*International Journal of Finance, Insurance, and Risk Management*
*Volume XIV, Issue 1, 2024*

*pp. 28-49*

# The Causality Between Corruption and Economic Growth in MENA Countries: A Dynamic Panel-Data Analysis

*Submitted 20/04/23, 1st revision 14/05/23, 2nd revision 15/06/23, accepted 30/06/23*

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***Abstract:***

***Purpose:*** *To contribute to the ongoing debate, this study examines the impact of corruption on economic growth in the Middle East and North Africa (MENA) region between 2000 and 2021 using a Customized Corruption Index-CCI and panel data on MENA countries. These countries were selected because they are understudied in the economic literature, and despite the World Bank's recent emphasis on corruption in the developing world, the MENA countries have received little attention.*
***Design/Methodology/Approach:*** *The researcher used Cobb-Douglas functional form to test corruption in MENA using a customized index CCI to track corruption over almost 20 years/ then used the dynamic panel data GMM.*
***Findings:*** *The findings indicate that there is a negative correlation between corruption and economic growth, but this is not consistent across all MENA nations.*
***Practical Implications/limitations:*** *First, the relatively recent lack of data from MENA nations. This issue is related to the inaccessibility of data for many MENA countries, particularly regarding the returns on resources, private malfeasance, and other variables in Gulf countries. In addition, researcher encountered several restrictions, such as electricity and internet outages, due to the fact that he is from Lebanon, a country whose citizens have endured difficult living conditions since the Lebanese crisis began in 2019.*
***Originality/value:*** *Demonstrating a customized index that suits the characteristics of MENA countries to peculiarly measure corruption in this region/ the outcome of the Customized Corruption Index-CCI is then compared to CPI and CC-from WGI.*

***Keywords:*** *Impact of corruption, Economic Growth, Corruption measurements, Empirical Review, MENA.*

***JEL classification:*** *G00, O47, O53.*

***Paper Type:*** *Research study.*

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## 1. Introduction

Corruption is an extensively researched topic with a heavy focus on its impact on economic growth for which Mauro (1995) was the pioneer. Since the 1950s, various economists, sociologists, and political scientists have researched and written papers on corruption. A good number of this studies have not only raised awareness, but build a significant knowledge on its socio-political governance and economic implications and the subsequent dramatic increase (Méon and Sekkat, 2005).

As knowledge on the dynamics of corruption and its manifestation increases, there is a revelation on its prevalence across the globe, the trends, nature, and similarities. In this regard, available knowledge confirms corruption as a systemic, temporal, and sometimes cultural phenomenon wherever it takes place.

Furthermore, the presence of corruption in Europe, United States of America, Asian and African countries indicates that the vice is so widespread. For the preceding reason, corruption is hardly limited to a specific geographic setting, time series, or specific government form. Wherever it takes place, corruption has had a debilitating effect on the socio-economic and political spheres of human existence.

The battle against corruption and corrupted systems is as old as human civilization, yet it is far from being won. Specifically, the vice is cultivated on innate human selfish nature that prioritizes self, a factor that sustains it despite exhortation, resources, and time dedicated to fighting against it. A combination of individual greed morph to become corrupt systems that are represented in the top echelons of power where decisions are made and executed like the state.

Notably, there is a remnant that desires and lives honestly, but at the risk of being for failure to conform. It is like a hurricane that consumes everything in its path from Europe, Asia, as well as the Middle East and North Africa (MENA). Despite the gloomy picture, corrupt systems can be changed if there is sufficient individual and political will to confront it. Unfortunately, there has been very limited of that in the MENA region leading to significant economic counter-effects. For this reason, this study investigates the economic effects of corruption in the MENA region between 2000 and 2021.

Given the complex nature of corruption, this study employs a "Dynamic Panel-data Analysis" using varied tests from the 1990s until 2021. The study aims to investigate the impact of corruption on economic growth in MENA region, and testify whether there is a negative, positive, or no impact of corruption on economic growth.

## 2. Literature Review

In the past few years, MENA countries have witnessed great political unrest that were a protest against corrupt governments, among other ills. Moreover, the protests,

which aroused in the wake of the 2011 Arab spring, resulted in the decay of many dictatorships such as in Tunisia, Sudan, and other MENA countries. As a result, many countries are striving to foster democracy and social inclusion, while struggling to fight systemic corruption, which was one of the reasons that ignited protests.

In order to forestall protests, some governments in MENA, such as Jordan and Morocco, responded to demands and implemented some reforms. Such actions succeeded in promoting change and fighting corruption which hindered the entirety of the revolution; noting that these two countries did not face any outright revolutions.

Nowadays, the MENA region is still perceived as politically unstable with great-unfulfilled calls for fighting corruption and other main sources of popular dissatisfaction. Along with political instability, economic failure in many of the region's countries has either initiated or aggravated political conflict. In Lebanon, for instance, economic collapse triggered the protests.

Many MENA countries are marked by poor governance, high unemployment rates (especially among youth), and low economic growth, with the remarkable exclusion of most Gulf countries. According to Fakir and Yerkes (2018), the region's future is also very gloomy. In view of these constant political and economic issues, it is hardly surprising to witness an increase in corruption level and low confidence in governments. It is saddening that fewer citizens believe that they can carry out change on their own.

These are only a few of the solemn results of the year 2019 illustrated by "Global Corruption Barometer" (GCB), which investigates citizens' encounters and experiences and viewpoints of corruption in six countries in Mena: Tunisia, Morocco, Lebanon, Palestine, Jordan, and Sudan. However as demonstrated, the comprehensive image is rather gloomy, the situation varies extremely from one country to another.

## 2.1 Theoretical Background on the Relation between Corruption and Economic Growth

According to Sharma and Mitra (2019), corruption affects economic performance beyond morality. The literature suggests that corruption's economic effects determine morality. Poor governance and confusing regulations are regarded to promote corruption (Thalassinos and Stamatopoulos, 2015; Thalassinos *et al.*, 2006; 2022). Corruption "greases the wheels" and boosts economic performance in such a setting. Corruption may be advantageous in some instances, but also increases production costs, validating the "sand the wheels" idea.

Corruption may help society despite its consequences, as suggested by Bardhan

(1997) corrupt bureaucrats grant government contracts to the greatest bribe payer when private agents compete for them. If contract objectives and quality are not compromised, allocation efficiency may not be affected. Bribery only diminishes producer surplus.

Beck and Maher (1986) and Lien (1986) proved that the lowest-cost bidder always wins, that bribery can imitate the efficiency of competitive bidding when information is insufficient. If the official is swayed by reasons other than the bribe's quantity, inefficiency can result.

Bribery may boost productivity (Huntington, 1968; Leff, 1964; Leys, 1965). "Grease the wheels" has been shown to work in certain situations. Since government workers have little incentive to work faster, slow governance breeds slowness. Corruption may help bureaucracy make good decisions since bribery requires talent.

Bjorvatn and Naghavi (2011) discovered that corruption only increases economic efficiency when the actual government size is bigger than the optimal level, demonstrating that corruption can support growth and efficiency despite its moral condemnation.

The "sand the wheels" argument claims that bribes do not improve efficiency or fix institutional weaknesses. Efficiency, investment, and growth suffer (Myrdal, 1968; Rose-Ackerman, 1997). Thus, bribes are unlikely to get the most efficient producer a license. The highest briber may simply be the one most willing to compromise on the quality of the goods he will produce if he gets a license (Méon and Sekkat, 2005; Rose-Ackerman, 1997). Finally, bribery does not appear to stimulate private investment.

Corruption decreases public investment (Tanzi and Davoodi, 1997) and shifts public spending from efficient to inefficient locations (Mauro, 1995). Ugur and Dasgupta (2011) found that corruption directly affects per capita GDP growth in low-income countries, though not significantly. However, public finance and human capital routes provide bigger indirect advantages.

According to Ajie and Wokekoro (2012), corruption hurts economic performance. Méon and Weill (2010) investigated whether corruption can help weak institutions function. Corruption has less impact on efficiency in countries with weak institutions. Corruption may also benefit countries with poor administration, according to studies. Zhou and Peng (2012) likewise found inconclusive results.

D'Agostino, Dunne, and Pieroni's (2016a; 2016b), Sharma and Mitra's (2015), and Huang's (2016) cross-country panel found mixed results, indicating that excessive regulation and complicated business policies limit firms' strategic options and empower bureaucracy. Except for South Korea, Huang and Ho (2017) found no correlation between governance and economic growth in Asian countries.

Some studies (Bhattacharyya and Hodler, 2010; Collier and Hoeffler, 2009; Mehlum, Moene, and Torvik, 2006; von Haldenwang and Ivanyna, 2018) have found that the resource curse concept only applies to countries with ineffective institutions and widespread corruption.

## 3. Methodology

In this study researcher examines and estimates the level of corruption in MENA region countries using several indicators. After that, the researcher states the impact of corruption's level on economic growth and analyzes the relation or corruption's impact on economic growth.

For this purpose, the present study applies Cobb-Douglas functional form to test and estimate corruption effect and use the approach adopted by "Transparency International's Corruption Perception Index-CPI" and "Worldwide Governance Indicators-WGI-", in addition to the index that was customized by the researcher to test the corruption in MENA region countries, that is referred to as "Customized Corruption Index-CCI".

Research at hand tracked 20-year trend of corruption level of the countries listed within the MENA region and liken it with these countries' economic growth level. This will take place by measuring corruption using three models and compare the outcome of these three models to state impact on economic growth. As for the MENA region that is chosen as a sample for this study, it comprises approximately 19 countries.

The following countries are usually included in the MENA region: "Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Palestine, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates UAE, and Yemen". Sudan and Ethiopia are sometimes included.

Almost 6% of the world's population is found in countries within the MENA region, there are countries rich in natural reserves of both oil and gas among these countries. Therefore, MENA region countries play a significant role in global economic stability. Those countries that lack sufficient data because of factors such as political instability, such as Syria, will be excluded from the analysis.

In the study researcher focuses on elaborating and examining the relationship between corruption and its impact on economic growth; the researcher elucidates the factors that are most probably accountable for null, positive, or negative impact on economic growth. Accordingly, this aim calls for applying empirical testing for these factors through regression analysis.

These factors that affect the effect of corruption on economic growth could be translated into an econometric model; this economic model shows economic,

structural, and social facts related to each country, such as; the level of corruption, and so on. As a result, these factors would eventually be labeled as economic growth determinants in the MENA region countries (Figure 1).

Thus, research will run a multiple regression analysis with which various factors that play a role in influencing the countries' corruption level will be treated as the independent variables while the level of economic growth will be treated as the dependent variable.

### 3.1 Research Model and Specifications

The main challenge lies in measuring the disputed concept of corruption. Therefore, the researcher will develop a customized procedure model previously mentioned and specified in section 3, which is the CCI, to ensure that the corruption's effect on economic growth is measured properly.

Since CPI only measures corruption's perception, which is not the synonym of measuring corruption itself, indicating that CPI tends to simplify the method of measuring a complex phenomenon as corruption. Besides, CC from WGI does not reflect the real rate of corruption that they are controlling. Therefore, this sub-section is dedicated to stating the dependent, independent, and control variables of this research that will develop a model using proxy variables for measuring corruption.

This subsection will state the variables that will assist in increasing the sturdiness of the research model. Therefore, this model mainly depends on the classic equation of multiple regression that is presented as follows:

$$Y = \alpha + \beta 1\, X1 + \beta 2\, X2 + \beta 3\, X3 + \ldots\ \beta n\, Xn + \mu$$

Where Y is the dependent variable, α is the intercept or constant, $\beta 1,\ldots,n$ are the co-efficients, $X1,\ldots,Xn$ are the independent variables and μ is the error term.

Thus for this study researcher designed 3 model specifications as presented below:

1. Model One: $\boldsymbol{lgdp_t = \alpha + \beta_1 ll_t + \beta_2 lk_t + \beta_3 lcci_t + \varepsilon_t (1)}$
2. Model Two: $\boldsymbol{lgdp_t = \alpha + \beta_1 ll_t + \beta_2 lk_t + \beta_3 lcpi_t + \varepsilon_t}$ (2)
3. Model Three: $\boldsymbol{lgdp_t = \alpha + \beta_1 ll_t + \beta_2 lk_t + \beta_3 lccwgi_t + \varepsilon_{t\,(3)}}$

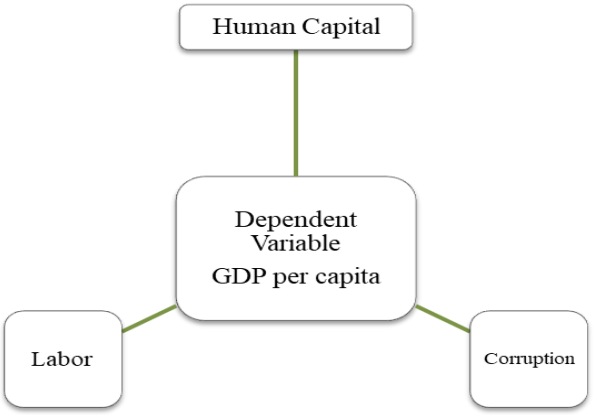
## 4. Research Results and Discussion

### 4.1 Unit Root Tests

The Auto-Regressive Distributed Lag (ARDL) Bounds Test approach is used in this study. When compared to alternative co-integration processes, the limits testing

methodology offers several econometric advantages. Despite differing orders of integration, the ARDL approach, according to Pesaran (1997), offers precise estimates of long-run parameters and valid t-statistics. Whether the underlying regressors are totally I(0), I(1), or mutually integrated (Table 1).

***Figure 1.*** *Solow Growth Model*




***Source:*** *Researcher Illustration.*

The unit root test was first used to determine whether the data was non-stationary. The null hypothesis asserts that there is no unit root, while the alternative hypothesis asserts that the data is stationary. The ARDL test was performed due to a unit root problem. The Panel Unit root test is used in order to test the unit root for each individual series in a panel using Levin, Lin and Chu test (LLC), Im, Pesaran and Shin (IPS), Dickey Fuller (ADF) and Phillips Perron (PP).

Thus, the unit root test is used to examine the stationarity of the variables. The stationarity can be studied in different test such Augmented dickey-fuller (ADF, 1984), Philips Perron (PP,1988), Im et al (2000), shin and Snell (2002) and other tests are used in order to know the existence of unit root problem or not.

### 4.1.1 Model One Specification

$$lgdp_t = \alpha + \beta_1 ll_t + \beta_2 lk_t + \beta_3 lcci_t + \varepsilon_t (1)$$

$H_0$: Ø=1, All the panels contain unit roots
$H_1$: Ø#1, At least one panel is stationary

***Table 1.*** *Panel Unit root test*

| Variables | Level & first difference | Intercept/ trend | LLC | IPS | ADF | PP | Decision |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| LNGDP | Level | Intercept | 1 | 0.0117* | 0.0278* | 0.0616 | I(1) |
| | | Intercept &trend | 0.9033 | 1 | 0.9999 | 1 | |
| | First difference | Intercept | 0.0039** | 0.0004*** | 0.0007*** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.6144 | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNL | Level | Intercept | 0.0643 | 0.9959 | 0.9324 | 0.0063** | I(1) |
| | | Intercept &trend | 0.8481 | 0.5096 | 0.2004 | 0.0000**** | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNK | Level | Intercept | 0.0000**** | 0.0009*** | 0.0011** | 0.0018** | I(0) |
| | | Intercept &trend | 0.8718 | 0.9997 | 0.8682 | 0 .9612 | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNCCI | Level | Intercept | 0.0035** | 0.0371* | 0.0675 | 0.0005*** | I(0) |
| | | Intercept &trend | 0.2697 | 0.5006 | 0.3572 | 0.0000**** | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept & trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |

***Source:*** *Researcher illustration, EViews 12.*

According to Table 1, the result of panel unit root test indicate that the result is a mixture from I (0) and I (1) this means the necessity of using panel ARDL model.

### 4.1.2 Model Two Specification

$$lgdp_t = \alpha + \beta_1 ll_t + \beta_2 lk_t + \beta_3 lcpi_t + \varepsilon_t \quad (2)$$

$H_0$: Ø=1, All the panels contain unit roots
$H_1$: Ø#1, At least one panel is stationary

***Table 2.*** *Panel Unit root test*

| **Variables** | **Level & first difference** | **Intercept/ trend** | **LLC** | **IPS** | **ADF** | **PP** | **Decision** |
|---|---|---|---|---|---|---|---|
| LNGDP | Level | Intercept | 1 | 0.0117* | 0.0278* | 0.0616 | I(1) |
| | | Intercept &trend | 0.9033 | 1 | 0.9999 | 1 | |
| | First difference | Intercept | 0.0039** | 0.0004*** | 0.0007*** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.6144 | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNL | Level | Intercept | 0.0643 | 0.9959 | 0.9324 | 0.0063** | I(1) |
| | | Intercept &trend | 0.8481 | 0.5096 | 0.2004 | 0.0000**** | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNK | Level | Intercept | 0.0000**** | 0.0009*** | 0.0011** | 0.0018** | I(0) |
| | | Intercept &trend | 0.8718 | 0.9997 | 0.8682 | 0.9612 | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNCPI | Level | Intercept | 0.0675 | 0.2771 | 0.3781 | 0.0545 | I(1) |
| | | Intercept &trend | 0.1718 | 0.1848 | 0.2556 | 0.0001*** | |
| | First difference | Intercept | 0.0000*** | 0.0000*** | 0.0000*** | 0.0000*** | |
| | | Intercept &trend | 0.0000*** | 0.0000*** | 0.0000*** | 0.0000*** | |
| | Second difference | Intercept | 0.0000*** | 0.0000*** | 0.0000*** | 0.0000*** | |
| | | Intercept & trend | 0.0000*** | 0.0000*** | 0.0000*** | 0.0000*** | |

***Source:*** *Researcher Illustration, EViews 12.*

According to the table above, the result of panel unit root test indicate that the result is a mixture from I(0) and I(1) this means the necessity of using panel ARDL model.

### 4.1.3 Model Three Specification

$$lgdp_t = \alpha + \beta_1 ll_t + \beta_2 lk_t + \beta_3 lccwgi_t + \varepsilon_t \quad (3)$$

$H_0$: Ø=1, All the panels contain unit roots
$H_1$: Ø#1, At least one panel is stationary

***Table 3.*** *Panel Unit root test*

| Variables | Level & first difference | Intercept/ trend | LLC | IPS | ADF | PP | Decision |
|---|---|---|---|---|---|---|---|
| LNGDP | Level | Intercept | 1 | 0.0117* | 0.0278* | 0.0616 | I(1) |
| | | Intercept &trend | 0.9033 | 1 | 0.9999 | 1 | |
| | First difference | Intercept | 0.0039** | 0.0004*** | 0.0007*** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.6144 | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNL | Level | Intercept | 0.0643 | 0.9959 | 0.9324 | 0.0063** | I(1) |
| | | Intercept &trend | 0.8481 | 0.5096 | 0.2004 | 0.0000**** | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNK | Level | Intercept | 0.0000**** | 0.0009*** | 0.0011** | 0.0018** | I(0) |
| | | Intercept &trend | 0.8718 | 0.9997 | 0.8682 | 0.9612 | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| LNCCWGI | Level | Intercept | 0.1889 | 0.0847 | 0.1045 | 0.0000**** | I(1) |
| | | Intercept &trend | 0.6820 | 0.0451 | 0.0633 | 0.0000**** | |
| | First difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept &trend | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | Second difference | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |
| | | Intercept | 0.0000**** | 0.0000**** | 0.0000**** | 0.0000**** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | & trend | | | | | |

***Source:*** *Researcher Illustration, EViews 12.*

According to the table above, the result of panel unit root test indicate that the result is a mixture from I(0) and I(1) this means the necessity of using panel ARDL model.

### 4.2 Regression Analysis Results

ARDL model of MENA countries contains 357 observations of 22 MENA countries. The sample was taken from 2000 to 2020. The dependent variable was log of GDP per capita, whereas there were three independent variables which included a log of the labor force, Capital, and corruption. Corruption was recognized in three different models using three measurements, CPI, CC from WGI and CCI. These log-log model results were obtained from e-views to derive the following analysis below in Tables 4-9.

#### 4.2.1 Short Run Equation

$$\boldsymbol{\Delta LNGDPt = -0.259217 + 2.171626\Delta LNCCIt - 0.144430\Delta LNLt + 0.351458\Delta LNKt - 3.911131 + \varepsilon t} \quad \textbf{(1)}$$

According to Table 4, the co-integration coefficient is significant and negative, which reflects the long run equilibrium observed in the previous year that influence the adjustment of the variables towards their equilibrium relationship.

In addition, there no effect of LNCCI on LNGDP, only LNK has a positive effect in the short run on LNGDP, where the increase in LNK for 1 unit will lead to an increase in LNGDP in 0.35458 units.

***Table 4.*** *Short run equation*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| CointeQ01 | -0.259217 | 0.053401 | -4.854200 | **0.0000**** |
| ΔLNCCI | 2.171626 | 1.184780 | 1.832937 | 0.0679 |
| ΔLNL | -0.144430 | 0.176726 | -0.817254 | 0.4145 |
| ΔLNK | 0.351458 | 0.086730 | 4.052334 | **0.0001**** |
| C | -3.911131 | 0.826654 | -4.731279 | **0.0000**** |

***Source:*** *Researcher Illustration, Eviews 12.*

$$\boldsymbol{\Delta LNGDPt = -0.262322 + 0.042216\Delta CPIt - 0.124035\Delta LNLt + 0.359076\Delta LNKt - 0.109917 + \varepsilon t} \quad \textbf{(2)}$$

According to Table 5, the co-integration coefficient is significant and negative, which reflects the long run equilibrium observed in the previous year that influence the adjustment of the variables towards their equilibrium relationship. In addition,

there no effect of LNCPI and LNK on LNGDP, only LNL has a negative effect in the short run on LNGDP, where the increase in LNL for 1 unit will lead to decrease in LNGDP in 0.124036 units.

***Table 5.*** *Short run equation*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| CointeQ01 | -0.262322 | -0.262322 | -4.27998 | **0.0000**** |
| ΔLNL | -0.124036 | 0.193635 | -0.640564 | **0.0000**** |
| ΔLNK | 0.359076 | 0.082786 | 4.337411 | 0.5224 |
| ΔLNCPI | 0.042216 | 0.074605 | 0.545867 | 0.5720 |
| C | 0.109917 | 0.041595 | 2.642534 | **0.0087**** |

***Source:*** *Researcher Illustration, Eviews 12.*

$$\boldsymbol{\Delta LNGDPt = -0.259217 + 2.171626\Delta LNCCIt - 0.144430\Delta LNLt + 0.351458\Delta LNKt - 3.911131 + \varepsilon t} \quad \textbf{(3)}$$

According to Table 6, the co-integration coefficient is significant and negative, which reflects the long run equilibrium observed in the previous year that influence the adjustment of the variables towards their equilibrium relationship. In addition, there no effect of LNCCWGI on LNGDP, only LNK has a positive effect in the short run on LNGDP, where the increase in LNK for 1 unit will lead to an increase in LNGDP in 0.354820 units.

***Table 6.*** *Short run equation*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| CointeQ01 | -0.283238 | 0.059970 | -4.722984 | **0.0000**** |
| ΔLNCCWGI | -0.095916 | 0.061321 | -1.564159 | 0.1190 |
| ΔLNL | -0.109326 | 0.187752 | -0.582291 | 0.5609 |
| ΔLNK | 0.354820 | 0.090146 | 3.936063 | **0.0001***** |
| C | 0.853872 | 0.176394 | 4.840709 | **0.0000**** |

***Source:*** *Researcher Illustration, Eviews 12.*

### 4.2.2 Long Run Equation

$$\boldsymbol{LnGDPt = 5.090491LNCCIt + 0.002400LNLt + 0.771204LNKt} \ (1)$$

According to the long run equation (Table 7), LNGDP has a positive and significant relationship between LNCCI and LNK, when LNCCI increase 1 unit, LNGDP increase 5.09 units, and when LNK increase 1 unit, LNGDP increase 0.771204 units.

***Table 7.*** *Long run equation*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LNCCI | 5.090491 | 2.057095 | 2.474602 | **0.0140*** |
| LNL | 0.002400 | 0.082693 | 0.029022 | 0.9769 |

| | | | | |
|---|---|---|---|---|
| LNK | 0.771204 | 0.069100 | 11.16074 | **0.0000****** |

***Source:*** *Researcher Illustration, Eviews 12.*

$$LnGDPt = -0.040933LNCPIt + 0.188112LNLt + 0.763547LNKt \quad (2)$$

According to the long run equation (Table 8), LNGDP has a positive and significant relationship between LNL and LNK, when LNK increase 1 unit, LNGDP increase 0.763547 units, and when LNL increase 1 unit, LNGDP increase units.

***Table 8.*** *Long run equation*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LNK | 0.763547 | 0.04158 | 18.36301 | **0.0000****** |
| LNL | 0.188112 | 0.077362 | 2.431571 | **0.0157*** |
| LNCPI | -0.040933 | 0.109921 | -0.372384 | 0.7099 |

***Source:*** *Researcher Illustration, Eviews 12.*

$$LnGDPt = -0.095721LNCCWGIt + 0.741866LNLt + 0.046210LNKt \quad (3)$$

According to the long run equation (Table 9), LNGDP has a positive and significant relationship between LNCCI and LNK, when LNCCI increase 1 unit, LNGDP increase 5.09 units, and when LNK increase 1 unit, LNGDP increase 0.771204 units**.**

***Table 9.*** *Long run equation*

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| LNCCWGI | -0.095721 | 0.040096 | -2.387262 | **0.0177*** |
| LNL | 0.741866 | 0.044439 | 16.69403 | **0.0000****** |
| LNK | 0.046210 | 0.077086 | 0.599452 | 0.5494 |

***Source:*** *Researcher Illustration, Eviews 12.*

## 5. Conclusions, Proposals, Recommendations

Corruption is a widespread challenge that appears in practically every society around the world in various forms and levels. It is so deeply established in the system that it is sometimes impossible to eradicate. Governments endeavor to lessen corruption's impacts, but most fail due to the intricate and sophisticated tactics used to conceal their crime.

Previous literature on corruption featured three opposing theories: one arguing that corruption is advantageous to the economy with positive Impact, two alleging that it is harmful and negative impacts, and the third indicated that there is null or no impact on economic growth.

This study aimed to empirically deduce corruption’s impact on economic growth using an extended Solow growth model, including labor, capital, and corruption.

Annual time-series data from 2000-2020 was used; this study is the first research to analyze and distinguish these impacts in two different countries of MENA region. CPI, CC-WGI and CCI was used an indicator of corruption.

In contrast, GDP per capita was used as an indicator for economic growth as it is a precisevariable incorporating changes in GDP with population changes. ARDL Bounds method model for cointegration was used to test both the short-run and the long-run relationship between corruption and economic growth.

The study found that in the case of short run, there is no impact of the logarithm of each independent variable, logarithm of customized corruption index (LNCCI), the logarithm of corruption perception Index (LNCPI) and the logarithm of Control of Corruption from World Governance Indicators (LNWGI) on the dependent variable Logarithm of GDP in the MENA region.

While in the case of the long run estimation of the three models, that model one indicate that the logarithm of customized corruption index (LNCCI) influence positively on the logarithm of Gross domestic product (LNGDP) in 5.090491 points while for both model two and three that the logarithm of corruption perception index (LNCPI) and the logarithm of control of corruption from Worldwide Governance Indicators (LNWGI) have no impact on the dependent variable Logarithm of GDP in the MENA region.

Last but not least, from the collected data it is obvious that corruption is unfortunately widespread in the MENA region, with many governments plagued by bribery, nepotism, and embezzlement. This has had a detrimental impact on economic growth, political stability, and public trust in government institutions.

However, there are signs of progress as several countries have taken steps to combat corruption through increased transparency and accountability measures. For example, Saudi Arabia launched an anti-corruption campaign in 2017 that resulted in the arrests of dozens of high-profile businesspeople and officials.

Similarly, Tunisia established an independent anti-corruption agency tasked with investigating and prosecuting cases of corruption. While these efforts are promising, much work still needs to be done to effectively root out corruption in MENA to sense the real difference in the levels of corruption in the MENA region.

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