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Medicines and democracy: The importance of institutional quality in the relationship between health expenditure and health outcomes in the MENA region

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Abstract

Evidence suggests that the effect of health expenditure on health outcomes is highly context-specific and may be driven by other factors. We construct a panel dataset of 19 countries from the Middle East and North Africa region for the period 1995-2012. Panel data models are used to estimate the macro-level determinants of health outcomes. The core finding of the paper is that increasing health expenditure leads to health outcomes improvements only to the extent that the quality of institutions within a country is sufficiently high. The robustness of the results is assessed using various measures of health outcomes as well as institutional variables. Overall, it appears that increasing health care expenditure in the MENA region is a necessary but not sufficient condition for health outcomes improvements.

Keywords: Health expenditure · Health outcomes · Institutional quality · MENA region.

JEL classification: H51 · I15 · I18.

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1. Introduction

The question of *whether (and to which extent) health outcomes are related to the countries' level of expenditure on health* has been extensively addressed in the context of developed countries (*e.g.*, Crémieux et al., 1999; Martin et al., 2008). Yet, addressing such a question in the context of developing countries with solid evidence is still in great demand. Indeed, such a question stands as one of the key issues in the current debate on reforms seeking to achieve Universal Health Coverage (UHC) (World Health Organization, 2013). The latter is the priority goal that has been adopted for the 2015-2030 international agenda as a follow-up to the current Millennium Development Goals (MDGs) (O'Connell et al., 2014).

Previous studies indicate that health outcomes across countries (*e.g.*, life expectancy, child mortality) are not *strongly* (Anderson and Poullier, 1999; Filmer and Pritchett, 1999; Zakir and Wunnava, 1999; Anderson and Hussey, 2001) or *directly* (Rajkumar and Swaroop, 2008; Farag et al., 2013) associated with the level of expenditure on health, especially once other factors are accounted for.[1] Particularly, frequent references are made to the *deterring effect* that contextual and institutional factors (*e.g.*, good governance, political unrest) may have on the achievement of the desired outcomes of health spending.

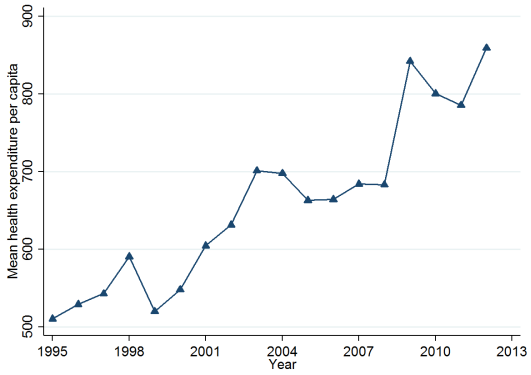
In most cases, among countries with *good* health outcomes, the range of health expenditure is extremely wide. Such variation makes it difficult to get a conclusive answer regarding the impact of health expenditure on health outcomes (*e.g.*, Anderson and Hussey, 2001 among OECD countries, Crémieux et al., 1999 in Canada, or Martin et al., 2008 in England). For instance, in a recent study among 30 European countries, Mackenbach and McKee (2015) show that the quality of democracy and governance are positively associated with some indicators of health policy, while the distribution of power and political representation have few associations. Among sub-Saharan African countries, Ssozi and Amlani (2015) find that health expenditure has a substantial effect on the proximate targets (immunization, malaria, HIV/AIDS, and nutrition), but has a lower impact on the ultimate goals (life expectancy, infant, and child mortality). This seems to suggest that the relationship between health expenditure and health outcomes is context-specific.

The present paper seeks to address the above questions in the particular context of Middle Eastern and North African (MENA) countries. The MENA, a middle-income region, has experienced a rapid population growth (36.8% between 1995 and 2012), while life expectancy increased by 6%. The mean life expectancy in the region was 74.4 years in 2012. Overall, MENA countries have some of the lowest levels of government spending on health care (World Bank, 2013). However, the region has witnessed a positive trend in per capita health spending over the past two decades, with a 68.4% increase between 1995 and 2012, as shown in Figure 1a. In parallel,

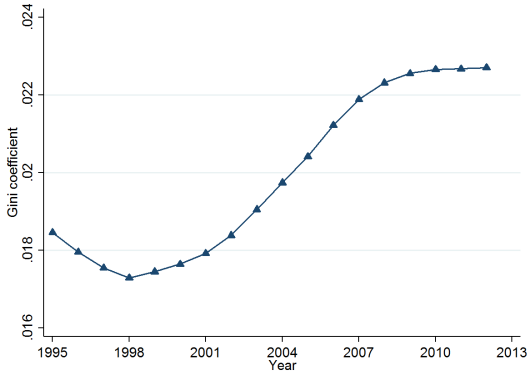
[1] These *other* factors may include living standards, schooling, or individual behavior (Riley, 2001).

there has been a rise in between-country health inequality in the MENA region since the mid-1990s. More precisely, from 1995 to 2012, health inequality (as measured by the Gini coefficient for national life expectancies) increased by 23%.[2] Figure 1b clearly shows that between-country health inequality has been increasing. Of that total increase in between-country health inequality, about 54% is attributable to changes in population shares (*i.e.*, the allocation effect), while 46% of the increase is due to cross-country differences in life expectancy growth rates (*i.e.*, the growth effect). Altogether, it seems that the rise in health expenditure in the MENA region over the past two decades had contrasting effects on health outcomes.

(a) Mean health expenditure per capita



(b) Gini coefficient



NOTES: The inequality measure is described in the text. See Appendix A1 for the list of countries.

Figure 1: Health expenditure and between-country health inequality in the MENA region, 1995-2012

MENA countries are currently confronting a significant challenge due to escalating burden of ill-health (Abu-Zaineh and Abul Naga, 2014), accompanied by a growing prevalence of non-communicable diseases (Abdul Rahim et al., 2014). In this respect, contrasting evolutions between MENA countries can be related to the significant differences in their epidemiological situations. While infectious diseases remain the

[2]Here, we calculate the trend in between-country health inequality in the MENA region for the period 1995-2012. We use the Gini coefficient, which is a standard measure of inequality. This index is generally used to measure income inequality, but has been derived to measure health inequality (Goesling and Firebaugh, 2004). The Gini coefficient is expressed in the following form:

$$\text{Gini coefficient} = \sum_j p_j r_j (q_j - Q_j) \tag{1}$$

where p_j is the j_{th} country's share of the MENA population, r_j is the life expectancy in country j divided by the average life expectancy in the MENA region (namely, the *life-expectancy ratio*), and q_j (Q_j) is the proportion of the MENA population in countries where life expectancy is lower (greater) than in country j. The index is calibrated to zero when life expectancy is distributed evenly across countries. Then, the index value increases with the level of inequality across countries.

main public health problem in low-income countries, with AIDS, tuberculosis and malaria epidemics leading to a decrease in global life expectancy, in most middle-income countries, the epidemiological transition towards non-communicable chronic diseases is already ongoing (Mokdad et al., 2014). Coping with the rising burden of non-communicable diseases, and at the same time laying the ground for transforming the health system towards UHC, presents the major challenge for health policy-makers in MENA countries. The limited resources and institutional capacity as well as the ongoing political unrest in some of these countries pose further challenges (Alwan, 2014).

This study, therefore, attempts to provide policy-makers with some insights into the impact of health expenditure per capita on health outcomes over the last two decades, focusing on the MENA region. Data are taken from different sources including the World Health Organization (World Health Organization, 2015), the World Development Indicators database (World Bank, 2015), the Freedom House database (Freedom House, various issues), the Quality of Government database (Dahlberg et al., 2015) and the Center for Systemic Peace database (Marshall and Cole, 2014). The main research question is apprehended using an elaborate econometric modeling (including instrumental variable fixed-effects and random-effects models). The robustness of the results is tested using various measures of health outcomes (life expectancy at birth and infant mortality) as well as institutional variables (political rights and civil liberties, the quality of government, and government effectiveness). The remaining of the paper is organized as follows. The data and the econometric methodology are detailed in Section 2 and Section 3, respectively. Sections 4 presents the study results and Section 5 addresses practical and policy-oriented questions in light of our results.

2. Data

We construct a panel dataset of 19 countries for 18 years, from 1995 to 2012. All these countries are part of the MENA region. The list of countries and the variable definitions and sources are reported in the appendix (Table A1 and Table A2, respectively). Our analysis uses data from various sources to explore the macro-level determinants of health outcomes as identified in the health economics literature.[3] Health expenditure per capita, GDP per capita, and the total fertility rate are taken in logs. The institutional quality variable, Freedom House, is composed of two components - political rights and civil liberties - for which the average has been calculated. Each country has a score that ranges from 1 to 7, 1 representing the most free, and 7 the least free. As the time unit is taken to be a year, the war variable is included as dummy variables for each country-year of the panel. This dummy variable takes the value of one if an armed conflict has occurred in the year considered, and zero otherwise. The data is taken from the Uppsala Conflict Data Program-International Peace

[3]See for instance Clark (2011), or Kabir (2008) for a focus on developing countries.

Research Institute of Oslo Armed Conflict dataset (Gleditsch et al., 2002; Themnér and Wallensteen, 2014). In addition to the inclusion of the macro-level determinants of health outcomes, we also include time effects (year dummies) in the model in order to circumvent the problem of omitted variables. Time effects are meant to capture the unobserved time-varying factors common to all countries in the sample - in particular the contextual (exogenous) development and spread of medical technology - thereby reducing the main potential source of omitted variable bias.

Descriptive statistics of the variables used in the analyses are given in the appendix (Table A3), as well as the cross-correlation matrix (Table A4). The correlation between life expectancy at birth and health expenditure per capita is markedly positive ($\rho = 0.73,\ p < 0.001$). As shown in the introduction, between-country health inequality in the MENA region have been increasing since the mid-1990s (see Figure 1b). Table A3 reports that both life expectancy at birth and health expenditure per capita in the MENA region exhibited large variations during the past two decades. The methodology employed in the study to explore the effect of health expenditure on health outcomes is presented in the next section.

3. Econometric methodology

We estimate multivariate regression models with a country-level health outcome as dependent variable. The main variables of interest are health expenditure and the level of institutional quality. The models also include the macro-level determinants of health outcomes as identified in the health economics literature and presented in the previous section.

We are concerned with a panel where both N (the number of countries) and T (the number of time periods) are quite large (that is, 19 and 18, respectively). When the time horizon is short, panel econometric models can be estimated using the generalized method of moment (GMM) technique developed by Arellano and Bond (1991). However, the number of instruments in difference and system GMM tends to explode with T, which can produce misleading estimates (Roodman, 2009). In our case where both country and time dimensions are quite large and of the same magnitude, either the random-effects or the fixed-effects estimator can be implemented. Indeed, we need to employ estimation techniques that allows to deal with potential heterogeneity bias which can arise due to the confounding effect of time-invariant variables omitted from the regression models (Wooldridge, 2002).

The statistical procedure is as follows. First, as a point of departure, we estimate the multivariate regression model using Ordinary Least Squares (OLS). Then, in order to address the potential issue of heterogeneity bias, we estimate fixed-effects and random-effects models. Finally, as some of the covariates may be endogenous, we implement an Instrumental Variable (IV) estimation procedure which is able to account for the problems of reverse causality (health expenditure could be a response to mortality shocks) and measurement error. The estimations of the fixed-effects and

random-effects models with the IV technique is implemented using respectively the two-stage least-squares within and random-effects estimators developed by Balestra and Varadharajan-Krishnakumar (1987). For IV estimations, log(GDP per capita) and log(Health expenditure per capita) are treated as endogenous and are instrumented using first lags. All models are estimated with annual data from 1995 to 2012 and with robust standard errors that are clustered at the country level. All specifications include year dummies, which are not reported in the tables of results.

To gain more understanding of the health expenditure-health outcomes relationship, we also investigate whether the effect of health expenditure changes with the level of institutional quality. For that purpose, we reestimate the aforementioned models by adding an interaction between health expenditure and the quality of institutions, allowing to test whether the level of institutional quality affects the marginal effect of health expenditure on health outcomes.

4. Results

4.1. Baseline model

The results from the baseline model are displayed in Table 1. A test of overidentifying restrictions allows us to test on model specification, that is, to choose between the random-effects and the fixed-effects models.[4] In view of the specification test results, the fixed-effects estimator estimator is preferred over the random-effects estimator. Covariates other than health expenditure and institutional quality are included in the regressions in order to control for their influence on life expectancy at birth; yet their analysis is not the main focus of this paper. The estimated coefficients are nonetheless consistent with theoretical considerations and other related empirical studies on the determinants of life expectancy at the macro level (see for instance Clark, 2011). Per capita income seems to have no significant effect on life expectancy at birth. Indeed, the coefficient on GDP per capita is significant for the OLS regression only. The total fertility rate has the expected negative sign across all models. The share of urban population is positively associated with life expectancy at birth. Urbanization seems to matter more than GDP *per se*, highlighting the prominent role played by the quality and proximity of health care services in improving health outcomes. Not surprisingly, we find that war has an overwhelming negative impact on life expectancy across all models. Finally, for all models, the coefficients of year dummies are significant, positive and increasing over time.[5] This suggests that life expectancy at birth improved over the sample period due to unobserved factors

[4]The test is implemented by Arellano (1993) and Wooldridge (2002), in which a random effects equation is re-estimated by being augmented with additional variables consisting of the original regressors transformed into deviations-from-mean form.

[5]The coefficients of year dummies are not shown here for space considerations, but the complete tables are available from the authors upon request.

common to all countries in the sample, for instance the worldwide development and spread of medical technology.

We now turn to the analysis of the results regarding institutional quality and per capita health expenditure, the two main variables of interest of this study. First, institutional quality has only a weak direct effect on on life expectancy. The coefficient on institutional quality is either insignificant, or significant at the 10% level for IV estimations. The sign is nonetheless the expected one: decreasing institutional quality is negatively correlated with life expectancy at birth. Another interesting feature of this baseline model is that there is no significant direct relationship between health expenditure per capita and life expectancy at birth. There thus seems to be no evidence for a homogeneous effect of health expenditure on life expectancy for MENA countries over the past two decades.

Table 1: Baseline model

	OLS	Fixed-effects	Random-effects	IV Fixed-effects	IV Random-effects
log(GDP per capita)	0.526**	-0.006	0.186	0.348	0.434
	(0.163)	(0.739)	(0.628)	(0.470)	(0.304)
log(Total fertility rate)	-3.971***	-3.541^{+}	-3.785**	-3.173***	-3.504***
	(0.389)	(1.806)	(1.334)	(0.653)	(0.525)
Urban population	0.114***	0.227^{+}	0.169**	0.232***	0.165***
	(0.009)	(0.114)	(0.051)	(0.030)	(0.020)
log(Health expenditure per capita)	0.347	-0.195	-0.102	-0.416^{+}	-0.257
	(0.264)	(0.394)	(0.415)	(0.217)	(0.211)
Freedom House	-0.112	-0.172	-0.162	-0.167^{+}	-0.148^{+}
	(0.089)	(0.298)	(0.264)	(0.090)	(0.089)
War dummy	-1.749***	-0.712	-0.742^{+}	-0.638***	-0.701***
	(0.206)	(0.438)	(0.431)	(0.152)	(0.148)
Constant	62.414***	62.120***	64.145***	59.631***	62.862***
	(1.178)	(6.212)	(3.527)	(3.993)	(2.015)
Test of overidentifying restrictions					
Sargan-Hansen statistic			38.678		
P-value			0.0000		
R^2 within	0.837	0.812	0.809	0.821	0.815
R^2 between		0.737	0.771	0.732	0.771
R^2 overall		0.765	0.799	0.762	0.802
No. of countries	19	19	19	19	19
No. of observations per country					
minimum		13	13	12	12
average		17.474	17.474	16.474	16.474
maximum		18	18	17	17
No. of observations	332	332	332	313	313

NOTES: The dependent variable is life expectancy at birth. Robust standard errors in parentheses. The symbols $^{+}$, *, **, and *** indicate statistical significance at the $p < .10$, $p < .05$, $p < .01$, and $p < .001$ levels, respectively. Annual data : 1995-2012. All specifications include year dummies, which are not reported. For IV estimations, log(GDP per capita) and log(Health expenditure per capita) are treated as endogenous (instrumented using first lags).

4.2. Further analysis of the health expenditure effect

To gain more understanding about the relationship between health expenditure and life expectancy, we also investigate whether the effect of health expenditure on health outcomes changes with the level of institutional quality. For that purpose, a health expenditure-institutional quality interaction is investigated. This interaction is included in the baseline model, and the estimates are presented in Table 2.

Parameter estimates for other covariates remain qualitatively the same. We find

Table 2: Model with interaction

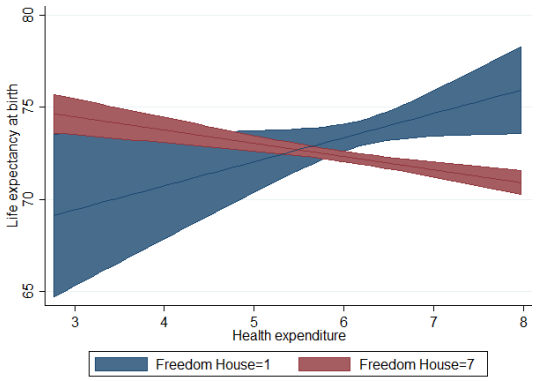
	OLS	Fixed-effects	Random-effects	IV Fixed-effects	IV Random-effects
log(GDP per capita)	0.124	-0.139	-0.076	0.147	0.150
	(0.162)	(0.788)	(0.654)	(0.435)	(0.306)
log(Total fertility rate)	-3.486***	-3.827*	-3.758**	-3.277***	-3.357***
	(0.332)	(1.818)	(1.263)	(0.607)	(0.484)
Urban population	0.117***	0.235*	0.180***	0.240***	0.181***
	(0.008)	(0.097)	(0.049)	(0.028)	(0.019)
log(Health expenditure per capita)	5.702***	2.060	2.204	1.646*	1.965**
	(0.585)	(1.456)	(1.523)	(0.748)	(0.715)
Freedom House	5.591***	1.985	2.109	1.856**	2.105***
	(0.586)	(1.326)	(1.418)	(0.611)	(0.600)
log(Health expenditure per capita) × Freedom House	-0.845***	-0.359	-0.372^{+}	-0.338***	-0.371***
	(0.083)	(0.209)	(0.216)	(0.099)	(0.096)
War dummy	-1.562***	-0.586*	-0.613*	-0.504***	-0.549***
	(0.154)	(0.277)	(0.258)	(0.137)	(0.132)
Constant	29.426***	49.537***	51.523***	48.584***	50.517***
	(3.214)	(8.670)	(7.397)	(5.061)	(3.692)
Test of overidentifying restrictions					
Sargan-Hansen statistic			99.307		
P-value			0.0000		
R^2 within	0.892	0.840	0.838	0.851	0.848
R^2 between		0.783	0.805	0.769	0.800
R^2 overall		0.806	0.830	0.797	0.828
No. of countries	19	19	19	19	19
No. of observations per country					
minimum		13	13	12	12
average		17.474	17.474	16.474	16.474
maximum		18	18	17	17
No. of observations	332	332	332	313	313

NOTES: The dependent variable is life expectancy at birth. Robust standard errors in parentheses. The symbols $^{+}$, *, **, and *** indicate statistical significance at the $p < .10$, $p < .05$, $p < .01$, and $p < .001$ levels, respectively. Annual data : 1995-2012. All specifications include year dummies, which are not reported. For IV estimations, log(GDP per capita) and log(Health expenditure per capita) are treated as endogenous (instrumented using first lags).

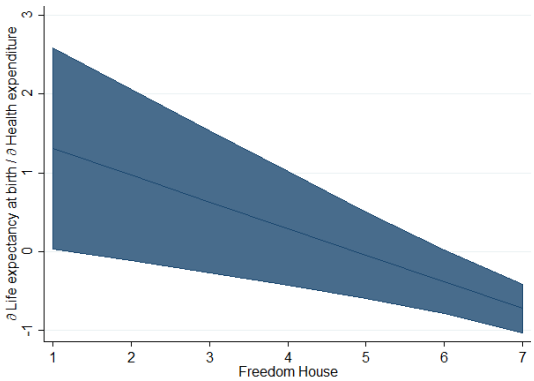
significant interaction terms for all estimations except the fixed-effects one. The results thus suggest that the health expenditure effect is likely to differ according to the institutional context. Everything seems to indicate that the level of institutional quality acts as a threshold in the effect of health expenditure on life expectancy at birth. Given that the interaction term is significant, looking at the main effects of health expenditure and institutional quality is not meaningful. The results reveal that the impact of health expenditure on life expectancy varies depending on the level of institutional quality. We provide a graphical analysis in order to ease the interpretation of the results. Figure 2 shows the predicted values and average marginal effects (with 95% confidence intervals) of health expenditure on life expectancy for the two IV estimations. The estimated relationship between health expenditure and life expectancy is first displayed for two representative values of institutional quality (its minimum and maximum observed values). These predicted values are shown in Figure 2a for the IV fixed-effects estimation, and in Figure 2b for the IV random-effects estimation. The average marginal effects of health expenditure on life expectancy given institutional quality are then shown in Figure 2c and Figure 2d for the IV random-effects and the IV fixed-effects estimations, respectively. We see that the effect of health expenditure on life expectancy is positive for high levels of institutional quality, but decreases when institutional conditions deteriorate, eventually becoming negative when the quality of institutions is very poor.

Altogether, the effect of health expenditure on health outcomes depends ultimately on the efficiency of institutions in allocating health care resources. Our results suggest that the effect of increasing health expenditure can even be pervasive when institutions deteriorate below some threshold. In this case, the rise in health expenditure - which has no impact on health outcomes - may in the same time crowd out other types of essential expenditures.

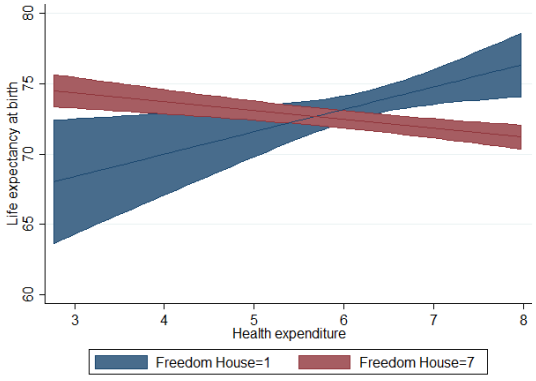
(a) Predicted values (IV Fixed-effects)



(c) Marginal effect (IV Fixed-effects)



(b) Predicted values (IV Random-effects)



(d) Marginal effect (IV Random-effects)

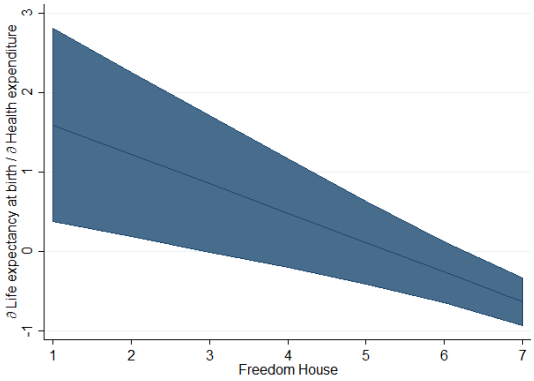


Figure 2: Effect of health expenditure on life expectancy at birth given institutional quality

4.3. Robustness checks

We now test the robustness of our results using alternative measures. First, we look at an alternative measure of health outcome, that is, the infant mortality rate. To do so, we reestimate the regressions presented in Table 2 - that is, the models with the health expenditure-institutional quality interaction - taking infant mortality rate as the dependent variable instead of life expectancy at birth. The results remain

qualitatively the same, in terms of sign, magnitude, and statistical significance.[6] Figure 3 shows the predicted values (Figure 3a) and average marginal effects (Figure 3b) of health expenditure on the infant mortality rate for the IV fixed-effects estimation. We clearly see that the effect of increasing health expenditure on infant mortality is negative for high levels of institutional quality. By contrast, the effect of a rise in health expenditure on infant mortality is null when the quality of institutions is very poor.

(a) Predicted values (IV Fixed-effects) **(b)** Marginal effect (IV Fixed-effects)

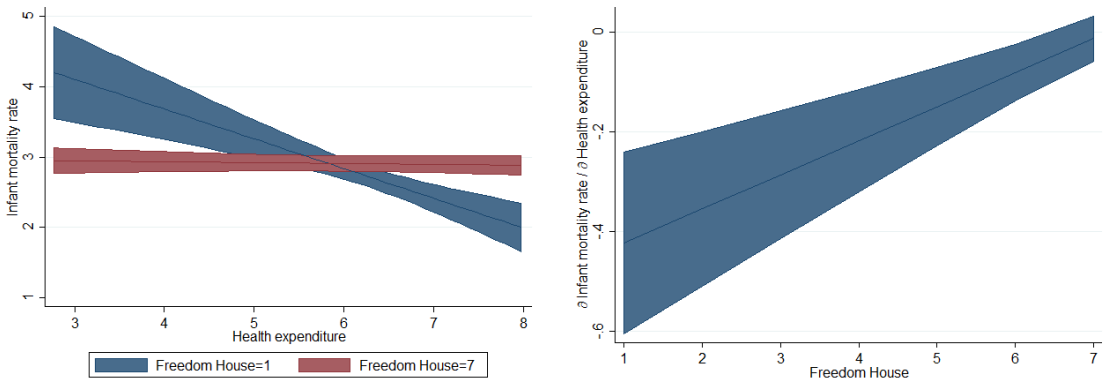


Figure 3: Effect of health expenditure on infant mortality rate given institutional quality

Next, we test the sensitivity of our results using two alternative measures of institutional quality. We first use the Quality of Government (Dahlberg et al., 2015), which considers three dimensions, namely, corruption, law and order, and bureaucracy quality. The indicator ranges from 0 to 1, higher values indicating higher quality of government. Second, we use the Effectiveness Score compiled by the Center for Systemic Peace (Marshall and Cole, 2014). The Effectiveness Score is based on four performance dimensions, namely, security, political, economic, and social. An Effectiveness Score, ranging from 0 to 13, is assigned to each country for each year. The greater the score, the less effective is the government with regard to the four performance dimensions considered. We thus reestimate the regressions presented in Table 2 replacing alternatively the initial institutional quality variable (Freedom House) by these two measures.[7] Figure 4a and Figure 4b show the average marginal effects of health expenditure on life expectancy at birth for the IV fixed-effects estimation, using the indicator of Quality of Government and the Effectiveness Score, respectively. The results largely confirm our key qualitative finding, that is, the sign and magnitude of the health expenditure-health outcome relationship ultimately depends

[6]The table is not shown here for space considerations, but is available from the authors upon request.

[7]The table is not shown here for space considerations, but is available from the authors upon request.

on a country's level of institutional quality.

(a) Marginal effect (IV Fixed-effects) **(b)** Marginal effect (IV Fixed-effects)

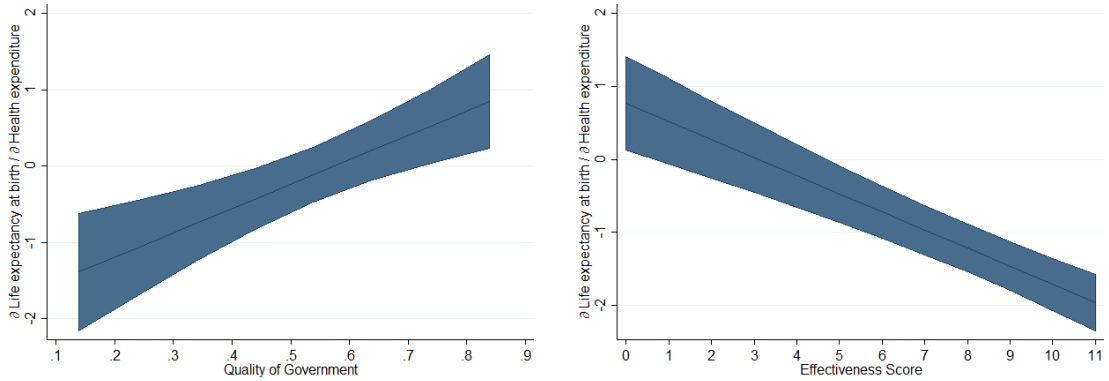


Figure 4: Effect of health expenditure on life expectancy at birth given two alternative measures of institutional quality

5. Discussion

This study attempts to provide new insights into the question of whether (and to which extent) health outcomes are related to the countries' level of health expenditure using the particular case of the MENA region. Several interesting findings and key implications emerging from our empirical analysis are worth making in light of the practical questions raised in the outset and the specific context of countries under consideration. First, the conjecture on the crucial role of the quality of institutions appears to be particularly important in the domain of health. This is in line with the public economics literature suggesting that the return on investment in a public good depends on the quality of institutions. [8] This literature is particularly abundant in the domain of education (see for instance Hicken and Simmons, 2008). There are reasons to believe that the general institutional quality is a crucial factor to achieve better health outcomes, as this is likely to affect the budget allocation to the health sector (*e.g.*, spending on health infrastructure, the share of primary, secondary and tertiary care, as well as the spatial distribution of health facilities). Although, the impact of health expenditure on health outcomes has been extensively addressed in the context of developed countries, few empirical studies have been conducted to investigate similar issue in the context of developing countries, particularly, in the MENA countries. Countries belonging to this region have experienced several political unrests and, more recently, popular uprisings. The latter, so-called "Arab Spring", proclaimed bread, social justice and good governance.

[8] See for instance Kaufmann et al. (2004) and De la Croix and Delavallade (2009). For a focus on the MENA region, see also Agénor et al. (2005) and Guetat (2006).

Secondly, the mechanisms proposed to explain the role of governance in the interplay between health expenditure and health outcomes depend on the variable(s) used to apprehend institutional quality. In the context of our study, we first employed the "Freedom House" variable (Freedom House, various issues), which is a summary index of political rights and civil liberties. Accordingly, the importance is attached to the "people's voice", that is, the ability of individuals to fully express their opinions, needs and genuine preferences in order to shape more efficient decisions on resource allocations by the bureaucratic organizations. Our results confirm the above conjecture on the role of the quality of institutions in the MENA region: the effect of health expenditure on health outcomes (as measured by life expectancy and infant mortality) depends ultimately on the efficiency of institutions in allocating health care resources. This is in line with previous evidence illustrating the strong intermediary role of the quality of institutions in the achievement of the target outcomes in other countries context. For instance, previous studies indicated that the efficiency of health expenditure is closely related to the quality of governance (Rajkumar and Swaroop, 2008; Farag et al., 2013). Using an alternative metrics, the "Quality of Government" (Dahlberg et al., 2015), which considers three dimensions (corruption, law and order, and bureaucracy quality) confirm our results. Indeed, the poor "Quality of Government" appears to be associated with an adverse effect of health expenditure on health outcomes. Given the resource-constraint in many developing countries, the increase of health expenditure that does not yield the desired outcomes may additionally crowd-out other types of essential expenditures. Provided that the above metric captures the "vox publica" mechanism, this may suggest that private economic behaviors need to be taken into account in the public decision-making process.

Typically, government spending aims to provide public goods and services that are necessary to enhance both human and physical capital. These factors of production resulting from private decisions are conditioned by the quality of institutions (*e.g.*, property right enforcements) (North, 1990; Tanzi and Davoodi, 1997). While the impact of government expenditure depends ultimately on the "multiplier effect", which is in turn determined by the agents' behavior, the latter behavior is contingent upon the institutional quality. Such an observation is likely to hold in the domain of health. In effect, inefficiency, corruption and cronyism in the health sector were shown to have serious negative effects on access to and quality of health care services (Mataria et al., 2009; Kankeu et al., 2014). In addition, a study by Kaplan et al. (1989) found that individuals' satisfaction of the health care services is, sometimes, a factor of recovery in itself. The private investment in personal health critically depends on the political stability of the country since the different dimensions of risk exposure are generally linked together and positively correlated. In other words, the incentives to have safe health behavior are weakened in a society where other types of risk are important (*e.g.*, war-related deaths).

The analysis undertaken in this study has benefited from the availability of panel

data for a set of countries belonging to the MENA region over the period 1995-2012. The methodology allows to control for endogeneity, thus, to infer some causal interpretations while testing the robustness using various metrics of the variables of interest (health outcomes, institutional quality). The analysis employed three internationally recognized proxies: "Freedom House" (Freedom House, various issues), "Quality of Government" (Dahlberg et al., 2015), and "Government Effectiveness" (Marshall and Cole, 2014) to capture the possible mediating role of institutional quality on the association between health expenditure and health outcomes. Clearly, a more comprehensive analysis of the impact of health expenditure on health outcomes shall also control for the potential role played by other variables belonging to both supply-side (*e.g.*, infrastructure, technical progress, efficiency of public spending), and demand-side (*e.g.*, individuals' preferences, risk-behavior). However, the lack of appropriate data on these aspects have made it impossible to capture these effects.

In spite of their limitations, the results presented in this paper provide a useful picture of the mutable role played by the institutional quality on the association between health expenditure and health outcomes in the MENA region. It is beyond our ability to recommend a mixture of health expenditure and civil liberties. Obviously, civil liberties represent intrinsic values for any society, and are not only instruments to maximize the return on health investment. The policy implication could, however, reside in the reassessment we have obtained on the quantitative impact of health expenditure. The pessimist view of a weak impact, which could penetrate the circles of decision and even shape the implemented policies in a context of low-resources countries, is clearly challenged, as long as the countries are also offering to the population a sufficient level of democracy. Although the democratization process is still in its infancy in some MENA countries, the recent popular uprisings (*e.g.*, Tunisia) is promising shall be accompanied by appropriate reforms of institutions.

Appendix

Table A1: List of countries

Middle East and North Africa
Algeria
Bahrain
Brunei Darussalam
Cyprus
Egypt, Arab Rep.
Iran, Islamic Rep.
Iraq
Jordan
Lebanon
Libya
Morocco
Oman
Qatar
Saudi Arabia
Syrian Arab Republic
Tunisia
Turkey
United Arab Emirates
Yemen. Rep.
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Table A2: Variable definitions and sources

Variables	**Sources**
Health expenditure per capita (constant 2005 US$ PPP)	World Health Organization (2015)
Life expectancy at birth	World Development Indicators (World Bank, 2015)
Infant mortality rate (per 1,000 live births)	idem
GDP per capita (constant 2005 US$ PPP)	idem
Total fertility rate	idem
Urban population (% of total population)	idem
Freedom House	Freedom House (various issues)
War dummy	Gleditsch et al. (2002); Themnér and Wallensteen (2014)
Quality of Government	Dahlberg et al. (2015)
Effectiveness Score	Marshall and Cole (2014)

Table A3: Descriptive statistics

	Mean	**Standard deviation**	**Min**	**Max**
Life expectancy at birth	72.589	4.141	59.236	79.846
Infant mortality rate	21.794	14.267	2.900	79.100
Health expenditure per capita	668.757	550.323	15.979	2978.592
GDP per capita	11893.537	14301.392	705.819	60290.180
Total fertility rate	2.977	1.096	1.465	7.578
Urban population	69.244	16.274	23.760	98.946
Freedom House	5.355	1.358	1	7
Quality of Government	0.532	0.139	0.139	0.880
Effectiveness Score	3.968	2.761	0	11

Table A4: Cross-correlation matrix

	LE	IMR	HE	GDP	TFR	UP	FH	QoG	ES
Life expectancy	1								
Infant mortality rate	-0.949***	1							
Health expenditure	0.733***	-0.695***	1						
GDP	0.585***	-0.579***	0.794***	1					
Total fertility rate	-0.692***	0.672***	-0.492***	-0.286***	1				
Urban population	0.779***	-0.758***	0.612***	0.596***	-0.450***	1			
Freedom House	-0.223***	0.162	-0.285***	-0.065	0.375***	0.044	1		
Quality of Government	0.454***	-0.428***	0.452***	0.351***	-0.434***	0.223***	-0.506***	1	
Effectiveness Score	-0.728***	0.754***	-0.683***	-0.630***	0.471***	-0.588***	0.290***	-0.644***	1

NOTES: The symbol *** indicates statistical significance at the $p < .001$ level.

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