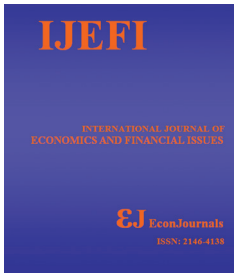

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The Impact of Corruption on Healthcare Services: Empirical Evidence from the MENA Region

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ABSTRACT

The aim of this article is to analyse the perceived effect of corruption on health for a sample of 15 MENA countries over the period 1996-2018. This study used an econometric approach and a system of simultaneous equations models (SEMs) to explore relationships among latent variables and to examine the direct and indirect effects of corruption on health. Results showed that corruption affect negatively health care services and hinders economic growth for the MENA region. Furthermore, we found a bi-directional causal relationships between economic growth and health, and as well as between corruption and economic growth. However, the results support the occurrence of unidirectional causality between corruption and health. These empirical insights are of particular interest to policymakers as they help identify areas that are sensitive to corruption in health sector and the palliative strategies to be put in place.

Keywords: Corruption, Economic Growth, Health, Simultaneous Equations Models
JEL Classifications: O11, O47, I1

1. INTRODUCTION

Over the past two decades, progress has been made in achieving global commitments set in the context of the Millennium Development Goals (MDGs). Legal frameworks, systems and procedures are in place in many countries; a substantial increase in public spending on social services such as education, water access and sanitation has been observed in most countries. However, the data on the achievement of the MDGs show an uneven progression across regions and countries. The reasons generally advanced for this uneven progression may be due to the inability of some countries to cope with entrenched disparities and inequalities or the inadequacy of financial resources from allocated to developing countries. Recent studies have also shown that may be explained by bad governance and huge bottlenecks, such as corruption that leads to diversion of valuable resources (Falkingham, 2004 and Vian, 2008).

Corruption may occur in any area of the health sector and happens when people abuse their own position to benefit themselves their organisation or other people close to them. It can take many forms including bribes, theft, or giving incorrect or inaccurate information deliberately. It is a social, political, and economic problem that threatens all sectors of economy (Vian, 2008). In the last 20 years, researchers and ploliticians show that the health sector is the most vulnerable to corruption owing to its complexity (Habibov, 2016). Because in health sector, corruption is literally a matter of life and death. It is within this framework that our research is conducted. It tries to test the perceived effect of corruption on the quality of health. More specifically, it goes beyond the traditional framework that seeks to test only the direct effect of corruption on health, and attempts to test the role that economic growth can play in mediating such a relationship.

Although there is a very little research exists to link corruption to the health, we can categorize economc theory related to this field into two schools of thought. Once school of thought conceptualises corruption as *sand the wheels* and suggests a negative impact of corruption (Clausen et al., 2011). Corruption,

encompassing unofficial out-of-pocket payments and gifts, is associated with lower propensity of using healthcare when needed (Falkingham, 2004; Balabanova et al., 2004 and Fan and Habibov, 2009). Bribes often constitute catastrophic expenditures for the poor (Habibov, 2011). Due to corruption barriers, more advanced and specialized health services remain out of reach for the poor (Habibov, 2010).

According to this school of thought, there is mounting evidence of the negative effects of corruption on the health and welfare of citizens (McPake et al., 1999; Gupta et al., 2002; Azfar and Gurgur, 2005; Lewis, 2005; Rose, 2006). As Savedoff and Hussmann (2006) clarifies, the health sector is vulnerable to corruption owing to: Uncertainty related to the demand for services (who will fall ill, when, and what will they need). Many stakeholders such as regulators, taxpayers, consumers and healthcare providers work together in intricate ways and with asymmetric information, making it hard to identify and control for diverging interests. Moreover, the health sector is unusual because private healthcare providers are entrusted with important public roles, and the large amount of budget allocations for health spending in many countries (Savedoff and Hussmann, 2006).

Besides, expensive hospital construction, high technologie equipment and the increasing arsenal of drugs needed for treatment, combined with a powerful market of vendors and pharmaceutical companies, present risks of bribery and conflict of interest in the health sector (Latham, 2001; Kassirer, 2006). Monopoly also creates opportunities for corruption by limiting the ability of citizens to choose other providers of services. If the government is the only provider offering medical services, for example, patients could be compelled to pay bribes to access those services. Government agents may also feel pressured by clients to accept bribes. This is especially true in situations where people are sick and suffering, and feel that bribes are the only way to ensure they receive the best possible treatment (Vian and Burak, 2006). Pressure may also be exerted by suppliers, or by other agents involved in corruption.

Uncertainty prevails within the sector: It is not possible to predict who will fall ill or to predict the timing of their illness. This makes it difficult to forecast the necessary medical supplies and services. It is also a sector characterized by asymmetric information, which is reflected in serious disparities in supplier, patient and product provider, care provider relationships. Doctors, for example, prescribe medications to patients, who presume that these drugs are the appropriate treatment for them. However, physicians may prescribe a particular product because a pharmaceutical company offers it financial incentives or the product may be recommended by the national health guideline developers for the same reasons, which is not recommended (PNUD, 2011).

The second school of thought conceptualises corruption as *grease in the wheels* and highlights the positive effects of corruption (Méon and Weill, 2010). First, corruption alleviates inefficiencies of administering public healthcare. Healthcare professionals consider their remuneration low and expect informal payments, while patients expect that they would have to pay out-of-pocket to underpaid professionals for additional or better quality services (Gaal and McKee, 2004; Vian and Burak, 2006). When expectations of healthcare professionals and patients match, then a transaction of paying and receiving unofficial payments takes place. In addition, corruption encourages competition. Individuals may pay bribes to receive necessary treatment free in public healthcare rather than to pay officially more for the same treatment in private facilities (Rose, 1998). Conceptualizing corruption as grease the wheels postulates that we should expect effect of healthcare satisfaction on corruption. Some rsearchers argue that corruption can have positive effects by creating parallel economic flows. Beyond the argument of corruption greasing the wheels of the economy, they see the corruption as a positive force (economically, socially) and redistributive.

In total, economic literature in the subject has not been able to conclusively establish the health quality effects of corruption. It is, thus, not quite clear whether the relationship between corruption and health care is negative as one might expect. The above short discussion shows that, from a theoretical perspective, the nature of the relationship is ambiguous. Corruption is conceptualised as sand the wheels and at the same time grease in the wheels. Questions that arise are: What effect outweighs the other? Is there compensation between the positive and negative effects of corruption on health? In this paper, we use aggregate annual panel data from World Wide Governance Indicator and World Development Indictors for a sample of 15 MENA countries from 1996 to 2018 in order to estimate a model exploring relationships between corruption, economic growth and health.

The present study is different from existing literature in the following ways. First, we are trying to test the interaction among corruption and health because in the health sector, corruption is literally a matter of life and death. Second, given the lack of consensus about the effects of corruption on health, we focus on testing the nexus between corruption, economic growth and health using simultaneous equations models (SEMs). To the best of our knowledge, none of the empirical studies have focused on investigating simultaneously these relashionships via the SEMs. In particular, this modeling approach examines simultaneously the following combined causality effects that run: (i) From corruption and economic growth to health; (ii) from health and economic growth to corruption; and (iii) from health and corruption to economic growth. Third, there is little empirical evidence which shows the way corruption affects health. Finally, our main contribution in this study is to provide a unified empirical framework that allows determining simultaneously the direct and indirect effects of corruption on health and calculating the toal effect. Furthermore, a clearer understanding of this link can help policymakers as they help build sound economic policies to ameliorate the governance of health system.

The remainder of the paper is organized as follows: The model specification, the econometric methodology and analyses data are outlined in section 2; the empirical results are presented and discussed in section 3; and main conclusions and some policy implications are offered in the final fourth section.

2. THE ECONOMETRIC MOTHODOLOGIE

2.1. Model Specification

To empirically investigate the direct and the indirect impact of corruption on health quality, one needs to specify a model that allows us to capture the interrelationships that exist among corruption, economic growth and health. In particular, one needs a model that allows us to endogenize economic growth, with corruption included as a determinant of economic growth. As mentioned above, most existing literature supposes that corruption affect economic growth. It has also established that economic growth affect health system. It is therefore worth investigating the interrelationships between the three variables by considering them simultaneously in a modeling framework. Our illustrative framework suggests that there is a causal relashionships between the three variables. We think that a simultaneous equations models (SEMs) may be more appropriate as was our problem, insofar it may test simultaneously the effects of corruption on health directly and indirectly. The SEMs method is the estimation method most commonly used in models with panel data and in the multiple-way linkages between certain variables. Therefore, we specifie a basic econometric model that consists of a series of three main equations describing the behaviour of the endogenous variables. In particular, the model consists of a health equation, and two other equations; one for corruption and the other for economic growth: The first (health equation) tests the direct effects and the two other equations test the indirect effects.

In specifying health equation, we include a set of control variables that have been identified by empirical literature as robust determinants of health (Dhrifi, 2018). We first incorporate, in addition to corruption and economic growth, five other variables which are identified by related literature as key determinants of health status: These are health public expenditure, CO_2 emission, water access, density of physicians and urbanization.

The second endogenous variable in the model is GDP growth. Based on Barro (1996), we model as an equation of economic growth, in addition of the health and corruption variables, a set of macroeconomic variables that are commonly used as factoring explaining economic growth: Inflation, trade openness, financial development and the rate of investment. These variables have been traditionally flagged as important factors in explaining variations of economic growth.

The third endogenous variable is corruption. The set of explanatory variables, drawing on the existing literature on determinants of this variable, includes GDP growth, health indicator, inequality, education and political stability (Gyimah-Brempong, 2002).

The three-way linkages between these variables are empirically examined by making use of the following three simultaneous equations:

$$\text{Health}_{it} = \lambda_0 + \lambda_1\text{CCOR}_{it} + \lambda_2\text{GDPG}_{it} + \lambda_3\text{CO}_{2it} + \lambda_4\text{URB} + \lambda_5\text{PHYS}_{it} + \lambda_6\text{WAT}_{it} + \lambda_7\text{HPE}_{it} + \xi_{1it} \quad (1)$$

$$\text{GDPG}_{it} = \beta_0 + \beta_1\text{CCOR}_{it} + \beta_2\text{Health}_{it} + \beta_3\text{INF}_{it} + \beta_4\text{FD}_{it} + \beta_5\text{TRADE}_{it} + \beta_6\text{RI}_{it} + \xi_{3it} \quad (2)$$

$$\text{CCOR}_{it} = \alpha_0 + \alpha_1\text{GDPG}_{it} + \alpha_2\text{Healh}_{it} + \alpha_3\text{EDUC}_{it} + \alpha_4\text{INQ}_{it} + \alpha_5\text{PS}_{it} + \xi_{2it} \quad (3)$$

Where, Health is proxied by life expectancy at birth; CCOR design control of corruption[1] GDPG represent growth of GDP per capita; CO_2 is carbon dioxyde emissions (metric tons per capita); URB design urbanisation (the urban population as a share of the total population); PHYS is an indictor which measure the number of physisians as per thousand population; WAT represent access to drinking water, it is measured by the proportion of households that use water from the faucet, protected wells and boreholes considered drinkable; HPE design health public expenditure (% GDP); PS represent political stability; FD is an index measuring financial development (total credit to the private sector as a ratio of GDP); TRADE design trade openness (% of exports and imports of GDP); RI represent the rate of investment; INF is an indicator of inflation measured by consumer price index; INQ is a proxy of inequality measured by Theil index; EDUC design education measured by secondary sckool enreolement and PS is political stability. Where, i denotes the country (i =1,…, 15) and t denotes time period (t = 1996,…, 2018); ε_{it} is the error-term assumed to be distributed independently in all time periods of the country i.

2.2. How Does Corruption Affect Directly and Indirctly Health?

The interest of this study centres on the way in which corruption affects health directly and indirectly via economic growth. Equation (1) shows that a change in corruption by one unit causes health to change by an amount equal to λ_1. Furthermore, equation (1) shows that a change in economic growth by one unit causes health to change by an amount equal to β_1. However, equation (2) shows that a change in corruption by one unit can also induce a change in the GDP growth index by an amount equal to α_2 which means that the effect of change in corruption by one unit is not limited to its direct impact on health, but also includes the indirect impact via economic growth channel. Thus, the global effect of corruption on health equals the sum of indirect and direct effects. This impact can be calculated by finding the derivative of health equation with respect tocorruption index, which is equal to:

$$\frac{\partial Health}{\partial CCOR} = \beta_1 \frac{\partial GROWTH}{\partial CCOR} + \lambda_1 = (\beta_1 * \alpha_2 + \lambda_1) \quad (4)$$

The above expression makes it clear that the impact of corruption on health is twofold: The direct impact, which is equal to λ_1 and the indirect impact, which is equal to β_1 multiplied by the derivative of economic growth with respect to corruption. Equation (2) in the model shows that the derivative of economic growth with

1. It is a score provided by World Wide Governance In dictors and that ranges from -2.5 to 2.5; the higher the score, the more the country is less corrupt.

respect to corruption is $\frac{\partial GROWTH}{\partial CCOR} = \alpha_2$. Thus the total impact of corruption on health equals to $\beta_1^* \alpha_{2+} \lambda_1$. Estimating the above complete system of equations allows us to determine the total effect of corruption on health.

2.3. Data Analyses

The variables used in this study are chosen in accordance with the economic theory and data availability. The sample used is annual data covering the period 1996-2018 for 15 MENA countries namely Algeria, Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, Turkey, UAE and Yemen which are considered for this panel analysis. Selected indicators are more relevant and commonly used in explaining corruption and health care nexus: GDP growth, CO_2 emission, trade openess, financial development, urbanisation, water access, inflation, the rate of investment, health public expenditure and physisians per 1000 people are taken from World Development Indicators (WDI). Theil index is provided by the University of Texas. Regarding the control of corruption and political stability variables are taken from the World Wide Governance Indicators (WGI).

Table 1: Descriptive statistics

Variables	Obs	Mean	Std. dev	Min	Max
CCOR	345	−0.062	.615	−1.670	1.722
GDPG	345	4.068	3..825	−37.146	26.170
Health	345	72.897	3.825	59.504	78.584
Water	345	75.354	3.568	49.343	93.848
URB	345	0.596	1.635	0.517	0.678
HPE	345	4.4525	1.046	1.072	9.293
PHYS	345	5.167	2.834	3.543	12.325
CO_2	345	14.073	7.235	2.685	33.254
RI	345	23.578	6.917	2.986	40.872
INF	345	8.278	6.637	1.983	186.235
FD	345	49.254	32.499	0.082	168.874
TRADE	345	0.652	0.296	0.622	1.774
PS	345	0.015	0.954	−2.355	1.826
EDUC	345	87.235	3.874	49.714	97.356
INQ	345	0.058	0.053	0.004	0.358

Source: Statistics provided by the author

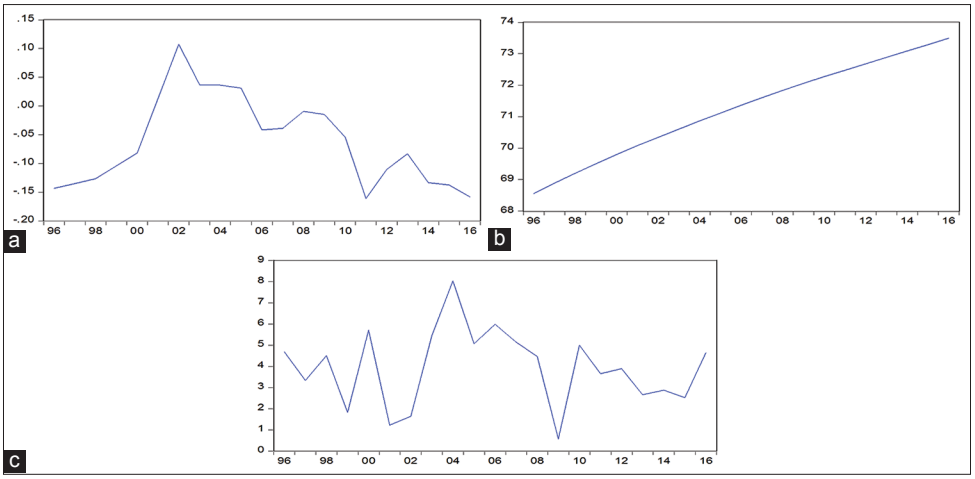
The descriptive statistics of different variables for the global panel are given below in Table 1. As regards our interested variables, an interesting observation is the low average of the corruption index, indicating that MENA countries are perceived to be highly corrupt. We notice that control of corruption score is generally negative in most countries of the region, it equals −0.06 on average and it ranges from a minimum of −1.67 and a maximum of 1.72. According to the Figure 1 presented below, we notice that if the corruption tended to decrease between 1996 and 2002, this score has fallen dramatically in the last 15 years. According to the latest statistics provided by World Wide Governance Indicators (2018), we can see that Yemen is the most corrupt country in the region with a rate of (−1.67), followed by Lebanan, Iran, Algeria and Egypt respectively with scores of −0.97, −0.72; −0.69 and −0.63. However, one also observes from the sample statistics that the United Arab Emirates, Qatar, Oman, Jordan and Saudi Arabia are the least corrupt countries in the region respectively with scores of 1.26; 0.92; 0.37 and 0.23.

If we consider the GDP growth rate per capita, we find that on average countries in MENA region have registered a growth rate of around 4.06 during the considered period. Although this rate reach a maximum of 26.317 in Qatar in 2006, it have negative values arriving to −37.14% in Yemen in 2015. It appears also to be the most volatile variable (Figure 1 below) in our model whith a heighest coefficient of variation (5.05). For the third variable of interest which is life expectancy at birth, we notice that a new born on MENA region may live 72.89 years on average. This figure varies between a minimum of 59.5 and a maximum of 79.5. The figure presented below shows that the curve has an ascending pace suggesting that health care conditions are improving in the MENA region during the considered period.

2.4. Estimation Techniques

Recall that, according to the above discussion, the simultaneous equations models is the more appropriate as was our problem, insofar it may test simultaneously the interrelationships between our three interested variables. This estimation method is the most commonly used in models with panel data and in the multiple-way linkages between certain variables. It is normally used when the

Figure 1: (a-c) Trends in control of corruption, life expectancy at birth and GDP growth for the Mena region



Source: Figure prepared by the author based on the data provided by World Development Indictors and World Wide Governance Indicators

endogenous variable in one equation becomes an exogenous variable in another. Estimation methods that can be used in the context of simultaneous equation models depend on identification criteria[2] for estimating the model and the endogeneity problem. In the present case, the model is over-identified, so using ordinary least squares (OLS) to estimate the structural equations will result in inconsistent estimates for the model parameters. The model therefore, has an endogeneity problem of order two, which is why estimation by OLS would be double registered. This estimation method is based on the three-stage least squares (3SLS) technique, which aims to solve endogeneity problems by introducing the problematic variables as instrumental variables. Treatment with STATA gives a solution using the 3SLS method.

2 To determine whether a structural equation in a system of linear simultaneous equations is identified, the following rule can be used: G = total number of endogenous variables in the model (i.e. in all equations that comprise the model); K = total number of variables (endogenous and exogenous) excluded in the equation being checked for identification. The order condition is as follows: if K = G – 1 the equation is exactly identified; if K > G – 1 the equation is over-identified; and if K < G – 1 the equation is unidentified.

Table 2: The effects of corruption on economic growth and health

Variables	Health	GDP growth	Control of corruption
Health	--	0.73	0.41
	--	(1.832)**	(1.468)
CCOR	0.31	0.41	--
	(12.56)***	(1.776)**	--
GDPG	2.33	--	0.218
	(4.195)**	--	(6.203)***
CO_2	−0.47	--	--
	(7.892)***	--	--
PHYS	0.73	--	--
	(5.38)***	--	--
WAT	0.49	--	--
	(3.677)**	--	--
HPE	0.084	--	--
	(0.98)	--	--
URB	0.93	--	--
	(5.35)***	--	--
TRADE	--	0.226	--
	--	(3.647)**	--
INF	--	−0.06	--
	--	(2.395)**	--
RI	--	3.67	--
	--	(2.646)**	--
FD	--	0.48	--
	--	(0.92)	--
RI	--	2.81	--
	--	(2.146)**	--
INQ	--	--	0.43
	--	--	(9.659)***
EDUC	--	--	3.93
	--	--	(2.504)**
PS	--	--	0.807
	--	--	(1.767)*
CST	4.79	2.64	5.912**
	(8.365)***	(7.514)***	(11.378)
Observations	345	345	345
R squared	0.33	0.29	0.36

*significant at 10% **Significant at 5%; ***Significant at 1%. CCOR represent control of corruption index; GDPG design GDP growth; Health is measured by life expectancy at birth; CO_2 is carbon dioxyde emission; URB is Uurbanization; WAT represent water acces; HPE represent health public expenditure; PHYS is nymber of physicien per 1000 people; FD is the indicator of financial development; INF is the inflation rate; TRADE is trade openness; RI is the rate of investment; INQ represent inequality; EDUC is education and PS design political stability.

3. RESULTS AND ANALYSES

This section presents the regression results for our estimable equations. Table 2 presented below reports the estimation results of the estimated model using the 3 SLS method for the period 1996-2018. The first row shows the results for the health equation, in which the parameters of interest are as follows: The coefficient that represents the effect of corruption and GDP growth on health. The coefficients of these variables of interest have the correct signs and are statistically significant. The estimated coefficient on control of corruption shows a clear positive relationship between good governance and life expectancy at birth. The $\lambda_1 = 0.31$ value for this model measures the elasticity of health status with respect to control of corruption. This suggests that an increase in control of corruption implies wider access to health care and other services. That's to say that a high rate of corruption affects negatively health systems and leads to a decrease in life expectancy at birth. This funding is similar to those found by (McPake et al., 1999; Gupta et al., 2002; Azfar and Gurgur, 2005; Lewis, 2005; Savedoff and Hussmann, 2006 and Rose, 2006 and Nazim, H. 2016). It coincides also whith the scholol of thought that conceptualised corruption as sand the wheels.

The results also demonstrate that GDP per capita growth has a positive and significant effect on health. This implies that with a 1% increase in per capita income growth, life expectancy at birth rises by 2.33 of a percentage points. A high growth rate would be expected to solve problems of food insecurity, the decrepit nature of buildings and equipment, the lack of adequate social infrastructure and the insufficient budget to reduce mortality. Moreover, higher incomes lead to improved public-health infrastructure such as water and sanitation, along with better nutrition, better housing and the ability to pay for health care (Pritchett and Summers, 1996; Cutler et al., 2006 and Dhrifi, 2018).

For the rest of explanatory variables, they have the expected signs expect of health public expenditure. This variable appears to be positive and statistically insignificant. This is due to the incapacity of the governments to control the funds use. This is the case of most of the developing countries which suffer from a high-level corruption and misallocation of resources Omri (2013). From these results, it is clear that MENA region countries should orient their economic policies to changes and promote the government expenditure. The results regarding environmental quality variables measured by CO_2 emissions show a negative and significant effect on health at the 1% level suggesting that a 1% increase in CO_2 emission decrease the level of life expectancy at birth by around 0.47%, which is consistent with the results achieved by (Dhrifi, 2018). This implies that the more is the CO_2 emission, the less is the life expectancy at birth. This implies that environmental quality is a real determinant of health.

In the case of urbanization, the coefficient shows that a 1% increase in the urban population will decrease the life expectancy at birth

by 0.93% point. This may be due to the fact that health care is typically more accessible in urban areas, and because the private cost of accessing health care (such as transport costs) may also be lower for urban households (Shultz, 1993). For the coefficient of density physician variable, it appears to be statistically significant at the 1% level. Thus, a higher density of physicians indicated more easily accessible health care, and should correlate with a higher life expectancy at birth.

The second row of Table 2 reports the results of the estimation of the economic-growth equation, showing that the coefficient of control of corruption is positive and significantly different from zero at a confidence of 95 % level. A one standard deviation increase in control of corruption (one unit deccrease in corruption) is associated with about 0.41% point increase in the growth rate of real GDP per capita. This implies that reducing corruption by one standard deviation will therefore increase the growth rate of real GDP by 0.41% point on average in MENA region, all things equal. The positive and significant coefficient of control of corruption is consistent with the results of Mauro (1995; 1997); Li et al. (2000); Rose-Ackerman (1999); Wei (2000); Tanzi and Davoodi (1997), as well as with the theoretical postulates of Shleifer and Vishny (1993); Ehrlich and Lui (1999); Braguinsky (1996). However our results differ from those of Fiorino et al. (2012). and Akai, N. et al. 2005 who show that the effect of corruption on economic growth is negative and statistically significant in the middle and long spans but insignificant in the short span.

The β_2 value for this model, which measures the elasticity of economic growth with respect to health, appears statistically significant at the 5% level, showing that a one standard deviation increase in health indicator may promote economic growth by about 0.73% point. This indicates that poor health is a major constraint on GDP growth. Better health increases labour productivity by reducing the number of days lost to sick leave, incapacity or disability. Moreover, healthier workers are physically and mentally more energetic and thus more effective in the labour market which may promote by consequence GDP growth, Dhrifi (2018).

Then, rising inflation creates uncertainty which negatively affects economic growth. A 1% increase in the consumer price index decreases GDP growth by about 0.06% point. This result is interpreted in accordance with the theoretical predictions which provide that inflation is a factor worsening growth because it has a negative impact on the real value of assets and the purchasing power of household incomes (Kpodar, 2006). In other words, inflation tends to exert an adverse impact on the real growth. The impact of trade variable of the economy is positive (Kahouli and Kadhraoui, 2012). This result supports the idea that openness policy through the abolition of trade barriers and free movement of capital flows promote economic growth. What is not expected, however, is that the effect of domestic credit to private sector on economic growth is positive and statistically insignificant. Finally, the coefiicient of rate of investment is positive and significant at the 95% confidence level. This indicates that investment rate is positively correlated with the growth rate of real GDP. The positive coefficient of investment is consistent with endogenous growth theory which argues tha investment is an important determinant of long term economic growth.

The findings of the control of corruption equation represent the third concern of this study, as it regards the effects of health, GDP growth, income inequality and political satbility on corruption. In this third specification, the estimated coefficient of health appears to be positive and statistcally insignificant. However, the estimated coefficient of economic growth appears to be positive and significant at 1 % level. This implies that a development towards more corruption will thus yield a decrease in the growth rate, and vice versa. This fundings are similar to those found by (Mauro, 1997; Treisman, 2000; Vian, 2008; Buehn and Schneider, 2012 and Ahmad et al., 2012).

The coefficient of theil index obtained bin column 3 is negative and significantly different from zero indicating that increased inequality is associated with decreased control of corruption. In other words, the estimate coefficient of theil index suggests that a 1 unit increase in income inequality decreases the corruption coefficient by about 0.43% point, which confirms the results found by (Li et al., 2000; Gupta et al., 2002 and Dincer and Gunlap, 2008) who found a positive relationship between corruption and income inequality. Similary the same results are found by Samadi and Farahmandpour (2013) who explored the effects of income inequality on corruption based on the country's economic freedom by categorizing countries according to their economic freedom. The study classifies countries into four groups according to their average of economic freedom in four groups (free, mostly free, mostly unfree and unfree countries). The results show that there exist positive relationship between corruption and income inequality in free as well as mostly free countries as decrease in one lead to other in same way while negative relationship exist in mostly unfree countries as decrease in inequality worsen the corruption due to their monitoring system.

As regards the α_3 value for this model, which measures the elasticity of corruption with respect to education, it appears to be positively and statistically significant at 5% level, which indicates that education and human capital in general is a major determinant of corruption. This result coincides whith those found by Viorică et al. (2011) who investigated the impact of education on corruption in Romania by using time series data from 1997 to 2009, the result suggests that corruption is significantly and negatively correlated with the level of education. Similary Glaeser, E.L., Saks, R.E. (2006), investigated the causes and consequences of corruption in the U.S. They found that more educated states, and to a smaller degree richer states, have less corruption. Finally, the estimated coefficient of political stability appears to be positively correlated to control of corruption showing that the more stable the political environment, the lower is the level of corruption.

Figure 2: Interaction between corruption, economic growth and health for MENA countries

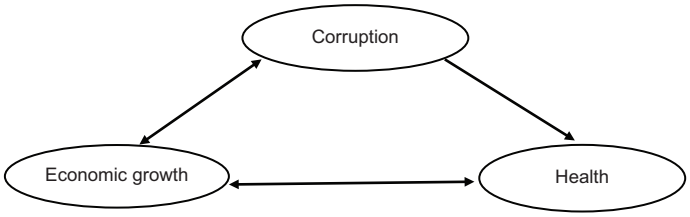


Table 3: Decomposition of the total impact of corruption on health

Coeficient	The direct impact of corruption	The indirect impact via economic growth	Total effect of corruption on health
	λ_1	$\beta_1 * \alpha_2$	$\lambda_1+\beta_1 * \alpha_2$
Estimation	0.31	0.73 * 0.41= 0.299	0.31+0.73 * 0.41= 0.609

Source: Developed by the author using the results provided by Table 2

Overall, we can conclude at the end of this estimation that the huge of corruption affect negatively health care services and hinders economic growth for the MENA countries. Our findings provide also evidence of bidirectional causality between GDP growth and health, between corruption and growth and there is unidirectional causal relationship that runs from corruption to health without any feedback (Figure 2).

3.1. Calculation of the Total Effect of Corruption on Health

After testing the direct and the indirect impact of corruption on health, we now proceed to quantify the total impact (direct and indirect effect). Mathematically, direct and indirect effect of corruption on health can be expressed using equaion 4 presented above. Table 3 summarizes the results regarding the impact of corruption on health: As reported in the table, the results show the direct impact of corruption on health where an increase in control of corruption by one point leads to an increase in life expectancy at birth by $\lambda_1 = 0.31$ points. As for the indirect impact of corruption on health, it can be computed by the product of the coefficient of economic growth in the health equation and the coefficient of corruption in the the economic growth equation ($\beta_1 * \alpha_2 = 0.73 * 0.41= 0.609$). Thus, the combined effects suggest that the total impact of corruption is equal to the sum of the direct and indirect effects which is 0.6 and indicates that an increase in corruption by one point leads to a decrease in the rate of the life expectancy at birth by about 0.6 point divided in a direct impact of 0.31 and an indirect impact of 0.29 point. This suggests that the indirect impact is of considerable volume and is comparable to the direct or traditional impact of corruption on health.

4. CONCLUSION AND POLICY IMPLICATIONS

Corruption is wide spread in real life and now also it is a popular topic in economic research. It is present in all the countries of the world and it touched all sector of the economy. While the literature on the impact of corruption on economic growth has increased over the last few years, there is lack of consensus about the effects of corruption on health sector. The objective of the present study is to fill this research gap by examining the above interaction for 15 MENA countries over the period 1996-2018. More specifically, this paper stains to determine the perceived effect of corruption on health taking into account the role that can play economic growth in mediating such relashionship. To do this, we focus on testing the nexus between corruption, economic growth and health using simultaneous equations models (SEMs).

Our results suggest that corruption affect negatively health sector and hinders economic growth. It is showed that a one standard deviation increase in corruption index may reduce life expectancy at birth by about 0.6% point divided in a direct impact of 0.31 and an indirect impact of 0.29 point. This implies that corruption is considered as one of the single largest obstacles to health sector and economic and social development on general. Empirical results show salso a bi-directional causal relationship between economic growth and health and as well as corruption and economic growth. However, the results support the occurrence of unidirectional causality that runs from corruption to health without any feedback. These empirical insights are of particular interest to policymakers as they help to identify the areas that are sensitive to corruption in health sector and allow putting in place anti-corruption strategies. We think that a lot of attention to governance is important to the ability of health systems to fulfill essential public health functions. There is general agreement that good health governance is characterized by responsiveness and accountability; an open and transparent policy process; to prevent any possibility of corruption, it is particularly important to create mechanisms for promoting transparency and ensuring that everyone reports on its results. It is also necessary to improve the chances of detection and to provide for the appropriate enforceable sanctions in case of proven corruption. The development of strategies to prevent or control corruption requires a good understanding of the factors that determine the characteristics of acts of corruption.

Finally, the prevention and control of corruption requires a real political will. It should be noted that the political will remains difficult to assess and that there is a risk of overestimating the reform intentions of senior officials and underestimating the political stakes they face in fulfilling their promises when they are sincere. Knowledge of the health sector and sufficient resources to implement planned strategies and interventions may be necessary.

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