How Corruption affect Growth in MENA region? Fresh Evidence from a Panel Cointegration Analysis

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Abstract

This paper aims at analyzing the effects of corruption on investment and growth in 15 Middle East and North African (MENA) countries during the period 1985-2013. We used the International Country Risk Guide (ICRG) corruption index and we conducted a panel cointegration analysis and Granger causality procedure to detect the dynamic relationships between the variables. The main findings of this paper show that corruption is a serious hurdle to economic growth in MENA countries since it affects investment activities and foreign direct investment inflows. In this case, policymakers have to implement effective anti-corruption strategies to avoid the epidemic of corruption.

Keywords: Corruption, Investment, Growth, PVECM, MENA

1. Introduction

It is commonly acknowledged by economists and international organizations that corruption remains one of the prevalent challenges to our modern society. Corruption hinder growth and prosperity by distorting business activity, reduce investment, dampen the intended effect of policies and hinder the functioning of institutions (Sequeira 2012). Since the nineties a huge amount of theoretical and empirical papers have been carried out to examine the origin of corruption, its determinants, its consequences, and the effective anti-corruption strategies that could stop its widespread. The topic was firstly analyzed by the seminal work of Leff (1964) who opined the close linkage between corruption and economic growth. Since that, a huge amount of papers have been carried out to test the determinants and the reel effects of corruption for different countries by the use of different econometric procedures (OLS, 2SLS, ECM, VAR, PVAR, VECM, PVECM etc.). Despite the vast amount of studies, the empirical findings provide conflicting results. In fact, while corruption appears to affect growth for some countries (Del Monte and Papagni (2001), Akai *e*t *al* (2005). Ajie and Wokekoro (2012), Nguyen and Van Dijk (2012), Donga and Torgler (2013), Beekman *et al* (2014)) it does not have any effects for other countries. Some researches show that corruption could even be profitable for growth (Leff (1964), Huntington (1968), and Friedrich (1972) Hines (1995),).

Literature has used various indices for measuring corruption. The most used are Business International (BI), the Transparency International index (TI) and the International Country Risk Guide (IRCG). BI published indices on 56 "country risk" factors for 68 countries, for the period 1980-1983, and on 30 country risk factors for 57 countries, for the period 1971-1979. The BI indices are between 0 and 10 and a high value of the index means that the country in has "good" institutions. The corruption perception index (CPI) provided by International Transparency (IT) ranks countries according to the extent by which corruption is believed to exist. It was created in 1995 by Transparency International and includes almost 200 countries on a scale of zero to 10, with zero indicating high levels of corruption and 10 indicating low levels. Since 2012, the scale of CPI varies between 0 and 100. Developed countries typically rank higher than developing nations due to stronger regulations. The ICRG index rates 140 countries each month on the basis of over 40 risk metrics affecting political, economic and financial risk, dating back to 1984 for most. The ICRG corruption index varies from 0 to 6, with higher values indicating higher corruption.

Despite the existence of various studies on the relationship between corruption and growth, the topic remains till this day on the timetable of the scholars, international organizations and policy makers. Hence, in this paper we aim at studying the dynamic relationship between corruption and growth in Middle East and North Africa (MENA henceforth) region. The selected region is an interesting case study for various reasons. First, almost all MENA countries have liberalized their economies in the nineties, ratified most of the international agreements (GATT, Free Trade Agreement, WTO, etc.) and increased their partnerships with numerous western countries. Consequently, several MENA countries have seen their role in the global economy as investors and trade partners improved and they became a major player

in the global capital markets with their powerful sovereign funds and exchange reserves (Hamdi and Sbia 2013). Second, MENA countries have witnessed buoyant economic growth during the past few years with the average growth rate in the last ten years (4.7% during 2002-2012). Furthermore, many of the MENA countries have become a center for international business and investment and many countries have experienced massive inflows of foreign capital for investment such as Tunisia, Morocco and the GCC countries. FDI has dramatically increased in the MENA with the inflows increasing by 6 times from 1990 to 2000 and by 12 times from 2000 to 2010 (Ernst &Young 2013). This in turn have boosted the economic activities and created employment. Third most of the countries have similar socioeconomic characteristics and this make the comparative analysis more effective. Fourth, since the seventies, the MENA region has been the subject of a large literature on oil and energy sector, banks and financial market, trade and economic growth. However, to the best of our knowledge, comprehensive studies on corruption are very limited. In was argued in recent literature by international organizations that corruption in the Arab world in general and in the MENA region in particular is one of the main fundamental causes of the social upheavals that happen since 2010. Corruption was epidemic in the different sectors of the economy in particular in the political sector. According to an investigation of Transparency International (2010), 36 % of the Arabs had to pay repeatedly bribes to public state employees.

For all these reasons we are aiming in this paper at analyzing the concept of corruption, causes and consequences on FDI and Growth in selected MENA countries. In the empirical section we use data which covers the period 1985 to 2013. While most of the previous studies have employed GMM and OLS techniques, we opt for the present study a Panel vector error correction model and cointegartion technique to detect causality between the variables used in the model. Using PVECM is very useful in case of a multivariate framework as it helps investigating the dynamic relationship between the different variables. Beyond economic growth (proxied by GDP per capita) and corruption (measured by ICRG index) we include in the econometric model: foreign direct investment as a percentage of GDP (FDI), domestic investment as a percentage of GDP (Inves) and total credit to the private sector (CPS). Therefore, the use of PVECM will provide more than one conclusion that GMM and other panel data techniques cannot provide.

The main findings of this paper show that corruption is a serious hinder of economic growth in MENA countries and some serious policy actions have to be done to stop the widespread of corruption.

The rest of the paper is organized as follows: section 2 gives a brief recent literature review, section 3 gives a glance at the propagation of corruption in MENA countries, section 4 provides the methodology, section 5 gives the empirical results and finding while section 6 concludes.

2. Corruption, FDI and Growth: A brief recent literature review

Broadly, literature on the economic and social consequences of corruption on growth is vast. The first academic articles were published in late 60s by the pioneering works of Leff (1964), Myrdal (1968) and Huntington (1968) and later by North's (1990, 1994), Mauro (1995) and Bardhan (1997).

During the past recent years, the topic has received a great deal of attention by policymakers, governments and scholars as well. This shows the importance of corruption which is considered as the main impediment to growth especially for less developed countries. Despite the conflicting results of the impacts of corruption on growth in developed countries, most of the recent papers have argued that corruption hampers economic development and then recommended a quick policy actions and reforms to fight its widespread. However, some other researches support the idea that corruption does not have potential effects on growth but it could even be profitable for economic development. For example, Akcay (2001) conducted an empirical study to test the consequences of the level of corruption on FDI inflows for a sample of 52 developing countries. In his research, he employed two different indices of corruption and conducted an OLS regression with region dummies. Surprisingly, the results reveal that corruption is not found to be an obstacle to growth in the sample. He argued that the market size, corporate tax rates, labor costs and the openness of the economy are the main determinants for FDI inflows. In a similar study by Evrensel (2010), he examined the relationship between corruption-growth nexus using a sample of 121 developed and developing countries. His model found that only corruption controls the relationship between the governance-related variables and growth rates and government effectiveness significantly and adversely affect the average growth rate. Regarding the relationship between growth volatility and governance-related variables, the results suggest that higher corruption control, expropriation risk control, government effectiveness, and government consumption decrease growth volatility.

In another finding, Mutaşcu (2010) conducted a study to examine the relationship between corruption and political, administrative and economic determinants factors for a panel of 27 European countries observed during the period 1996-2008. Using a regressive pool data model, the results reveal that corruption has a significant negative impact on the human well-being (measured by the Human Development Index).

The study of Azam *et al* (2013) uses a sample of 33 Less Developed Countries (LDCs) observed over the period 1985-2011 to test whether corruption affect FDI or not. Using a panel data methodology they found that the level of FDI inflows in LDCs is influenced by the level of corruption, market size and inflation rate. In another type of study, Saha and Gounder (2013) examined the relationship between income and corruption using recent data covering 100 countries and by regions and income classification for the period 1995 to 2008. To explore the non-linear relationship, they performed linear, quadratic and cubic models. Their results indicate a negative relationship between income and corruption.

Castro and Nunes. (2013) analyzed the impact of corruption on FDI inflows in 73 countries during the period 1998-2008. Empirical findings based on the fixed effect GLS regression indicate that countries with a lower level of corruption have the greater FDI inflows. Results indicate also that controlling corruption may be considered as determinant to increase the level of FDI inflows. On the other hand, Okada and Samreth (2014) tested the effect of foreign direct investment on economic growth. They have used a sample of 130 countries from 1995 to 2008. Empirical results indicate that FDI alone does not spur economic growth. However, its effect is significant if the interaction term between FDI and corruption is considered. FDI has a positive impact on economic growth when corruption is severe, but a negative impact if corruption is below a certain level.

Based on a sample of 60 non-OECD countries over the period 1985–2002, Delgado *et al* (2014), have investigated initially the effect of FDI on the economic growth and especially haw can this impact varies with the level of corruption. Secondly, they have analyzed the corruption- growth linkage. To this end, they used a semi-parametric model which is able to detect haw corruption can impacts simultaneously the level of FDI and the economic growth. The empirical result of this research reveals that corruption exerts nonlinear effect on the FDI-growth relation, weakening the effectiveness of FDI at improving growth rates in many developing countries.

In the Asian context, Quazi (2014) has used the GLS panel data methodology to analyze the effect of corruption on FDI inflows in East Asia and South Asia during the period 1995-2011. The findings indicate that corruption impacts significantly negatively the level of FDI. Turning now to the African continent; Quazi *et al*.(2014) have used a dataset of 53 African countries over the period 1995-2012 to analyze the impact of corruption on FDI inflows. They conducted the dynamic System Generalized Method of Moments modeling framework. Empirical results indicate that corruption facilitates FDI inflows in Africa. Findings indicate also that the level of FDI is significantly affected by market size, government effectiveness, infrastructure, and economic freedom. For the same African continent, Onyinye (2014) have used a sample of Sub-Saharan African Countries during the period 2005-2011 to investigate the relation between corruption and FDI. The OLS regression indicates that there is a negative but not significant correlation between FDI and the level of corruption. Also, gross capital formation does not play a major role in attracting FDI. In contrary, the GDP growth is considered as more relevant in attracting FDI in Sub-Saharan Africa.

3. Corruption, FDI and Growth in the MENA region

During the past few years, many MENA countries have experienced social upsurges and demonstrations against their government. Generally speaking, an explosive mix of socio-economic problems and widespread and deepening political grievances constituted a common causal thread behind all the uprisings (Dalacoura 2012). Corruption was among the main reasons that pushed people to protest during the period 2010-2011 as it was endemic and exaggerated in these MENA countries. In fact, households have to pay money to get whatsoever from the public sector. This situation vexed people and hence unprecedented

demonstrations were recorded in most Arab countries which in turn forced some governments including Tunisia, Libya, Egypt and Yemen to recede and to leave the political scene. Some other upsurges end to dramatic conflicts and even to civil war such as the case for Syria.

The investigation of Transparency International in 2010 reveals that 36 % of the Arabs had to pay repeatedly bribes to public state employees. More recently, Transparency international (2012) studies the causes of corruption in five countries of the MENA[1] region, shows that the contextual factors such as the insecurity and the oil wealth and the institutional factors are the most determinants of corruption in these countries. The report of Revenue Watch (2011) indicates that the oil income feeds the corruption and weak the public institutions. Numerous other publications showed that the oil wealth in the MENA countries often go in parallel with losses of liberty, polarization of the disparities. (Dunning.2007, Di John, 2007 and Schwarz, 2008).

The level of corruption in the MENA countries can be explained also by the poor governance in this region. The quantitative picture reveals a gradation in the quality of governance in MENA. Worldwide Governance Indicators (WGI) aims to measure the quality of governance in a particular nation using six metrics: Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. An examination of the evolution of the level of those indicators reveals that almost all the MENA countries recorded negative scores. According to the WGI indicators, especially the control of corruption, nine countries of fifteen have recorded negative scores. For example, the control of corruption score for Algeria crossed from -0,47 in 1996 to reach -0,53 in 2012. Also, Egypt recorded negative value during the period 1996-2012. The control corruption score was -0,06 in 1996 to become -0,57 in 2012. Iran and Syria are the two countries which have the weakest score. Iran have registered a score of -0,99 in 2010 and -0,92 in 2011. This score was about -0,64 in 1996. Contrary to Iran and Syria, Tunisia and Turkey have recorded the highest score for controlling corruption although that those scores appear negative. The control corruption score for Tunisia crossed from -0.22 in 1996 to reach -0,18 in 2012.

For the second index of governance relative to the voice and accountability, fourteen of fifteen countires of our study recorded negative scores. Only Cyprus registered positive values which crossed from 1, 03 in 1996 to reach 1,00 in 2012. Consequently, we can consider this index as the weakest component of governance indicators in the MENA countries. For the index of rule of law, we can consider it as respected on average. Only five countries of fifteen have recorded negative scores. Those countires are Algeria, Iran, Syria, Tunisia and Turkey. Similarly to the index of rule of law, only six countries recorded negative values when the index is the government effectiveness. Finally, when we analyze the political stability and absence of violence or terrorism, we find that nine of the fifteen observed countries have registered negative scores en average during the period 1996-2012. This political instability can be considered as a favourable ground to the spread of corruption.

[1] Egypt, Libya, Morocco, Jordan and Tunisia.

The recent report of Transparency International (2013) indicates that 84 % of 17 countries of the MENA region (all except the United Arab Emirates and Qatar) obtained a score lower than 50, on a scale varying 0 in 100, where The index from varies 0 (very corrupt) to 100 (not corrupted. Among 17 countries of the MENA region, only five of them saw their rank improving over one year where Algeria realized the best improvement (+11), followed by Egypt (+4) and Saudi Arabia (+3). Syria registered the largest drop (-24 notches) followed by Libya (-12) and Yemen (-11). The deterioration of situation in Libya and Syria are the main reason explaining this drop.

For Tunisia, Transparency International (2013) and the World justice project and the Rule of law index (2013), show that the level of corruption increased during the last decade. The country moved from the rank 33rd in 1998 to 73rd among 183 countries in 2011 and 77th among 177 countries in 2013. This shows that the level of corruption in Tunisia increased during this period[2]. An examination of the most corrupted sectors in Tunisia reveals that the police sector is the most corrupted with a level of 51%, followed by the parliament members and the State employees of the national government with a level of 32%. In the last rank, we find Judges and magistrates with 30%.

The report of Transparency international (2013) indicates that Egypt is ranked 114th out of 177 in the Corruption Perceptions Index but it reveals Egypt's score saw no change from 2012. According to the global Corruption Perceptions Index (CPI), Libya is ranked 172th over 177 countries (Transparency International.2013) while Algeria is ranked 94th and Morocco 91th.

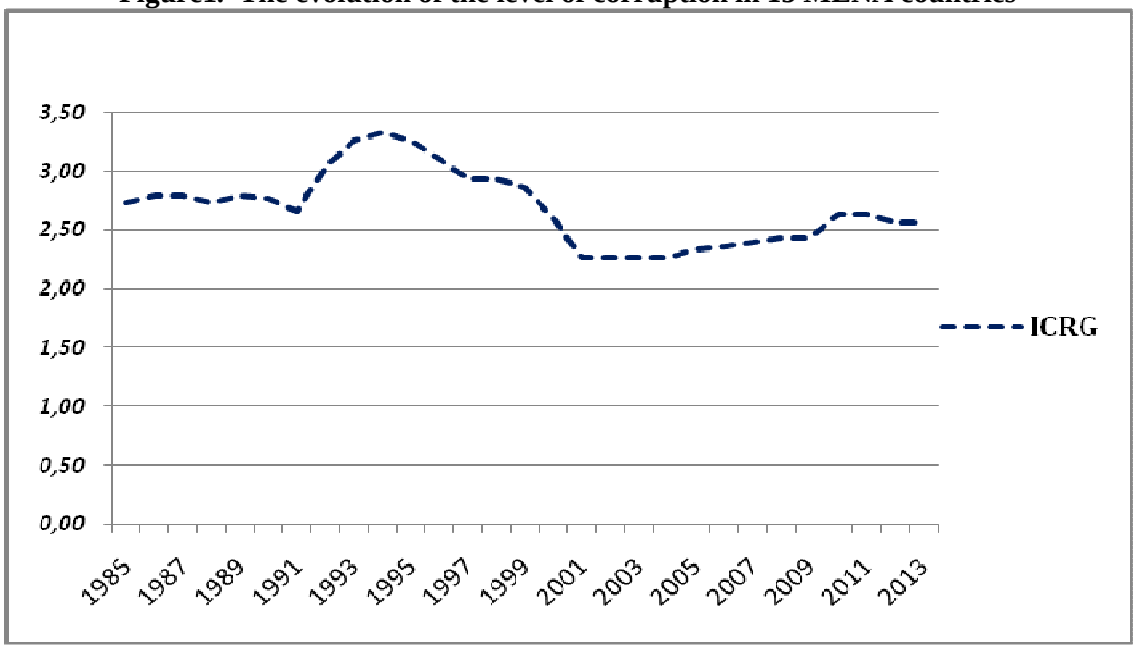
For the Gulf Cooperation Council (GCC henceforth) countries, the UAE and Saudi are the only countries that improved their ranking. Transparency International's Corruption Perceptions Index 2013, ranked the UAE 26th, Qatar 28th Bahrain 57th Oman 61st, Saudi Arabia 63rd and Kuwait 69th. Conflict-wracked countries like Syria and Yemen significantly declined to the bottom of the world ranks for perceived levels of corruption, with rankings of 168 and 167 respectively.

Figure 1 below indicates the evolution of the level of corruption in 15 MENA countries during the period 1985-2013. Values used in Figure 1 are calculated in term of mean during the period 1985-2013. We have used the ICRG index to analyze the evolution of the level of corruption in 15 MENA countries. We did not use the CPI for two reasons. First, the CPI' indexes for Algeria, Bahrain, Cyprus, Iran, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, Turkey and UAE are available since 2003. Data for the other countries are collected since 1998. Second, the CPI Index methodology changed in 2012 from a scale of 0 to 10 (0 highest perceived corruption, 10 highest perceived probity), to a scale of 0 to 100.

[2] The situation get worsened after the so called "*Jasmin revolution*" of December 2010 as the corruption perception index moved from 3.8 in 2011 to 2.8 in 2012 and 1.9 for 2013.

As it is shown is Figure 1, the level of corruption is not constant over the time. We can even see five different trajectories. The first one is observed during the period 1985-1991 where the average level of corruption was constant and globally weak. The average level of corruption moved from 2.73 in 1985 to 2.67 in 1991. In the second phase, we see an upward trend of the average level of corruption during period 1992-1996. The mean value of the ICRG shifted from 3.03 in 1992 to 3.10 in 1996. Compared to the total period of study 1985-2013, the level of corruption during the second period is the highest in the MENA region. The third phase spreads out from 1997 to 2000. From 1997, we notice a decrease of the level of corruption for the MENA countries. The mean value of the ICRG moved from 2.93 in 1997 to 2.60 in 2000. During the fourth phase, the average level of corruption gets back to its constant level. It moved from 2.27 in 2001 to 2.43 in 2009. This period is considered as the least corrupted phase. From 2010, the level of corruption begins to take a rising trend. The mean value of the ICRG moved from 2.27 in 2001 to 2.36 in 2010 and 2.57 in 2013.

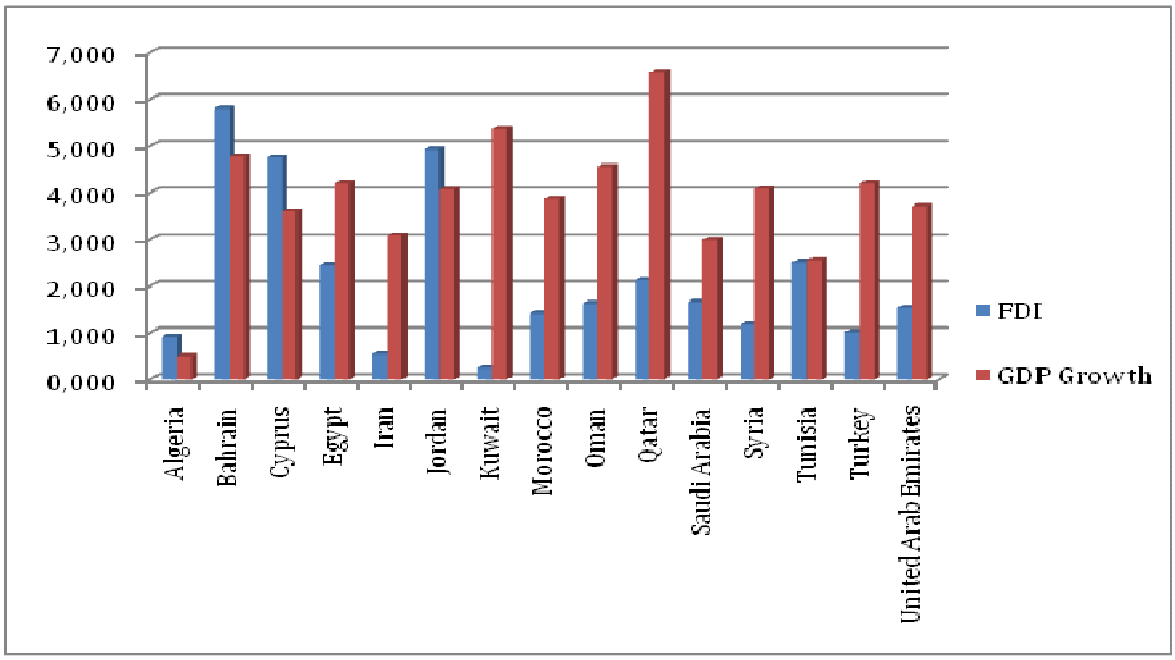
Figure1. The evolution of the level of corruption in 15 MENA countries



Source: Authors from the ICRG reports

Turning now to the level of FDI inflows and economic growth in the MENA countries, Figure 2 shows a comparative figure of the two variables in 15 MENA countries. The values are expressed in mean during the period 1985-2013.

Figure2: FDI inflows and GDP growth in 15 selected MENA countries



Source: Authors from the World Bank Indicators (WDI)

Figure 2 shows that Qatar has the highest average GDP growth rate (6,592%) during the period of the study followed by Kuwait (5,376%) Bahrain (4,782 %) while Algeria recorded the lowest rate (0,506 %). Regarding FDI inflows, Figure 2 shows that Bahrain is ranked in the top list with a ratio of FDI inflows to GDP equal to 5,805 followed by Jordan (4,929%) and Cyprus (4,759%). Algeria and Iran have recorded weak FDI inflows as their ratios were 0,913% and 0,548% respectively. Finally, Kuwait appears in the last rank with a value of 0,246%.

Based on these statistics and data explained above, we can think about three possible assumptions:

1. Countries with a high level of corruption are characterized by a weak GDP growth and FDI inflows. Algeria is the best example.
2. Countries with a weak level of corruption are characterized by a high rate of GDP growth and FDI inflows, as for example in Bahrain, Qatar, Jordan and Cyprus.
3. Countries with a low ratio of FDI inflow do not know necessary a weak rate of GDP growth. This relation is in particular evident for the some GCC countries such as Kuwait and UAE.

In the next section we will try to get an empirical explanation of the most plausible and feasible scenario in the MENA region.

4. DATA & METHODOLOGY

4.1. Data

The data used in this paper cover the period 1985 to 2013 for fifteen Middle East and North Africa (MENA henceforth) countries including: Algeria, Bahrain, Cyprus, Egypt, Iran, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, Turkey and United Arab Emirates. The dependent variable is economic growth proxied by per capita gross domestic product (GDPpc) and the independent variables are as follows: Foreign direct investment as a percentage of GDP (FDI), domestic investment as a percentage of GDP (Inves) and total credit to the private sector (CPS). These variables were obtained from the World Bank's Statistics Database. Regarding corruption, it is an index that varies from 0 to 6, where lower value implies higher corruption. Data on corruption was extracted from International Country Risk Guide (ICRG).

Table-1 exposes the results of descriptive statistics and correlation matrix. The results show that on average, FDI is negative while the other variables are positive. As a first glance, this figure is not promising as it could indicate the low contribution of FDI to economic growth. However, the correlation matrix reveals the existence of a positive relationship between FDI and GDP while negative relationships exist between FDI and investment along with the per capita real GDP. It is worth mentioning that the coefficients between all the variables are low which reflect absence of autocorrelation between the variables of the study.

Table-1: Descriptive Statistics and Correlation Matrix

	LGDPPC	LFDI	LCPS	LINVES	LCOR
Mean	1.2549	-0.1287	3.6038	3.0670	0.9519
Median	1.4747	0.1397	3.6071	3.0779	0.9808
Maximum	3.5260	3.5136	5.8501	3.9125	1.6094
Minimum	-3.5065	-4.6051	1.3635	1.9740	0.4054
Std. Dev.	0.9888	1.6720	0.7540	0.2923	0.2752
Observations	433	433	433	433	433
	LGDPPC	LFDI	LCPS	LINVES	LCOR
LGDPPC	1				
LFDI	0.0108	1			
LCPS	-0.0338	0.2524	1		
LINVES	-0.0093	0.1585	-0.1210	1	
LCOR	0.0272	-0.0746	0.3560	-0.1313	1

Note. LGDPpc is the real GDP per capita; LINV is the ratio of investment to GDP, LCPS is the credit to the private sector as a share of GDP, LCOR, the corruption index, LFDI is the foreign direct investment inflows as a percentage of GDP, *L* is the logarithm. All the variables are expressed into log form to reduce the problem of heteroscedasticity.

4.2. Econometric approach

The purpose of this research paper is to investigate the existence of a long-run and short-run relationship between corruption and growth for the case of MENA countries. To this end, the empirical methodology will be presented in multiple stages. First of all, we have to test for

stationarity of all the variables using Levin-Lin-Chu (LLC, 2002), Im, Pesaran and Shin (IPS, 2003), the Augmented Dickey–Fuller (F-ADF), Philips–Perron (PP, 1998) and finally Breitung (2000). The PURT will then be followed by various tests to identify the existence of panel cointegration relationship. Finally, in case we found that all the variables are integrated of order one I(1) and cointegrated, we conduct a panel vector error correction model (VECM) technique suggested by Engle and Granger (1987) to determine the short-run elasticities. In our multivariate framework, PVECM will help detecting the dynamic relationship between the different variables of this study. Hence, we could expect to have more than one result.
The Framework of the PVECM is specified as follows:

$$\Delta LGDP_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i} \Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{1i} \Delta LFDI_{t-i} + \sum_{i=1}^{r} \beta_{1i} \Delta LInv_{t-i} + \sum_{i=1}^{s} \beta_{1i} \Delta LCPS_{t-i} + \sum_{i=1}^{t} \beta_{1i} \Delta LCOR_{t-i} + \theta_1 ect_{t-1} + \varepsilon_{1t} \quad (1)$$

$$\Delta LFDI_t = \alpha_2 + \sum_{i=1}^{p} \beta_{2i} \Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta LFDI_{t-i} + \sum_{i=1}^{r} \beta_{2,i} \Delta LInv_{t-i} + \sum_{i=1}^{s} \beta_{2,i} \Delta LCPS_{t-i} + \sum_{i=1}^{t} \beta_{2i} \Delta LCOR_{t-i} + \theta_2 ect_{t-1} + \varepsilon_{21t} \quad (2)$$

$$\Delta LINV_t = \alpha_3 + \sum_{i=1}^{p} \beta_{3i} \Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{3i} \Delta LFDI_{t-i} + + \sum_{i=1}^{r} \beta_{3i} \Delta LInv_{t-i} + \sum_{i=1}^{s} \beta_{3i} \Delta LCPS_{t-i} + \sum_{i=1}^{t} \beta_{3i} \Delta LCOR_{t-i} + \theta_3 ect_{t-1} + \varepsilon_{31t} \quad (3)$$

$$\Delta LCPS_t = \alpha_4 + \sum_{i=1}^{p} \beta_{4i} \Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{4i} \Delta LFDI_{t-i} + \sum_{i=1}^{s} \beta_{4i} \Delta LInvY_{t-i} + \sum_{i=1}^{t} \beta_{4i} \Delta LCPS_{t-i} + \sum_{i=1}^{t} \beta_{4i} \Delta LCOR_{t-i} + \theta_4 ect_{t-1} + \varepsilon_{4t} \quad (4)$$

$$\Delta LCOR_t = \alpha_5 + \sum_{i=1}^{p} \beta_{5i} \Delta LGDP_{t-i} + \sum_{i=1}^{q} \beta_{5i} \Delta LFDI_{t-i} + \sum_{i=1}^{s} \beta_{5i} \Delta LInvY_{t-i} + \sum_{i=1}^{t} \beta_{5i} \Delta LCPS_{t-i} + \sum_{i=1}^{t} \beta_{5i} \Delta LCOR_{t-i} + \theta_5 ect_{t-1} + \varepsilon_{5t} \quad (5).$$

Where ε_{it} are the serially uncorrelated random error terms. The ect_{t-1} is the cointegrating vectors and θ_i is the adjustment coefficient indicating the weight of adjusted disequilibrium in the past. To get a long-run relationship among the variables the coefficient of θ_i should be negative and statistically significant.

5. EMPIRICAL RESULTS

5.1. Panel Unit roots and Panel Cointegration tests

We employ the Levin and Chu test, (LLC, 2002), the Im, Pesaran and Shin (IPS, 2003)) test, the Fisher-Type test by ADF and PP-test and finally Breitung (2000) test to check for the

stationarity of the variables. The results are presented in Table 2. They show that the test statistics for the log levels of LGDP, LFDI, LCPS, LINV and LCOR are statistically insignificant. When we apply the panel unit root tests to the first difference of the five variables, all four tests reject the joint null hypothesis for each variable at the 5 per cent level. Accordingly, from all of the tests, the panel unit roots tests indicate that each variable is integrated of order one (I(1)).

Table 2. Panel Unit Root Test

Method	**LGDPpc**		**LFDI**		**LCPS**		**LINVES**		**LCOR**	
	Level	***First***	***Level***	***First***	***Level***	***First***	***Level***	***First***	***Level***	***First***
LLC	10.412	-8.7280***	0.0443	-3.7664***	-0.3836	-5.1806***	2.8225	-8.6397***	-0.3597	-6.8212***
IPS	-0.7493	-14.412***	-0.7095	-10.989***	-0.8193	-6.2927***	-1.1979	-9.9431***	-0.5834	-6.8383***
ADF	24.779	212.23***	30.136	159.97***	41.076	96.148***	34.390	143.78***	36.931	98.522***
PP	197.00	2680.7***	11.325	921.89***	14.4642	193.608***	70.8069	588.135***	46.2656	204.777***
Breitung	2.12742	-6.1815***	-1.19106	-8.93874***	0.56170	-2.23376**	-0.30567	-8.96660***	0.22938	-8.28863***

Note: The numbers represent *p*-values

Note: ** and *** denote significance of coefficients at 5% and 10% levels of significance respectively.

The second step of our empirical procedure is to test for the existence of the panel cointegration between GDP and the other explanatory variables for balanced MENA Panel data by the mean of Pedroni (1999) tests. The test results are exposed in table 3; they reveal the rejections of the null of no cointegration for all tests at 1 % level of significance except Panel *v*-test. Therefore, we can confirm that our model is panel cointegrated. This result is supported by the Kao (1999) test as it is significant at 1% level of significance suggesting panel cointegration relationship among GDP and its determinants for MENA countries.

5.1.1. Panel cointegration test

Table 3. Pedroni Residual Cointegration Test

	Weighted Statistic	*Prob.*
Panel v-Statistic	-1.358398	0.9128
Panel rho-Statistic	-2.984684	0.0014**
Panel PP-Statistic	-10.61705	0.0000***
Panel ADF-Statistic	-4.170289	0.0000***
	Statistic	*Prob.*
Group rho-Statistic	-1.989357	0.0233**
Group PP-Statistic	-16.26547	0.0000***
Group ADF-Statistic	-3.319524	0.0005***

Kao Residual Cointegration Test		
ADF	-2.628075***	0.0043

Unrestricted Cointegration Rank Test		
Hypothesized	Trace Test	Max-Eigen test
None	200.1***	129.4***
At most 1	95.06***	77.12***
At most 2	40.90	32.62
At most 3	26.82	21.13
At most 4	41.47	41.47

Note: The optimal lag lengths are selected using SBC.
Trace test and Max-eigenvalue test indicate 1cointegrating vector at the 0.01 level.
*** Denotes the rejection of the null hypothesis at 1%level of significance.

The result of Johansen Fisher test shows the existence two cointegrating vectors at 1% of significance.

5.2. Panel Long run and short run

As we find evidence of a cointegration relationship between the variables of our model, hence, an at least one long-run equilibrium must exist and Granger causality should also exists among these variables in at least one way (Engle and Granger, 1987). To examine these procedures, we start the analysis by performing a Panel vector error correction methodology (PVECM) to allow us getting the long-run and short-run results.

5.2.1. Long-run estimation

The outputs of the long-run equilibrium estimation are revealed in Table 4. They show that the coefficient of corruption is positive (0.557) and it exert a statistically positives effects on per capita GDP at the level of 1%. It is worth recalling that the positive sign reveals the negative impact on growth. In our case, an increase in the level of corruption (index) is followed with a decrease in per capita GDP growth rate of 0.557.percentage points. This result is in line with most of the studies on corruption and growth nexus.

The variable credit to the private sector (CPS) is positive as expected but it does not exert a statistically significant effect on real per capita GDP. The level of credit to the private sector appears to be insufficient in MENA countries and this conclusion could be of great interest for policy makers to boost up credits which will in turn accelerate investment activities and hence, growth.

Regarding the others variables. The results of Table 3 also show that the coefficient of investment and FDI are negative (-0.843 and -0.959 respectively) and significant at the level of 5%. This unexpected result shows that the low level of FDI inflows in MENA region and the weak investment activities. Unfortunately, MENA region appears to have the incapacity to attract massive FDI inflows in the late nineties. From 2001 to 2003, the UNCTAD inward

FDI performance index shows that the MENA is far behind any other developing region except South-Asia (UNCTAD, 2004). In this sense, it is worth recalling that MENA although countries have many similar socioeconomic characteristics they also have similar factors that hampered FDI inflows since the seventies and eighties. According to Eid and Paua, (2003) FDI flows to MENA countries have been meager and unevenly distributed and some socioeconomic and political factors explain this disparity. These factors include political instability, restriction of FDI to a few sectors, preventing a majority ownership to foreigners and requiring a local partner in a joint venture and a relatively slow pace of privatization. All these factors have impacted negatively economic growth and development. Therefore, a lot of efforts have to be done to attract more FDI and to encourage foreign investors doing business in MENA region.

To conclude, in a corrupted environment, one should expect that investment activity is feeble and the overall economic performance is weak.

Table 4. Long run elasticities

	Coef.	**T-value**
LFDI	- 0.09	1.791**
LCPS	0.039	-0.163
LINVES	- 0.643	1.554**
LCOR	0.557	-0.157***
C	-2.025	

Note*** and ** denote significance of coefficients at 1% and 5% level of significance respectively.

The output of the short-run estimation is reported in Table 4. The variables are presented with two lags as the optimal lag length was two according to the sequential modified LR test statistic (LR), Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) lag selection criteria. First of all, it is relevant to show that the error correction term, having the right sign, is statistically significant at the level of 5%. The coefficient of the ECT is -0.65 suggesting that when per capita GDP is above or below its equilibrium level, it adjusts by almost 65% within the first year. Thus, the speed of adjustment towards equilibrium is not enough fast in case of any shock to emission equation.

Turning now to the signs of the variables, it is shown that the coefficient of credit to the private sector is negative but significant. Hence, if we consider CPS as an indicator of financial development, then our finding cannot support finance-led-growth hypothesis in MENA countries in the short-run. Policymakers should further improve the credit condition and the market for credits to facilitate access to finance and accelerate economic growth in the short-run. This could be done by encouraging the development of the interbank market and open market operations to allow the refinancing of short and medium-term projects and to enable the availability of liquidity and to avoid the inefficiencies of direct controls (Hamdi *et al.* 2014).

Another important result is the sign of FDI which became positive and significant at 5% level. This change is mainly due to the fact that the positive impact of FDI in economic growth has received a great deal of attention by policy makers in numerous countries in MENA region. In fact, following the period of the post-oil chocks, several MENA countries have adopted major structural and institutional reforms to attract FDI and to boost up their economies through investment activities. They also make various steps to make their environments more business friendly and more attractive for international investors. Some countries like Tunisia, Algeria and Morocco have quickly adopted the Structural adjustment programs (SAPs) as suggested by the IMF and the World Bank to accelerate growth and to integrate the world economy. As a result, the FDI began rising continuously for several years but the FDI's distribution has been uneven. Overall, the growth in their FDI inflows in MENA countries was reached an outstanding level in 2009 as it moved from 0.77% of the total inflows in 1990 to 8% in 2009. It seems that the adopted reforms have had a positive impact on the level of growth in the MENA region as a whole.

Regarding the other variables, they have the same results like the long-run estimations

Table 5. Short-run estimation

Regressors	Coef	t-stat
D(LFDI(-1))	0.12	2.48056**
D(LFDI(-2))	0.17	3.44373***
D(LCPS(-1))	-0.706	-2.43508**
D(LCPS(-2))	-0.045	-0.14754
D(LINVES(-1))	-0.142	-0.50652
D(LINVES(-2))	-0.055	-0.20238
D(LCOR(-1))	0.465	1.99077*
D(LCOR(-2))	-0.188	-0.47487
C	-0.035	-0.68870
ECT	-0.651	-8.45509***

Note: *, ** and *** denote significance of coefficients at 1%, 5% and 10% levels of significance respectively.

As we found a panel long-run cointegration relationship among LGDP, LFDI, LCPS, LINV and LCOR, hence Granger causality should exist in at least one direction between as least two variables. Thus, the next stage is to examine the direction of causality amongst these variables.

5.2.2. Granger causality tests

The results of causality tests based on the PVEC model are reported in Table 6. The table has three major blocks illustrating the short-run effects, long-run effects represented by the error correction coefficients, and the joint short-run and long run effects, respectively.

Table 6. Results of causality tests based on VECM.

Variables	Short run (F-stats)					ECT	Joint short and long run (F-stats)				
	ΔLGDP	ΔLFDI	ΔLINV	ΔLCPS	ΔLCOR		ΔLGDP& ECT	ΔLFDI& ECT	ΔLINV ECT	ΔLCPS & ECT	ΔLCOR& ECT
ΔLGDP	-	5.002***	1.291	3.437**	3.667***	-0.653***	-	27.648***	24.858***	27.035***	23.835***
ΔLFDI	0.514	-	2.636**	0.361		-0.215***	0.586	-	2.196*	0.853	
ΔLINV	0.718	0.730	-	0.957	1.679*	-0.007***	2.837**	0.922	-	1.047	1.608
ΔLCPS	1.0766	0.372	0.245	-	0.189	0.032**	1.419	1.659	1.489	-	1.475
ΔLCOR	0.4198	0.890	2.914**	0.546	-	0.0079	0.279	0.791	2.177*	0.536	-

*** Denotes the rejection of the null hypothesis at 1% level of significance.

Table 6 reveals some significant results. The most important one is the existence of a unidirectional Granger causal relationship running from FDI, CPS and COR to GDP. This means that FDI is a very important factor for the economy of MENA region. This result is in line with the most previous studies (De Mello (1997), Mauro (1995), Borensztein et al. (1998), Bengoa and Sanchez-Robles (2003), Anwar and Sun (2011)). Similarly, CPS is also important as it facilitate investment activities. It is worth recalling that credit condition is one of the most important factors of FDI inflow. This result supports the fact that the numerous structural reforms and efforts launched by several MENA countries during the past few decades were successful to the financial sector and the overall MENA economy. Surprisingly, the results show that investment is not a major contributor to economic growth in MENA region. This result is in line with the one found in table 5 for the short-run estimates

Table 6 also reveals a bidirectional Granger causal relationship running between corruption and Investment. Corruption may deter investment opportunities. In fact, when institutional and foreign investors believe corruption is high, they may be discouraged to invest because corruption generates additional costs to the investors (King, 2003). In this case one can concludes that corruption appears to be a significant hurdle of investment activities and prosperity. This result is in line with the results found by Mauro (1997).

Regarding error correction results, it is found to be negative and significant for all the VECMs except in LCOR equation. In this context, LCOR appears to be weakly exogenous.

Turning now to the right side of table 6, the results of the significance of interactive terms of change in all the variables along with the ECT in the GDP equation are consistent with the presence of Granger-causality running from LCPS, LFDI, LCOR and LINV, to real per capita GDP. This means that all the variables have positive and significant long-run impacts on the level of GDP per capita for the case of MENA countries. Therefore, corruption is serious problem threating short-run and long-run economic growth in MENA region and it should be controlled in order to enjoy the full benefits of the structural and institutional reforms.

6. Conclusion

Corruption is perceived to harm economic growth**.** Based on this conclusion, this paper intends to clarify this relationship for a sample of fifteen MENA countries within a multivariate framework. Precisely, this study uses a Panel Vector Error Correction Model to investigate the relationship between foreign direct investment, corruption and economic growth. We also use credit to the private sector and investment as additional variables to examine the channels through which corruption could affect growth. Results showed that per capita GDP and the other explanatory variables are non-stationary series but after first differencing, the series became stationary and the series are integrated of order I(1). The Johansen Cointegration test was used to identify the long-run relationship between the variables.

The results of PVECM model advocate that corruption has a significant influence on per capita GDP in the short run and the long run as well. It was also found that lower levels of corruption improve the impact of foreign direct investment on economic growth. It is worth recalling that the levels of FDI inflows are not equally distributed among MENA countries. In fact, while some countries i.e. Turkey, Saudi Arabia, Egypt, Morocco, Tunisia and the United Arab Emirates received huge amount for FDI inflows, some other countries such as Djibouti and Palestinian Territory (West Bank & Gaza), Yemen have been deprived or they received a very low FDI inflows. Therefore, the later bloc of countries has to accelerate their structural reforms to benefit the numerous added values of foreign investment.

The major conclusion of the paper is that corruption harms directly and indirectly economic growth in MENA region and that strict and serious policy actions should be implemented to fight its widespread.

The major conclusion of the paper is that corruption harms directly and indirectly economic growth in MENA region. Despite that our sample covers developed countires, like Qatar, Cyprus, Saudi Arabia and UAE, with higher income and with higher governance indicators; corruption is seemed to exert negative effect on the economic growth. The main contribution of this paper is that corruption acts negatively on the economic growth even in the presence of strong indicator of governance such as Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. This result is different from the previous when corruption does not exert any effet on growth in countries with high income and strong governance.

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