# Assessment of fiscal space in Morocco:
# An empirical analysis through the tax effort approach

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## Abstract

This paper approaches the question of assessing the Moroccan fiscal space in through the approach of the fiscal effort, this issue seems to be relevant in a context, as the Moroccan one, where taxation generates most of the budget's state resources. The tax effort is an important indicator, because it helps concomitantly to appreciate the ability to exploit tax resources, and to evaluate the ratio of government revenues comparing to the level of levy determined by the structural factors. To do this, we used a random-effect model during the 1990-2012, the main results: A positive tax effort reflects a level of taxation higher than the expected deduction taking into account the structural characteristics of the country. It can be deduced that the public revenue area is well exploited.

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# 1   Introduction

The structural adjustment policies adopted by many developing countries in from the 1980s did not yield satisfactory results in social and economic terms. Indeed, many imbalances still persist. The international community responded by setting a set of objectives called "Objectives Millennium Development Goals "(MDGs).

These highlight the issues of poverty and the exclusion of vulnerable populations, a summit was organized for this purpose in New York in 2000. Its aim is to adopt policies that reduce poverty by half on the horizon 2015.

Morocco is part of this project, a vast project of economic and social reforms in order to achieve the goals set by the community has been launched, but the results achieved in this respect are still below expectations, and hard work on the social and economic side remains to be done.

Moreover, it is worth remembering that poverty reduction and the fight against exclusion in all its forms require significant financial resources, the mobilization of these means is today at the center of attention.

Fiscal space is proving to be an effective instrument of economic policy, it is one of the fundraising fields needed to finance this important social project. Its exploration should reveal the effectiveness of policies to be followed in the future in achieving the MDGs. These must rely primarily on the resources produced by the internal components of the Moroccan fiscal space.

It is considered the margin that allows the government to allocate resources to the pursuit of a specific objective in a manner that conserve the viability of its financial position (CERDI, 2005).

The purpose of this article is to provide the results from an estimation of budget space in Morocco through an econometric model of panel data that tries to react to the possible problem: Does Morocco have a fiscal area not yet exploited?

## 2   Review of related literature

Literature constituted in this sense is very varied, but the research carried out seems to be classified in the light of the different macroeconomic effects of the enlargement of the budgetary space and their contingency (effect of varying intensity depending on the type of the economic system).

Based on various researches dated back to *Buiter (1985)* era, when a given government has the ability to generate sufficient and sustainable revenues to cover not only its day-to-day and forthcoming operations but to reimburse its national public debt as well, we safely conclude that the latter country is fiscally sustainable. *(see also Chalk and Hemming, 2000).*

Thus, a high volatility of budgetary resources leads to risk, which leaves public resources vulnerable. Baunsgaard and Keen, (2005) who highlighted the issue of the level of weak public resources developed this finding.

According to *Peter S. Heller (2007),* the importance of the fiscal space resides in the fact that it is a gauge for both the effectiveness of the tax and regulatory policies adopted and the extent of their impact on economic development and not in its so advertised use of detecting if additional resources for eventual

investments are possible.

In the context of the study about the enlargement of the fiscal space and the vulnerability of balanced public finances, *Emran and Stiglitz (2005)* have focused on the case of risk of strong tax distortions. Peter S. Heller (2007), treat On the other hand, and to stop the harmful consequences of the instability of the recipes. *Bleaney et alii., (1995)* have emphasized the care about the enlargement of the budgetary space of this observation.

Not only did *Ajay Tandon and Cheryl Cashin (2010),* invent a conceptual framework for assessing fiscal space for health but they developed a blueprint to follow in such assessments as well. Moreover, they tried to explain the impact of broader macroeconomic factors on government health expenditures.

According to *Joshua Aizenman and Yothin Jinjarak (2011)* a country's fiscal space is defined as the inverse of the tax years necessary to pay back the national public debt.

This research project attempts to identify the issue of macroeconomic effects of enlarged fiscal area. Also, if we notice the scarcity of empirical literature dealing with the issue in the Moroccan context, the *Z. Chorfi (1999)* study focusing on financing constraints and the weight of public spending to determine the margin of budgetary maneuver. *JF. Brun, G. Chambas and F. Mourji (2007)* treated the problematic assessment of Morocco's fiscal space via an econometric model Regarding our work, we will bring the effects of space in Morocco through the concept of fiscal effort.

This literature reveals important effects of the widening of the fiscal areas on the social side, but would it be better to increase fiscal resources without having bad social consequences (increased poverty, increased inequalities) and without

increasing economic distortions? This is one of the fundamental questions that arouses the interest given to the development of fiscal space.

## 3   Method of analysis

*Lotz and Morss*[4] *(1967)* introduced the concept of fiscal effort with a focus on the study of the international tax ratio, and they applied this problem empirically.

With $p$ the levy rate, $\hat{p}$ the structural levy rate and $\varepsilon$ the fiscal effort, one can write:

$$p = \hat{p} + \varepsilon \tag{1}$$

From there, we can evaluate the components of the public levy. On one hand, this levy is defined by the structural factors (tax potential or contributory capacity) and on the other hand, the fiscal effort resulting from economic policy.

The concept of fiscal effort makes it possible to calculate the countries exploitation of their public revenue. To reach this, it is necessary to differentiate between the share of public resources, which is defined by structural factors, and the part of public resources defined by the economic policy and the government actions in general *(Brun et al, 2006)*.

The levy rate of one economy $i$ at date $(t)$, $TPi, t$ is determined by both the fiscal potential of the economy $i$ on the date $(t)$, $(PFi, j)$ and by the tax effort granted $EFit$, which can be also determined in relation to the tax potential:

$$TP_{ij} = f\left(PF_{ij}, EF_{i,j}\right) = PF_{i,t} + EF_{i,t} \tag{2}$$

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[4] Lotz   J- R., and   Morrs E- R. (1967), «Measuring 'Tax Effort' in Developing Countries », IMF

The determination of the tax potential is made by structural characteristics of the savings, apprehended by variables $(X_{i,t}^j)$ on which policies influence slightly in

the short term. On the opposite, the tax effort depends, by definition, on factors that can be conditioned by government action. The different variables affecting the direct and indirect influence of the State are noted $(Z_{i,t}^k)$, There are two ways to

identify the tax effort and its determinants, of which help is a part.

A first method (in two steps) consists in identifying the factors of the rate of structural sampling and tax effort through two consecutive estimates. In a first step, the rate of levy is regressed only on its structural determinants:

$$X_{i,t}^j TP_{i,t} = \alpha + \Sigma \beta^j . X_{i,t}^j + \hat{\mu}_{i,t} b \tag{3}$$

The value of the levy rate predicted from the previous equation measures the potential tax. The tax effort is the residue $\mu_{i,t}$ of this equation:

$$EF_{i,t} = \lambda + \Sigma y^k . Z_{i,t}^k + v_{i,t} \tag{4}$$

By construction, the average of the residues $(\hat{\epsilon})$ for the entire sample being zero,

the tax effort must be interpreted in a relative way. The reference standard consists on an average behavior of the entire selected country-years panel. So, for a given country, a negative residual means that the country indicates a tax effort below the norm (and conversely when the residue is positive). Finally, if the residual is zero, the country makes a tax effort in accordance with the average of the sample: a faulty tax situation but a tax mobilization policy having an efficiency similar to the average.

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The second method consists in evaluating the effect of the fiscal potential and effort variables in a single equation (one-step method). This method will be used to test the power of the results obtained.

# 4 Data and Methodology

### 4.1 Sample of study

Our sample is made up of data relating to several countries and to an important stretch of time (Panel data of 10 countries for the period of 1990-2012). The model is estimated by Panel data.

Table 1: Evolution of the tax burden calculated according to rate (tax recipes/ GDB)

|            | 1990-1994 | 1995-1999 | 2000-2004 | 2005-2009 | 2010-2012 |
|------------|-----------|-----------|-----------|-----------|-----------|
| Algeria    | 26,77     | 28,53     | 30,98     | 34,75     | 35,92     |
| Bulgaria   | 18,45     | 16,95     | 18,54     | 23,84     | 19,25     |
| Egypt      | 16,79     | 16,56     | 13,90     | 15,23     | 13,77     |
| India      | 9,65      | 8,96      | 8,93      | 11,28     | 9,88      |
| Jordan     | 19,97     | 19,54     | 18,88     | 23,21     | 15,38     |
| **Morocco** | **22,16** | **20,75** | **19,67** | **23,75** | **23,90** |
| Pakistan   | 12,83     | 13,16     | 10,30     | 9,67      | 9,75      |
| Philippine | 15,15     | 16,07     | 12,98     | 13,85     | 12,47     |
| Thailand   | 16,180    | 15,250    | 14,300    | 16,64     | 16,68     |
| Tunisia    | 20,52     | 20,56     | 21,12     | 21,25     | 20,58     |
| Sample     | **17,85** | **17,63** | **16,96** | **19,35** | **19,29** |

We are therefore going to perform an estimate of generated tax resources subject from real rates of ordinary public resources. Our rule of decision is based on two hypotheses:

- H1 **:** A positive tax effort translates a level of the upper real sample in sample waited considering the structural characteristics of the country. They deduct that the fiscal space is exploited well in this country and that to clear additional Public revenues it would be necessary to implement policies of creation for public resources more active than those led by the sample.

- H2 **:** On the contrary, a tax effort close to zero means that the authorities of the country have adopted the policies of taxation to which the degree of effectiveness is close of medium level of the whole sample.

### 4.2 The choice of variables

The evolution of the potential taxation can be explained by many structural variables, among these variables, they find the level of development represented by two variables: the per capita GDB, and the part of the agricultural added value in the GDB. Then, the rate of trade openness, and the degree of monetization represented by aggregate M3. This information is drawn from different databases to name a few; the International Monetary Fund (IMF), World Bank, as well as database Chlem.

### 4.3. Estimate of the Fiscal Space

The econometric equation of the rate of deduction of tax can be represented in the following way:

$$pf = \beta1_{it} + \beta2_{it}pib + \beta3_{it}timp + \beta4_{it}vaag + \beta5_{it}expmp + \varepsilon_{it} \qquad (5)$$

With:

$pf_{struc}$:     rates of tax

$Per\ capita\ GDB$   :      per capita GDB

$timp$  :      rates of imports

$vaag_t$:       agricultural mark-up

$expmp_t$: Part of mining and oil export in complete export

These coefficients intervene expressly in term $\beta1_{it}$ in the following way:

$$\beta1_{it} = \beta1 + \alpha_i + \varepsilon_t \tag{6}$$

With β1 an independent constant of time and individual effect, αi represent the individual effect which can be fixed or unpredictable and ε (t) represent the temporal specific effect.

Analysis of parameter stability

Table 2: Results of the tests of stability

|  | Levin, Lin et Chu | | Im, Pesaran et Shin | |
|---|---|---|---|---|
|  | At the level of 5 % | In first difference estimator | At the level of 5 % | In first difference estimator |
| **rates of tax** | 0,433 | 0,000 | 0,766 | 0,000 |
| **Per capita GDB** | 0,098 | 0,000 | 0,871 | 0,000 |
| **rates of imports** | 0,187 | 0,000 | 0,444 | 0,000 |
| **agricultural mark-up** | 0,189 | 0,000 | 0,189 | 0,000 |
| **Part of mining and oil export in complete export** | 0,175 | 0,000 | 0,439 | 0,000 |

They point out after a first difference that our series are stationary and integrated of order (1), this is justified by the probabilities which are very less at the beginning of 5 %.

The co-integration tests

In our case and according to the likelihood mentioned on the exit of Eviews, the null hypothesis of co-integration hypothesis is rejected, and as a result, Co-integration of different variables is certified. The test is made on the basis of two hypotheses: the null hypothesis is that questions every Co-integration between

data that it is possible to nameH0, and an alternative hypothesis that certifies the existence of a long-term relation and as a result Cointegration (H1).

➢ Test of individual effects

Table 4: testing for individual effects

| Test that all null coefficients of individual effects: |
| --- |
| H0 : homogeneity of data:<br><br>F (9,176)=<u>83,950</u><br><br>Prob>F   = 0,0000 |

So, across the results of the performed test, they note that the statistics of Fisher are highly significant, which shows a presence of heterogeneity between the coefficients of the model.

➢ **Test Fixed effect against Random effect : Hausman Test**

The test of Hausman is one of the specification tests which allows to determine if the coefficients of both (fixed and unpredictable) estimates statistically differ.

The strategy of this test consists in comparing the matrix of variance-covariance of both estimator. The Result is a set of statistics which follow t (when N tends towards the infinite) a law of Khi-two to K-1 degree of freedom. The empirical statistics of this test are calculated by the following expression:

$$H = (\widehat{\bar\beta 1} - \widehat{\bar\beta 2})'[var(\widehat{\bar\beta 1} - \widehat{\bar\beta 2})']^{-1}(\widehat{\bar\beta 1} - \widehat{\bar\beta 2}) \qquad (7)$$

Table 4: result of Hausman test

| | (b) test | (B) | (b-B) difference | Sqrt(diag(V_b-V_B))S.E. |
|---|---|---|---|---|
| Per capita GDB | 0,01096 | 0,01565 | 0,04697 | 0,00000 |
| agricultural mark-up | -0,06145 | -0,06944 | -0,00799 | 0,00587 |
| Rates of imports | 0,12396 | 0,14010 | -0,01614 | 0,00802 |
| Part of mining and oil export in complete export | 0,07642 | 0,06770 | 0,00872 | 0,00780 |

b=consistent under Ho and Ha; obtained from xtreg
B= inconsistent under Ha, efficient under Ho, obtained from xtreg

| Hausman Test |
|---|
| Ho : difference in coefficients not systematic |
| Chi2 (4) = (b-B)'(V_b-V_B)'(-1)(b-B) <br> = 2,660 <br> Prob>ch2= 0,61630 |

For the considered sample, the statistics of the test of Hausman are 2, 66 given that the model includes four explicative variables (K=4), the statistics of the

Hausman Test follows a law X2 with two degrees of freedom. With a probability of 61 %more than 5 %, it is there fore possible to reject null hypothesis, which means that there is an random effect at the beginning of 5 %.

Table 5: Result of Random Effect Model

| Explicative variable | Coefficients | Std, Error | t-statistic | Prob |
|---|---|---|---|---|
| Constante | 2,2343 | 0,2360 | 9,4677 | 0,0000 |
| Per capita GDB | 0,0157 | 0,0139 | 1,1268 | 0,2613 |
| agricultural mark-up | -0,0694 | 0,0395 | -1,9589 | 0,0404 |
| Rates of imports | 0,1401 | 0,0430 | 3,2562 | 0,0013 |
| Part of mining and oil exportin complete export | 0,0677 | 0,0163 | 4,1445 | 0,0001 |
| $R^2$ : Within Between Overall | 0,1593 0,3528 0,5216 | Random effects u_i-Gaussian Wald khi2 (3)        =39,42 Prob>khi2                =0,000 | | |
| Effets aléatoires : **Morocco** Algeria Bulgaria Egypt India Jordan Pakistan Philippine Thaïland Tunisia | **0,237** 0,484 0,115 -0,162 -0,551 -0,070 -0,089 -0,085 -0,020 0,141 | | | |

►Analysis of individual effects on the potential tax revenues

The value of the constant (2,23) measures the medium value of the element of unpredictable error. The value of the Random effect of Morocco, for example, is (+0,24), which points out to how much the element of unpredictable error of Morocco differs from the medium value of the sample. An identical interpretation applies to the other elements of unpredictable effects.

So, they note that the most remarkable gap in comparison with the average of the sample, is recorded by Algeria (+0,48) exporter of oil, followed by Morocco (+0,24) and by Tunisia (+0,14). On the contrary the Asiatic countries of the sample recorded almost no gap.

By building of REM (Random Effect Model), the average of error for the whole sample being any, tax effort must be interpreted in a relating way. The reference norm is constituted by a medium behaviour of the whole panel discreet country-year: for a given country, a negative error means therefore that the considered country approves a lower tax effort in norm (the sample) and conversely when the error is positive.

So, given *ai* the Random effect relating to the country I, shown in the table of estimate tax effort by country is explained as follows:

$$\log(pf_{it)}) = 2,2343 + \alpha_i + 0,0157\log(pibt_{it})\,0,0694(vaag_{it}) +$$

$$0,1401\log(timp_{it}) + 0,0677\log(expmp_{it})$$

$$(8)$$

Based on this expression, the tax potential of the country is deducted on the basis that the real sample is cut out to determine the fiscal effort. As it is common in this type of study, they introduce results constituted by the averages of variables

calculated over five-year periods.

Table 6: Evolution of fiscal effort

|  | 1990 - 1994 | 1995- 1999 | 2000- 2004 | 2005- 2008 | 2009- 2012 | 2009- 2012 |
|---|---|---|---|---|---|---|
| **Morocco** **Potential** **taxation** **Real** **taxation** | 1,07 21,08 22,16 | -0,03 20,78 20,75 | -1,27 20,94 19,67 | 1,17 22,58 23,75 | 4,30 23,58 27,98 | 2,08 23,79 25,87 |
| **Algeria** | -2,68 | 0,14 | 1,55 | 4,06 | 15,44 | 10,76 |
| **Bulgaria** | 0,61 | -0,81 | -0,80 | 2,49 | 2,74 | 1,87 |
| **Egypt** | 0,30 | 0,59 | -0,90 | 0,16 | -0,28 | 0,21 |
| **India** | 0,76 | -0,40 | -0,99 | 0,41 | 1,30 | 2,04 |
| **Jordan** | 0,04 | -0,77 | -1,26 | 3,02 | -1,90 | 1,45 |
| **Pakistan** | 1,07 | 1,72 | -0,78 | -2,15 | -2,59 | 2,72 |
| **Philippine** | 0,64 | 1,63 | -1,16 | -1,23 | -0,72 | -0,33 |
| **Thaïland** | 1,40 | 0,39 | -1,57 | -0,13 | -0,38 | 1,17 |
| **Tunisia** | 0,03 | 0,34 | 0,36 | -0,63 | -0,26 | -0,98 |

A positive tax effort translates a level of real taxation more than the real taxation in the sample waited considering the structural characteristics of the country. They deduct from it that the fiscal space is exploited well in this country, and that to clear additional recipes, it would be necessary to implement mobilization policies of recipes more actively than those led by the sample.

On the contrary, a negative fiscal effort corresponds to a lower real taxation less than potential taxation in that waited considering the structural characteristics of the country. An additional space of recipes can indeed be cleared by adopting mobilization policies of revenues similar to that of other countries of the sample.

A stabilization of the fiscal effort close to zero means that the authorities of the country adopted politics of taxation to which the degree of effectiveness is close to the medium level of the whole sample. It means that the space of its tax resources is entirely exploited.
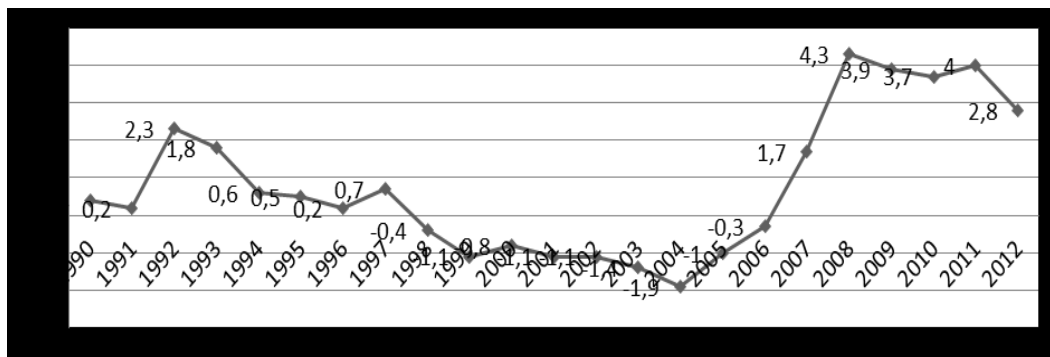


Figure1: the evolution of fiscal effort in Morocco

It is necessary to point out that an analysis led only from noticed public tax levy is not entirely satisfactory. as much as an important part of the level of tax revenues which depends on structural factors on whom the economic policy can not act in short term while there's idual part (tax effort) is determined of factors widely dependent on the economic policy. In other words, in order to discern if an additional space of recipes can be cleared in a specific country we assume to answer following question: how are the real tax revenues in comparison with the level of sample determined by the structural factors?

According to the tests of specification of individual effects, the model with

Random effects is preferred to that of fixed effects and common effects to explain the evolution of fiscal effort at the level of every country of the sample on one hand. The results of estimates allowed to conclude that the mobilization of potential taxation in Morocco, in last years, was real, and that the space of public recipes is exploited well. Also, our country even mobilised beyond its potential, on the other hand. As a result, the economic policy was favourable to tax mobilisation and allowed the levy of additional public resources. and so to exploit better the potential of resources, indeed, between 1998 and 2006, negative fiscal effort pointedouta space of public resources sub-exploited. So, the Tax reform initiated for the year 2005 encouraged the Moroccan authorities to implement politics of recipes similar to those led by the sample to clear additional recipes.

Our results converge on the analysis calling evaluation of real rate of tax burden on the basis of international comparison and also the concept of tax effort led to conclude in the absence of a significant additional space of tax resources. This conclusion is in harmony with the direction in favor of a stabilization of the rate of tax burden kept in the report«50 years of human development, 2025» in Morocco.

However, this conclusion could be rejected by an optimization at the level of all public finances, what opens the door to a true be in perspective of this research.

## 5    Conclusion

The opening up of the national economy to its international environment exposes it, just like all States, to the impact of the financial crisis on demand-side sectors which has led to a worsening of the current account deficit of the balance payments.

That's why the exploration of the possibilities offered by the Moroccan fiscal space is essential. It's about jugging the ability of government to reserve its public

resources area in a context of declining tariff resources.

To do this, we used a cylindrical panel econometric approach, based on an international comparison analysis between 10 developing countries.

From the specification tests of individual effects, we can say that the model of random effects is preferable to that of fixed effects and common effects to explain the evolution of the tax effort at the level of each country in the sample. The estimation results have led to the conclusion that the mobilization of the fiscal potential in Morocco, in the past years was effective and the public revenue area is well exploited and our country has even mobilized beyond its potential.

Indeed, between 1998 and 2006, the negative fiscal effort indicated an area of under-utilized public resources. Tax reform initiated since 2005 prompted the Moroccan authorities to implement policies of revenue mobilizations similar to that used by the sample to generate additional revenue.

This positive fiscal effort leads us to conclude that it is difficult to mobilize additional public resources. This is an assessment of the average of the panel taken as a reference. Thus, according to the criterion of the fiscal effort, it is induced that the public resource space of Morocco has been overexploited in recent years and therefore seeking additional development of the public resources area would be a necessary remedy to deal with the risk of excessive tax distortions.

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