

ECONOMIC
RESEARCH
FORUM



منتدى
البحوث
الاقتصادية

2015

working paper series

PUBLIC SPENDING EFFICIENCY, GOVERNANCE,
AND POLITICAL AND ECONOMIC POLICIES: IS THERE
A SUBSTANTIAL CAUSAL RELATION? EVIDENCE
FROM SELECTED MENA COUNTRIES

Riadh Brini and Hatem Jemmali

Working Paper No. 947

**PUBLIC SPENDING EFFICIENCY, GOVERNANCE,
AND POLITICAL AND ECONOMIC POLICIES: IS THERE
A SUBSTANTIAL CAUSAL RELATION? EVIDENCE
FROM SELECTED MENA COUNTRIES**

Riadh Brini and Hatem Jemmali

Working Paper 947

September 2015

Send correspondence to:

Hatem Jemmali

University of Sousse

hatemjemmali79@gmail.com

First published in 2015 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Copyright © The Economic Research Forum, 2015

All rights reserved. No part of this publication may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher.

The findings, interpretations and conclusions expressed in this publication are entirely those of the author(s) and should not be attributed to the Economic Research Forum, members of its Board of Trustees, or its donors.

Abstract

In this paper, we first seek a robust methodology for the estimation of the relative public spending efficiency of eleven Middle East and North Africa (MENA) countries over the period 1996-2011. Using the non-parametric Data Envelopment Analysis (DEA), we estimate relative efficiency scores for the four main disaggregated accounts of public spending: administration, health, education and infrastructure. Then, the Tobit regression model is used in the second part of the paper to determine the impact of governance and political and economic factors on public spending efficiency. The results mainly show 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 negatively affect the efficiency of public spending.

JEL Classification: E6, H5

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

ملخص

نسعى في هذه الورقة لايجاد منهجية قوية لتقدير الكفاءة النسبية للإنفاق العام من إحدى عشرة دولة من بلدان الشرق الأوسط وشمال أفريقيا (MENA) خلال الفترة 1996-2011. وباستخدام التحليل غير حدودي مغلف البيانات (DEA)، فإننا نقدر عشرات الكفاءة النسبية للحسابات الأربعة الرئيسية المصنفة من الإنفاق العام: الإدارة والصحة والتعليم والبنية التحتية. ثم، يتم استخدام نموذج الانحدار في الجزء الثاني من الورقة لتحديد أثر الحكم والعوامل السياسية والاقتصادية على كفاءة الإنفاق العام. تظهر النتائج بشكل رئيسي إلى أن الأردن هو الأكثر كفاءة في الإنفاق العام على الإدارة والتعليم والصحة، وتونس على البنية التحتية. في حين أن ليبيا والجزائر واليمن هي أقل كفاءة نسبياً في الإنفاق العام على الإدارة والصحة. وعلاوة على ذلك، فإن النتائج تشير إلى أن الاستقرار السياسي، وحرية التجارة والنمو الاقتصادي سيكون له أثر إيجابي على كفاءة الإنفاق العام. ومع ذلك، الصوت والمساءلة يؤثران سلباً على كفاءة الإنفاق العام.

1. Introduction

Recently, public spending has received considerable attention from governments, taxpayers and scholars as well as international organizations (World Bank, International Monetary Fund, etc.) due to its critical implications for a country's development. Still, the concern about the role of government has been shifted towards empirical estimations of the efficiency and performance of various public sector activities (Afonso, Schuknecht and Vito-Tanzi, 2005). 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 is why in developing and low income countries, as well as in developed ones, governments should spend the money collected from taxpayers more efficiently, as they are 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, and foreign and local investors. Realizing the importance of how public revenues are spent, they all seek more transparent and efficient government spending practices, which undoubtedly plays a key role in a country's economic development and its stability (Tanzi and Schuknecht, 2000; Heller, 2003).

In economic theory, public spending is considered as a substantial engine of economic growth and human development. Lucas (1988) suggests, for example, that public spending on education raises the level of human capital, which contributes considerably to a knowledge-based economy. More widely, Zagler and Dürnecker (2003) point out that fiscal policy instruments such as public spending on education, infrastructure, research and development, and health have a 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 older research that was limited to only some types of expenditure separately. These studies focus, principally, as noticed by Haque and Osborn (2003), on a set of developed countries or a combination of both developed and developing countries. Thus, interpretations and findings of such studies cannot simply be expanded to the 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 which have recently experienced very important political changes. This is why, in this study, we aim to more deeply examine 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, and political and economic stability on such efficiency in these countries. Thus, the main questions addressed 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 thus 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 along the following lines. The first section is devoted to a brief literature review. Section 2 describes the methodology and the data used for the public

spending efficiency estimates. Section 3 presents the main results of efficiency estimates. Section 4 examines the impact of governance and political and economic factors on efficiency indices. 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, and education or redistribution mainly improves economic growth and overcomes the phase of recession in an economy. Indeed, efficient public expenditure imply a rise in human capital, which improves the research, development and innovation activity (Afonso, Schuknecht and Tanzi, 2006; Zagler and Dürnecker; 2003). 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 (Borger and Kerstens, 1996; Afonso, Schuknecht and Tanzi, 2005; Afonso and Fernandes, 2006; Afonso, Schuknecht and Tanzi, 2006; Haque and Osborn, 2007; Rayp and Sijpe, 2007; Afonso and Fernandes, 2008; Becker, 2008; Feeny and Rogers, 2008; Angelopoulos, Philippopoulos and Tsionas, 2008). The majority of these studies concentrate on public spending efficiency on 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. Also, Afonso, Schuknecht and Tanzi (2006) and Afonso and Fernandes (2008) argue that per-capita income and education levels significantly affect government spending efficiency. These findings are supported by Borger and Kerstens (1996) and Rayp and Sijpe (2007).

Some studies illustrate that the public spending efficiency depends on the size of the public sector. Indeed, Afonso, Schuknecht and Tanzi (2005) argue that countries with a small public sector may appear to be more efficient. This finding is confirmed by Becker (2008), who shows that countries with obvious and citizen-friendly regulatory environments are relatively efficient in their public spending. Feeny and Rogers (2008) support these results in their study on public spending efficiency in small island developing countries (SIDS) and Sub-Saharan African countries. They find that governance and literacy are some of the main determinants of public sector efficiency. In the case of low and lower middle income countries, Rayp and Sijpe (2007) find, moreover, that development subsidy, less civil liberty, and good governance all contribute to enhance the efficiency of government expenditure. This finding is maintained by Adam, Delis and Kammas (2007) 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 and strong transparency, regulatory practices, cost effectiveness, and public spending directly associated with policy objectives. In this regard, Angelopoulos et al. (2008) 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 (2001) found that public spending on education in Africa positively affects the efficiency level of public expenditure. Fenny and Rogers (2008) similarly found 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 (Borger and Kerstens, 1996, Afonso and Fernandes, 2006, and Afonso and Fernandes, 2008).

Despite 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 have focused on either developed countries or developing countries outside the MENA region. That is why this study is entirely devoted to some countries from the MENA region and aims to analyze public spending and the effect of governance and political and economic factors on public spending efficiency in these countries.

3. Methodology and Data

The current study uses panel data from developing MENA countries (Algeria, Libya, Djibouti, Morocco, Egypt, Syria, Iran, Tunisia, Iraq, Jordan, and Yemen) for the period 1996-2011. The countries were chosen so as to compare the performance of Arab Spring countries with the performance of others developing countries. 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, D., Kraay, A. and Mastruzzi, M., (2009).

The calculation of efficiency ratios is essentially based 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 different techniques to estimate this frontier (Murillo-Zamorano, 2004). In our study, to estimate the ratio of efficiency for each sector, we use the Data Envelopment Analysis (DEA) method based on Banker, Charnes and Cooper (1984). This widely used method is a non-parametric linear programming-based technique that allows assessing the relative efficiency, based on efficient production frontiers (Casu and Molyneux, 2003). 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.

$\max \phi$

subject to

$$\sum_{j=1}^n \lambda_j x_{ij} \leq x_{ih} \quad i = 1, \dots, m$$

$$\sum_{j=1}^n \lambda_j y_{fj} \leq \phi y_{fh} \quad f = 1, \dots, s$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0 \quad j = 1, \dots, n$$

The DEA method is 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 properly define the inputs and outputs to measure efficiency. Similarly to Afonso, Schuknecht and Tanzi (2005), we divide public spending on administration, health, education and infrastructure. They are used to reflect the quality of interaction between fiscal policies and market processes. According to Feehand and Matsumoto, (2002) expenditure on public infrastructure facilitates private production and growth as well as reduces the transportation costs of private firms. Also, 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, (1996) emphasized the importance of government spending on health, which reduces illnesses, and increases the quantity of labor as well as its productivity.

After the estimation of efficiency scores and comparison between considered countries, we investigate the impacts of governance and 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. This reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism (Kaufmann 2013). A higher value of political stability indicates less political risk in a country. This situation can increase the efficiency of public spending. Following Rayp and Sijpe (2007), good governance allows for the intensification of rule of law and maintain political stability, which results in higher efficiency of the government spending. Conversely, a lower value of political stability implies a higher inefficiency of public spending.

VA: The voice and accountability variable. This 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 (Kaufmann 2013). 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 its 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 . Democracy indicates that people exercise 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 (Koop, Osiewalski, and Steel, 2000).

M: This is the money growth variable used as a proxy for government monetary policy. Rayp and Sijpe (2007) show 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

3.1 Efficiency estimates

Table 2 presents the average technical efficiency scores of countries for the period 1996 to 2011. The results shown in the former table illustrate that Jordan is relatively 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.

Figures 1 and 2 present 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 expenditure on education, but it presents a lower level of enrollment in secondary education. In Jordan and Tunisia, enrollment in secondary education is high and a considerable amount is spent on education.

Figures 3 and 4 clearly show that Jordan has the highest percentage of government expenditure on health and has the highest 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.

4. Impact of Governance and Political and Economic Factors on Efficiency Indices

4.1 Descriptive statistics

Table 3 presents some summary statistics (Mean, Standard deviation). We find that Iran and Algeria have the highest and lowest means of political stability, with values of 0.92 and -1.47 respectively. Yemen 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 Egypt 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 the correlation matrix between different variables. The table illustrates that there is no problem of multicollinearity.

5. Results and Discussion

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

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

Moreover, the results show that the democracy variable positively and significantly affects 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 on 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 increased transparency of government practices, which raises the efficiency of public services. Similarly, Deliktas and Balcilar (2005) 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 public spending efficiency in the MENA region. Economic growth increases investment opportunities and economic output, which contributes to an increase in efficiency of economic performance.

6. Conclusions and Recommendations

This paper analyses public spending efficiency and the effect of governance, and political and economic policies on public spending efficiency in selected MENA countries for the period 1996-2011. By using the Data Envelopment Analysis (DEA) method and Tobit regression analysis, the results show that political stability is positively related 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 the efficiency of public spending. This result is consistent with Angelopoulos, K., Philippopoulos, A. & Tsionas, E. (2008).

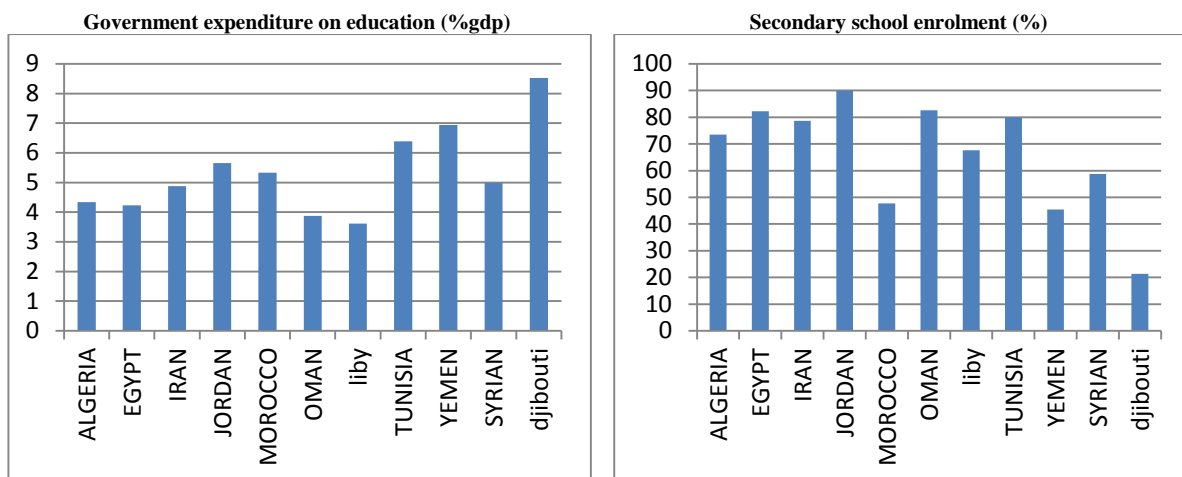
Public spending efficiency could be considered one of core diagnostic studies that facilitate government implementation of more effective and transparent mechanisms and practices. These governmental practices and mechanisms allow for the allocation and usage of available public resources in an efficient manner that promotes economic growth and the alleviation of poverty. According to Becker (2008), government spending efficiency analysis is recognized as the best and most transparent tool to gain insight into the practices of a country's authorities in their exploitation of the public resources that are collected to achieve economic and political objectives.

The potential results from this study will surely enable both policy-makers and international organizations to accurately determine sectors where public expenditure is inefficient and where governments are incapable of efficiently reallocating their public resources. Furthermore, recognition of the political and economic factors that influence public spending efficiency enables governments to formulate better policies. The expected results recommend that governments should strive for political stability and the liberalization of their financial market to increase the efficiency of public expenditure. Nevertheless, governments should be vigilant, as uncensored political freedom could largely diminish the benefits of public spending efficiency.

References

- Afonso, A., & Fernandes, S. (2006). Local Government Spending Efficiency: DEA Evidence for the Lisbon Region. *Regional Studies*, 40, pp. 39-53.
- Afonso, A., & Fernandes, S. (2008). Assessing and Explaining the Relative Efficiency of Local Government. *The Journal of Socio-Economics*, 37, pp. 1946-1979.
- Afonso, A., Schuknecht, L. & Tanzi, V. (2005). Public Sector Efficiency: An International Comparison. *Public Choice*, 123 (3-4), pp. 321-347.
- Afonso, A., Schuknecht, L. & Tanzi, V. (2006). *Public Sector Efficiency Evidence for New EU Member States and Emerging Markets*. (European Central Bank Working Paper No. 581). Frankfurt: European Central Bank.
- Angelopoulos, K., Philippopoulos, A. & Tsionas, E. (2008). Does Public Sector Efficiency Matter? Revisiting the Relation Between Fiscal Size and Economic Growth in a World Sample. *Public Choice*, 137, pp. 245-278.
- Berker, D. (2008). *Public Sector Efficiency and Interjurisdictional Competition – An Empirical Investigation*, (Thünen-Series of Applied Economic Theory Working Paper No. 101). Rostock: Universität Rostock
- Borger, B.D. & Kertens, K. (1996). Cost Efficiency of Belgian Local Governments: A comparative Analysis of FDH, DEA, and Econometric Approaches. *Regional Science and Urban Economics*, 26, pp. 145-170.
- Devarajan, S., Swaroop, V., & Zou, H.F. (1996). The Composition of Public Expenditures and Economic Growth. *Journal of Monetary Economics*, 37, pp.313-344.
- Feehan, P.J., & Matsumoto, M. (2002). Distortionary Taxation and Optimal Public Spending on Productive Activities. *Economic Inquiry*, 40(1), pp. 60-68.
- Feeny, S. & Rogers, M. (2008). Public Sector Efficiency, Foreign Aid and Small Island Developing States. *Journal of International Development*, 20, pp. 526-546.
- Haque, M. & Osborn, D. (2007). Public Expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries. *Manchester School*, 75, pp. 533-556.
- Heller, P. (2003). *Who Will Pay? Coping with Aging Societies, Climate Change and Other Long Term Fiscal Challenges*. Washington D.C.: IMF.
- Gupta, S. & Verhoeven, M. (2001). The Efficiency of Government Expenditure: Experiences from Africa. *Journal of Policy Modelling*, 23, pp. 433-467.
- Lucas, R.E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22, pp. 3-42.
- Rayp, G. & Sijpe, N.V.D. (2007). Measuring and Explaining Government Efficiency in Developing Countries. *Journal of Development Studies*, 43, pp. 360-381.
- Tanzi, V. & Schuknecht, L. (2000). *Public Spending in the 20th Century: A Global Perspective*. Cambridge: Cambridge University Press.
- Zagler, M. & Dürnecker, G. (2003). Fiscal Policy and Economic Growth. *Journal of Economic Survey*, 17, pp. 397-418.

Figures 1 and 2: Government expenditure on education and Secondary school enrolment



Figures 3 and 4: Government Expenditure on Health and Life Expectancy at Birth

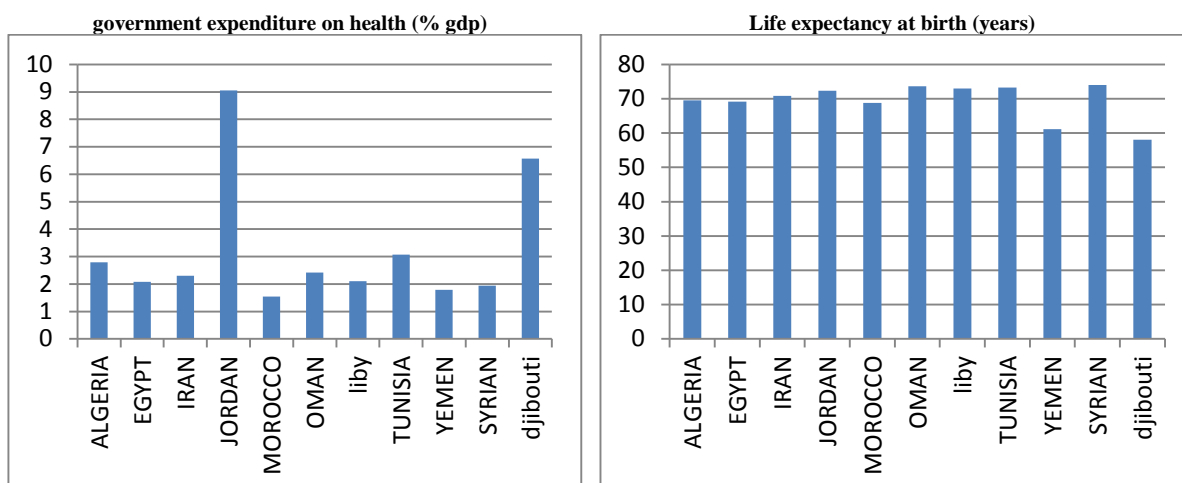


Table 1: Inputs and Outputs of Public Spending by Sector

	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

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	0.77	0.92	0.88	0.82
Syrian	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	0.44	0.66	0.75	0.42

Table 3: Descriptive Statistics

Variables statistics	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
Djibouti	-0.98	0.21	-0.33	0.47	-5	3.22	92.6	13.79	7.06	9.47	1.15	2.75
Morocco	-0.57	0.20	-0.3	0.22	-6	0.63	67.28	10.67	10.45	4.49	3.43	4.49
Egypt	-0.98	0.155	-0.54	0.37	-5	1.62	50.3	10.64	12.34	4.01	3.07	1.56
Syrian	-1.58	0.11	-0.37	0.49	-7.06	4.56	69.8	7.39	13.35	5.65	1.27	2.96
Iran,	-1.22	0.28	0.92	0.34	-3	4.79	44.91	10.32	16.46	21.8	3.28	2.18
Tunisia	-0.89	0.32	0.12	0.15	-3.62	0.5	91.27	11.10	11.50	3.83	3.39	1.78
Jordan	-0.54	0.22	-0.27	0.20	-2.31	0.47	123.9	14.59	11.49	6.89	2.60	2.40
Yemen	-1.02	0.23	-1.6	0.42	-2	0	76.28	4.83	14.76	6.21	0.31	4.7
Oman	-0.81	0.19	0.84	0.16	-8.37	0.5	89.24	4.99	12.83	10.1	2.27	3.92

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: 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.