

# Determinants of Corruption in Middle East Countries: Evidence from Panel Data

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**Abstract:** Corruption is as old as time, and it is really hard to find any country around the globe immune from corruption. According to World Bank (WB) and International Monetary Fund (IMF) corruption is defined as "the abuse of public or corporate office for private gain". Several decades ago, there were a number of studies conducted that provided significant determinants of corruption levels in many parts of the world. These variables that affect corruption can at times vary between regions. This study pinpoints some important factors that affect the corruption index in the Middle East countries. Based on data provided by Transparency International, the average number of corruption in the Middle East has recently become inflated. This study analyzes various economic and non-economic corruption determinants in the Middle East countries for the period between 2012 and 2018 using panel data to run two regression models. The results showed for economic variables that increasing in economic freedom, GDP per capita, and foreign direct investment significantly lead to decrease corruption phenomenon in the Middle East countries. whereas, the relationship between corruption and GDP growth, inflation, and openness trade index are statistically insignificant. Random effect panel data for non-economic variables model has been estimated. Unexpected relationship between democracy variable and CPI is stated, where higher democracy index leads to increasing in corruption in the Middle East countries. Education level and human development index have significantly effect on reducing corruption. Human development index should be increased by improve the level of the decent life among the societies. Even though the coefficient of female labor force is positive, it is statistically insignificant. Significant negative relationship between corruption and population as well as freedom index has been reported.

**Keywords:** Corruption, Middle East Countries, Panel Data

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## 1. Introduction

Corruption can be compared to a serious contagious disease, it strikes some parts of society and then contagion spreads to other parts destroying functionality within its infected path. Corruption is as old as time, and it is really hard to find any country around the globe immune from corruption [14]. According to World Bank (WB) and International Monetary Fund (IMF) corruption is defined as "the abuse of public or corporate office for private gain".

Several decades ago, many studies provided significant determinants of corruption levels in many parts of the world, but at times the variables that affect corruption vary between regions [27].

This study pinpoints some important factors that affect the corruption index in the Middle East countries, that consist of

Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen. These countries have diverse economic structures. Eight (8) of these countries are oil based countries, precisely, the Gulf Cooperation Council (GCC) countries, Iran, and Iraq. Based on data provided by the Transparency International, the average level of corruption in the Middle East has recently become inflated. This study analyzes various economic and non-economic corruption determinants in Middle East countries for the period between 2012 and 2018 using panel data to run two regression models. The result indicates that economic freedom, FDI, per capita GDP, human development index, freedom level, population, education level, and democracy scores have a significant impact on the corruption score.

The main objective of this study is to determine a set of

variables that could affect the corruption level in the Middle East countries. To author knowledge this is the first study that explores economic and other types of determinants of corruption with the focus limited to the Middle East region countries as there is a different environment and culture compared to other regions around the globe.

The rest of the paper is organized as follows: Section II reviews related literature. Section III provides data and variables definitions. Section IV provides methodology and model specification. Empirical results are explained in section V. Section VI concludes and provides some policy implications. Section VII provides references and appendix.

## 2. Literature Review

Many previous studies have detected the relationship between corruption and several other factors, whether those factors are economic, political, or social. Ghaniy and Hastiadi [13] examined the effects of some variables on corruption using cross sectional data analysis for 92 countries, they found that there is a significant negative relationship between economic freedom, degree of democracy, and GDP per capita and corruption for those countries. On the other hand, they found that increasing in education variable significantly leads to increase in corruption level, Fechette [12] got same relationship between education and corruption in his study, where Treisman [33] reported a positive relationship.

A positive correlation between corruption and government investment and public investment is supported by Chen, Schneider, and Sun [7]. They studied the reasons of corruption for 30 provinces in China over the period from 1995 to 2015 by using multiple indicators and multiple causes (MIMIC) model to analyze unobservable corruption's determinants taking causes and consequences in account. They noticed that the average of corruption level was decreasing over the study time, they concluded that the main variables that have significant negative relationship and led to drop in corruption index are education, media supervision, and law enforcement. Moreover, they found that foreign direct investment has no significant effect on corruption.

One of previous result can also found in Bosco [5], who evaluated impact of set of variables on corruption for 31 European countries using panel data generated by Pesaran CCE model. He concluded that there is no strong correlation between public expenditure and corruption, on the other hand he found evidence of the positive effect of privatization level on corruption, which means that privatization rises corruption among all countries under study. Finally, he explored several variables that significantly described negative effects on corruption, precisely GDP per capita, technology progress, education, and democracy.

Elbehaw and Revier [11] analyzed the determinants of corruption for 150 countries for the years between 1998 and 2005 using panel data analysis by estimating Hausman Taylor equation. They explored that the population size, government wage, government consumption expenditure,

and natural resource abundance do not affect corruption level. However, they provided that increase in some variables such as, GDP per capita, openness to trade, and the percentage of female in labor force will lower the corruption score in high level of significance.

Ata and Arvas [3] investigated that increase in economic freedom and GDP per capita significantly lessen corruption score, whereas inflation has a positive effect on corruption. They got this finding after they run Topit regression model using cross sectional data for 25 European countries. In addition, they stated that economic growth has statistically insignificant effect on corruption.

Seldadyo and Haan [26] reviewed 70 economic, political, judicial, cultural, social, and geographical of corruption determinants. The main goal of this study is to analyze those variables though Factor Analysis technique. The authors reduced dimensions of variables by using Exploratory Factor Analysis, so they reduced 27 variables to 5 new variables, namely, regularity capacity, federalism, inequality, trade, and political liberty. They found that regularity capacity variable has a strongest significant effect on corruption. They concluded that other variables have also strong even positive (which are, ethnic tension, socialism legal origin, portion of population with no religion, ethnic conflict, government wage, fuel export, primary school enrollment) or negative effects (which are, population density, Scandinavian legal origin, illiteracy rate, latitude, external debt, precedential, portion of female in labor force) on corruption.

## 3. Data and Variables Definition

This study takes into account Corruption Perceptions Index (CPI) as a dependent variable, which measured by Transparency International. This organization ranks 180 countries every year by their levels of public sector corruptions, the average CPI level among the countries is 43 using a scale of 0 to 100, where a country that reaches a low scale experienced a high level of corruption and vice versa.

The following variables are all independent economic variables and other variables that are expected to affect corruption level:

Economic variables:

Economic Freedom Index is an indicator that measures the right of people to control their own labor and property. The Heritage Foundation (heritage.org) measures this index based on 12 variables, these variables are categorized into four groups: rule of law, government size, regulatory efficiency, and open market. The scale of economic freedom places between 0 and 100, where the high value indicates a high level of economic freedom. The index classifies each economy in one of the following types:

Free if,  $80 \leq \text{Economic Freedom} \leq 100$ .

Mostly Free if,  $70 \leq \text{Economic Freedom} < 80$ .

Moderately Free if,  $60 \leq \text{Economic Freedom} < 70$ .

Mostly Unfree if,  $50 \leq \text{Economic Freedom} < 60$ .

Repressed if,  $40 \leq \text{Economic Freedom} < 50$ .

Last economic freedom index report was published in 2019

by Heritage Foundation. The score was ranged between 90.2 for Hong Kong and 5.9 for North Korea. Shabbir and Anwar [28], Park [23], and Goldsmith [16] provided a negative relationship between EF and corruption, Where Paldam [22] stated positive relationship.

Foreign Direct Investment (FDI) is an investment that is made by a company in one country into a business located in another country. In their previous work on corruption, Rehman and Naveed [24] found a significant positive relationship between corruption and FDI.

GDP Growth measures the speed's rate of economy's growing by comparing a country's GDP to a previous year. Ata, Arvas [3] and Rehman, Naveed [24] discovered that GDP growth positively affect corruption perception index.

GDP per capita is a measure of country's gross domestic product divided by its total population. This index is a good measurement of people's standard living, so we can

determine poor and rich countries from the GDP pc for those countries. Corruption perception index is negatively affected by GDP per capita as it shown in Elbahnasawi and Revier study [11].

Inflation Index (and it is also called Consumer Price Index) is calculated by using the average of changing prices of goods and services over time. This index was used by many previous studies as a factor that affect corruption level, since the inflation negatively affect the real wage and hence the purchase power of people. The high rate of inflation could increase corruption Rehman and Naveed [24], or decrease corruption Ata and Arvas [3].

Trade openness measures the whole trade of a country (export and import) as a ratio of gross domestic product. Ades and Tella [1], Brunetti and Weder [6] explored a significant negative relationship between corruption and trade openness.

*Table 1. Statistic description for economic variables.*

	<b>CORR</b>	<b>EF</b>	<b>FDI</b>	<b>GDPG</b>	<b>GDPPC</b>	<b>INF</b>	<b>TO</b>
Mean	44.46154	63.99494	5.10E+09	3.072343	23326.6	4.917574	92.34982
Median	45	65.1	2.88E+09	2.926121	20627.93	2.87256	89.54349
Maximum	71	77.6	1.93E+10	13.39624	85076.15	39.26602	191.8778
Minimum	16	40.3	-2.17E+09	-7.44456	2440.51	-3.74915	30.24655
Std. Dev.	15.02835	8.349066	4.82E+09	2.664229	19832.49	6.740737	42.2175
Skewness	-0.00275	-0.99674	0.916945	-0.04172	1.296299	2.823886	0.708841
Kurtosis	2.251111	3.830895	2.946454	7.703904	4.509426	12.69958	2.606716

#### Non-Economic Variables:

Democracy Index variable is provided by Economic Intelligent Unit (EIU). The EIU calculates democracy index for 165 countries based on sixty indicators divided into five main variables: electoral process, civil liberties, the functioning of government, political participation, and political culture. The index lays between 0 and 10, higher value indicates higher level of democracy, the index classifies each country in one of the following regime types:

Full democracy if,  $8.0 \leq \text{Democracy Index} \leq 10.0$ .

Flawed democracy if,  $6.0 \leq \text{Democracy Index} < 8.0$ .

Hybrid regimes if,  $4.0 \leq \text{Democracy Index} < 6.0$ .

Authoritarian regimes if,  $0.0 \leq \text{Democracy Index} < 4.0$ .

In 2018 The highest level was 9.87 and it was reached by Norway, where North Korea had the lowest level which is 1.08. Treisman [33] employed an empirical approach to determine factors that affect corruption, and he showed a significant negative relationship between corruption perception and democracy index.

Education Index is an average number of years of schooling. This index is calculated by United Nations Development Program (UNDP) every year since 1980 by using mean years of schooling among countries. Shbbir and Anwar [28] provided that education level positively affects

the corruption score, where Bosco [5] showed a negative relationship in his study.

Human Freedom Index is published by Cato Institute (cato.org) every year. They use 79 indicators to calculate personal freedom for 162 countries around the globe on a scale of 0 to 10, where a higher number means higher degree of freedom. This index is calculated based on many areas such as, rule of law, religion, identity and relationship, movement, legal system and property right, and etc. This index has a negative effect on corruption as it found by Shbbir and Anwar [28].

Female labor force is a participation rate of female to the total labor force. Negative relationship between female labor force and corruption was provided by Swamy, Knack, Lee, and Azfar [29].

Human Development Index provided by UNDP to determine the human development and standard life of societies for 189 countries. The index focuses on three dimensions, the duration average of healthy life, the knowledge of people, and the level of decent life. Zhang, Cao, and Vaughn [34] found that HDI negatively affects the corruption level.

Population most of previous studies explored that population has a significant negative effect on the level of corruption, such as Tavares [32], Rehman and Naveed [24].

*Table 2. Statistic description for non-economic variables.*

	<b>CORR</b>	<b>DEMC</b>	<b>EDUC</b>	<b>FL</b>	<b>HFI</b>	<b>HDI</b>	<b>POP</b>
Mean	44.46154	3.749011	9.094505	22.02311	48.62121	0.793659	27820308
Median	45	3.31	9.4	18.07704	44.49	0.8	9141596
Maximum	71	7.85	13	47.18562	136.6	0.903	98423595
Minimum	16	1.71	6.6	12.37031	28	0.659	1299943
Std. Dev.	15.02835	1.486863	1.665891	9.35438	18.77441	0.066084	32315000

	CORR	DEMC	EDUC	FL	HFI	HDI	POP
Skewness	-0.00275	1.27059	0.480652	1.391764	2.113433	-0.39119	1.029894
Kurtosis	2.251111	4.417651	3.037131	4.33098	9.548637	2.257848	2.406999

#### 4. Methodology and Model Specification

As indicated, the aim of this section is to answer the question of what economic and non-economic factors that

$$\text{CORR}_{it} = \alpha_i + \beta_1 \text{EF}_{it} + \beta_2 \text{FDI}_{it} + \beta_3 \text{GDPG}_{it} + \beta_4 \text{GDPPC}_{it} + \beta_5 \text{INF}_{it} + \beta_6 \text{TO}_{it} + \varepsilon_{it}$$

$i$ : represents specific county included in the study.

$t$ : represents time, where  $t=2012, \dots, 2018$ .

$\alpha, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \text{ and } \beta_6$ : are the coefficients to be estimated.

$\varepsilon$ : is the error term.

CORR: corruption perception index (source: Transparency International reports 2012-2018).

EF: economic freedom index (source: Heritage Foundation (heritage.org)).

FDI: foreign direct investment (source: World Bank

vary corruption level in the Middle East countries for the period between 2012 and 2018. This study uses panel data analysis to run two regression models by dividing variables into two parts, economic and non-economic variables:

Economic Variables' Model:

indicators (data.worldbank.org/indicator)).

GDPG: GDP growth (source: World Bank indicators (data.worldbank.org/indicator)).

GDPPC: GDP per capita (source: World Bank indicators (data.worldbank.org/indicator)).

INF: inflation rate (source: World Bank indicators (data.worldbank.org/indicator)).

TO: trade openness (source: World Bank indicators (data.worldbank.org/indicator)).

Non-Economic Variables' Model:

$$\text{CORR}_{it} = \alpha_i + \beta_1 \text{DEMC}_{it} + \beta_2 \text{EDUC}_{it} + \beta_3 \text{FL}_{it} + \beta_4 \text{HFI}_{it} + \beta_5 \text{HDI}_{it} + \beta_6 \text{POP}_{it} + \varepsilon_{it}$$

$i$ : represents specific county included in the study.

$t$ : represents time, where  $t=2012, \dots, 2018$ .

$\alpha, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \text{ and } \beta_6$ : are the coefficients to be estimated.

$\varepsilon$ : is the error term.

CORR: corruption perception index (source: Transparency International reports 2012-2018).

DEM: democracy index (source: Economic Intelligent Unit (EIU) reports 2012-2018).

EDUC: education index (source: United Nation Development Program (UNDP)).

FL: female labor force (source: World Bank indicators (data.worldbank.org/indicator)).

HFI: human freedom index (source: Cato Institute reports 2012-2018 (cato.org)).

HDI: human development index (source: United Nation Development Program (UNDP)).

POP: total population (source: World Bank indicators (data.worldbank.org/indicator)).

results are presented in this section. Results have divided into two parts:

Part one: economic variables' model:

Table 3 shows the results of cross-section panel data model. 1 for the period 2012-2018 including economic independent variables (economic freedom, foreign direct in investment, GDP growth, GDP per capita, inflation, and trade openness) to determine which of those variable significantly affect corruption for Middle East countries. Economic freedom is statistically significant at level 1% affect CPI. Thus, if economic freedom increase by one unit the CPI will increase by 0.52 which means decreasing in corruption. Same result was found by Paldam [22]. Also, foreign direct investment Rehman and Naveed [24] as well as GDP per capita Elbahnasawi and Revier [11] have a significant positive relationship with CPI at 1% level. This result can be interpreted as rich countries that have high GDP per capita less corrupted than poor countries. Although GDP growth and inflation are negatively affect CPI, they are statistically insignificant at any level, this finding is the opposite of Braun and Tella study where they found inflation significantly affects corruption. Finally, the openness trade has a coefficient greater than zero, but this relationship with CPI is statistically insignificant because of high p-value.

#### 5. Empirical Result

Based on models that shown in section 3, some empirical

**Table 3.** Result for economic variables model.

Dependent Variable:	CORR			
Method:	Panel Least Squares			
Sample:	2012 2018			
Periods included:	7			

  

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EF	0.521791	0.044655	11.68488	0
FDI	7.55E-10	1.57E-10	4.800998	0
GDPPC	0.000346	3.95E-05	8.778393	0
GDPG	-0.034336	0.270074	-0.127136	0.8992

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.147873	0.105377	-1.403285	0.1648
TO	0.026139	0.022013	1.187449	0.2389

  

Root MSE	5.817989	R-squared	0.803995
Mean dependent var	46.83544	Adjusted R-squared	0.79057
S.D. dependent var	13.2253	S.E. of regression	6.052364
Akaike info criterion	6.511685	Sum squared resid	2674.071
Schwarz criterion	6.691643	Log likelihood	-251.2116
Hannan-Quinn criter.	6.583782	Durbin-Watson stat	0.450217

Part two: non-economic variables' model:

A cross section random effects panel data is used in this model to analyze and investigate non-economic variables that cause corruption. Hausman test has is used in to compare the

results between random effect model and fixed effect model. High p-value appeared in Table 5, so null hypothesis is failed to be rejected.

*Table 4. Result for non-economic variables model.*

Dependent Variable:	CORR
Method:	Panel EGLS (Period random effects)
Sample:	2012 2018
Periods included:	7
Swamy and Arora estimator of component variances	

  

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-27.32721	12.64279	-2.161487	0.0335
DEM	-2.824353	1.361411	-2.074579	0.0411
EDU	3.729917	0.983426	3.79278	0.0003
FL	0.063745	0.195016	0.326872	0.7446
FI	-0.129595	0.059114	-2.192295	0.0311
HDI	69.76528	20.64236	3.379714	0.0011
POP	-1.10E-07	3.66E-08	-3.010817	0.0034

  

Root MSE	8.659001	R-squared	0.72862
Mean dependent var	42.40659	Adjusted R-squared	0.709236
S.D. dependent var	16.71392	S. E. of regression	9.012574
Sum squared resid	6823.025	F-statistic	37.58817
Durbin-Watson stat	0.237655	Prob (F-statistic)	0

Table 4 shows the result from running random effect panel data model for non-economic variables. Unexpected relationship between democracy variable and CPI is stated in the table, where the democracy is negatively affects CPI with 5% significant level. Thus, higher democracy index leads to increasing in corruption in Middle East countries. This result could be because of citizen are not given a real control power in democracy, or the democracy itself is relatively new in this region so people do not perform it in right way. Shabbir and Anwar [28] as well as Serra [27] found that democracy has significant effect on reducing corruption. As it shown in table 4, education index has positively affect CPI at significant level 1%. Most of

previous studies had same results such as, Ades and Tella [1], Brunetti and Weder [6], where more schooling years among countries shrink corruption. Even though the coefficient of female labor force is positive, it is significantly insignificant. However, Swamy, Knack, Lee, and Azfar [29] reported that relationship statistically significant. Freedom index and population negatively affect CPI, same finding as Brunetti and Weder [6] and Tavares [31] respectively. The coefficient of human development index has positive sign which indicates the level of HDI is positively correlated with CPI (high HDI leads to low corruption), Zhang, Cao, and Vaughn [34] had a same result.

*Table 5. Hausman test result for non-economic variables model.*

Correlated Random Effects - Hausman Test			
Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d. f.	Prob.
Period random	8.305226	6	0.2166

## 6. Conclusion

The debate on differences of variables that affect

corruption level is still open and has been the subject of many applied works. The relevant literature has emphasized many economic and non-economic determinants cause corruption. This study estimates some important factors that

affect the corruption index in the Middle East countries, that consist of Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen. Those countries have diversity of their economies, 8 of them are oil based countries precisely Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates. Based on data provided by the Transparency International, the average of corruption in the Middle East is recently inflated. This study analyzes various economic and non-economic corruption determinants in Middle East countries for the period between 2012 and 2018 using panel data to run two regression models.

The finding of the first model indicates that increasing in economic freedom, GDP per capita, and foreign direct investment significantly lead to decrease corruption phenomenon in the Middle East countries. whereas, the relationship between corruption and GDP growth, inflation, and openness trade index are statistically insignificant. Based on finding of this model, the author suggests that encouraging policies for foreign direct investment should be taken in account by Middle Eastern governments. In addition, government should strongly support policies that increase the

scale of economic freedom.

In the second equation, random effect panel data for non-economic variables model has been estimated. Unexpected relationship between democracy variable and CPI is stated, where the democracy is negatively affects CPI with 5% significant level. Which means, higher democracy index leads to increasing in corruption in the Middle East countries. This result could be because of the democracy itself is relatively new in this region so people do not perform it in right way. Thus, governments should give citizens a real control power in democracy in the Middle East countries. Education level and human development index have significantly effect on reducing corruption. The author suggests that governments should focus on improving the quality of education and provide chances to individuals to complete all levels of schooling. Also, human development index should be increased by improve the level of the decent life among the societies. Even though the coefficient of female labor force is positive, it is statistically insignificant. Significant negative relationship between corruption and population as well as freedom index has been reported.

## Appendix

*Table 6. Correlations matrix among economic variables.*

Covariance Analysis: Ordinary							
Sample: 2012 2018							
Correlation	CORRUPTION	ECONOMIC FREEDOM	FDI	GDP GROWTH	GDP PER CAPITA	INFLATION	TRADE OPENNESS
CORRUPTION	1						
ECONOMIC FREEDOM	0.770624296	1					
FDI	0.243397899	0.0524512	1				
GDP GROWTH	0.179580794	0.1697595	0.2556792	1			
GDP PER CAPITA	0.746894024	0.5361083	-0.0497705	0.0786	1		
INFLATION	-0.480835755	-0.6555588	0.11730927	-0.1151	-0.36679	1	
TRADE OPENNESS	0.491595753	0.7019847	-0.2202984	0.05343	0.37258	-0.431811	1

*Table 7. Correlations matrix among non-economic variables.*

Covariance Analysis: Ordinary							
Sample: 2012 2018							
Correlation	CORRUPTION	DEMOCRACY	EDUCATION	FEMAL LABOR FORCE	FREEDOM	HDI	POPULATION
CORRUPTION	1						
DEMOCRACY	0.074160734	1					
EDUCATION	0.651397542	0.2605287	1				
FEMAL LABOR FORCE	0.120854647	0.8269086	0.27140574	1			
FREEDOM	-0.318353807	-0.4316848	-0.1741664	-0.2697	1		
HDI	0.758424328	0.0638774	0.74253743	0.2587	-0.2131	1	
POPULATION	-0.452233817	-0.102206	-0.3791586	0.05424	0.47057	-0.45766	1

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