THE IMPACT OF FISCAL POLICY ON ECONOMIC GROWTH: EMPIRICAL EVIDENC FROM PANEL ESTIMATION

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Abstract

The analysis of the correlation between budgetary revenues and economic growth through fiscal policy represents an important debated topic in the theoretical and empirical literature. This paper investigates the effect of the relationship between fiscal variables and economic growth in MENA countries using a Generalized Method of Moments (GMM) method as a dynamic panel data analysis over the 1980-2007 periods. The dynamic Panel Data result especially GMM-Sys establishes a long run relationship between fiscal policy and economic growth, the correlation pattern between the per-capita gross domestics and the categories of budgetary revenues reveals a link of positive causality between the economic growth and fiscal revenues. Furthermore, the effects of taxation are difficult to isolate empirically.

Keywords: *Economic growth, Fiscal policy, Panel Data, GMM. GMM-Diff, GMM-Sys*

Introduction

The relationship between fiscal policy and economic growth has long attentive economists. Unfortunately, the analysis of that correlation has disturbed empiricists for almost as long. As is well known, public policy neoclassical growth models consign the role of fiscal policy to one of determining the level of output rather than the long-run growth rate (Kneller, et al. 1999). Wide range of literature is available on the important role of fiscal policy in fastening economic growth. There are two schools of thought who explain the role of public policy but in two distinct ways; they are the neo-classical school and the Keynesians. (Nazir, etal.2013).

Many studies of the relationship between fiscal policy and economic growth were conducted before the relevant endogenous growth models developed, i.e. from the early 1980s. (Landau 1986; Hooppner (2003); perotti (2006); Amanja and Morrissey (2005); Falk, et al. (2006)). Government spending, tax revenues and budget deficits as fiscal policy variables have been used by these authors and found different responses of macroeconomic activities to fiscal policy. As stated byHoppner (2003), Castro, et al. (2006), shocks to government spending positively affect GDP growth rate, whereas shocks to taxes inversely affect GDP growth rate. Many researchers (Barro and Sala-i-Martin (1995); Kneller and Gemmell (1999); Odedokun (2001); and Bose, et al. (2003); Amanja and Morrissey (2005); Romero de Avila and Strauch (2007) have used fiscal policy variables in the growth equation and have found their significant contribution. Landau (1983) used cross-sectional data from 104 countries and found a negative relation between public consumption as share of GDP and growth per capita using Summers-Heston data, while Barro (1989) used data from 98 countries in the post-World War II period, he found that government consumption decrease per capita growth, while public investment does not affect growth.

Levine-Renelt (1992) found that most results from earlier studies on the relationship between long run growth and fiscal policy indicators are fragile to small changes in the conditioning set.Gemmell, et al.(2006) used panel data of OECD countries and found that in long run distortionary taxes and productive expenses have an adverse and positive impact on growth of OECD countries respectively. Romer (2007) by using narrative records assessed impact of taxation on economic movements to explore magnitude, timing and principal incentive for all chief post-war tax policy activities.Study found tax increase to be highly contractionary. Results were more significant.

In this paper we test specific predictions of recent public policy endogenous growth models such as Barro (1990) and Mendoza et al. (1997), paying careful attention to avoiding the source of bias just mentioned. Using the criteria proposed by these models to classify fiscal data, we examine the growth effects of fiscal policy for a panel of nine MENA countries(Algeria, Egypt, Jordan, Iran, Tunisia, Morocco, Bahrain, Oman, Kuwait) during 1980–2007. We find: - significant support for the predictions of Barro (1990) with respect to the effects of the structure of taxation and government expenditure on growth; - thatmis - specification of the government budget constraint leads to widely differing parameter estimates which, in previous studies, have been erroneous for non-robustness; and - our results are robust to several changes in data classification or regression specification. The remainder of the paper is structured as follows. In Section 2 we discusses our empirical methodology and results for our MENA sample, and Section 3 draws some conclusions.

Methodology

Model specification and data
In order to examine the impacts of fiscal policy on economic growth, we estimate the following equation:

$$Y_{it} - Y_{it-1} = \alpha_i + \delta Y_{it-1} + \beta X_{it} + \varepsilon_{it}$$

Where, Y_{it} , GDP per-capita, ε_{it} Error term, X_{it} Matrix of independent variables, $i(i = 1...N)$, $t(t = 1...T)$, α_i individual effect

The study will use the Fiscal policy variables divided according to economic theory, based on the different definitions for the classification of fiscal policy variables. Kneller (1999), Laura Obreja Brasoveanu (2008).Gross Domestic Product per-capita,(GDP $_{pcapita}$), GDP, Labor force (L_{force}), Taxes revenue (T_{arev}), Taxes trade (T_{axtrad}), Taxes goods and services (T_{axgood}), Taxes income ($T_{axincome}$). We will use as controle variables-Trade Openness (Open), Population (Pop), and Final consumption expenditure (FCEXP), and Final consumption government (FCEGG), capital stock (K). (A first approach of estimating the initial capital stock is based on HARBERGER (1978). This approach based on neoclassical growth theory and relies on the assumption that the economy under consideration is at its steady state. As a consequence of this assumption output grows at the same rate as the capital stock (See, e.g.,Mechael Berlemann and Jan-Erik Wesselhoft, 2012), andthe Stability ratio (Inst) we use the following equation in order to calculate the ratio of growth's stability

$$gy_{it} = \alpha_i + \beta_i t + \lambda y_{t-1} + \varepsilon_{it}$$

Where, gy_{it} is Real GDP growth, i individual (Country), t time (Trend).

Dynamic panel-data models

Much of the recent liturature on dynamic panel data estimation has focussed on providing optimal linear Generalised Methods of Moments (GMM) estimators under relatively weak auxiliary assumption about the exogeneity of the covariate processes and the properties of the heterogeneity and error term processes.

In simple dynamic panel models, it is well known that the usual fixed effects estimator is inconsistent when the time span is small (Nickell, 1981), as is the ordinary least squares (OLS) estimator based on first differences. In such cases, the instrumental variable (IV) estimator (Anderson and Hsiao, 1981) and generalized method of moments (GMM) estimator (Arellano and Bond, 1991) are both widely used. However, as noted by Blundell and Bond (1998), these estimators both suffer from a weak instrument problem when the dynamic panel autoregressive coefficient (ρ)approaches unity. When ρ=1, the moment conditions are completely irrelevant for the true parameter ρ, and the nature of the behaviour of the estimator depends on T.

WhenT is small, the estimators are asymptotically random, and when T is large the unweighted GMM estimator may be inconsistent and the efficient two step estimator (including the two-stage least squares estimator) may behave in a nonstandard manner. Some special cases of such situations are studied in Staiger and Stock (1997) and Stock and Wright (2000), among others, and Han and Phillips (2006), the latter in a general context that includes some panel cases.

Research Results

We used the Arellano – Bond Dynamic Panel GMM Estimatorsto identify theimpact of fiscal policy variables on economic growth:Methods to avoid these problems were developed in Arellano and Bover (1995), Blundell and Bond (1998), and more recently in Hsiao, Pesaran, and Tahmis- cioglu (2002). Arellano and Bover (1995) and Blundel and Bond (1998) propose a system GMM procedure that uses moment conditions based on the level equations together with the usual Arellano and Bond type orthogonality conditions. Hsiao et al. (2002).

The following model examines the impact of Fiscalpolicy on economic growth in a dataset of nine countries for 28 years (1980 – 2007). We used the first difference in order to correct the model from the countries' effect. See, e.g. Roodmar (2006).

$$\Delta y_{it} = \beta_1 \Delta y_{i,t-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it}$$

For the sake of argument we used the Tow-step Arellano Bond inspired from the Windier correction model based on Arellano Bond estimator in differences and we estimated the different models using the GMM techniques:
- The first model: Arellano Bond Simple (AB);
- The second model: Differences GMM model-1(Diff_GMM1)
- The third model: Differences GMM model-2 (Diff_GMM2);
- The fourth model: System GMM model (Sys_GMM);

Test of Sargan and Arellano Bond Test.
Before estimating these equations, we have to use the entire Test of Sargan and Arellano Bond Test.

Table 1: comparaison between the three GMM models

```
. estimates table AB Diff_GMM1 Diff_GMM2 Sys_GMM , star stats(N r2 r2_a)
```

Variable	AB	Diff_GMM1	Diff_GMM2	Sys_GMM
L.Capita	-.08493851***	-.08502131***	-.03031204	-.54805028***
L2.Capita				-.03594564***
lcgov	.09435518***	.09160176***	-.22173716	.05975123***
ltaxincome	-.04257932**	-.03238497**	-.15062652	.01245299*
lk1	.03495161	.03010778	.68502961	.02079708*
open	.03092874	.04843533	0	.0597042***
ltaxrev	.01967351	.02139986	.61004313	-.04589715***
ltaxgood	-.00335293	-.00748969	-.13161256	.01045968**
lpop	-.02343646	-.02920707	-.01700237	.0122816
inst	1.7048833***	1.6743404***	0	2.1228049***
llabor	-.00316884	.00313822	1.4414348	.02154032**
ltaxitrad	-.01392771	-.01700143	-.65664807	-.03091278***
_cons				-1.3977535***
N	233	233	233	233
r2				
r2_a				

```
                              legend: * p<0.05; ** p<0.01; *** p<0.001
```

In this table we used the Arelano-bond dynamic models to find the optimal model, that is used in estimation the correlation between growth and Fiscal policy' elements. Hence, the table shows parametres estimated using the different regression models. Accordingly the results showed a significant and positive relationship between variables, especialy in the first model (AB) and Sys_GMM model.

Using Sargan test to test the existence of the relationship between variales. on the other hand , applying the last model (Sys_GMM),after introducing a new variable (Inst) in order to attract the disequilibrume between and within individuals.

```
Sargan test of overidentifying restrictions
      H0: overidentifying restrictions are valid

      chi2(221)    = 456.3824
      Prob > chi2  = 0.0000
```

In addition to Hansen test which is more precise than Sargan test used in second model to check the determination conditions of moments, and the first dgree differences are statistically accepted. The following table summaries the most important models of this study.

Estimation of different models

As explained before, we will analyse just the model of best economic explanation of the growth, and deeply analyse the impact of fiscal variables on the economic growth path in the long run, which cames very surprising due to the small size of our sample, which push as to use GMM with some technical reserve. The results of the study are presented in table

Table 2: Estimation of different models

```
. esttab,r2 ar2 se scalar(rmse)
_____
                     (1)           (2)           (3)           (4)
                   Capita        Capita        Capita        Capita              Cap
_____
L.Capita         -0.548***     -0.110***     -0.546***     -0.452***     -0.555***
                  (0.0241)      (0.0126)      (0.0241)      (0.0427)      (0.0245)

L2.Capita        -0.0359***                  -0.0597***    -0.0597***    -0.0341***
                  (0.00499)                   (0.00492)     (0.00866)     (0.00495)

lcgov             0.0598***     0.0733***     0.0645***     0.0398*       0.0529***
                  (0.00945)     (0.0171)      (0.00892)     (0.0160)      (0.00846)

ltaxincome        0.0125*       0.0103        0.0112*       0.00350       0.0127*
                  (0.00560)     (0.0104)      (0.00544)     (0.00974)     (0.00553)

lk1               0.0208*      -0.00378       0.0190*       0.0615***     0.0300***
                  (0.00812)     (0.0150)      (0.00802)     (0.0140)      (0.00755)

open              0.0597***     0.0823**      0.0554***     0.0304
                  (0.0159)      (0.0293)      (0.0153)      (0.0275)

ltaxrev          -0.0459***    -0.0274**     -0.0436***    -0.0331***    -0.0466***
                  (0.00504)     (0.00916)     (0.00445)     (0.00794)     (0.00446)

ltaxgood          0.0105**      0.00542       0.0129***     0.00369       0.0127***
                  (0.00385)     (0.00705)     (0.00319)     (0.00568)     (0.00326)

lpop              0.0123        0.00707
                  (0.0112)      (0.0204)

inst              2.123***      1.804***      2.113***                    2.087***
                  (0.0876)      (0.150)       (0.0879)                    (0.0893)

llabor            0.0215**      0.0171        0.0257***    -0.0000529     0.0186**
                  (0.00751)     (0.0140)      (0.00633)     (0.0112)      (0.00612)

ltaxitrad        -0.0309***    -0.0205*      -0.0301***     0.00772      -0.0296***
                  (0.00555)     (0.0103)      (0.00558)     (0.00963)     (0.00568)

_cons            -1.398***     -1.449***     -1.418***     -2.037***     -1.232***
                  (0.153)       (0.281)       (0.156)       (0.278)       (0.149)
_____
N                   233           242           233           233           233
R-sq
adj. R-sq
rmse
_____
Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
```

Estimation Model Results Using Gmm

The model shows the existence of a relationship between variables of buget and the fiscal policy for the sample of the study that contain the countries of middle east and North Africa from one side and the path of economic growth represented by per capita gross domestic product. There is a significant relatioship between all vriables and the dependant variable, some with minus sign and others with plus sign apear in the results of different techniques.

The minus sign of first and second degree of lags of the variable (L.capita) is an expected sign because of the laged variables introduced in the model as independent variables. Classical sources of growth represented by capital stock(LK1) and labor (Llabor) have positive effect and they are very significant, therefore, these tow variables are from the most important factors of stimulating the growth (this may be a result to the movement of labor between sectors especially in the middle east).

Fiscal policy variables were mixed in theory and stimulating in terms of empirical analysis. Wiothrefernce to theories, fiscal policy variables have positive effect on the economic growth, which is reflected by the results of estimation of the model.

Table 3: Estimation Model Results Using GMM

```
. xtdpdsys Capita lcgov ltaxincome lk1 open ltaxrev ltaxgood lpop inst llabor ltaxitrad, l

System dynamic panel-data estimation          Number of obs       =233
Group variable:country                         Number of groups    =    9
Time variable:year
                                               Obs per group:    min = 25
                                                                 25.88889
                                                                 max = 26

Number of instruments = 234                    Wald chi2(12)       = 1185.90
                                                    Prob > chi2        0.0000
One-step results
_____
      Capita |     Coef.    Std. Err.     z     P>|z|     [95% Conf. Interval]
_____|_____
      Capita |
         L1. | -.5480503    .0241274   -22.71   0.000    -.5953391   -.5007614
         L2. | -.0359456    .004992     -7.20   0.000    -.0457298   -.0261615
       lcgov |  .0597512    .0094477     6.32   0.000     .0412342    .0782683
  ltaxincome |  .012453     .0055988     2.22   0.026     .0014795    .0234264
         lk1 |  .0207971    .0081201     2.56   0.010     .004882     .0367121
        open |  .0597042    .0159287     3.75   0.000     .0284846    .0909238
     ltaxrev | -.0458971    .0050359    -9.11   0.000    -.0557674   -.0360269
    ltaxgood |  .0104597    .0038543     2.71   0.007     .0029054    .0180139
        lpop |  .0122816    .0111868     1.10   0.272    -.0096441    .0342073
        inst |  2.122805    .0876005    24.23   0.000     1.951111    2.294499
      llabor |  .0215403    .0075057     2.87   0.004     .0068295    .0362512
   ltaxitrad | -.0309128    .0055549    -5.56   0.000    -.0418002   -.0200254
       _cons | -1.397753    .1534735    -9.11   0.000    -1.698556   -1.096951
_____
Instruments for differenced equation
        GMM-type L(2/.).Capita
        Standard D.lcgov D.ltaxincome D.lk1 D.open D.ltaxrev D.ltaxgood D.lpop D.inst D.llabor D.lt
Instruments for level equation
        GMM-type LD.Capita
        Standard _cons
.
. estimates store  Sys_GMM
```

Variable (Taxincime) has a significant positive effect; an increase of 1% in income taxes is expected to increase per capita gross domestic product by 1.24%, in spite of the variable is considered as Distortionary taxation. See Barro-Sala, Martin (1995) and Kneller (1999). The significant positive effect of the variable (Taxrev) is in harmouny with the economic theory. However, the other results of the fiscal policy variables that is introduced in the analysis on the basis of the classification of the world bank (Tax good) (Taxitrad), are not stimulating, because they have significant negative effect keep discussing open about the problematic of economic growth, and that it has not been decided yet what are the appropriate mechanisms to explain the levels of growth in the long run, specially the modern models of economic growth.

The positive significance of variable (Lcgov) confirms again that government spending which represente the public sector has a positive efect on economic growth, inspite of differeces about this issu in theory and empirical studies. Trade openness (Open) has a significant positive parameter which confirms that opening policies of this countries, North africa countries know a huge movment in their imports and exports in the last period. Moreover, Internationl trade in middle East countries enormously increased, the last variable (Inst) was introduced after calculating it from the data of the rate of growth of GDP for successive periods in order to controle the economic's stability, it a pears from the results the existance of a relationship between trade openness and this variable (Inst) which improve the indicators of the model when this variable moves, and it has an effect on fiscal policy variables. See Lioune (2006).

Generally, the impact of the fiscal policy on the economic growth is clear in this case inspite of alteration between the different tools of monetary policy, and government intervention in the economy. The empirical study shows that the debate about the problimatic of economic growth still open. Statistically, the probabilty of the existance of disturbances between variables ant its instability in some cases, which can be considred as apart of the empirical analysis of the problem. The heteroginty of the countires of the study and the small number of them (9 countries) can leads to big bias in the results. These results contribute in the explanation of economic growthof the coutires of the sample, and what can have an effect on it during the determination of the macroeconomic policies.

On the basis of this we will test the different models by testing the effect of different variables on the stability of economic growth for these countries as dependent variable. As an attest to understand the problimatic of economic growth and the effect of the different economic policies on stimulating it, we pass to an other part of the empirical analysis which is based on the theoritical framework, by employing other techniques to substantiate the economic analysis from one side and to confirm the results obtained in the first part from other side.
The expected results of the effect of fiscal policy variables on the stability of economic growth is summarised in the table (4).

Estimation models DIFF_ GMM.
The estimated models shows results very close to the results obtained in the explanation of the economic growth (in the previous models , the dependent variable was per capita gross domestic product), significant positive parameters for fiscal policy variables (Taxrev) and (Taxitrad), and significant negative for (Taxgood) and (Taxincome) which is in harmony with the economic theory. However, the variable of government spending (Lcgov) has a non significant negative effect on the stability of the economic growth. The trade openness has a significant positive effect on the economic growth thus the policy of trade openness is very important for the stability of the economic growth.

Generally the effect of the fiscal policy in North Africa countries and Middle East on the economic growth and its stability, shows the importance of the used variables in the different models. The volume of the public sector still an important part in the determination of macroeconomic policies, the attempt of the government to analyse this policy can leads to stabilise the levels of economic growth in the long term.

The formulation of the buget for these countries is different due to the differences in the nature of the policy followed in each sector, which can lead to complementary in economic activity, specially policies of bilateral opening between countries, and without focusing on any country because the purpose is macro analysis and the effect of the fiscal policy that can be a tool in the hand of govenments to stimulate the economic growth in its different levels.

Table 3: Estimation Models DIFF_GMM.

```
. esttab,r2 ar2 se scalar(rmse)
```

	(1) inst	(2) inst	(3) inst
L.inst	-0.0000327* (0.0000161)	-0.0000328* (0.0000161)	-0.0000328* (0.0000161)
lcgov	-0.00815 (0.00737)	-0.00842 (0.00723)	-0.00859 (0.00707)
ltaxincome	-0.000704 (0.00471)	-0.000551 (0.00464)	
lk1	0.0267*** (0.00592)	0.0270*** (0.00570)	0.0269*** (0.00563)
open	-0.0310* (0.0122)	-0.0313** (0.0121)	-0.0314** (0.0120)
ltaxrev	0.0150** (0.00582)	0.0149** (0.00574)	0.0144** (0.00463)
ltaxgood	-0.00132 (0.00297)	-0.00147 (0.00286)	-0.00163 (0.00255)
lpop	-0.0526** (0.0180)	-0.0506*** (0.0146)	-0.0503*** (0.0143)
llabor	0.00113 (0.00599)		
ltaxitrad	0.00616 (0.00367)	0.00619 (0.00367)	0.00625 (0.00363)
N	232	232	232
R-sq			
adj. R-sq			
rmse			

```
Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
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Conclusion & Suggestions

In this study, we attempted to determine the key factors leading to economic growth for MENA countries over the period 1980–2007.

Our goal was to find out whether the experiences of the countries under investigation provide us with some new evidence concerning the recently heated debate in particular; we sought to clarify whether the growth of MENA countries was driven mainly by factor accumulation or by improvements in efficiency.

Generally the effect of the fiscal policy in North Africa countries and middle east on the economic growth and its stability, shows the importance of the used variables in the different models. The volume of the public sector still an important part in the determination of macroeconomic policies, the attempt of the government to analyse this policy can leads to stabilise the levels of economic growth in the long term.

The formulation of the buget for these countries is different due to the differences in the nature of the policy followed in each sector,which can lead to complementary in economic activity, specially policies of bilateral opening between countries, and without focusing on any country because the purpose is macro analysis and the effect of the fiscal policy that can be a tool in the hand of govenments to stimulate the economic growth in its different levels.

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