

Public spending efficiency, governance, political and economic policies: Is there a substantial causal relation? Evidence from selected MENA countries

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Abstract

In this paper, we seek first a robust methodology for estimation of the relative public spending efficiency of eleven Middle East and North African (MENA) countries over the period 1996-2011. Using the non-parametric Data Envelopment Analysis (DEA), we estimate relative efficiency scores for four main disaggregated accounts of public spending that are administration, health, education and infrastructure. In the second part of the paper, the Tobit regression model is used to determine the impact of governance, political and economic factors on public spending efficiency. The results show mainly that Jordan is the most efficient in public spending on administration, education and health and Tunisia on infrastructure. While Libya, Algeria and Yemen are relatively less efficient in public spending on administration and health. Moreover, the results indicate that political stability, trade freedom and economic growth have a positive effect on public spending efficiency. Nevertheless, Voice and accountability affect negatively such efficiency.

Keywords: *Public spending efficiency; governance; political and economic policies; DEA; MENA region*

1. Introduction

Recently, public spending has received considerable attention from governments, taxpayers and scholars as well as international organizations (World Bank, International Monetary Fund...) due to its critical implications for a country's development. Though, the concern about the role of government has been shifted towards empirical estimations of the efficiency and performance of various public sector activities [1]. In the context of globalization, more transparent and efficient public spending practices are required from the government, to assure a more equitable allocation of resources and to relieve the pressure on these resources.

It has been widely recognized, that public spending efficiency defined as the ability of the government to maximize its economic activities or to minimize their expenditures given a level of expenditure, is a main requisite for a country's economic performance. That's why in developing and low income countries as well as developed ones, governments should spend the money collected from taxpayers more efficiently, as it is accountable to its citizens. In this regard, governmental practices in some MENA countries, particularly in the Arab Spring countries (Tunisia, Libya, Egypt, and Yemen) have begun to receive considerable interest from politicians, foreign and local investors. Realizing the importance of how public revenues

are spent, all seek a more transparent and efficient government spending practices which play undoubtedly a key role in a country's economic development and stability [2, 3].

In economic theory, public spending is considered as a substantial engine of economic growth and human development. Lucas[4] suggests, for example, that public spending in education raises the level of human capital, which contributes considerably to a knowledge-based economy. More widely, Zagler and Dürnecke[5] point out that fiscal policy instruments such as public spending on education, infrastructure, research and development, and health have long-run impact on the economy.

In the current paper, we attempt to assess firstly the public spending efficiency of selected MENA countries and in the second stage, analyze the impact of governance, political and economic policies on public expenditure efficiency across these countries. Our main contribution in this study is the investigation of different types of public expenditure at the same time, unlike ancient researches limited only to some types of expenditure separately. These studies focus, principally, as noticed by Haque and Osborn[6], on a set of developed countries or a combination of both developed and developing countries. So, interpretations and findings of such studies cannot be simply expanded to case of developing countries, since the composition of government expenditures and priority in economic objectives between those heterogeneous countries are so different. For this reason, in our study we have selected only developing countries from the MENA region; some of them have experienced recently very important political changes. That's why, in this study, we aim to examine more deeply the impact of such political and economic changes on public spending efficiency.

The main objective of this paper is thus twofold, to measure public spending efficiency in selected MENA countries in order to do cross-country comparisons and to assess the impact of governance, political and economic stability on such efficiency in these countries. Thus, the main questions addressed here are: i) How to identify the efficiency of public spending? ii) How to assess such efficiency? iii) What are the main drivers of this efficiency? And how efficiency may be affected by the political and economic stability of a country? The focus of this study is then not on how to reduce public expenditures, but rather more on increasing the efficiency and effectiveness of each unit of money spent by the government.

The remainder of the paper proceeds emerges along the following lines: the following section is devoted to a brief literature review; section 3 describes the methodology and the data used for the public spending efficiency estimates. Section 4 presents the main results of efficiency estimates and discussions. Finally, Section 5 concludes with some political recommendations for the selected MENA countries.

2. Literature review

It's recognized that in public finance literature, public sector spending on infrastructure, consumption, social welfare, education or redistribution improves mainly economic growth and overcomes the phase of recession in an economy. Indeed, efficient public expenditures imply a rise in human capital, which improves the research, development and innovation activity [1,5]. Besides, regular enhancement of such research and innovation activity is essential for a country to maintain its competitiveness. Public spending, principally on education, raises human capital and therefore brings technological advancement, which in turn implies efficiency in the whole economy.

Measurement of public spending efficiency and investigation of its driving factors has acquired great importance in the literature [7,1,8,6,9,10,11,12]. The majority of these studies concentrate on public spending efficiency in education, social welfare, civil justice, investment, economic stability, and economic efficiency. One of the main findings of these studies is the broad dispersion in public spending performance within and across considered countries. Besides Afonso, Sckuknecht and Tanzi [1] and Afonso and Fernandes [8] argue

that per-capita income and education levels affect significantly government spending efficiency. These findings are supported by Borger and Kerstens [7] and Rayp and Sijpe [9].

Some studies illustrate that the public spending efficiency depends on the size of the public sector. Indeed, Afonso, Sckuknecht and Tanzi [1] argue that countries with a small public sector may appear to be more efficient. This finding is confirmed by Becker [10] who shows that countries with obvious and citizen-friendly regulatory environments are relatively efficient in their public spending. Feeny and Rogers [11] support these results in their study on public spending efficiency in small island developing countries (SIDS) and Sub-Saharan African countries. They found that governance and literacy are one of the main determinants of public sector efficiency. In the case of low and lower middle income countries, Rayp and Sijpe [9] found, moreover, that development subsidy, less civil liberty, and good governance contribute all to enhance the efficiency of government expenditure. This finding is maintained by Adam, Delis and Kammas [13] in their analysis of some OECD countries during the period 1980 to 2000. They prove that the quality of governance is more essential than socioeconomic environment in affecting government spending efficiency. In addition, the findings of these studies show that states that are efficient in their government spending are characterized by citizen-friendly regulatory environments, strong transparency, regulatory practices, cost effectiveness, and public spending directly associated with policy objectives. In this regard, Angelopoulos et al. [12] found, in their study on public sector efficiency in both developed and developing countries, that government efficiency chiefly depends on the investment and the openness of the economy.

Gupta and Verhoeven [14] found that public spending on education in Africa affects positively the efficiency level of public expenditures. Fenny and Rogers [11] found similarly that literacy and school enrolment are the main determinants of public sector efficiency in small island developing nations. Further studies of public spending efficiency have also been done at the local government level [7,8,15].

Although the importance of public spending efficiency as shown above, there are very few studies on this subject in the MENA region. The majority of studies from the literature has been founded on either developed countries or developing countries outside the MENA region. That's why, this study aimed to analyze public spending and the effect of governance, political and economic factors on public spending efficiency is devoted entirely to some countries from the MENA region.

3. Methodology and data

The current study uses panel data from developing MENA countries (Algeria, Libya, Djibouti, Morocco, Egypt Arab Rep, Syrian Arab Republic, Iran, Tunisia, Iraq, Jordan, and Yemen Rep.) for the period 1996-2011. The countries were chosen so as to compare the performance of Arab Spring countries with that of others developing ones. Data on different measures of inputs and outputs employed in the first-stage to estimate public expenditure efficiency were acquired principally from World Bank, while data on political stability, voice and accountability, civil liberty, money growth, trade freedom, and financial freedom - used to investigate the effects of such factors on public spending efficiency - are obtained from Kaufmann, Kraay, and Mastruzzi [16].

The calculation of efficiency ratios is founded basically on the part of the observed output level to the maximum level that could have been acquired from a given input level. This maximum level is considered as the efficient frontier that will be the benchmark for assessing the relative efficiency of public spending. In public spending literature, there are so different techniques to estimate this frontier [17]. In our study, to estimate the ratio of efficiency for each sector, we use Data Envelopment Analysis (DEA) method based on Banker, Charnes and Cooper [18]. This method, widely used, is a non-parametric linear programming-based

technique that allows assessing the relative efficiency, founded on efficient production frontiers [19]. On the frontier, we find the most efficient countries, while below, countries are considered to be inefficient. We use, too, the output-oriented variable return to scale (VRS) model assuming that the government maximizes output in each economic sector given an unchanging amount of spending as follows.

$$\begin{aligned} & \max \phi \\ & \text{subject to} \\ & \sum_{j=1}^n \lambda_j x_{ij} \leq x_{ih} \quad i = 1, \dots, m \\ & \sum_{j=1}^n \lambda_j y_{fj} \leq \phi y_{fh} \quad f = 1, \dots, s \\ & \sum_{j=1}^n \lambda_j = 1 \\ & \lambda_j \geq 0 \quad j = 1, \dots, n \end{aligned}$$

The method DEA based on empirical data containing inputs and outputs of a number of entities called Decision Making Units (DMUs). where x_{ih} and y_{fh} are the i_{th} input and h_{th} output. λ_j is an unknown weight, where $j = 1, 2, \dots, n$ that represents the number of DMUs. The optimal value of ϕ^* represents distance of the sector from the efficient frontier. Hence, the most technically efficient country will have $\phi^* = 1$ and the inefficient country exhibits $\phi^* < 1$. The VRS model is a better representation of efficiency analysis with the assumption that output levels cannot be reduced proportionately to the levels of input. By solving the above mathematical programming problem, we are able to get public spending efficiency scores for each country's sector in each year for the period 1996-2011.

Now, it is important to define properly the inputs and outputs to measure efficiency. Similarly to Afonso, Skuknecht and Tanzi [1], we divide public spending on administration, health, education and infrastructure as shown in Table 1. They are used to reflect the quality of interaction between fiscal policies and market processes. According to Feehan and Matsumoto [20] expenditures on public infrastructure facilitates the private production and growth as well as reduction of the transportation costs of private firms. Also, the spending on education can help to increase the share of knowledge and qualified workers in the economy, which contributes to economic growth. In addition, Devarajan, Swaroop and Zou [21] emphasized the importance of government spending on health, which reduces illness, and increases the quantity of labor as well as its productivity in a country's economy.

Table 1 Inputs and outputs of public spending by sector.

	Inputs		Outputs
Administration	Government expenditure on Administration		<ul style="list-style-type: none"> • Corruption in government • Regulatory quality • Government effectiveness
Health	Government expenditure on health		<ul style="list-style-type: none"> • Infant mortality rate • Life expectancy at birth
Education	Government expenditure on education		<ul style="list-style-type: none"> • Secondary school enrollment • Adult literacy rate
Infrastructure	Government expenditure on economic affairs		<ul style="list-style-type: none"> • Electricity power transmission • Standard telephone lines per 100 inhabitants

After the estimation of efficiency scores and comparison between considered countries, we investigate the impacts of three factors governance, political, and economic policies on the efficiency of each sector's public expenditure. To assess these impacts we estimate a regression where the efficiency score is considered as the dependent variable of the model. Given that efficiency scores are ranging between 0 and 1, we estimate a Tobit regression model based on panel data.

The equation of the model is as follows:

$$Eff_{it} = \alpha + \beta_1 PS_{it} + \beta_2 VA_{it} + \beta_3 demo_{it} + \beta_4 trade_{it} + \beta_5 M_{it} + \beta_6 gdp_{it} + \varepsilon_{it}$$

where:

Eff: The efficiency score,

PS: the political stability variable; It reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism [22]. A higher value of political stability indicates less political risk of a country. This situation can increase the efficiency of public spending. Following Rayp and Sijpe [9], good governance allows the intensification of rule of law and maintain a political stability, which results in higher efficiency of the government spending. While, a lower value of political stability implies a higher inefficiency of public spending.

VA: the voice and accountability variable; it reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media [17]. A higher index of VA shows that people are in a situation to choose their own government. In this case the government is relatively more alert in their spending, which leads to higher efficiency of public spending.

Demo: This variable measures the democracy proxy of the political situation in a country i at time t . The democracy indicates that people exercises freedom of speech, which might increase the efficiency level of the government.

Trade: This variable is used to measure the economic openness and the trade freedom of a country i at time t . A higher value of trade contributes to a more efficiency of public spending [22].

M: is the money growth variable use as a proxy of government monetary policy. Rayp and Sijpe [9] shows that higher monetary growth implies less budgetary constraints, and therefore the government might be complacent in controlling its spending, resulting in a lower efficiency level.

gdp: gross domestic product per capita

ε :residual term of a country i at time j

4. Results and Discussions

4.1. Efficiency estimates

Table 2 presents the average technical efficiency scores of country's for the period 1996 to 2011. The results shown in the former table illustrates that Jordan is relatively the more efficient in public spending on administration, education and health. While Tunisia is the most efficient in public spending on infrastructure with an efficiency score of 95%, followed by

Jordan and Morocco with efficiency scores of 85% and 84%, respectively. Libya, Algeria and Yemen are relatively less efficient in public spending.

Table 2 Average efficiency scores of MENA countries (1996-2011)

	Administration	Health	Education	Infrastructure
Algeria	0.35	0.33	0.54	0.53
Libya	0.25	0.25	0.42	0.15
Djibouti	0.56	0.65	0.71	0.45
Morocco	0.78	0.89	0.89	0.84
Egypt Arab Rep	0.77	0.92	0.88	0.82
Syrian Arab Republic	0.65	0.78	0.87	0.78
Iran,	0.70	0.65	0.67	0.70
Tunisia	0.74	0.75	0.78	0.95
Jordan	0.84	0.97	0.92	0.85
Yemen Rep	0.44	0.66	0.75	0.42

Figures 1 and 2 presents the statistics of government expenditure on education as a percentage of GDP and the secondary school enrollment for the selected MENA countries during the same period 1996 to 2011. These figures illustrate that Djibouti spends the highest percentage of government expenditures on education, but it presents a lower level of secondary enrollment education. In Jordan and Tunisia secondary enrolment education are high and a considerable amount is spent on education.

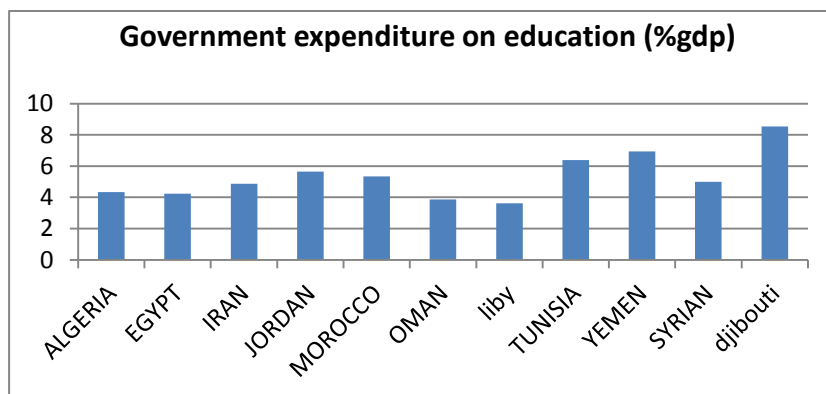


Figure 1: Government expenditures on education

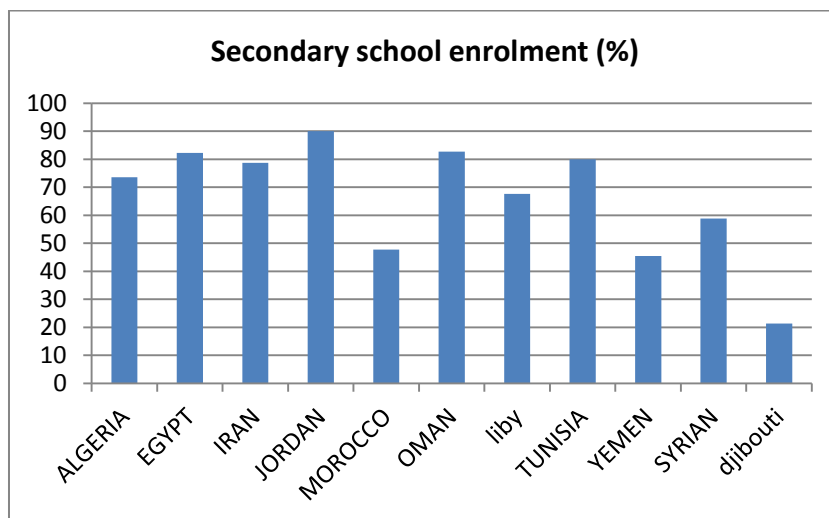


Figure 2: Secondary school enrolment

While the Figures 3 and 4 show clearly that Jordan spend the highest percentage of government expenditures on health and it presents the higher life expectancy at birth in the MENA region. However, Djibouti spends a significant amount on health, but it has a lower life expectancy at birth.

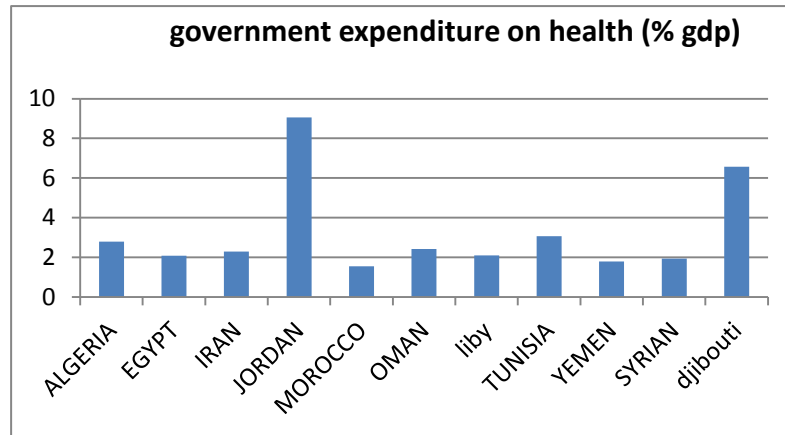


Figure 3: Government expenditure on health

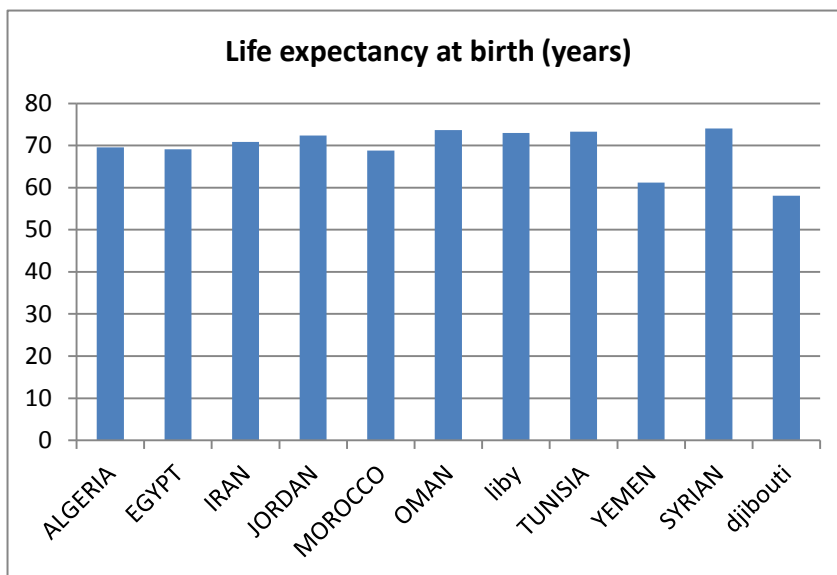


Figure 4: Life expectancy at birth

Table 3 Descriptive Statistics

Variables	VA		SP		Democ		Trade		M		GDP	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Algeria	-1.09	0.17	-1.47	0.32	-5	2.58	63.18	9.09	17.13	9.4	2.02	1.84
Libya	-1.72	0.16	-0.13	0.69	-7	0	72.65	24.25	13.33	14.87	-2.6	19.35
Djibout	-0.98	0.21	-0.33	0.4	-5	3.2	92.6	13.7	7.06	9.47	1.15	2.75

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Morocco	-0.57	0.20	-0.3	0.2	-6	0.6	67.2	10.6	10.4	4.49	3.43	4.49
Egypt Arab Rep	-0.98	0.15	-0.54	0.3	-5	1.6	50.3	10.6	12.3	4.01	3.07	1.56
Syrian Arab Rep	-1.58	0.11	-0.37	0.4	-7.06	4.5	69.8	7.39	13.3	5.65	1.27	2.96
Iran,	-1.22	0.28	0.92	0.3	-3	4.7	44.9	10.3	16.4	21.8	3.28	2.18
Tunisia	-0.89	0.32	0.12	0.1	-3.62	0.5	91.2	11.1	11.5	3.83	3.39	1.78
Jordan	-0.54	0.22	-0.27	0.2	-2.31	0.4	123.9	14.5	11.4	6.89	2.60	2.40
Yemen Rep	-1.02	0.23	-1.6	0.4	-2	0	76.2	4.83	14.7	6.21	0.31	4.7
Oman	-0.81	0.19	0.84	0.1	-8.37	0.5	89.2	4.99	12.8	10.1	2.27	3.92

4.2. Impact of governance, political and economic factors on efficiency indices

Table 3 presents some summary statistics (Mean, Standard deviation). We find that Iran and Algeria have respectively the highest and lowest means of political stability, with values of 0.92 and -1.47. Yemen Republic and Oman have the highest and lowest mean democracy index at -2 and -8.37. Jordan has a highest value of voice and accountability with -0.54, whereas Libya has the lowest value with -1.72. Jordan and Egypte have the biggest and smallest means of trade, with values of 123.9% and 50.3% respectively. Iran and Djibouti have the highest and lowest means of money growth at 16.46 and 7.06. Morocco and Libya have the highest and lowest means of economic growth (GDP), with values of 4.49% and-2.6% respectively.

Table 4 reports the results of correlation matrix between different variables. The table illustrates that there is no problem of multicollinearity.

Table 4 Correlation matrix

	VA	SP	Democ	Trade	M	gdp
VA	1					
SP	0.433	1				
Democ	-0.035	-0.634	1			
Trade	0.341	0.382	-0.136	1		
M	-0.026	0.056	0.049	-0.121	1	
gdp	0.085	0.122	-0.017	0.027	0.136	1

Table 5 presents the estimation results of the effects of governance, political and economic policies on public spending efficiency. The results indicate that political stability has a positively and significantly effect on public spending efficiency of administration (0.122), education (0.019), health (0.235) and infrastructure (0.125). Thus, in the considered countries, the political stability might increase the efficiency of public spending. Similarly, Rayp and Sijpe (2007), shows that good quality of governance implies a political stability, which results in higher efficiency of the government policies.

The results show also that voice and accountability factors affects positively, but not significantly the spending efficiency of administration and health. In the cases of education and infrastructure sectors the results show that voice and accountability affect significantly and negatively the public spending efficiency. This finding implies that more political freedom might have a negative consequence on government spending efficiency.

Besides, the results show that the democracy variable affect positively and significantly the efficiency of public spending on administration (0.102) and health (0.351). Similarly, trade freedom is found to be positively related to public spending efficiency in administration (0.087), education (0.125), health (0.01) and infrastructure (0.635). This result can be explained by the fact that trade liberalization contributes to increase the transparence of government practices, which raises the public service efficiency. Similarly, Deliktas and Balçilar [24] point out that in more liberal economies, public spending efficiency rises.

Finally, the results show that economic growth (GDP) has a positive and significant impact on the public spending efficiency in the MENA region. Economic growth increases investment opportunities and economic output, which contribute to an increase in economic performance efficiency.

Table 5: Tobit estimation of public spending efficiency

	Administration	Health	Education	infrastructure
SP	0.122** (2.32)	0.235* (4.02)	0.019* (4.021)	0.125** (2.01)
VA	0.125 (1.25)	0.025 (1.23)	-0.015** (-2.412)	-0.012** (-2.13)
Democ	0.102** (2.11)	0.351* (3.56)	-0.03 (1.56)	0.125 (1.11)
trade	0.087*** (1.91)	0.01** (2.22)	0.125** (2.45)	0.653* (4.12)
M	0.421 (1.62)	0.001 (0.56)	0.002 (0.987)	0.121*** (1.88)
gdp	0.005 (1.02)	0.536*** (1.91)	0.125** (2.35)	0.421** (2.22)
Cst	1.02 (0.95)	1.025 (1.25)	1.254 (1.02)	0.981 (1.41)
sigma	0.112 (0.009)	0.411 (0.01)	1.21 (0.032)	0.19 (0.015)
Log-likelihood	31.21	23.25	22.35	33.12

Notes: *, **, *** denotes significance level respectively at 1%, 5% and 10%. z-statistics in parentheses

5. Conclusions and recommendations

This paper analyses public spending efficiency and the effect of governance, political and economic policies on public spending efficiency in selected MENA countries for the period 1996- 2011. By using Data Envelopment Analysis (DEA) method and Tobit regression analysis, the results show that political stability is related positively to public spending efficiency, which is consistent with theory and the empirical results of Feeny and Rogers (2008). Also, the results show that more political freedom has a negative impact on the efficiency of public spending on education and infrastructure. Trade freedom and economic growth are positively related to efficiency public spending. This result consistent with Angelopoulos., Philippopoulos, and Tsionas [12].

Public spending efficiency could be considered as one of core diagnostic studies that facilitate government implementation of more effective and transparent mechanisms and practices. These governmental practices and mechanisms allow allocating and using available public resources in efficient way promoting economic growth and poverty alleviation. According to Becker [10], government spending efficiency analysis is recognized as the best and transparent tool to gain insight into the practices by the country's authorities in their exploitation of public resources collected to reach economic and political objectives.

The potential results from this application enable surely both policy-makers and international organization to accurately determine sectors where public expenditure is inefficient, so that governments is incapable to reallocate efficiently their public resources. Furthermore, recognition of the political and economic factors that influence public spending efficiency enables governments to make more adequate and approved policies. The expected results recommend that governments should struggle for political stability and liberalization of their financial market to facilitate increasing public expenditure efficiency. Nevertheless, governments should be vigilant as uncensored political freedom could diminish largely the benefits of public spending efficiency.

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