The Complex Phenomenon of Corruption: An Empirical Analysis

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Abstract

Corruption is a complex social, economic and political phenomenon, which exists in all countries. The structural characteristics of corruption differ between countries. The deeper roots of corruption depend on the individual conditions of each country, whereas they can be detected in bureaucratic tradition, economic development and social history, among others. At the policy level, the associated reform measures are inadequate if they are not supported by the appropriate institutional framework and good governance practices. However, in case policies that are applied in order to combat corruption fail, it evolves from occasional to endemic problems impeding the efforts to limit corruption. In addition, fragile institutional environments flourish the conditions strengthening systemic corruption, which has penetrated into the value system of societies.

Keywords

Corruption, Institutions, Governance, Economic Development

1. Introduction

Corruption is a global phenomenon, which reflects the level not only of economic, but also of wider social and institutional development. A key feature of corruption is its structural nature, particularly regarding less developed countries, which are affected by structural constraints and instabilities in the economic, institutional, and broader socio-political spheres (World Bank, 1997). The endemic nature of the problem, i.e. the embeddedness of corruption in political and social culture, limits the effectiveness of policies in order to address it

(Uberti, 2022).

This institutional and macroeconomic view of corruption allows for its conceptual linkage with issues such as human development, as well as the income level. Democratic institutions and social cohesion act as strategic pillars for the formulation of appropriate policies and ensure their reliable implementation to overcome structural weaknesses that hinder social and political development (Ades & Di Tella, 1999). In this analytical framework, the examination of governance, which expresses qualitative factors of development, is considered indispensable because it provides a strong indication of the evolution of macroeconomic, structural and institutional characteristics of each economy.

Corruption is a complex concept (Lane, 2017), whereas its multiple dimensions—economic, social and political—interact, making it difficult to tackle. However, if the necessary long-term efforts to combat corruption are not applied, its multidimensional characteristics become structural (Commission of the European Communities, 2003). For this reason, it is necessary to identify the deeper drivers of corruption, so that the problem to be confronted on a sustainable basis (Jain, 2001).

The root causes of corruption depend on the specific circumstances of each country and can be traced back to bureaucratic tradition, political development and social history. Moreover, corruption tends to spread where institutions are weak and government policies allow for the creation of revenue (Vavouras, Manolas, Sirmali, & Sfakianakis, 2011). Institutional pathologies were already considered from the early stages of investigating the phenomenon as the most important factor that increases the potential for public officials to engage in corrupt practices (Bliss & Di Tella, 1997). Corruption contributes to government failure through the erosion of public institutions, social instability and exacerbation of poverty that impedes sustainable development (United Nations Development Programme, 2008). Corruption is, therefore, a symptom of underlying institutional weaknesses and according to the World Bank is also recognized as one of the greatest obstacles to economic and social development (World Bank, 1992).

Historical evidence indicates that efforts to combat corruption are almost as old as the existence of the phenomenon (Riley, 1998). It should, therefore, be considered why corruption is more prevalent in some countries than in others, and why, despite efforts to tackle the phenomenon, suppression of corruption is difficult (Treisman, 2000). However, in cases where the required long-term and targeted actions to address the phenomenon are not implemented, corruption becomes structural, which further complicates effective policy responses to the problem (Dixit, 2009).

The concept of governance is broad and multidimensional. However, although the term is used extensively, there is no single and exhaustive definition due to its complex nature (Organisation for Economic Co-operation and Development, 2009). However, there is a general consensus that governance refers to the way in which power in a country is exercised. Thus, it should be noted that the con-

cept of governance is broader than that of government and, therefore, the two terms are not identical (Kjaer, 2004: p. 3). According to the United Nations Development Programme (2007), governance is discerned at the national, global, and local levels.

Most of the causes and, consequently, the policies to suppress corruption are institutional in nature (Uslaner, 2011). Corruption can vary from an isolated act to an endemic dysfunction of the political and economic system (Gupta, Davoodi, & Alonso-Terme, 2002). Dealing with corruption is particularly difficult when it is systemic, i.e. when it has eroded the broader value system of society to the extent that it is considered the norm in everyday life (World Bank, 1994). In countries where corruption is systemic in nature, countries affected by the phenomenon are characterized by structural bottlenecks and constraints in the economic, institutional and broader socio-political sectors (Klitgaard, 1988). In addition, in this case, formal institutions, such as the legal framework, are maintained but their application in practice is often violated by the operation of informal rules, which take precedence over the formal ones (Gwartney, Hall, & Lawson, 2010).

In the case of systemic underdevelopment, pathologies and dysfunctions are inherent in the entire spectrum of economic and institutional systems, which operate in parallel and interconnected ways (Easterly, Ritzen, & Woolcock, 2006). Thus, developing countries, in particular, are trapped in a vicious cycle of systemic corruption and fragile development (Campos, Lien, & Pradhan, 1999). Corruption is more pronounced in less developed countries because of several factors, which are prevalent in these countries that contribute to their lagged development (Gründler & Potrafke, 2019). These conditions include large income inequalities, low income and human development, imbalances between changing moral standards and the inefficiency of social and government enforcement mechanisms (Nye, 1967). Beyond the costs of systemic corruption, it should be clarified that the phenomenon is a symptom of a "disease", but not the "disease" itself (Rose-Ackerman, 1999). This observation may possibly explain the failure of policies pursued as they usually do not take into account the structural nature of the problem thus making it impossible to address it sustainably (Scharbatke-Church & Chigas, 2019). Therefore, in order to combat systemic corruption, the institutional culture of dealing with the phenomenon needs to be transformed as in this case, corruption is an entrenched situation and has deeper causes (Bräutigam & Knack, 2004).

2. Determinants of Corruption

Investigating the determinants of corruption is important to effectively address the phenomenon (Aidt, 2009). Thus, it is widely accepted and confirmed in the context of this analysis that levels of corruption vary across countries due to the level of income and income inequality, the quality of governance and the level of human development. The focus of relevant policies is, therefore, on economic

growth, high standards of social cohesion and the consequent reduction of income inequalities (Hall & Jones, 1999).

In particular, corruption, in addition to the level of economic development, reveals the level of institutional, social and political development (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1999). It should also be noted that institutional dysfunctions, such as corruption, constitute a failure of governance. To improve the level of corruption, all states, especially the developed ones, should strengthen their mechanisms for exercising good governance (Transparency International, 2020). Countries with high-quality governance are expected to have lower levels of corruption (Alesina & La Ferrara, 2002). State efficiency, which is a partial determinant of governance, is essential for the provision of necessary goods and services as well as for the functioning of institutions. On the other hand, institutional deficiencies threaten sustainable development, both economic and social (Organisation for Economic Co-operation and Development, 1995). Good governance enhances the existence of democratic power structures (Saha, Gounder, & Su, 2009). Economic progress that is not accompanied by a corresponding rise in the level of social and political development can only temporarily lead to a rise in living standards. The deficit of good governance acts as a constraint on sustained prosperity (United Nations Development Programme, 2010: p. 6).

One of the most prevalent definitions of governance in the literature is that of the World Bank according to which "governance is the traditions and institutions through which power is exercised in a country" (Kaufmann, Kraay, & Zoido-Lobatón, 1999). This definition includes three main dimensions of governance:

1) The political dimension refers to the process of appointing, controlling and replacing governments.

2) The economic dimension refers to the ability of governments to effectively formulate and implement stable policies.

3) The institutional dimension refers to the respect of citizens and the state for the institutions that define the economic and social interactions between them.

For each of the above three dimensions, two measures of governance are constructed, thus resulting in a set of six defining dimensions of governance, which are the following (Kaufmann, Kraay, & Mastruzzi, 2010):

1) The process of appointment, control and replacement of governments:

a) Voice and Accountability (VA): Perceptions of the extent to which a country's residents can participate in the election of their governments, as well as freedom of expression, freedom of participation and freedom of the media.

b) Political Stability and Absence of Violence/Terrorism (PV): Perceptions of the possibility of destabilization or overthrow of the government by unconstitutional or violent means including politically motivated violence and terrorism.

2) The ability of governments to effectively formulate and implement stable policies:

a) Government Effectiveness (GE): Perceptions of the quality of public servic-

es, the quality of public officials and their degree of independence from political pressures, the quality of policy design and implementation and the credibility of government commitment to these policies.

b) Regulatory Quality (RQ): Perceptions of the government's ability to design and implement stable policies and regulations that enable and promote private sector development.

3) Respect by citizens and the state for the institutions that define their economic and social interactions:

a) Rule of Law (RL): Perceptions of the extent to which citizens trust and comply with the rules of society, such as the ability to enforce contracts, property rights and courts.

b) Control of Corruption (CC): Perceptions of the extent to which public power is exercised for private gain.

The income level of countries is considered a key determinant variable of corruption as poor countries are considered to be the most affected by this problem (Acemoglu, 2009). In particular, countries undergoing a crisis face severe instability in the economic sector (Agiomirgianakis, Papadogonas, & Sfakianakis, 2016). As a result, key sectors of economies are affected (Agiomirgianakis & Sfakianakis, 2022). In addition, the concept of human development is examined, which is important as it emphasizes certain qualitative aspects of development. Human development is defined as the process of expanding the choices of individuals, the most important of which is to have a long and healthy life, high levels of education and a decent standard of living. Moreover, corruption is widespread in environments of high-income inequality (Rontos, Syrmali, Salvati, & Vavouras, 2023).

In addition, certain geographic regions are more affected by corruption, such as Latin American countries, which are frequently mentioned in the literature (World Bank, 1989). Moreover, the specificities of individual regions seem to create favourable conditions for the spread of corruption. One such case is Sub-Saharan African countries, where the political instability and unrest, poor governance and social insecurity prevalent in these countries contribute to the exacerbation of the phenomenon (Transparency International, 2009). On the other hand, Scandinavian countries are considered to be among the least corrupt countries in the world (International Monetary Fund, 2013).

3. Methodology of Research

The empirical analysis is based on data from 132 countries for the period 2000-2020 based on data availability. The employed panel data is estimated with the Fixed Effects (FEs) method (applying the White diagonal correction of standard errors for heteroscedasticity and autocorrelation). To decide on the estimation method a Hausman test was conducted (Baltagi, 2005), which indicated that the Fixed Effects (FEs) method is preferred instead of the Random Effects (REs) method. The Fixed Effects (FEs) method can be used with panel data to estimate

the effect of time-varying independent variables in the presence of time-constant omitted variables (Wooldridge, 2013). Therefore, the unobserved heterogeneity could be treated by assuming that omitted variables do not change over time and, as a result, by eliminating their effect through the FE method. To test the validity of the results the Panel Least Squares method (without fixed or random effects either for cross section or time series data) is also performed, which is presented in Column (3) in Table 6.

The corruption variable is approximated by the Corruption Perceptions Index (CPI), which is provided by the international non-governmental organisation Transparency International (TI) in its Corruption Perceptions Index (CPI) Report. According to Transparency International, corruption is defined as "the abuse of entrusted power for private gain". The index ranks countries according to the perceptions of corruption in the public sector and evaluates administrative as well as political corruption (Transparency International, 2020). Although perceptions should not be confused with the every-day incidents of corruption, there is a general consensus that these assessments provide a reliable indication of the actual levels of corruption (Lambsdorff, 2007). The scale of the index ranges from 0 to 100, where zero indicates maximum levels of corruption[1]. On the other hand, as the value of the index increases there are perceptions that there is no corruption in the country under consideration.

Governance is approached with the variable Government Effectiveness (GE), which reflects perceptions of the quality of public services, the quality of public officials and their degree of independence from political pressures, the quality of policy planning and its reliable implementation (Kaufmann, Kraay, & Mastruzzi, 2010). Therefore, this variable assesses government's ability to effectively formulate and implement stable policies. Government effectiveness is one of the six defining dimensions of governance[2]. The measurement scale of the indicator is defined between −2.5 and 2.5, where higher values correspond to improved levels of government effectiveness and, thus, better quality of governance.

Gross National Income (GNI) per capita is expressed in Purchasing Power Parities (PPPs) and is provided by the World Bank[3], This measure of income is widely used in international comparisons to measure economic growth in a country. Gross national income at purchasing power parities is the national income converted into international dollars using the purchasing power parity. An international dollar has the same purchasing power on gross national income as that of a US dollar in the United States of America. Gross national income expressed in purchasing power parities is a useful measure for comparing living standards between countries as purchasing power parities take into account the relative cost of living in different countries as opposed to nominal gross national income or real Gross Domestic Product (GDP). It should be noted that to facili-

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[1]The index of corruption has been transferred into the 0 - 10 measurement scale.
[2]http://info.worldbank.org/governance/wgi/index.aspx#home.
[3]https://data.worldbank.org/indicator/NY.GNP.PCAP.CD.

tate the interpretation of results the GNI index has been converted into the logarithmic scale [ln(GNI)].

The index of income inequality (GINI) is obtained from the Standardized World Income Inequality Database (SWIID). The advantage of the Gini index is that it maximizes the comparability of income inequality data not only across countries but also over time within the same country. The measurement scale of the index has a theoretical range between 0 - 100, where zero indicates perfect equality (i.e. each unit receives an equal share of income), while 100 indicates perfect inequality (one unit receives all income)[4].

The Human Development Index (HDI) was introduced in 1990 by the United Nations Development Programme (UNDP) in its first Human Development Report. The HDI is based on three sub-indicators, which are: 1) longevity, expressed by life expectancy at birth. This variable approximates the level of health and nutritional conditions; 2) the level of education as calculated by combining the percentage of adults who know how to write and the primary school enrolment rate, secondary and tertiary education; and 3) living standards, as measured by real per capita Gross Domestic Product (GDP) at purchasing power parities. According to the value assigned to the HDI, countries are classified into four categories, which are as follows: 1) very high human development, if the value of the index is higher than 0.900; 2) high human development, if the value of the index is between 0.800 and 0.899; 3) medium human development, if the value of the index is between 0.500 and 0.799; 4) low human development, if the value of the index is lower than 0.500[5].

Based on the theoretical analysis above, the equation to be estimated is as follows:

$$\text{CPI} = \beta_0 + \beta_1 \text{LSPR} + \beta_2 \text{GE} + \beta_3 \ln(\text{GNI}) + \beta_4 \text{GINI} + \beta_5 \text{HDI} + \beta_6 \text{PR} + e \quad (5.1)$$

4. Empirical Results

The use of descriptive statistical measures presented below can make apparent the variations between countries with respect to the main variables of interest in the empirical analysis, namely corruption, government effectiveness, income, level of human development and income inequalities depending on the geographical region to which they belong. To this end, Table 1 presents geographical regions for selected countries of the samples. Thus, the geographical breakdown includes Sub-Saharan Africa, which according to the United Nations geographical categorization consists of all African countries except for Egypt, Algeria, Morocco and Tunisia[6]. Also, the countries of Asia are included, which are divided into sub-regions, namely East Asia, South Asia and Southeast Asia. The geographic identification of Latin America & the Caribbean and Middle East & North Africa (MENA) countries is based on the World Bank's geographic

[4]https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/11992.
[5]http://hdr.undp.org.
[6]See http://unstats.un.org/unsd/methods/m49/m49regin.htm.

Table 1. Geographical areas for selected countries of the sample.

Sub-Saharan Africa (1)	Asia (2)	Latin America & Caribbean (3)	Middle East & North Africa (4)	Scandinavia (5)
East Africa	*East Asia*	Argentina	Egypt	Denmark
Ethiopia	Japan	Venezuela	Algeria	Norway
Zambia	China	Bolivia	Jordan	Sweden
Zimbabwe	Korea, South	Brazil	Iran	Finland
Kenya	Mongolia	Guatemala	Israel	
Madagascar		Dominican	Morocco	
Malawi		Republique	Tunisia	
Mauritius		Ecuador		
Mozambique		El Salvador		
Burundi		Colombia		
Uganda		Costa Rica		
Rwanda		Mexico		
		Nicaragua		
		Honduras		
		Uruguay		
		Panama		
		Paraguay		
		Peru		
		Chile		
West Africa	*South Asia*			
Ghana	India			
Mali	Bangladesh			
Benin	Pakistan			
Senegal				
Central Africa	*Southeast Asia*			
Angola	Vietnam			
Chad	Indonesia			
	Malaysia			
	Singapore			
	Philippines			
South Africa				
Lesotho				
Botswana				
Namibia				
South Africa				
Swaziland				

classification[7]. It is also interesting to examine Scandinavian countries as they occupy the top positions in the global ranking in terms of income and corruption indicators and are traditionally considered countries with low levels of income inequalities (International Monetary Fund, 2013).

Table 2 presents the mean and standard deviation of the main variables of interest for the above geographical groups over the period 2000-2020. Examination of the above table shows that Asian countries with regard to the corruption variable have the highest mean (4.168), after the Scandinavian countries, and a high standard deviation (2.266), which indicates high variability of values. In other words, the observations are "scattered" around their mean value and, consequently, the values obtained by the countries for this indicator vary considerably in relation to the average. Thus, some countries perform higher and others lower. The government effectiveness variable for Asian countries has a high standard deviation (0.948) and a low mean (0.360). However, the mean value of government effectiveness is higher than Middle Eastern & North African countries, as well as Sub-Saharan African & Latin American countries, which have a negative mean value on the relevant indicator.

The above results, particularly with regard to high standard deviation, should not be surprising. Asian countries include states with low levels of corruption and high levels of income, such as Japan and Singapore, but also, states, such as Pakistan and Vietnam, which are affected by high levels of corruption, low income, political instability and wider institutional inefficiencies and social dysfunctions.

For Sub-Saharan African countries should be noted that they perform poorly on all indicators, with particular reference to the corruption indicator, government effectiveness and the human development indicator as presented in Table 2. The Latin America region performs low in terms of the income inequality indicator and, therefore, associated countries are highly unequal.

On the other hand, the Scandinavian countries have the lowest levels of corruption as expressed by the highest average value of the corresponding index for all the geographical areas considered, while they have competitive economies and low levels of income inequality. They also perform high on the other socio-economic variables (income, government effectiveness, human development), which are analysed in Table 2. These results are expected as these countries have a high level of development not only economic but also socio-political. Moreover, the Nordic countries have low standard deviation for all the variables considered, as they exhibit uniform performance in terms of their institutional, structural and qualitative characteristics.

Figure 1 depicts the scatter plot between corruption (CPI) and income [ln(GNI)] variables for all the countries in the sample over the period 2000-2020. The analysis of the scatter plot is important as it provides some initial indications regarding the existence of possible non-linear relationships. The examination of the scatter plot yields the following:

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[7]http://www.worldbank.org/en/country.

Table 2. Mean and standard deviation by geographical area, 2000-2020.

Variables	Mean value	Standard deviation
Corruption		
Asia	4.168	2.266
Sub-Saharan Africa	3.159	1.038
Middle East & North Africa	3.901	1.259
Latin America	3.549	1.283
Scandinavia	9.119	0.386
Income		
Asia	8.150	0.710
Sub-Saharan Africa	3.520	0.449
Middle East & North Africa	4.290	0.405
Latin America	3.760	0.350
Scandinavia	5.400	0.159
Income inequality		
Asia	6.423	0.436
Sub-Saharan Africa	5.713	0.865
Middle East & North Africa	6.330	0.962
Latin America	5.223	0.991
Scandinavia	7.575	1.178
Government effectiveness		
Asia	0.360	0.948
Sub-Saharan Africa	−0.430	0.563
Middle East & North Africa	−0.030	0.620
Latin America	−0.190	0.542
Scandinavia	2.050	0.159
HDI		
Asia	0.711	0.141
Sub-Saharan Africa	0.479	0.109
Middle East & North Africa	0.736	0.098
Latin America	0.737	0.072
Scandinavia	0.931	0.025

- The richest countries appear to have lower levels of corruption as proved for the Nordic countries (Denmark, Norway, Sweden, Finland), Switzerland and New Zealand. Indeed, the relationship between corruption and income becomes stronger for higher income levels.
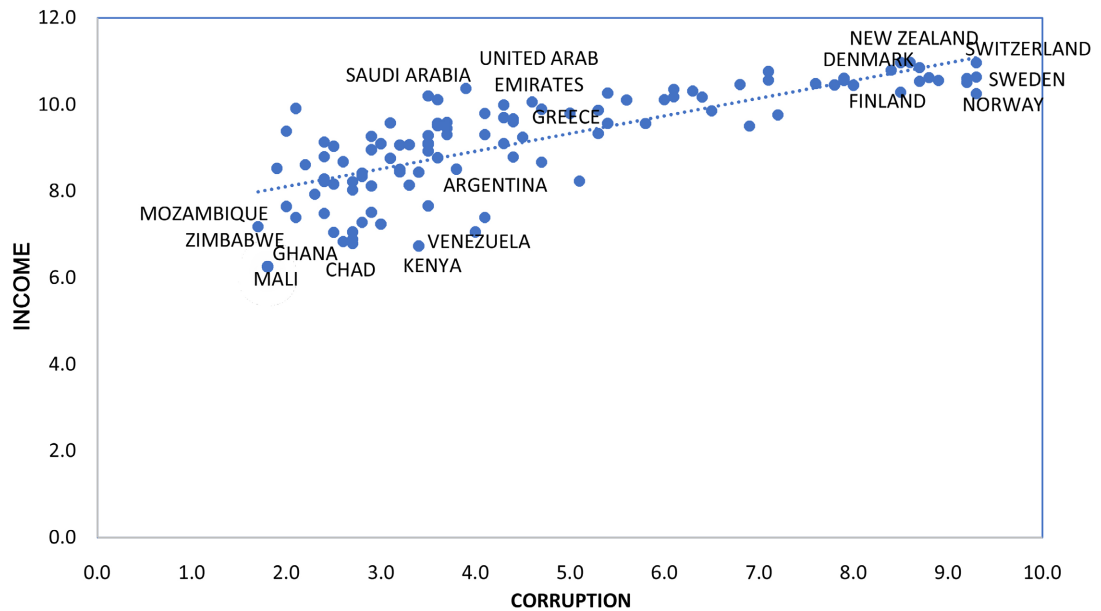
- The poorest countries appear to have higher levels of corruption as is the case for Sub-Saharan Africa (Angola, Zimbabwe, Kenya, Mali, Mozambique, Chad) but also for Latin America (Argentina, Venezuela, Bolivia).
- However, it should also be noted that corruption varies significantly between countries even when the effect of income is taken into account. Saudi Arabia, the United Arab Emirates and Greece appear as more corrupt countries given their income level. These deviations around the regression line suggest that the relevant theories on the determinants of corruption are to some extent incomplete. Also, this divergence or heterogeneity of observations around the regression line suggests the existence of a non-linear relationship between the variables under consideration, namely income and corruption. Therefore, although income is an important variable and explains to a large extent the level of corruption in a country, it is not in itself sufficient in terms of studying the determinant factors of corruption. Instead, institutional and social factors in addition to the economic dimension of the phenomenon should be taken into account.

Figure 2 shows the relationship between corruption (CPI) and income (GNI) of the countries in the total sample for different levels of income inequality (GINI). More specifically, the relationship between corruption and income is examined by separating the total sample of countries according to the average value of income inequality. In this case, it is observed that the slope of the regression line is larger for countries with income inequality value higher than the sample mean (rhombus). That is, the relationship between income and corruption is stronger for improved levels of income inequality. Therefore, in environments of low-income inequality, high income has a greater positive effect on
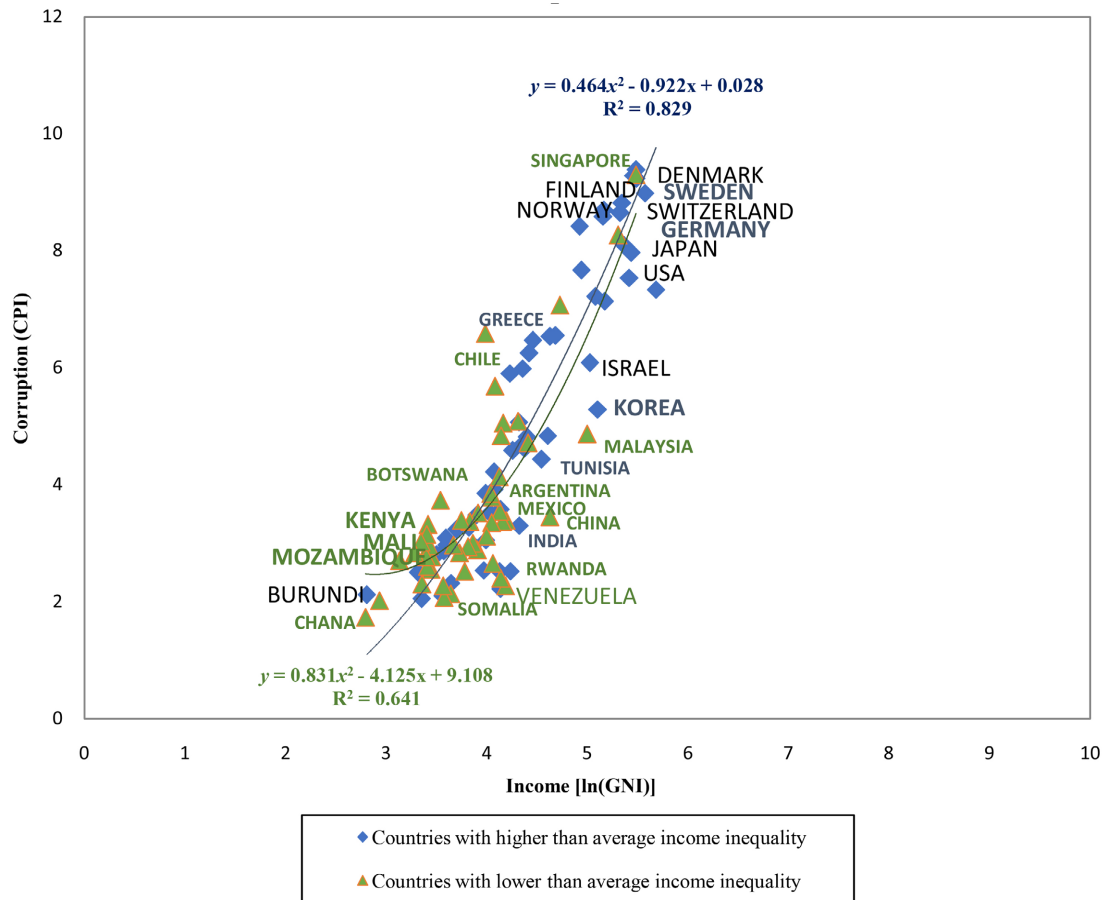
Figure 2. Corruption and income at different levels of income inequality over the period 2000-2020. Sources: 1) http://www.transparency.org/cpi2010/in_detail;
2) https://www.weforum.org/publications/the-global-competitiveness-report-2020/;
3) https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/11992.

corruption than in the case of aggravated inequalities, where the strength of this relationship appears to diminish. The above observations indicate the existence of a non-linear correlation between income and corruption, where the level of income inequality enters into this relationship and co-shapes it.

The analysis in **Figure 2** reveals some outliers. In particular, Singapore has some of the lowest levels of corruption in the world despite being in the category of countries with higher than the average income inequality values in the sample and, thus, high levels of income inequality. At the same time, however, it should be noted that both of them are high-income countries. That is, despite the worsening inequalities, the high level of income seems to be positively associated with the low level of corruption.

The above empirical observations (stylized facts) can be rendered in a more formal or schematic way in **Table 3** below. If economies are separated according to the level of income (high - low), as well as according to the level of income inequality (high - low), four groups of countries emerge. Groups II and III describe two predominant categories (polar cases). Group II includes countries

Table 3. Corruption, income and income inequality: a grouped presentation of countries.

	High level of income	Low level of income
High level of income inequality	I. Countries with low levels of corruption: Asia (e.g. Singapore)	II. Countries with high levels of corruption: Sub-Saharan Africa (e.g. Ghana, Burundi, Rwanda, Somalia, Sudan), Latin America (e.g. Argentina, Colombia)
Low level of income inequality	III. Countries with low levels of corruption: Scandinavian countries (e.g. Denmark, Norway, Sweden, Finland, Denmark)	IV. Countries with high levels of corruption: Sub-Saharan Africa (e.g. Ethiopia, Burundi)

with high levels of corruption in a low-income environment and high levels of income inequality, such as countries in Sub-Saharan Africa (Ghana, Burundi, Rwanda, Somalia, Sudan) and Latin America (Argentina, Colombia). Group III includes countries with low levels of corruption in a high-income environment and low levels of income inequality, as is the case of Nordic countries (Denmark, Norway, Sweden, Finland). Between these two types, intermediate categories can be observed. Group I includes countries with high levels of income and high levels of income inequality but for which low levels of corruption are observed, as is the case for some Asian countries (Singapore). Group IV includes countries with low income and low levels of income inequality, where high levels of corruption prevail as is observed for Ethiopia and Burundi[8].

Table 4 presents descriptive statistics in order to summarize data regarding the main variables of interest, namely corruption, income and income inequality. Based on the minimum (1.3) as well as the maximum (9.6) value of corruption (CPI) on the 0 - 10 measurement scale, it can be entailed that the observations cover a wide range of values, as this is a global sample and therefore includes countries with both high and low levels of corruption. As can be seen from the examination of data, no country in the sample is totally free of corruption scoring 10 on the relevant indicator, which corresponds to zero levels of corruption.

The correlation matrix below gives results that are consistent with the theoretical predictions of the relationships between corruption (CPI), income [ln(GNI)] and income inequality (GINI), as shown in Table 5. Corruption (CPI) is positively related to the income variable [ln(GNI)] and income inequality (GINI). That is, higher levels of income and lower levels of income inequality are associated with lower levels of corruption. There is also a positive correlation between the income variable [ln(GNI)] and income inequality (GINI) as indicated by the corresponding correlation coefficient. That is, richer countries are expected, on average, to have lower levels of income inequality.

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[8]It is possible that the levels of income inequality appear to be reduced because the population as a whole is poor, as seems to be the case for Ethiopia and Burundi (Keefer & Knack, 1997).

Table 4. Descriptive measures.

	CPI (1)	GINI (2)	GCI (3)
Mean	4.4	6.2	4.1
Median	3.4	6.5	4.3
Standard deviation	2.1	0.7	0.7
Minimum value (Min)	1.3	3.2	2.6
Maximum value (Max)	9.6	8.1	5.9

Sources: 1) http://www.transparency.org/cpi2010/in_detail;
2) https://www.weforum.org/publications/the-global-competitiveness-report-2020/;
3) https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/11992.

Table 5. Correlation table.

	CPI (1)	GINI (2)	GCI (3)
CPI	1	0.679	0.857
GINI		1	0.569
GCI			1

Sources: 1) http://www.transparency.org/cpi2010/in_detail;
2) https://www.weforum.org/publications/the-global-competitiveness-report-2020/;
3) https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/11992.

The results according to the Fixed Effects (FEs), Random Effects (REs) and Panel Least Squares (PLSs) methods are presented in Table 6. Below the coefficient estimates, the standard error, the t-statistic and the p-value are presented. In addition, the results of the Hausman test, which is performed to select the method for estimating panel data, are presented in the last row in Table 6 together with the corresponding p-value (in parentheses). It should be noted that the results with respect to the three estimation methods do not differ significantly in terms of their economic and statistical significance. Therefore, the estimates using the proposed Fixed Effects method are set out below.

According to the Fixed Effects (FEs) estimates presented in Column (1) in Table 6, all independent variables are statistically significant and have the expected sign with the exception of the Human Development Index (HDI). In particular, the HDI is negative but not statistically significant[9]. On the other hand, income inequality and government effectiveness have the expected positive signs and are statistically significant at conventional significance levels (1%).

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[9]The non-significance of the HDI variable may be attributed to the high correlation with the income variable (0.821).

Table 6. Estimates with the Fixed Effects (FEs), Random Effects (REs) and Panel Least Squares (PLSs) methods, 2000-2020.

	FE (1)	RE (2)	PLS (3)
Constant	2.103***	2.019***	21.648***
	0.358	0.437	1.868
	5.741	4.306	11.586
	0.000	0.000	0.000
ln(GNI)	0.321***	0.499***	0.246***
	0.580	0.148	0.041
	2.435	3.006	5.234
	0.000	0.004	0.000
GINI	0.398***	0.531***	0.160***
	0.121	0.150	0.041
	3.306	3.511	4.077
	0.001	0.000	0.000
ln(GNI) * GINI	0.192***	0.112***	0.192***
	0.027	0.025	0.027
	4.996	3.124	4.996
	0.000	0.000	0.000
HDI	−0.027	−0.352	−0.123
	0.004	0.071	0.060
	−1.542	−1.601	−1.159
	0.068	0.071	0.078
GE	0.340***	0.287**	0.339***
	0.454	0.038	0.076
	3.672	2.008	4.559
	0.001	0.046	0.000
LATIN	−0.341***	−0.109***	−1.215***
	0.103	0.099	0.168
	−3.051	−3.891	−4.675
	0.000	0.000	0.000
SCANDINAVIAN	0.239***	0.409***	0.398***
	0.029	0.072	0.081
	5.742	4.539	4.572
	0.000	0.000	0.000
$\bar{R}^2$	0.798	0.779	0.801
F-statistic	360.551	358.692	709.396
Prob (F-statistic)	0.000	0.000	0.000
Hausman	120.668 (0.000)	136.781 (0.000)	196.839 (0.000)

Note: ***, **, and * indicate statistical significance at the 1%, 5% and 10% level respectively.

Moreover, in the empirical analysis dummy geographical variables are included in order to mitigate the effect of non-observed heterogeneity between countries. In particular, the dummy variable of Latin American countries has the expected negative sign and is statistically significant at the 1% level. On the other hand, the dummy of Scandinavian countries has the expected positive sign and is statistically significant at the 1% level.

In order to study the mutual effect of the level of income and income inequalities on corruption, the interaction term [ln(GNI) * GINI] between these two variables is inserted into the model. In order to ensure that the interaction term does not incorporate either the effect of income or income inequality both terms are retained into the empirical model (Brambor, Clark, & Golder, 2006). Based on empirical estimates, the interaction term [ln(GNI) * GINI] is positive and statistically significant at the 1% level. The positive value of the interaction term denotes that the relationship between income [ln(GNI)] and corruption (CPI) is non-linear, as the effect of income on corruption is larger for improved levels of income inequalities, which correspond to higher values of the inequality index. Therefore, the marginal effect of income on corruption depends on the level of income inequality. As a result, the level of income and income inequalities are positively correlated and serve as complements regarding the control of corruption.

Based on the results of the estimates, if in the year 2022 Greece (21,740) had the income level of Luxembourg (91,200), which is one of the richest countries in the global sample, then the level of corruption in Greece (52) would decrease and approach the level of Japan (73).

The adjusted coefficient of determination has a satisfactory value ($\bar{R}^2$ = 0.798), which means that the model has good explanatory power explaining much of the variation in the dependent variable.

5. Discussion of Our Results

Corruption occurs in all countries regardless of the level of economic development, with varying degrees of intensity in each one depending on the specific conditions of each economy. Hence, the analysis of the determinant factors of corruption should not be restricted on individual sectors but, instead, should be multidisciplinary. It is, therefore, apparent that corruption is a complex social, economic and political phenomenon. In the case of less developed countries it is a structural problem, as it has deeper causes and is part of everyday practice. The systemic corruption observed in these countries, which are characterized by structural rigidities and institutional weaknesses corresponding to well-established features of the economies, makes it difficult to control the phenomenon.

Corruption reveals the level not only of economic but, also, of the wider social and political development of a country. A one-sided examination of economic development in terms of income, without considering the broader political and social conditions, proves inadequate. Structural weaknesses of the public sector,

the lack of competitiveness, inadequacies in the exercise of governance, among others, are pinpointed as the main causes of corruption. As a result, this phenomenon is primarily political and social in nature, while its structural character, i.e. its embeddedness in the political and social culture, makes it difficult to deal with it effectively. The multiple dimensions of the problem, i.e. the economic, political and social, affect each other creating a vicious circle from which it is difficult to escape. Consequently, in order to combat corruption effectively the root causes of the problem must be addressed. Anti-corruption policies prove to be unsuccessful if they are not supported by the appropriate institutional framework and good governance practices.

Therefore, anti-corruption principles, strategies and interventions should be developed to promote a sustainable perspective in addressing the phenomenon. Fighting corruption is a difficult task, which can be achieved through the effective implementation of appropriate long-term policies. The overarching issue that needs to be addressed is the policies to tackle corruption under the constraints of the economic, social and political system. As a result, improving economic conditions only has limited effects in terms of controlling corruption, as it also requires drastic improvements in the institutional, structural, organizational and qualitative parameters associated with corruption.

The analysis also showed that corruption is closely linked to the way governments carry out their functions. Hence, the quality of governance determines the extent of corruption. Improving governance requires structural transformations in the established political culture. Changing perceptions, however, can occur as a result of social development, which is linked to social transformation and changes in the structural characteristics of society. This long-term social development strategy should be the result of promoting concrete and appropriate institutional reforms.

Based on the analysis above, institutional dysfunctions, such as corruption, constitute a failure of governance. State efficiency, which is a fundamental pillar of governance, is essential for the provision of the necessary goods and services as well as for the functioning of democratic institutions. Good governance reinforces the existence of democratic power structures and limited corruption, whereas it is linked to institutional consolidation. Moreover, it is considered a critical factor in promoting economic and social development. Economic progress that is not accompanied by a corresponding rise in the level of social and political development can only temporarily lead to a rise in living standards. The deficit of good governance also acts as a constraint to sustained, overall prosperity.

The theoretical and empirical findings of the study indicate that the problem of corruption, beyond its economic dimension, has a strong political and social character. Improving economic conditions only is not sufficient to sustainable rise in living standards. Instead, these policies should be accompanied by institutional improvements, so as to be more effective. Moreover, the extent of corruption provides a strong indication of the evolution of the macroeconomic and

structural characteristics of each economy. Corruption contributes to government failure through the erosion of public institutions, social instability and the exacerbation of poverty that hampers sustainable growth. Corruption is, therefore, a symptom of underlying institutional weaknesses and is also recognized as one of the greatest obstacles to economic and social development.

6. Conclusion

Strategies to tackle corruption should take into consideration the root causes of the problem in order to successfully implement concrete economic and systemic reforms. Particularly, for the least developed countries, the most important determinants of corruption are structural in nature. Therefore, effective responses at the policy level require to consider the long-term nature of the problem. Reform policies prove inadequate if they are not supported by the appropriate institutional framework and good governance practices. For this aim, the institutional culture of dealing with corruption needs to change, as in these cases, it has penetrated into the whole spectrum of economic, social and political life. When the policies implemented to tackle corruption fail, it evolves from a transitory to a structural problem. In addition, it is noted that tackling corruption requires transformation in the established institutional culture of dealing with the problem, which implies changes in social perceptions. This transition can ultimately emerge as a result of targeted political actions, institutional reforms and extensive shifts in economic resources.

These results can be used at the policy level. In order to ensure coherent action on economic and social sustainability issues, key issues such as the promotion of appropriate educational reforms should be highlighted. After all, the most effective method of reducing economic and social inequalities is free access to education for all. In this way, education can be a means to support social cohesion and reduce social conflicts, especially in less developed countries, where the level of social development is low. Moreover, education is one of the most important factors to enhance social participation and raise the level of social capital.

Strategies to tackle corruption should take into account the deeper causes of the problem, so as to successfully implement targeted economic and systemic transformation. In particular, as far as less developed countries are concerned, the most important determinant factors of corruption are of structural character. As a result, regarding the most efficient confrontation of these pathogeneses, the long-term character of the problem should be taken into consideration while designing policies. Reform strategies prove to be inadequate if they are not supported by the appropriate institutional framework and good governance practices. The institutional culture of confronting corruption should change as in low-income countries, corruption has penetrated into the whole spectrum of economic, social and political life. In case policies applied for the control of corruption fail, it evolves from a temporal to a structural problem. Consequently,

the conditions that further strengthen systemic corruption evolve, which impedes the confrontation of the problem.

Therefore, principles, strategies and interventions against corruption should be developed in order to forward a sustainable prospect with regard to the confrontation of the phenomenon. The efficient control of corruption is a difficult goal at the policy level, which is achieved through the successful implementation of appropriate long-term policies. The dominant issue that should be forwarded is the policy control of corruption under the restrictions of the economic as well as the wider social and political system.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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