax ,generally it has been stable with an average of 22.64% for the period of 1993-2011 , However it began to decline in a recent years, as recorded the lowest rate in the year 2010 to 14.02%; while revenue from taxes on incomes and profits has in some sort of stability with an average of 27.7% of the total ordinary tax revenues for the period between 1993 and 2003, but it began to rise in the beginning of the year 2004, as logical consequence of the increase of wages and salaries in this period which reported the equivalent of 44.86% in 2011.

We Notes from the previous high data relative importance of indirect taxes and reduced the relative importance of taxes on income and profits of any reverse. What is prevalent in developed

countries, which is referred to by some studies that are linked between economic growth and its reflect on the tax system prevails that extent of the relative importance of each tax. **Hinrichs** mentioned in one of his studies by relying on the historical method and sectoral analysis method to that in the early stages of economic development of direct taxes relative to the indirect taxes are relatively high, and with the continuing process of economic development , the relative importance of indirect taxes increase at the expense of low Popularity relative to direct taxes, in the advanced stages of growth fade relative importance of indirect taxes keep the area of the relative importance for direct taxes.

In the same context both of each all of **V. Tanzi** and **H.Zee**, in their study of tax policy in developing countries, that the ratio of income taxes and consumption taxes in industrialized countries has been on a continuous basis with more than double the percentage in developing countries with mentioning that the level of economic development tends is closed to a relative shift in the structure of the tax revenue from consumption taxes to personal income taxes.

According to those researchers, this disparity is get back to several factors, including high wages in developed countries, the degree of development of the tax administration and the political and economic high position of rich popularity which gave them the ability of allowing them to block any reforms that will work to increase their tax burdens.[1]

And like most developing countries the importance of indirect taxes in the the structure of the Algerian tax system get increased because of the generous application of exemptions fiscal especially enterprises that established in the program framework of encouraging young people to invest, the nature of the economic structure, which is one of the factors that affect the level of taxes, **Tanzi 1992**, the more contribution of the agricultural sector in GDP get larger is the more we expected a low generates returns , that to say, the difficulty of imposing direct taxes on the agricultural sector because most of the seasonal sector workers are paid in cash, in addition to the above, Usually the agricultural sector benefit from exemptions and taxes advantages , that has been shown in this regard from the study for Musgrave that the

[1] Vito Tanzi, Howell Zee, Tax policy for developing countries, International Monetary Fund, 2001, p5.

ratio of indirect taxes from the total revenue associated inversely with GDP per capita national income and it is associated with the same contribution of the agricultural sector in the GDP.

Among the important factors that lead to the low level of taxes which is characterize by the most of developing countries is the phenomenon of the so-called shadow economy, and which is known as economic structure, **Pyle 1989** finds that one of the implications of the existence of the shadow economy is a part of the income that does not impose the tax,[1] in addition to the impact on the reliable statistics that occurred , this lack of data that disabled preclude the completed evaluation of the policy-maker are likely to influence its occurrence as a result of fundamental changes in the tax system. [2]

This is what justifies the reforms undertaken by most developing countries in the last three decades, by giving priority to indirect taxes, especially for drawing on the added value and which are often the main source of tax revenues in developed countries; and it was not recommended by the always all from the International Monetary Fund and the international financial institutions as a condition for providing financial support for developing countries. As a result, increased indirect taxes from 4.6% in 1990 to 5.4% in 2000 in both Africa and Asia, and at the same time the rate of 4.1% moved to 8.8% in Latin America and Caraib.

3. The study methodology:

In this study, we rely on the division of total non-hydrocarbon tax in non-hydrocarbon direct taxes and non-hydrocarbon indirect tax, because this division is the most important and widespread divisions, plus it often arises around more financial and economic discussions; Our focus on non-hydrocarbon direct taxes and non-hydrocarbon indirect taxes stems from the importance of the non-hydrocarbon tax due to its stability, especially that of petroleum levy is often exposed to earthquakes raised reflected negatively on the development process, which is evident by the recent decline (2014-2015), who know the price of oil and its consequences on the economies of the countries on the like Algeria-based heavily on hydrocarbon tax.

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[1] Farooq Rasheed, An analysis of the tax buoyancy rates in Pakistan, Market Fories, vol 2, № 3, 2006, p 3.

[2] Vito Tanzi, Howell Zee, Tax policy for developing countries, International Monetary Fund, 2001, p 2.

We will adopt in this study, the total of taxes on income and profits revenue and registration and stamps revenue to express the non-hydrocarbon direct taxes, and the total of taxes on goods and services revenue and customs duties revenue to express the non-hydrocarbon indirect taxes; how much we rely on non-hydrocarbon GDP to represent the tax base for non-hydrocarbon direct taxes and non-hydrocarbon indirect taxes, and is what can be illustrated through the following table:

Table 1: Tax bases for non-hydrocarbon direct taxes and non-hydrocarbon indirect taxes

Taxes	**Bases**
Total Non-hydrocarbon direct taxes revenue (NHDT)	Non-hydrocarbon gross domestic product (NHGDP)
Total Non-hydrocarbon indirect taxes revenue (NHIT)	Non-hydrocarbon gross domestic product (NHGDP)

Source: prepared by researchers

4. Economitric study

Prior to estimate the stability of the models are time-series variables in logarithmic levels tested, and so to make sure the stability and knowledge of the degree of integration and using the Augmented Dickey Fuller test ADF.

And thereafter are estimated long-term relationships in between each of the non-hydrocarbon direct taxes, non-hydrocarbon indirect and non-hydrocarbon gross domestic product and using the method of OLS, is then to make sure whether the residuals of these relationships stable of lesser degree. If the above conditions are achieved above the previous estimate relationships using error correction model ECM and which takes into account all of the long-term relationship and a short-term relationship

.2. 4.1.Statinarity test:

Before assessing the stability of the models are time-series variables in logarithmic levels tested, and in order to ensure the stability of the variables and see the degree of integration and using the Augmented Dickey Fuller test at the abstract level of 5%

4.1.1.The Augmented Dickey-Fuller (ADF) test:

Have been included in the Augmented Dickey-Fuller test ADF number of differences with the time gap p (number of degrees of

delay), which relies on the minimization of Akaike criteria and Schwarz and even crossing autocorrelation problem it disappear statistic DW, If P = 0, this means that Augmented Dickey Fuller test leads to simple Dickey Fuller test.
To illustrate the stability of the series or not and unstable type string any if the specified type TS or random type DS, and in order to take various possibilities, the Augmented Dickey-Fuller test runs on three different models for each variable and estimate under three hypotheses: without intercept, with intercept, with intercept and trend, and test alternative hypothesis H_1 :$|\emptyset|<1$on the basis of that:[1]

- **LnNHGGP:**

The number of delays taken in this test based on the minimization of Akaike and Schwarz standards is P = 0.

$$\Delta \mathrm{LnNHGDP_t} = \rho \mathrm{LnNHGDP_{t-1}} - \sum_{j=2}^{p} \emptyset_j \, \Delta \mathrm{LnNHGDP_{t-j}} + \varepsilon_t \dots\dots\dots (1)$$

$$\Delta \mathrm{LnNHGDP_t} = \rho \mathrm{LnNHGDP_{t-1}} - \sum_{j=2}^{p} \emptyset_j \, \Delta \mathrm{LnNHGDP_{t-j}} + c + \varepsilon_t \dots\dots\dots (2)$$

$$\Delta \mathrm{LnNHGDP_t} = \rho Ln\mathrm{NHGDP}_{t-1} - \sum_{j=2}^{p} \emptyset_j \, \Delta Ln\mathrm{NHGDP}_{t-j} + c + bt + \varepsilon_t \dots (3)$$

We will estimate the models are as follows:
The third model estimate:

$$\Delta \mathrm{LnNHGDP_t} = \rho Ln\mathrm{NHGDP}_{t-1} - \sum_{j=2}^{p} \emptyset_j \, \Delta Ln\mathrm{NHGDP}_{t-j} + c + bt + \varepsilon_t \dots (3)$$

First, we tested the signification of trend coefficient: H0: b = 0

[1] Régis Bourbonnais, Econométrie : Manuel et exercices corrigés, op cit, p 234.

$$t_{\hat{b}} = 2.99 > t_{tabulé}^{0.05} = 2.79$$

Through the results obtained note that the calculated t greater than t tabular at level of significance of 5%, and this means that the general trend coefficient is significatively different from zero, so we reject null hypothesis H0 and thus tiger to unit root test H0: Φ = 1 for the same model.

$$t_{\hat{\emptyset}} = -3.13 > t_{tabulé}^{0.05} = -3{,}69$$

We note that the calculated t greater than t tabular at every level of significance of 5% and thus accept the null hypothesis H0: Φ = 1 means that the series is instable of DS type, hence tiger to study the stability of the series in first differences.

ϖ **D(LnNHGGP):**

The number of delays taken in this test based on the minimization of

Akaik and Schwarz standards is p=2

The third model estimate:

First, we tested the significance of general trend coefficient: H0: b = 0

$$t_{\hat{b}} = 1{,}2 > t_{tabulé}^{0.05} = 2.79$$

Through the results obtained note that t is smaller than the calculated t tabular at level of significance of 5% and this means that the general trend coefficient is not significatevely different from zero, so we accept hypothesis H0 and thus to estimate tiger second model

The second model estimate:

First, we test the intercept c: H0: c = 0

$$t_{\hat{c}} = 3.32 > t_{Cal}^{0.05} = 2.54$$

We note that the calculated t greater than t tabular at level of significance of 5%, and this means that the hard coefficient significatevely different from zero reject any hypothesis H0 tiger to the unit root test H0: Φ = 1 for the same model

$$t_{\hat{\emptyset}} = -3.70 < t_{Cal}^{0.05} = -3.08$$

We note that the calculated t is smaller than t tabular at level of significance of 5%, and this means that the stable of first class I chain (1).

And can be summarized as, following the same methodology, the results of Augmented Dickey Fuller tests to determine the degree of stability of all the variables in the following table:

TABLE 2: ADF Test Results (Unit Root Tests)

Variables	Augmented Dickey Fuller					
	Level			First Difference		
	Trend and Intercept	Intercept	None	Trend and Intercept	Intercept	None
NHGDP	-3.13	-1.16	7.28	-3.33	-3.7	-1.28
NHDT	-0.74	0.93	6.53	-3.53	-3.35	-1.53
NHIT	-4.6	-1.86	3.11	-4.01	-4.45	-2.41
Critical value						
1%	-4.57	-3.85	-2.69	-4.72	-3.95	-2.72
5%	-3.69	-3.04	-1.96	-3.75	-3.08	-1.96
10%	-3.28	-2.66	-1.6	-3.32	-2.68	-1.6

Source: Source: Author's calculation based on Eviews 8 program

ADF statistics in the above table shows that all variables have a unit roots. In other words, they are non-stationary in level but stationary in the first difference.
which means the possibility of testing the co-integration between non-hydrocarbon direct taxes and non-hydrocarbon GDP , and between Non- hydrocarbon indirect taxes and non-hydrocarbon GDP.

4.2.Estimate the relationship in the long run:

After it became clear that all integrated variables of first degree I (1) ~ Yt and Xt ~ I (1) are estimated in the long-term relationship between tax and its tax base and using the method of OLS according to the following formula:

$$y_t = \hat{\alpha} + \hat{\beta} x_t + e_t$$

And even available simultaneous integration relationship must be leftover series this stable of lesser degree models.

If the conditions mentioned above, the appropriate model to estimate the relationship between these series is error correction ECM model, which takes into account all of the long-term relationship because they contain time-gap variables and short-term

relationship, and that the inclusion of time-series where the differences, thus it represents in the same time model static and dynamic model.

And it can be estimated by the following relationship:

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 (y_{t-1} - \beta x_{t-1})$$

I(0) I(0) I(0)

β_2 : Refers to the speed of adjustment coefficient (correction factor) and is refers to the amount of change in the dependent variable as a result of the deviation of the value of the independent variable in the short term for the value of the equilibrium in the long term by one unit, and expects that this factor is negative because it indicates the rate at which moving him short-term relationship towards the long-term relationship. And can be re-formulation of the previous equation as follows:

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 e_{t-1} + \varepsilon \quad \beta_2 < 0$$

Where:

e_{t-1}:Correction limit

4.2.1. Determination of error correction model (ECM).

After we determined that each stable of first class variables, the next stage is to estimate the error correction between each tax and their tax base.

1). Determination of error correction model between NHDT and NHGDP using the OLS:

- **Estimate the long-term relationship between NHDT and NHGDP using the OLS:**

$$Ln\, NHDT_t = \alpha + \beta LnNHGDP_t + \varepsilon_t$$

$$Ln\, NHDT_t = -14.17 + 1.28\, LnNHGDP_t + \varepsilon_t \quad \ldots..(1)$$

(-15.20) (20.61)

(.) t Student

R^2= 0.96 R^2 ajusté= 0.96 DW= 0.56 F. statistique=425

Where:

NHDT : Non-hydrocarbon direct tax revenue
α: Intercept
β: Tax buoyancy
$NHGDP$: Non-hydrocarbon GDP

Illustrated by the results obtained that the statistical Durbin-Watson indicate the presence of autocorrelation between the errors which affect the results of ordinary least squares, and to clarify that we resort Durbin-Watson and one of the most common tests used in autocorrelation discovery of the first-class test according to the following formula

$\varepsilon_t = \rho\varepsilon_{t-1} + \upsilon_t$

Where:

$|\rho| < 1$

$\upsilon_t \rightarrow n.i.d$

This test is based on the test the following hypotheses:

$H_0: \rho = 0$

$H_1: \rho \neq 0$ ($\rho < 0$ ou $\rho > 0$)

To test the null hypothesis we calculate statistical Durbin Watson:

$$dw = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2}$$

Where:

e_t :

Can also be written in terms of the statistical correlation coefficient estimator:

We have:

$$dw = \frac{\sum_{t=1}^{n} \hat{\varepsilon}_t^2 + \sum_{t=2}^{n} \hat{\varepsilon}_{t-1}^2 - 2\sum_{t=1}^{n} \hat{\varepsilon}_t \hat{\varepsilon}_{t-1}}{\sum_{t=1}^{n} \hat{\varepsilon}_{t-1}^2}$$

Including that:

$$\sum_{t=1}^{n} \hat{\varepsilon}_t^2 \cong \sum_{t=2}^{n} \hat{\varepsilon}_{t-1}^2$$

So:

$$dw = \frac{2\sum_{t=2}^{n} \hat{\varepsilon}_{t-1}^2}{\sum_{t=1}^{n} \hat{\varepsilon}_{t-1}^2} - \frac{2\sum_{t=1}^{n} \hat{\varepsilon}_t \hat{\varepsilon}_{t-1}}{\sum_{t=1}^{n} \hat{\varepsilon}_{t-1}^2}$$

And including that:

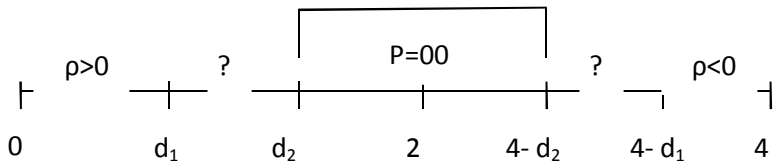
$$\hat{\rho} = \frac{\sum_{t=1}^{n} \hat{\varepsilon}_t \hat{\varepsilon}_{t-1}}{\sum_{t=1}^{n} \hat{\varepsilon}_{t-1}^2}$$

We get:

$$dw = 2(1 - \hat{\rho})$$

DW statistic represents the calculated value of the test and take values between 0 and 4, where that's why. To test the null hypothesis has all of the Durbin-Watson prepare statistical table represents the critical values for DW in the significance level of 5% and depending on the sample size (n) and the number of explanatory variables (k), and to clarify the test methodology build on the following figure:

Figure 3: methodology Durbin-Watson test:



Ressource : Régis Bourbonnais, op cit, p 83.

If:

$d_2 < dw < 4 - d_2$: We accept the null hypothesis

$0 < dw < d_1$: We reject the null hypothesis

$4 - d_1 < dw < 4$: We reject the null hypothesis

$d_1 < dw < d_2$ أو $4 - d_2 < dw < 4 - d_1$: We are not in a specific area, or the so-called zone of the doubt.

Through the results obtained in the first equation we note that:

$$DW = 056 < d_1 = 1.18$$

And therefore reject the null hypothesis, which indicates the existence of a positive correlation between errors. To remove the autocorrelation problem of the form draw upon manner Cochrane-Orcutt, which is considered one of the most commonly used methods

$$\text{Ln NHIT}_t = \alpha + \beta \text{LnNHGDP}_t + \varepsilon_t$$

$$Ln\,NHIT_t = -16.45 + 1.43\ LnNHGDP_t + e_t \ldots\ldots (2)$$

(-7.82) (10.42)

$$e_t = 0.61 e_{t-1} + v_t$$

(2.95)

(.) t Student

R^2= 0.98 R^2 ajusté= 0.97 DW= 1.81 F. statistique= 394.96

We note that the statistical DW located in the region of acceptance $d_2 = 1.4 < dw = 1.88 < 4 - d_2 = 2.6$, Suggesting remove autocorrelation problem between residuals.

Note of the overall modulus of elasticity estimated in equation (1) that the non-hydrocarbon direct taxes for a period of study was flexible, that is, an increase in non-hydrocarbon GDP by 1% in the long term lead to an increase of 1.43% in non-hydrocarbon direct taxes. And it could be argued that the latter respond well to changes in non-hydrocarbon gross domestic product.

- **Study the stability of the residuals of the equation (2)**

To see if there was a possibility of the existence of a long-term equilibrium relationship we study the stability of the previous equation residuals using ADF and after he was identified periods of delay (AIC minimization criteria, SCH) P = 1

Table 3: unit root test for residuals serie of long-term relationship between NHGDP and NHDT.

Variable	$t_{\hat{\emptyset}}$	t_t		
Residuals serie e_t	-3.85	1%	5%	10%
		-2.7	-1.96	-1.6

Source: prepared by researchers based on Eviews 8 program.

We note that the calculated t is smaller than t tabular at all levels and this means that the residuals series is stable at level I (0), and therefore the error correction model is the most appropriate in this case.

Estimate error correction model (ECM) between NHGDP and NHDT.

Since the variables (NHDT and NHGDP) integrated of the same class and the residuals of a stable temperature below are estimated dynamic model relationship (short-term) using the following equation:

$$\Delta \mathrm{LnNHIT_t} = \alpha_1 \Delta \mathrm{LnNHGDP_t} + \alpha_2 \mathrm{e_{t-1}} + \hat{u}_t \,, \quad \alpha_2 < 0$$

Where:

α_2: The speed of adjustment coefficient

$$e_{t-1} = LnNHIT_{t-1} - LnNHGDP_{t-1} +$$

Than:

$$\Delta LnNHIT_t = 0.06 + 0.73\ \Delta LnNHGDP_t + 0.84\ e_{t-1} + u_t$$

Through the estimated equation is clear that the speed of adjustment coefficient positive, which means that errors correction model is unverified.

2). Determination of error correction model between NHIT and NHGDP using the OLS:

- **Estimate the long-term relationship between NHGDP and NHIT using OLS:**

$$\text{Ln NHIT}_t = \alpha + \beta \text{LnNHGDP}_t + \varepsilon_t$$

$$\text{Ln NHIT}_t = \text{-8.25} + 0.93\ \text{LnNHGDP}_t + \varepsilon_t \ldots.(3)$$

(-13.92) (23.63)

(.) t Student

R^2= 0.97 R^2 ajusté= 0.96 DW= 1.71 F. statistique=558.32

$$1.40 < dw = 1.71 < 4 - d_2 = 2.60$$

Where:

NHIT: Non-hydrocarbon indirect tax revenue

α: Intercept

β: tax buoyancy

NHGDP: Non-hydrocarbon GDP

Note of the overall modulus of elasticity estimated in equation (3) that the indirect tax revenue for the period of the study was flexible few, that is, an increase in the non-hydrocarbon GDP by 1% resulting in long-term increase is less than one (0.93%) in total taxes to direct; and therefore the latter respond poorly to changes in

non-hydrocarbon GDP.

Study the stability of the residuals of the equation (3)

To see if there was a possibility of the existence of a long-term equilibrium relationship we study the stability of the previous equation residuals using ADF and after he was identified periods of delay (AIC minimization criteria, SCH) p=0.

Table 4: unit root test for residuals series of long-term relationship between NHGDP and NHIT.

Variable	$t_{\hat{\emptyset}}$	t_t		
Residuals serie e_t	-4.25	1%	5%	10%
		-2.7	-1.96	-1.6

Source: prepared by researchers relying on Eviews 8 program.

We note that the calculated t is smaller than t tabular at all levels and this means that the residuals series et stable at level I (0), and therefore the error correction model is the most appropriate in this case.

2.2-Estimation error correction model

Since the variables (NHGDP and NHIT integrated) of the same class and the residuals of a stable temperature below are estimated dynamic model relationship (short-term) using the following equation:

$$\Delta \mathrm{LnNHIT_t} = \alpha_1 \Delta \mathrm{LnNHGDP_t} + \alpha_2 \mathrm{e_{t-1}} + \hat{u}_t \quad \alpha_2 < 0$$

Where:

$$e_{t-1} = LnNHIT_{t-1} - LnNHGDP_{t-1} +$$

So:

$$\Delta LnNHIT_t = 0.03 + 0.74\, \Delta LnNHGDP_t - 0.97\, e_{t-1} + \hat{u}_t$$

(0.66) (2.14) (-4.09)

Can rework debugging following equation model:

$$\Delta LnNHIT_t = 0.03 + 0.74\,\Delta LnNHGDP_t - 0.97\,(LnNHIT_{t-1} + 8.25 - 0.93 LnNHGDP_{t-1}) + \hat{u}_t$$

Illustrated by the dynamic model that transaction to differ materially from scratch and speed adjustment coefficient substantially negative, which means that the error correction model ECM is verified. The results also show that the increase in the non-hydrocarbon gross domestic product 1% resulting in a short-term increase less than one in non-hydrocarbon indirect tax.

5.The conclusion:

Through the results obtained in this study, it is clear that overall flexibility is estimated direct regular taxes for a period of study coefficient was flexible, that is, an increase in the non-hydrocarbon GDP by 1% in the long term lead to an increase of 1.43% in non-hydrocarbon direct taxes. And it could be argued that the latter respond well to changes in non-hydrocarbon gross domestic product. This may be due to the intangible known to wage rises in recent years, witnessed by the public employment sector as a result of high oil prices.

In the same context, we came to the conclusion that the overall flexibility estimated coefficient for non-hydrocarbon indirect taxes study period was flexible few, that is, an increase in the non-hydrocarbon GDP by 1% resulting in long-term increase is less than one-0.93% in total non-hydrocarbon indirect tax; and therefore the latter respond poorly to changes in non-hydrocarbon GDP. This is due to the decline in the relative importance of rights and customs revenues to the weakness of the customs sector.