

## Moroccan tax potential: Econometric analysis through the tax effort

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**Abstract.** This paper aims to analyse the Moroccan tax potential compared to a sample of countries (panel), relying on the tax effort concept, which allows isolating the part of the government public levying. It is an international study, using a panel data (25 countries-26 years). The result of econometrics estimations shows the positive effect of the GDP per capita, the openness degree of the economy, the monetization degree and the part of industrial Added Value on the public potential while the part of agricultural Added Value had a negative impact. Analyzing the tax effort, we find that Morocco had a negative effort between 1990 and 2004. But, since 2005, the policies pursued after the reform helped reverse the trend to achieve a positive effort. It means that Morocco exploits all his fiscal resources from the standard of the sample.

**Keywords.** Tax burden, Tax potential, Tax effort, Structural factors, Panel.

**JEL.** E62, G28, H21, C50.

### 1. Introduction

The government ensures its sovereign missions by offering public goods in the best conditions of efficiency. It is also responsible for implementing conjunctural stabilization policies. Finally, it must promote equity through redistributive policies.

The expenditures required to finance public goods, such as spending on infrastructure, education and health services, are covered through several modes of funding: tax, internal and external borrowing, donations for the most poorer and finally, seigniorage recipes. The tax is causing increasing economic distortions with its level; the distortions also vary according to the structure of the public levy. The solvency condition of public finances requires the counterpart of borrowing of future public revenues. Donations depend on decisions made by the international community. Finally, seigniorage revenues can generate inflation.

Public finance managers have to identify the best possible combination between the various means of financing public goods. Given the constraints on donations and seigniorage resources and also the need to use future tax resources to mobilize borrowing in a sustainable way, taxation is a preferred means (Brun, Chambas, & Combes, 2006) to cover public expenditure. Except that the use of taxation must respect the teachings of the theory of optimal taxation.

The theory of optimal taxation involves analyzing the efficiency-equity tradeoff that a government faces. The logical path to determining the best tax system is threefold (Simula, 2011). First, it is important to agree on the objectives pursued by

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the public decision-maker. The next step is to examine the different means of achieving the ends pursued, taking into account the various material, institutional or informational constraints. Finally, it remains to identify the best feasible solution, one that best satisfies the objectives within the set of possibilities. We thus follow the approach advocated by Mirrlees, one of the founders of the modern theory of optimal taxation, "A good way of governing is to agree upon objectives, discover what is possible, and optimize" (Mirrlees, 1986; Simula, 2011).

Mastering the potential of tax resources is crucial for good tax policy planning. Indeed, the fiscal potential informs the political authorities of the economy's capacity to finance public expenditure autonomously. Morocco, a mainly tax-based country, on average, over the period 2000-2015, 88% of its revenue is tax revenue, has undertaken a set of tax reforms in recent years to make the most of the potential for public resources and improve the level of government revenue.

What are the factors likely to influence the tax potential? By conducting an econometric estimation test of this potential, based on panel data, this article proposes to provide answers to this question. After a short presentation of the general context of the theory of optimal taxation, a synthetic review on the tax potential where we expose the analysis methodology, then we proceed to the estimation and the interpretation of the results.

### 2. General context of the theory of optimal taxation

The theory of optimal taxation is currently the theoretical base most often used or cited to study the properties of a tax system. Its theoretical project is aimed at normative purposes in order to describe the optimal configuration of a tax system by relying on the maximization of a "macro" social welfare function. The authors of this school of thought have often put forward its filiation with the reference work of Musgrave: The theory of public finance published in 1959 (Beleau, 2013).

Musgrave (Beleau, 2013), in his reference book, believes in another vision of the economy. He thinks from his first chapter that modern capitalism is a mixed economy and that an important public sector is indispensable in a market economy. He admits, of course, that the distribution of income is to a large extent determined by the ownership of the factors of production and their remuneration on the market. At the same time, a significant portion of the national product must be devoted to collective needs. The state budget therefore significantly influences the private sector through taxes and public transfers. In addition, fiscal policy affects the level of employment and prices in the private sector. The economic system described by Musgrave is thus mixed, and a large and indispensable public sector coexists with the market economy. Therefore, Musgrave (Beleau, 2013) defines the modalities of the intervention of the State by emphasizing the multidimensional character of the fiscal policy:

- Provision of public goods and services;
- Increase or not the redistribution of income in the economy with the aim of reducing inequalities;
- Need for "automatic stabilizers" to counteract the negative impact of an exogenous shock.

All of these dimensions are brought together by Musgrave in three branches of government activity (Beleau, 2013):

\* The function of allocation of resources, aiming to reestablish an optimal use of resources in the Pareto sense, as the free functioning of the markets deviates from this objective. For example, it may be to combat negative externalities through the production of public goods and services.

\* The distribution function aimed at modifying the initial distribution of income and wealth according to the aspirations of society. The introduction of a progressive tax is, for example, a solution to a more equitable redistribution of income.

\* The stabilization function, for its part, must play the role of "regulator" of the economy, that is to say, maintain price stability and ensure the full use of factors of

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production. This function is part of the continuity of Keynesian thought as well as in the economic context of the time Musgrave wrote.

From this brief presentation of Musgrave, there is a desire to give the state and governments a margin of maneuver in the conduct of economic policy to meet the three objectives already mentioned. Musgrave does not hide his preference for economic regulation instruments, especially of the Keynesian type. This is also the statement of most economists who defend the theory of optimal taxation.

### 3. Tax potential analysis: a literature review

The major challenges dealing in particular with the fight against poverty and the major needs for basic infrastructure in a context of sluggish international economic conditions are leading public authorities in developing countries to seek to increase their resources further. It is in this context that the question of assessing the tax potential has long been the subject of particular attention. The fiscal potential of an economy is the ratio of the tax revenue that an economy can generate if it uses all its resources and capacity to collect it (Alfirman, 2003). Thus, the gap between the fiscal potential and the tax revenue actually collected is the fiscal effort.

The assessment of tax revenues and the analysis of their determinants generally pose methodological problems. These methodological difficulties stem in part from the fact that a part of the tax revenue of the countries may be due to the implementation of economic policies while another part may be the result of the evolution of a set of structural factors characterizing country (Brun *et al.*, 2006). Faced with these difficulties, a solution proposed by Stosky & Worldermariam (1997) aims to evaluate the tax effort by isolating the effect of economic policy on tax mobilization; the difference between the actual level of fiscal resources and the structural level determined by a set of structural factors such as the level of development, the sectoral origin of income and the degree of monetarization of the economy is then used.

In the literature, the methods of assessing the fiscal potential found are based mainly on estimates based on panel data. This methodology was used by Brun, Chambas & Gurineau (2007) for two different samples; the former includes 121 developing and transition countries, while the latter only includes developing countries (99). They showed that the levy rate is higher than imports and the share of mining and oil exports is high. On the other hand, the share of agricultural production in total production tends to decrease the public levy. The impact of per capita income is also positive, but it is less robust than that of the other variables, since it is no longer significant in the sample comprising only DCs. Indeed, the exclusion of transition countries from the sample increases the weight of the countries of Latin America - the richest within this group and structurally less than the African countries.

Chambas & Brun (2010) used the same method for the case of Senegal. They found that GDP per capita lagged behind, the share of the agricultural sector in GDP and the share of mining exports in total exports negatively affect the fiscal potential, while the impact of the import rate on GDP and the share of oil exports in total exports is positive. The study also showed that Senegal's level of revenue collection is close to its potential.

In addition, the Gupta (2007) study of 105 developing countries has reached the same results as Chambas & Brun (2010) for the sign of the agricultural sector and the import rate on GDP. Moreover, the author has shown that certain structural factors such as GDP per capita, foreign aid have a positive effect on the ratio of government revenue. However, in most specifications, variables measuring political stability, corruption and those describing tax policy have no impact on the ratio of taxes to GDP. In addition, the study indicated that in several sub-Saharan African countries the level of revenue collection is above potential, unlike some Latin American countries where it is below potential.

Bird, Vasquez, & Torgler (2014) also attempted to extend the simple model of tax effort by showing that not only factors such as the relative share of the non-

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agricultural sector in the economy or the weight of imports and exports in GDP, but also that other parameters such as government efficiency, political stability, absence of violence, law enforcement and corruption control act positively on the level of revenue collected.

Senou (2014) analyzed Benin's fiscal potential using a stochastic frontier model. This method is similar to the first one except that it breaks down the error term into two independent components. The first error term is assumed to follow a normal centered law, while the second follows a strictly positive normal law. He showed that structural factors such as the degree of openness of the economy and real GDP per capita determine a tax burden that is still below the fiscal potential. This tax potential is not exploited optimally. In other words, Benin is unable to mobilize satisfactorily its potential for fiscal resources.

Diagne & Ba (2016) evaluated Senegal's fiscal potential from a stochastic efficiency frontier model, using a tax line approach. They showed that the margin of increase in tax revenue as a percentage of GDP was estimated at 2.8 points, representing a fiscal potential of 22.4% of GDP. In addition, VAT has the highest deviation from potential, ie 0.9 percentage points. On the other hand, the most efficient tax line corresponds to the customs duties on petroleum products for which the margin of increase is estimated at 0.1 percentage point.

### 4. Econometric analysis of the determinants of the fiscal potential in Morocco

Drawing on all of the above work, our approach is to explain the tax potential by taking into account effective tax revenue rates and the concept of tax effort.

#### 4.1. Measurement and evolution of the effective tax levy rate in Morocco

In order to make homogeneous comparisons over time or between countries, we use as an indicator of fiscal resources the rate of fiscal levy in relation to the gross domestic product. It is preferable to retain the gross domestic product (rather than the gross national product), which includes all income obtained domestically and therefore liable to be taxed, and which excludes transfers from migrant workers, for the most part not taxed (Brun *et al.*, 2006).

The series of GDP that we worked with is the last published by the HCP (2007 chained price). A retropolation<sup>1</sup> correction of the 1980 base series is necessary in order to complete the series over the 1990-2015 study period. The correction consists of calculating the GDP values before 2007, applying the following formula:

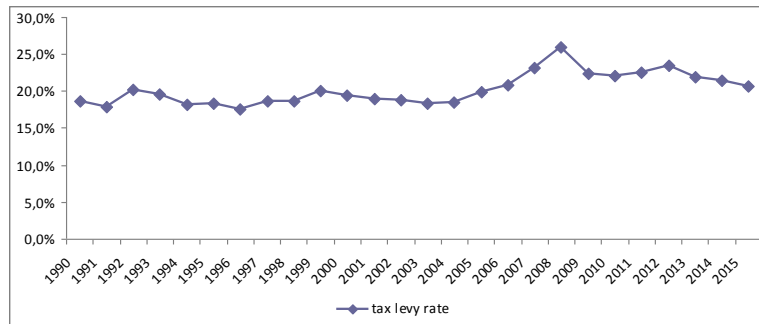
$$GDP_{07}^{t-1} = GDP_{07}^t * \left( \frac{GDP_{80}^{t-1}}{GDP_{80}^t} \right) \quad (1)$$

And for tax revenues we have relied on data published by the Ministry of Economy and Finance.

Graph 1 shows a trend increase in the tax levy rate. Over the period 1990-2015, the average rate is 20%. In 2008, a year of strong growth, tax revenues reached their typical value (26%) of GDP.

<sup>1</sup> The basic changes are to improve the national accounts and to better adapt to the needs of analysis. On the other hand, they have the disadvantage of causing breaks in the series of accounts. Nevertheless, in order to remedy this situation and to have homogeneous series long in time, the accounts of the past should be elaborated with reference to the new base year. The various procedures used to recalculate the old accounts are referred to as the "retropolation of national accounts" from previous bases on the basis currently in force.

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Graph 1. Evolution of the tax levy rate in Morocco (1990-2015)

Compared to many developing countries and despite relatively strong economic shocks (droughts, oil shocks), the tax burden in Morocco is characterized, during the period 1990-2015, by less instability, which is a favorable factor for good management of public finances.

### 4.2. Presentation of the structural factors of the fiscal potential

The tax potential or structural levy rate depends on the amount of income in the economy and the structure of that income or, more generally, the structure of the economy. These variables evolve slowly and can therefore be considered as "structural" factors. These factors can be grouped into several categories according to their nature. For each of these categories, we present the theoretical arguments suggesting an impact on the public levy and the expected relationships.

#### 4.2.1. Level of development and public levy

The most commonly used structural variable is the income level, measured by GDP per capita (PIBHAB), which is also an approximation of the level of development of the economy. It is reasonable to assume that the higher a country's level of development, the higher its capacity to raise resources (in proportion to its income). Several explanations can be put forward (Brun, Chambas, & Guérineau, 2007). On the demand side, the rise in the level of development leads to an increase and diversification of the demand for public goods that can reduce taxpayers' resistance to taxation (tax compliance). Among the higher goods (that is, whose demand increases more than proportionally to that of income), we find, in particular, health and education, which are to a large extent public goods. On the supply side, a rise in the level of development certainly increases the contributive capacity of the economy. In addition, the administrative capacity, especially with a view to raising taxes, is probably improving with the level of development, thanks in particular to the existence of economies of scale in the financial administrations and to a better environment (infrastructure of quality, qualification of government employees, level of education of the general population). A positive relationship is then expected.

#### 4.2.2. Product structure and public levy

For a given level of development, the fiscal potential is naturally different according to the characteristics of this economy. It depends in particular on the structure of production (agricultural sector, industrial sector, etc.), the degree of monetarization of the economy and trade openness (Stotsky & WoldeMariam, 1997). In fact, the different types of income are more or less easy to tax.

The agricultural sector is difficult to impose due to the predominance of subsistence activities and often dispersed production units with low unit production (Stotsky & WoldeMariam, 1997). The costs of implementing and controlling a tax on these activities would be very high and the expected gains low (Ghura, 1998; Brun, Chambas, & Guérineau, 2007). We can therefore anticipate a negative relationship between tax revenues and the share of agriculture in the economy (measured by the share of agricultural value added in GDP, VAAGR). On the other hand, industrial activities offer opportunities for tax revenue and we can therefore



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anticipate a positive relationship between the importance of industrial resources and the level of public resources. Their importance is measured by the share of industrial value added in GDP (VAIND). Economic transactions that do not result in a currency exchange are inherently more difficult to tax. We can therefore expect a positive relationship between the degree of monetarization of an economy (measured by the ratio between M2 aggregate and GDP, M2) and the capacity of the state to raise resources. The share of agricultural value added in GDP, the share of industrial value added in GDP and the degree of monetarization of the economy are also indicators of economic development, and these variables are generally correlated. Their simultaneous inclusion with GDP per capita captures the structural effects for a given level of GDP per capita (Brun, Chambas, & Guérineau, 2007).

Finally, the rate of levy is certainly influenced positively by the rate of trade opening (OUV) (Brun, Chambas, & Guérineau, 2007). In fact, income from international trade is a more taxable base than income or domestic consumption. In addition, an increase in the rate of openness of the economy generally leads to increased income volatility (Rodrik 1998; Brun, Chambas, & Guérineau, 2007). This can result in increased demand for taxpayer insurance resulting in higher availability to pay. Table 1 presents the description of the variables of the equation.

**Table 1. Variable Dictionary**

Variables	Definition	Formula/values	Data source
TAX	Tax levy rate	Log (Tax revenues/GDP)	WDI
PIBHAB	GDP Per capita	Log (GDP/capita)	WDI
VAAGR	Share of value added of the agricultural sector in the GDP	Log (agricultural VA/GDP)	WDI
VAIND	Share of value added of the industrial sector in the GDP	Log (industrial VA/GDP)	WDI
M2	Ratio M2 and GDP	Log (Aggregate M2/GDP)	WDI
OUV	Trade opening rate	Log((export+import)/GDP)	WDI

## 5. Analysis and discussion of the results of the estimates

Since the decomposition of actual resources, between potential component and effort component, is based on an econometric method based on econometric estimates, the sampling rate has been regressed only on its structural determinants. And for estimation purposes, and to avoid biased results, the introduction of logarithm to all variables allows us to homogenize the database, since all variables are in ratio and GDP per capita is in value. The sample of countries on which the assessment was made includes 25 countries<sup>2</sup> including Morocco. It brings together countries from Africa, Asia, South and North America and South-East Europe. The choice of the sample is also conditioned by the availability of the data. Some countries are competing countries and the others are leading countries in the category of emerging countries, so they are a reference in the medium and long term. For each country, observations are available for a period of 26 years (1990-2015). The data are organized, then, in the form of a country-years panel.

It should be noted that the results of the estimates presented in Table-2 are obtained using the Eviews econometric software (Appendix 1).

**Table 2. Results of the estimate of the fiscal potential**

Explanatory variables	Coefficients	t-student	p-value
Constant	1.651273	9.530145	0.0000
PIBHAB	0.015684	2.351247	0.1346
OUV	0.201853	6.168512	0.0000
VAAG	-0.074791	-2.561247	0.0152
VAIND	0.146921	4.466914	0.0000
M2	0.128019	4.997245	0.0000
R <sup>2</sup> = 0,66    R <sup>2</sup> adjusted= 0,63			

**Source:** Results of the econometric estimation.

<sup>2</sup> The sample includes: Algérie, Argentina, Arménia, Bénin, Bolivia, Burkina Faso, Chile, Colombia, République of Congo, Gabon, Guinea, India, Indonésia, Jordan, Malaysia, Mexico, Morocco, Pakistan, Paraguay, Philippines, Roumanian, Senegal, Sudan, Togo and Turkey.

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The results<sup>3</sup> show that the model is globally satisfactory. The student statistics are largely significant and the signs of the coefficients confirm the theoretical underpinning, explaining the impact of each structural variable introduced in the model on the tax potential.

According to the results, the income level is systematically included among the determinants of the sampling rate. It has a generally positive and significant impact. In other words, the tax rate increases by 0.01% if GDP per capita increases by 1%. Similarly, the degree of openness has a positive and significant effect on the tax rate. More specifically, a 1% increase in the opening rate results in a 0.2% increase in the tax levy rate. The share of the added industrial VA also has a positive and significant impact, the levy rate increases by 0.15% if this share increases by 1%.

The effect of the M2 share in GDP on the tax rate is also significantly positive. The importance of the degree of monetarization of the economy has the effect of stimulating the creation of taxable wealth.

On the other hand, our panel confirms the negative and significant impact on the tax levy rate of the importance of the agricultural sector. Agriculture, which is still largely in the informal sector, largely escapes taxation.

From the estimation results, we can deduce the fiscal potential, by replacing the coefficients obtained in the estimated equation, which is deducted from the effective tax rate to determine the tax effort.

The tax effort can be deduced as being the residue of the fiscal potential equation. Let "o" be the effective withdrawal rate, "s" the structural levy rate (or contributory capacity). We can then write:

$$O = S + \varepsilon \quad (2)$$

With "ε" the residual part remained unexplained by the structural factors:

$$\varepsilon = o - s \quad (3)$$

By construction, for all the countries in the sample selected, the average residue being zero; so the tax effort must be interpreted in a relative way. The reference standard (zero tax effort) corresponds to the average behavior of all the countries in the sample. In other words, a zero tax effort (zero residue) characterizes a country whose effectiveness of tax mobilization policy is in line with the average of the countries in the sample. A negative residual means that the country under consideration makes a lower than average tax effort and vice versa when the residual is positive. A situation of zero fiscal effort therefore signals, not a faulty fiscal policy, but a tax mobilization policy with an efficiency similar to the average of the panel.

As the interpretation of the tax effort is relative, the calculation of this tax effort for the whole of the country as well as its average is indispensable. Table-3 presents the result of this calculation.

**Table 3. Tax effort (on average) of different countries in the sample**

Countries	Calculated effort (on average)	effort /sapmle mean
Algéria	11,12	11,04
Argentina	3,44	3,36
Arménia	-2,72	-2,8
Bénin	-4,71	-4,79
Bolivia	5,76	5,68
Burkina. Faso	-2,2	-2,28
Chile	-0,41	-0,49

<sup>3</sup> Two estimation methods were applied: the fixed effects method and the random effects method. The one chosen according to the haussman tests has random effects, we accept H0 (random). In other words, some of the heterogeneity is part of the tax effort.

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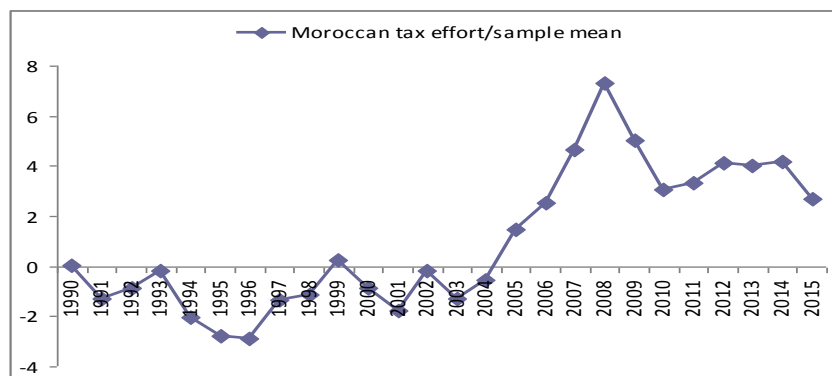
Countries	Calculated effort (on average)	effort /sapmle mean
Colombia	1,37	1,29
Republic of Congo	8,4	8,32
Gabon	3,65	3,57
Guinea	-6,11	-6,19
India	-3,86	-3,94
Indonésia	-7,35	-7,43
Jordan	6,39	6,31
Malaysia	-0,01	-0,09
Mexico	-2,57	-2,65
Morocco	1,06	0,98
Pakistan	-8,46	-8,54
Paraguay	-0,17	-0,25
Philippines	-4,8	-4,88
Roumania	8,6	8,52
Senegal	-0,11	-0,19
Sudan	-6,36	-6,44
Togo	-5,62	-5,7
Turkey	7,55	7,47
Average	0,08	0

**Source:** Author's calculation.

Countries that have a positive fiscal effort, including Morocco, have difficulty raising additional tax revenues, compared to the sample, while those with a negative fiscal effort have not exploited their space fiscal resources.

The evolution of the fiscal effort in Morocco (Graph-2), over the period 1990-2015, shows two important phases: Before 2005, the tax effort was negative (-1.12 on average). This means that the tax potential exceeds the effective levy level. The consequences of such an overrun on the economy are well known in terms of tax evasion and fraud, economic efficiency, loss of household welfare and poverty. Although the tax creates distortions in prices, it remains a means of regulation and public intervention.

On the other hand, since 2005, the year of tax reform, this effort has become positive (+3.86 on average). In other words, the reform has improved the mobilization of actual resources in relation to the fiscal potential. In this case, it can be said that Morocco has implemented effective economic policies, in comparison to the ones applied by the countries in the sample.



**Graph 2.** Evolution of Morocco's tax effort compared to the sample mean (1990 to 2015)

## 6. Conclusion

This article has examined the determinants of fiscal potential for a sample of countries including Morocco. The exercise required the estimation of a panel model (25 countries-26 years). The model explained the effect of the structure of the economy on the tax levy rate. The results showed the positive and significant impact of the level of development measured by GDP per capita, the degree of



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openness, the share of industrial VA and the degree of monetarization. However, the share of agricultural VA had a significant but negative impact.

The deduction of the tax effort, as being the difference between the actual tax rate and the tax potential, gave, in the case of Morocco, a negative effort before 2005 and then a positive one up to 2015. In other words, the country had a fiscal effort below the sample average, but the 2005 reform was able to reinforce the effective levy to a level that exceeded its potential. This means that the policies pursued have allowed efficient resource mobilization in comparison with the sample standard.

Improving tax resources both in terms of their level and their structure requires tax reform measures; in this area, a consensus has been established in recent years by Morocco. However, in view of the existing consensus, it seems appropriate to focus on the key points remaining in the debate such as the definition of institutions and a political economy favorable to reform, the degree of economic neutrality of VAT, the effectiveness of measures aimed at the taxation of unregistered activities, the desirability of taxation of agricultural activities, the rationalization of tax exemptions and benefits.

These various measures will have to be well accompanied by a stabilization of the macroeconomic framework in view of a sustainable progress of the level of public levy.

Strengthening domestic resource mobilization is not just about raising revenues: it also means designing a levy system that promotes cohesion and good governance, improving the capacity of governments to report on their decisions to the citizens and to promote social justice. The design and operation of the levy system, and in particular the dimensions of transparency, the fight against corruption and equity, are also decisive factors for the decisions of national and international investors as they constitute improving overall conditions that can attract more private investment.

**Appendix.**

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Dependent Variable: LOG(PPUB)  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 07/18/17 Time: 20:01  
 Sample: 1990 2015  
 Period included: 26  
 Cross-sections included: 25  
 Total panel (balanced) observations: 650

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Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PIB	0.000487	9.26E-05	5.266426	0.0000
OUV	0.041654	0.006903	6.034100	0.0000
X	0.559406	0.064020	8.737940	0.0000
M2	0.153618	0.060759	2.528307	0.0128
VA	-0.032143	0.010554	-3.045439	0.0029
C	12.70481	1.001946	12.68013	0.0000

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Effects Specification			
Cross-section random S.D. / Rho		7.29E-07	0.0000
Idiosyncratic random S.D. / Rho		1.878218	1.0000

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Weighted Statistics			
R-squared	0.330603	Mean dependent var	19.93637
Adjusted R-squared	0.302712	S.D. dependent var	3.587225
S.E. of regression	2.995469	Sum squared resid	1076.740
F-statistic	11.85318	Durbin-Watson stat	0.262156
Prob(F-statistic)	0.000000		

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Unweighted Statistics			
R-squared	0.330603	Mean dependent var	19.93637
Sum squared resid	1076.740	Durbin-Watson stat	0.262156

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