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ANALYZING THE IMPACT OF CORRUPTION ON INCOME LEVELS DISPARITY BETWEEN COUNTRIES

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Abstract:

The study aimed to analyze the impact of corruption on economic growth, for a sample of 131 countries, during the year 2018. Three indicators of corruption were used. The economic growth variable was an ordered variable that arranges the country's income into four categories of income. A set of control variables was also used. The relationship between the variables was analyzed using Ordered Probit and Ordered Logit Models. Three model parameters were estimated using STATA software. The results of the study showed that the three indicators of corruption had a negative and significant impact on the income levels of the studied countries. The results also showed that each income level has specific threshold values for corruption indicators. The higher the level of corruption in a country than that threshold. The greater the need for an effective anti-corruption policy. And allocate more funding for its success.

Key words: *Corruption; Ethical Behavior; Economic Growth; Ordered Probit Models; Ordered Logit Models.*

1. Introduction

The emergence and spread of the COVID-19 pandemic has shed light on the importance of anti-corruption policies. Where the experts of the International Monetary Fund indicate that the chances of corruption will be increased in the crisis times. This limits countries' ability to deal with the economic impacts of this pandemic. Besides creating problems in providing funds and aid to people, whom need it really. Under these circumstances, countries have a great need to reduce tax evasion and waste of public funds. In order to gain the citizens' trust to the government and public institutions, and to avoid more political and social problems (Gaspar, Mühleisen, & Rhoda, 2020).

The definition provided by Nye (1967), is One of the earliest definitions of the corruption' phenomenon; According to him, **"**Corruption is behavior which deviates from the

formal duties of a public role because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private regarding influence**"**.

Therefore, corruption is linked to all behaviors inconsistent with the duties of officials. Which are related to the exploitation of their authority and administrative position within public institutions, in order to achieve their own goals and this at the expense of the public interest (Aidt, 2003). Thus, corruption expresses any deviation from the Legal authority of each official (Khan, 1996). Bribery provided by one side to an employee in the public sector is the most common form of corruption. This does not mean that it is the only form. There are even other types of corruption (Lučić, Radišić, & Dobromirov, 2016). In addition, what may be a form of corruption in one country may not be the case in another country. As some forms of gifts are considered legal in some countries, while the laws of other countries consider them as a form of corruption (Enste & Heldman, 2017).

In terms of participation in corruption, the literature distinguishes between the bottom-up and the top-down corruption. In the first type, we find that corruption occurs at the low-level officials. However, because of their fear of judicial punishment, they work to implicate some of their direct superiors in the corruption process, in order to ensure their protection. As for the second type, we find it when corruption was at the level of the institution' top management. And when they work to buy the silence of its subordinates, those who have a direct relationship with the subject of the deal (Rose-Ackerman, 1999, p. 82).

Studies on corruption and economic growth have not yet reached a unified conclusion about the nature of the relationship between the two variables (Campos, Dimova, & Saleh, 2010). When a group of studies found a negative effect of corruption on economic growth. Other reached to the existence of a positive effect. While another group reached that the relationship between the two variables is a bidirectional or indirect relationship (Enste & Heldman, 2017).

The variation in the results of previous studies leads to more research on the relationship between the two variables. Therefore, this study seeks to answer the following questions:

First: What is the impact of corruption on the level of income?

Second, what are the threshold values that influence the shape of the relationship between the two variables?

Third, how does the corruption index in the government sector affect the income level of the country?

Fourth, how does the corruption index in the private sector affect the income level of the country?

The aim of the study is to analyze the relationship between corruption and the level of economic growth expressed by the level of income, using the threshold method. and working on determining the threshold values for the corruption index, which indicate the likelihood that a country will be classified at a certain income level.

The rest of the paper is structured as follows: Section 2 discusses review of literature, whereas Section 3 explains the methodology. Section 4 describes and discusses the results. Section 5 presents conclusions and policy implications.

2. Literature review

The success of any anti-corruption policy in any country is related to the extent to which that policy provides an accurate description of the corruption phenomenon, and the factors causing it. Then to develop appropriate solutions. Tanzi (1998) classifies the causes of corruption into direct and indirect causes. According to (Enste & Heldman, 2017), the corruption could be the result of a variety of reasons. Among them we find the size and structure of government, as well as the size of democracy in the country (Kotera, Okada, & Samreth, 2010). Since the impact of these factors can vary from one economic activity to another (Elliott, 1997, p. 181). It can also differ according to the level of government decentralization (Serra, 2006). It can also be related to the age of democracy (Treisman, 2000), and the level of its achievement (Rock, 2009).

On the other hand, corruption can be a result of other factors, such as the form and size of competition among economic dealers (Lambsdorff, 2006). As well as the level of government officials salaries (Tanzi, 1998; van Veldhuizen, 2011). And the extent of press freedom. Especially if this coincides with the existence of a free and fair judicial system in the country (Lambsdorff, 2006). The corruption literature also states that the rate of women's participation in social life can have a negative impact on the rate of corruption (Branisa & Ziegler, 2010). As well as the source of colonialism to which the country was subjected (Serra, 2006). And To what extent does the country depend on natural resources as a primary source of income (Isham, Woolcock, Pritchett, & Busby, 2005; Aslaksen, 2007; Bhattacharyya & Hodler, 2010; Erum & Hussain, 2019).

Due to the breadth of the corruption concept. It has many economic and social effects, and among them, we find the following: The impact on domestic and foreign investments and international trade. The spread of corruption at the level of a government leads to a decline in its domestic investments, especially from the private sector (Mauro, 1995). Because of the declined incentive for domestic investors to invest in the country. This is due to the possibility that the material and moral costs of their projects will be increased (Shleifer & Vishny, 1993). Which leads them to look for investment opportunities in other countries with a lower degree of corruption. The same observation can be made for foreign direct investment (Egger & Winner, 2006; Lambsdorff, 2006). Especially those looking for a suitable environment to invest their capitals. Where the corruption and bureaucracy indexes are parts of the most important indicators that express the investment attractiveness of countries (Johnson, LaFountain, & Yamarik, 2011).

With regard to its impact on public revenues, corruption has a negative impact on tax collection (Gaspar, Mauro, & Medas, 2019). However, in terms of its impact on the allocation of public investments, the spread of corruption leads to encouraging officials to invest public funds in sectors that yield greater returns for private investors. Which means the possibility to obtain a big part of bribes (Rose-Ackerman, 1999; Hessami, 2013). This is at the expense of investments of large public interest such as the education and health sector (Mauro, 1998). Corruption also has an impact on income inequality (Šumah, 2018). Besides its impact on the country' income level. According to (Bardhan, 1997), by the channel of the effect on investment and economic growth.

Although corruption is classified in most countries as a type of crime punishable by law. Due to its social and economic impacts. However, the economists 'view of it was divided into two main theories, the "grease in the wheel" and the "sand in the wheel" theory (Campos et al., 2010). The first category of economists indicates that corruption, and especially bribery, can have a positive impact on the economy and investment. By working to facilitate and speed up bureaucratic procedures, and reduce their costs (Colombatto, 2003; Drury, Krieckhaus, & Lusztig, 2006). These ideas spread, especially during the nineties. Where the most important criticism of these findings is their neglect of opportunity costs.

The Sand on Wheels theory suggests that corruption and bribery have a negative impact on investments and economic growth. Especially in terms of misallocation of public resources granted to investors. This theory is considered as the closest to reality, and this is in line with a large group of economists view (Campos et al., 2010).

Many studies have concluded that the corruption has a negative direct and one-way impact on economic growth. As it can follow five main channels (Lučić et al., 2016), which are: A decline in domestic and foreign investment. Increase in production costs; Misallocation of natural resources. Growing income inequality. Increasing uncertainty in the decision-making process by investors.

On the other hand, other studies have concluded that the relationship between the two variables is not linear, but rather a simultaneous and bidirectional relationship (Blackburn, Bose, & Haque, 2006). Whereas, in addition to the negative impact of corruption on the level of income, the low level of the latter can stimulate more corruption, and therefore the relationship between the two variables is reciprocal and not in one direction. The following table summarizes a group of studies on the relationship between the two variables and their findings. Where they were classified on the basis of the relationship' form between the two variables.

Table 1

Selected empirical findings on corruption-economic growth nexus

form of effect	study	Income variable	causality	Observation
	(Shleifer & Vishny, 1993)	economic growth	EG ← Cor	
	(Mauro, 1995)	economic growth	EG ← Cor	
	(Gupta, Davoodi, & Alonso-Terme, 2002)	income inequality	EG ← Cor	
	(Wei & Shleifer, 2000)	economic performance	EG ← Cor	
negative	(Abed & Davoodi, 2000)	economic growth	EG ← Cor	
	(Mo, 2001)	growth of GDP	EG ← Cor	
	(Méon & Sekkat, 2005)	Per capita GDP growth rate	EG ← Cor	
	(Blackburn et al., 2006)	economic growth	EG ↔ Cor	
	(Guetat, 2006)	Per capita GDP growth rate	EG ← Cor	
	(Shao, Ivanov, Podobnik, & Stanley, 2007)	economic growth	EG ← Cor	

	(Brown & Shackman, 2007)	GDP per capita	EG → Cor	long-term reduction in corruption
	(Aidt, Dutta, & Sena, 2008)	economic growth	EG ↔ Cor	
	(Podobnik, Shao, Njavro, Ivanov, & Stanley, 2008)	GDP per capita	EG ← Cor	
	(Bose, Capasso, & Murshid, 2008)	Quality of new public capital investments	EG ← Cor	find a corruption threshold that determines two distinct regimes by corruption level
	(Aidt, 2009)	GDP growth	EG ← Cor	
	(Gundlach & Paldam, 2009)	income	EG → Cor	
	(Dzhumashev, 2014)	economic efficiency	EG → Cor	
	(Mustapha, 2014)	GDP per capita	EG ← Cor	
	(Ugur, 2014)	GDP per capita	EG ← Cor	
	(Yusuf, Malarvizhi, Mazumder, & Su, 2014)	GDP	EG → Cor	
	(Ali, 2015)	GDP	EG → Cor	
	(Erum & Hussain, 2019)	per capita income	EG ← Cor	
	(Alfada, 2019)	GDP per capita	EG ← Cor	
positive	(Barreto, 2001)	GDP	EG ← Cor	
	(Rock & Bonnett, 2004)	GDP per capita	EG ← Cor	
	(Méon & Weill, 2010)	Productive efficiency	EG ← Cor	
	(Li & Wu, 2010)	economic growth	EG ← Cor	
	(Vial & Hanoteau, 2010)	plant growth	EG ← Cor	
	(Swaleheen, 2011)	growth rate of real per capita income	EG ← Cor	
	(Kato & Sato, 2015)	gross value added per worker	EG ← Cor	
	(Huang, 2016)	economic growth	EG ← Cor	
Non-linear	(Ahmad, Aman ullah, & Arfeen, 2012)	Log of GDP per worker	EG ← Cor	inverted U-shaped relationship
No causality	(Méndez & Sepúlveda, 2006)	real income per capita	No causality	

Note: EG: Economic Growth index; Cor: Corruption index; "←" the direction of causality.

The table 1 indicate that the majority of the previous studies have tried to link corruption and economic growth indicators in a direct way. It also shows that most of these studies suggest there is a negative correlation between the two variables, without analyzing the difference in the form of that relationship when the levels of corruption change.

Among the studies that adopted the threshold method to explain the relationship between the two variables. We find the (Bose et al., 2008) study, which focused on analyzing the impact of corruption on the quality of public services in a sample of 125 countries, during the period 1990-2000. According to (Hansen, 2000) methodology, The study found that the effect of the threshold on the relationship between the two variables differed from one public

service to another. Where the impact of the threshold was significant in the quality of electricity and water supply. While its impact was weak on road networks' quality.

The study of (Haque & Kneller, 2009) also relied on the methodology of (Hansen, 2000) in applying the threshold method. On a group of countries during the period 1980-2003. The study found a threshold effect on the relationship between corruption and economic growth. The researchers proposed a set of variables that can determine the threshold values.

The study of (Alfada, 2019) is one of the latest studies, that tried to analyze the difference in the form of the corruption and economic growth relationship, depending on the threshold analysis method, and this by analyzing data for a group of Indonesian provinces, during the period 2004-2015. Where the threshold of corruption was determined based on the methodology of (Hansen, 2000). And the estimation of the relationship between the variables was based on the method of two stages least squares (2SLS). The study found that in provinces with a corruption index greater than the threshold (1,765). Corruption was more destructive to economic growth.

Based on what has been mentioned previously. It is evident that most of the previous studies looking at the impact of corruption on economic growth, directly and indirectly. Through its impact on domestic and foreign investments and tax revenues, and according to the level of growth. Our study is characterized by the use of income levels as an ordinal variable, instead of taking the rate of economic growth or GDP as a dependent variable. We will use income levels according to the World Bank's classification of countries. Thus, the values of the coefficients of the regression function will indicate the probability values. We try to determine the minimum target value for corruption, by calculating the values of the threshold at which the country can be classified at a certain income categories.

3. Methodology

3.1. Collection of Data

The data used in this study were collected from different international institutions mainly represented in The World Economic Forum, United Nations Conference on Trade and Development, and the Transparency International organization. The dataset envelope 133 (see Appendix. 1). The only criterion for data selection is data availability during the year 2018.

3.2. Variable Definition and Descriptive Statistical Analysis

3.2.1. Dependent Variable

The dependent variable in this study is income level (IC) measured according to the World Bank classification of countries based on the GNI (Gross National Income) per Capita (in U.S. dollars, converted from local currency). This methodology origin back to the late of 1970. Currently, economies are divided into four income groups: low income (GNI<= 1,025), lower-middle income (1,026<= GNI<=3,995), upper-middle income (3,996<= GNI<=12,375), and high income (GNI<=12,375). The data for GNI retrieved from (World_Bank, 2020).

3.2.2. Independent variables

This study aims to explore the relationship between income level and corruption in general and to explore the difference between public and private sectors in terms of

corruption effect on income level. Thus, this study uses three different measures of corruption. First, The Corruption Perceptions Index (CPI) which is a scale of 0-100. Where a 0 equals the highest level of perceived corruption and 100 equals the lowest level of perceived corruption, retrieved from the Trade and Development and the Transparency International organization (Transparency_International, 2020). Second, Ethics and corruption (EC), and Third, Ethical behavior of firms (EBF). The two last variables issued by the World Economic Forum (WEF, 2019), its values ranged from 1 to 7, where a 1 equals to the lowest level of commitment to Ethics and 7 equals the highest level of commitment to Ethics.

3.2.3. Control variables

According to the previous literature, several control variables were introduced to enhance the relationship between income level and corruption or to meet the parallels condition in the model. In this study, we used three control variables: innovation (IN), innovation capacity (INC), and economic diversification. The innovation is an index of seven (7) sub-indexes, which are: Capacity for innovation ; Quality of scientific research institutions; Company spending on R&D; University-industry collaboration in R&D; Gov't procurement of advanced tech products; Availability of scientists and engineers; and PCT patents, applications. its values ranged from 1 to 7, where a 1 equals to the lowest level of innovation and 7 equals the highest level of innovation. Innovation capacity is the first sub-index in the innovation index, its values ranged from 1 to 7. Data for innovation and innovation capacity collected from World Economic Forum (WEF, 2019). While, Economic Diversification (Div) is measured by the Product concentration and diversification indices of exports and imports, which is calculated according to the following proportion:

$$\mathrm{Div_j} = \frac{\sum_i \left|\mathrm{h_{ij}} - \mathrm{h_i}\right|}{2}$$

Where:

$\mathrm{Div_j}$: is the Economic Diversification Index, $\mathrm{h_{ij}}$: the proportion of product i from the total exports of the country j, $\mathrm{h_i}$: the proportion of product i from the World total exports.

The Economic Diversification Index values ranged from 0 to 1. Where a 0 equals to highest level of Economic Diversification and 1 equals the lowest level Economic Diversification. Data retrieved from United Nations Conference on Trade and Development (UNCTADstat, 2019).

The table 2 provide descriptive and correlation statistics of the study variables. Panel a illustrates the frequency of each income level category within the study sample, while panel b concludes descriptive statistics on the study variables, those statistics gives insight on the distribution of each variable. Panel c provide Pearson correlation coefficients matrix. It is obvious that innovation and innovation capacity are highly correlated, as a result that the innovation capacity is a sub-index in the innovation index, and we substitute between those two variables to meet the parallel condition in the study models. The variables CPI, EC and EBF are highly correlated, because of the fact that all of it is a measure of corruption. Those high coefficients do not represent a multicollinearity problem and do not affect the study models estimation.

Table 2. Study variables descriptive and correlation statistics

Panel a. Dependent variable**.**

y	*Freq*	*Percent*
1	18	13.53
2	32	24.06
3	33	24.81
4	50	37.59
Total	133	100

Panel b. Independent and Control variables

Var	Obs	Mean	Std.dev	Min	Max
CPI	133	46.842	19.217	14	88
EC	133	3.724	1.173	1.717	6.413
EBF	133	4.068	0.940	2.554	6.284
IN	133	3.589	0.865	2.078	5.821
INC	133	3.989	1.033	2.063	6.550
Div	133	0.643	0.168	0.240	0.922

Panel c. Correlation matrix**.**

	CPI	INC	IN	Div	EC	EBF
CPI	1.0000					
INC	0.6949	1.0000				
IN	0.7840	**0.9286**	1.0000			
IN	-0.4872	-0.4937	-0.5467	1.0000		
EC	0.8294	0.6938	0.8100	-0.3329	1.0000	
EBF	0.8307	0.7923	0.8594	-0.3364	**0.9628**	1.0000

3.3. Ordered Probit and Ordered Logit Models

Two models are used in this study to analyze the effects of corruption on Income level. Those models are Ordered Probit and Ordered Logit models.

The data reflecting the income level are ordered variables of classification, and there are four categories, including “low income” (GNI<= 1,025), “lower-middle income” (1,026<= GNI<=3,995), “upper-middle income” (3,996<= GNI<=12,375), and “high income” (GNI<=12,375). Therefore, we use an Ordered Probit and Ordered Logit Models, which are suitable to analyze the relation amid income level and corruption. Since those two models are closely related, they called together Ordered Regression Models (Scott Long, 1997).The general formula of those models presented by Green as follows (Greene, 2017, p. 869).

$$y^* = X_i\beta + \varepsilon \qquad [1]$$

Where, y* is unobservable and we know only when it crosses thresholds. X_i is the set of explanatory variables, which may affect the income level. What we do observe is:

$y = 0$ if $y^* \le 0$ [2]
$= 1$ if $0 \le y^* \le \mu_1$
$= 2$ if $\mu_1 \le y^* \le \mu_2$
.
.
.
$= J$ if $\mu_{j-1} \le y^*$,

The μ’s are unknown parameters to be estimated with β. We assume that ε is normally distributed. The probability that observation i will select alternative j is:

Prob (y=0 |x) = F(-x’β), [3]
Prob (y=1 |x) = F(μ_1-x’β)- F(-x’β)

Prob (y=2 |x) = F(μ_2-x'β)- F(μ_1-x'β)

.

.

.

Prob (y=J |x) = 1- F(μ_{j-1}-x'β)

For all the probabilities to be positive we must have: $0 \leq \mu_1 \leq \mu_2 \leq \ldots \leq \mu_{j-1}$. For the ordered logit, F is the logistic Cumulative Distribution Function (CDF), while for the ordered probit F is the normal Cumulative Distribution Function (CDF).

This study consider three models as follows:

$$\mathrm{IC} = \mathrm{CPI}\beta_1 + \mathrm{IN}\beta_2 + \mathrm{Div}\beta_3 + \varepsilon \quad [4]$$

$$\mathrm{IC} = \mathrm{EC}\beta_1 + \mathrm{IN}\beta_2 + \mathrm{Div}\beta_3 + \varepsilon \quad [5]$$

$$\mathrm{IC} = \mathrm{EBF}\beta_1 + \mathrm{INC}\beta_2 + \mathrm{Div}\beta_3 + \varepsilon \quad [6]$$

Where, IC is the income level, CPI is the corruption perception index, EC is the Ethics and corruption index, EBF represents Ethical behavior of firms. IN is the innovation, INC is the innovation capacity, Div is the diversification index, and ε is the error term.

4. Results

4.1. The Corruption Perceptions Index results

Table 3 illustrates the estimated Ordered Logit and Ordered Probit models with the CPI as a measure for corruption (see Equ.4). The coefficients of the explanatory variables CPI and IN are positive and significant which indicate that a rise in CPI index value (reduction in perceived corruption) or/and a rise in innovation will lead to a shift to a higher income level. The coefficient of Economic Diversification is negative and significant, which mean that a rise in the Economic Diversification Index (high diversification) will lead to a transition to a higher income level.

The Pseudo R^2 of the Ordered Logit and Ordered Probit models are 34,93% and 34,87% respectively, which indicates that the two models have the same prediction power. The Parallel line test confirm that ordered logit coefficients are equal across the levels of the outcome (39,2%> 5%).

Table 3. Estimation of Ordered Logit and Ordered Probit models with CPI as a measure of Corruption

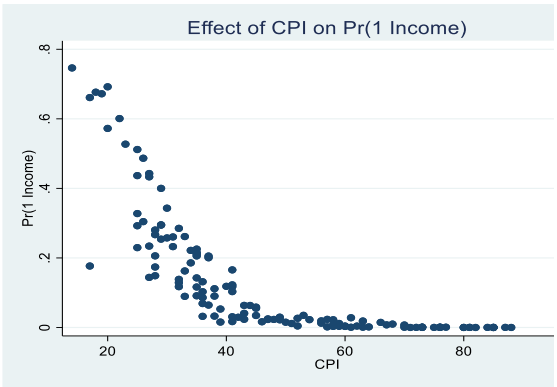
	Ordered logit		**Ordered probit**	
IC	Coef,	P>|z|	Coef,	P>|z|
CPI	0,106	0,000	0,059	0,000
IN	0,812	0,062	0,477	0,057
Div	-3,160	0,022	-2,027	0,012
/cut1 / cons1	2,239		1,122	
/cut2 / cons2	4,286		2,292	
/cut3 / cons3	6,491		3,551	
Number of obs	133		133	
LR chi2(3)/	123,91		123,10	
Prob > chi2	0,000		0,000	

Pseudo R2	0,3493	0,3487
Tests of the Parallel Pr chi2	0,392	

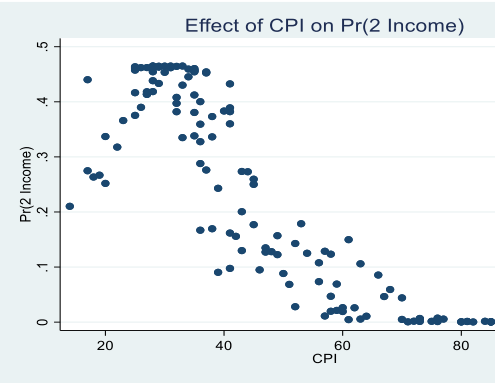
Since the Ordered Logit and Ordered Probit models have the same prediction power, the results of probability estimation of the two models were similar. Figure 1 shows the results of probability estimation of the Ordered Logit model with CPI as a measure of Corruption. Income 1, income 2, income 3 and income 4 refer to Income levels: low income, lower-middle income, upper-middle income, and high income respectively. The part A1 shows that the probability for a country to be a low-income country is very high (0,8) at low CPI values and the probability decreases when the CPI value increases. In part A2, the probability that a country is in the category of low-middle-income countries rises from 0,2 to 0,45 when CPI value rises from 10 to 25, and the probability remains constant at 0,45 until CPI value reaches 35, then, with increasing CPI, the Probability that a country is in the category of low-middle-income countries begins decreasing.

Fig. 1. Probability estimation of the Ordered Logit model with CPI as a measure of Corruption

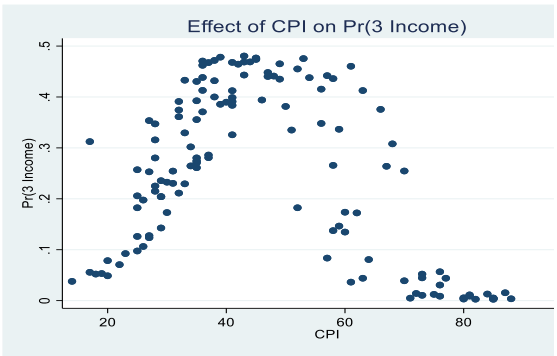
A1



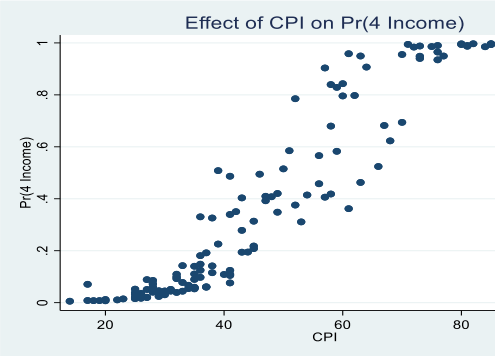
A2



A3



A4

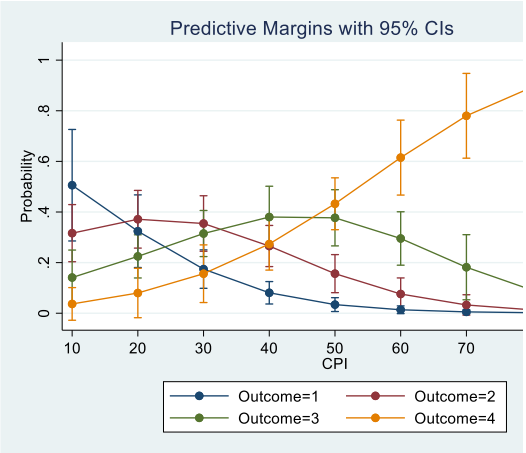


In the part A3 from figure 1, we noticed that the probability increases from 0 to 0,5 when CPI value increase, until it reaches the value 45. After that, the probability decreases steadily.

We also noticed that the probability does not exceed 0.5, and the concentration of countries is remarkable at CPI values less than 45.
We notice in part A4 from figure 1 that the probability increases when CPI value increase, and the probability reaches 1 when CPI exceeds the value of 70.

Fig. 2. Marginal analysis with multiple outcomes

A1. Ordered Logit



A2. Ordered Probit

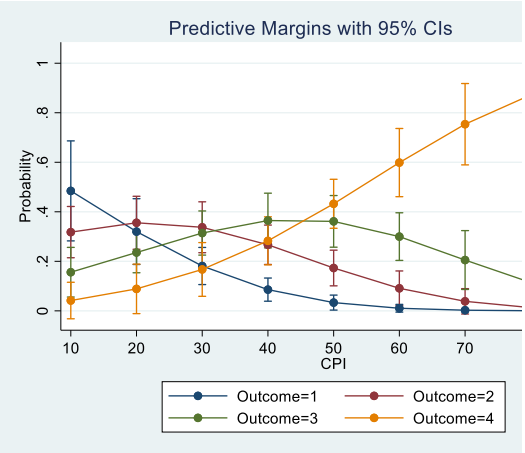


Figure 2 confirms that the Ordered Logit (part A1) and the Ordered Probit (part A2) models are similar in terms of predictive power. Trend lines of outcome 1, outcome 2, outcome 3 and outcome 4 refer to Income levels categories: low income, lower-middle income, upper-middle income, and high income respectively. It can be illustrated that the probability of a country belongs to the category of low-middle income or low-income countries decreases steadily when CPI value increase. High-middle income countries are more likely to be in the category of low-middle income, but after the CPI value exceeds 45, the likelihood that the country falls within this category becomes less. After the CPI value exceeds 45, the probability that a country belongs to the high-income countries category increase with the increase of CPI values. Form 50 high-income countries there is 47 country with CPI greater than 45.

4.2. Ethical commitment in public and private sectors results

The private sector is also a variable in the corruption equation. If there is a positive bribe requested by public sector employees using their influence and abuse of authority; the private sector contributes to spreading corruption through negative bribery. Private sector agents seek to provide bribes to public employees in order to obtain privileges and tax exemptions, without forgetting corruption between the private sector entities.

Corruption considered as a part of the ethical aspect of the private business sector, while the general concept of ethical commitment expresses an aspect of corporate social responsibility of firms.

Table 4 outlines the results from Ordered Logit and Ordered Probit with Ethics and corruption (EC), and Ethical behavior of firms (EBF) as measures of corruption within public and private sectors.

Table 4. Ordered Logit and Ordered Probit with Ethics and corruption (EC), and Ethical behavior of firms (EBF) as measures of corruption within public and private sectors respectively.

Sector	**Private**				**Public**			
Model	Ologit		Oprobit		Ologit		Oprobit	
IC	Coef,	P>|z|	Coef,	P>|z|	Coef,	P>|z|	Coef,	P>|z|
EBF	0.606	0.085	0.356	0.072				
EC					0.646	0.024	0.357	0.025
INC	1.318	0.000	0.769	0.000				
IN					1.219	0.011	0.740	0.008
Div	-3.786	0.008	-2.232	0.007	-4.851	0.000	-2.806	0.000
/cut1	2.223		1.309		0.688		0.448	
/cut2	4.130		2.408		2.504		1.507	
/cut3	5.961		3.470		4.246		2.522	
Number of obs	133		133		133		133	
LR chi2(3)/	97.20		97.42		90.97		91.50	
Prob > chi2	0.000		0.000		0.000		0.000	
Pseudo R2	0.2753		0.2760		0.2577		0.2592	
Tests of the Parallel Pr chi2	0,173				0.244			

Pseudo R^2 for Ordered Logit and Ordered Probit are very close in both public and private sectors, pseudo R^2 for ordered logit and ordered probit were 25,77 % and 25,92% in public sector, and 27,53% and 27,60% in private sector respectively, which mean that ethical commitment in public and private sectors explains income level. Ethical commitment coefficients in public and private sectors models were positive and significant. Accordingly, an increase in Ethical commitment of private or public sectors will lead to increase in the probability that this country will have a higher income level.

Relying on the indicators of the World Economic Forum, there is a convergence between the results of the public and private sectors, which indicates the strong correlation between the level of ethical commitment of the two sectors. both public and private sectors contributes to corruption, and it is not reasonable to putt all the blame on the public sector. The bribery is divided into positive and negative. The public employee may be honest, but he is exposed to pressures from the private sector, which is known as positive bribery, or if he requests or accepts it as it is known as negative bribery.

The obtained results are in line with pervious researches, which indicated that corruption negatively affects growth in the sense that it leads to a decrease in the gross domestic product (GDP) or prevents an increase in it. Thus, corruption is a barrier prevent countries to move for higher level of income.

High-income countries are industrialized countries that belong to the Organization for Economic Cooperation and Development (OECD), which produce products with high added value, unlike low-income and low-middle-income countries, the majority of those belong to the sub-Saharan region and Asian countries that are characterized by the dominance of agricultural activities. Pervious Research conclude to a negative impact of corruption on income inequality between different groups of society (Sanjeev, 1998).

This study aims at exploring the nexus between corruption measured by three different variables (CPI, EC, EBF) and income level measured by GNI. The results indicates that a country that wants to move from an income level to a higher income level must improve

its CPI value to be above 45. The higher the value of CPI is, the greater probability that it will move to a higher income level category. The probability that a country will move to a high-income category is confirmed by the value of the GNI income itself. Countries that score CPI above 70 are almost the same countries that have GNI above $ 40,000.

The point that caught our attention is the high-income countries, with low CPI value, represented with Kuwait, Trinidad and Tobago and Bahrain are rentier countries whose economy depends on the export of oil, as they are characterized by a low population (less than 5 million population).

5. Conclusion

Based on ordered probit and logit models, we estimated three models in aim to explore the relation between corruption and income level in public and private institutions, using three measures of corruption. Our data retrieved from different data base for 131 country during the year 2018.

The main findings can be summarized as follow: First, the Ordered Logit and Ordered Probit models are similar and have the same prediction power. The explanatory variables CPI, IN and Div have a significant effect on income level, where, a reduction in perceived corruption and/or a rise in economic diversification and/or a rise in innovation will lead to a shift to a higher income level.

Second, the results indicate that the probability of a given country belongs to the category of high income countries is very high when CPI value exceeds 45. Form 50 high-income countries there is 47 country with CPI greater than 45.

Third, ethical commitment in public and private sectors explains income level, which mean that both public and private sectors contributes to corruption. Accordingly, an increase in ethical commitment of private or public sectors will lead to increase in the probability that this country will shift to a higher income level.

This research used data on income level and corruption for one year, as consequently, the adoption of this research findings must be under one crucial limit, which inherit to the study data. The available data cover only a short period, which prevent to adopt a dynamic probit and logit models. Accordingly, policy makers and researchers should use the results of this study carefully.

Bearing this crucial limitation in mind, this study have two major implications. First, the study results allow policy makers to set anti-corruption policy in aim to improve the country income level ranking, thus, countries that have a corruption index similar to CPI value of its targeted income group, their anti-corruption policy becomes a secondary priority, especially if its CPI index value greater than 45. However, in the event that the current corruption index is less than the targeted one, the anti-corruption policy becomes of strategic goal, and countries are obliged to focus on anti-corruption policies.

Second, this study confirm that corruption had a negative impact on the income level. Our findings supports the theory of sand in wheels, given that there is no agreement between previous studies about the hypothesis that is closer to reality.

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