CORRUPTION AS AN OBSTACLE TO ECONOMIC GROWTH OF NATIONAL ECONOMIES

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ABSTRACT

There is no unified definition of the concept of corruption existing today at the level of theoretical or practical application. However, all current approaches agree that corruption represents any unfair behaviour with the goal of gaining a certain unqualified advantage at the expense of others. Professional literature presents mixed evidence about its impact on economic growth. Some authors consider corruption as a "driving force" of the economy, but others argue that it is "sand in the wheels". Most authors are of the opinion that corruption complicates economic transactions because it reduces the security of property rights and contributes to inefficient allocation of resources. Corruption often threatens the role of the government and makes it difficult for government intervention. It also leads to poor resource allocation, since the structure of public expenditure often changes in favour of certain sectors, especially those which have more obvious corruption opportunities.

This paper, based on findings in theoretical literature and empirical studies, validates the hypothesis on the negative impact of corruption on economic growth in the European Union in the period 1999 - 2014. Using information from the literature, an econometric model has been derived for this purpose, which provides an overview of what effect corruption in the selected sample of countries has on economic growth. This econometric model has shown that corruption negatively affects economic growth in the selected set of countries, not only directly but also indirectly through distribution channels. The distribution channels through which corruption affects economic growth within the selected group of countries have been defined as household expenditures, government expenditures and investments.

Keywords: *Corruption, Economic Growth, European Union, Panel Data Analysis, Transmission channels*

1. INTRODUCTION

Corruption is a serious issue which society has faced from time immemorial. It is a persistent and widespread problem, yet has never been successfully resolved. The professional literature says that corruption affects the economic situation in a country, particularly its economic growth. For decades, the issue of the impact of corruption on economic growth has been subject to a number of theoretical and empirical studies. Some authors consider corruption as a "driving force" of the economy, but others argue that acts as notional "sand in the wheels". In examining the relationship between corruption and economic growth, a number of authors have come to the conclusion that the significant impact of corruption on economic growth tends to fade or change its direction and degree of influence in the incorporation of other important determinants of economic growth. This suggests that a significant portion of the effect, which impairs economic growth, is transmitted indirectly via the main determinants of that growth, which are also referred to as transformation or transmission channels.

The aim of this paper is to verify the validity of the hypothesis of the negative impact of corruption on economic growth in countries of the European Union using panel data analysis for the period 1999 - 2014. In the analysis, the above-mentioned transmission channels are also taken into account, through which corruption could affect the economic growth of the selected group of countries.

2. THEORETICAL ARGUMENTS ON THE ECONOMIC EFFECTS OF CORRUPTION

One of the most important arguments for the favourable impact of corruption on economic growth was presented by Leff (1964) and Huntington (1968) in the 1970s. According to them, corruption has the ability to accelerate time-consuming and inefficient administrative processes. Hence it can be described as an indispensable "lubricant" for government administration. Conversely, Myrdal (1968) argued that this approach could result in even greater delays and other inefficiencies in order to attract a larger amount of bribes or a higher amount.

Contrary to the belief that corruption can have a positive impact on the economic performance of a country, the number of authors having published studies confirming the negative effects of corruption is greater and more unified in their opinions. The negative effects of corruption on foreign investment are shown by Shleifer and Vishny (1993). Corruption tends to reduce investment incentives for both local and foreign entrepreneurs. When the latter are often forced to pay bribes before creating their business or when they are solicited to pay large sums of money to public officials in order to remain in business, corruption hinders and even blocks the creation and development of companies and hence, disadvantages economic growth. In addition, corruption increases transaction costs, impedes the development of a market economy, undermines the system of free markets by increasing the degree of uncertainty and reduces government revenues while raising its spending (Rose-Ackerman, 1997; Tanzi 1998). In particular, it compromises the fundamental role of the state in some areas such as contract enforcement and protection of property rights, and makes it difficult for government intervention to impose necessary regulatory controls and inspections to correct for market failures. Corruption leads also to a misallocation of resources, particularly when the investment of public funds and approval of private investments are decided not on the basis of economic or social value of a project, but rather on the potential revenue that public officials may expect to receive from their decisions (Jain, 2001).

Based on his empirical studies, Mauro (2002) found that countries characterised by low productivity and large public sectors have a much greater likelihood of low economic growth and widespread corruption. More recent empirical studies indicate that the impact of corruption on economic growth cannot be explained without taking into account the institutional framework of each country. The authors Meon and Weill (2010), for example, have provided evidence that corruption has a detrimental effect on economies with effective institutions, while countries with inefficient institutional framework may benefit from corruption.

2.1. Transmission Channels

One of the first studies to focus on transmission channels was created by Mo (2001). Although it initially found a significant negative correlation between corruption and economic growth, the extent of this effect subsequently decreased and became statistically insignificant after the inclusion of other determinants of economic growth, namely investments, human capital and political instability. Based on this finding, these have been identified as transmission channels. The authors Pellegrini and Gerlagh (2004), continuing on from his work, defined trade openness as another transmission channel. Based on their study, they showed that the most important

channel through which corruption hinders economic growth is investment. This issue was also dealt with by Dridi (2013), who considered the transmission channels to be investment, human capital, political instability, inflation and government spending. Using his studies, he found that negative effect is transmitted mainly through human capital and political instability, while the effect of the investments channel appeared to be less than that corresponding to the previous empirical studies.

In conclusion, it can be said that there are various professional studies with different results, but they are predominated by those which show a negative impact of corruption on economic growth. Some studies have shown a significant negative impact of corruption on economic growth, while others revealed that this effect is statistically insignificant and show preference to other factors as variables affecting economic growth. Empirical studies also show that corruption acts on economic growth in a negative way directly as well as indirectly through the transmission channels.

3. METHODS

The hypothesis on the negative impact of corruption has been validated on a panel data set. An estimation of the model parameters was made using a model with fixed effects, which uses artificial variables to model individual effects. This regression has a great many response variables, but still, it is a regression model. Thus, all facts are presented here related to the regression model and to the equation (1):

$$Y_{it} = \alpha_N D_{it}^{(N)} + \beta X_{it} + \epsilon_{it} \quad (1)$$

This model assumes a diversity of transversal units in absolute terms, and hence for a model of fixed effects it is necessary to create *N* different artificial variables, denoted as $D^{(j)}$, where $j = 1,\ldots,N$ (Baltagi, 2013).

Before being applied, the estimated econometric model must be verified and evaluated. For this purpose, typical assumptions are used which in econometrics are considered to be in the context of regression errors; i.e., random elements ϵi and are expressed as follows:

- $E(\epsilon i) = 0$. Zero means value of the random elements.
- $var(\epsilon i) = E(\epsilon i^2) = \sigma^2$. Constant error variance (homoscedasticity).
- $cov(\epsilon i; \epsilon j) = 0$ *for* $i \neq j$. Random components are uncorrelated.
- ϵi is normally distributed.
- *Xi* is fixed; it is not a random variable.

The significance level used for the analysis is the standard; i.e., 0.05.

4. ANALYSING THE EFFECTS OF CORRUPTION IN ECONOMIC GROWTH IN COUNTRIES OF THE EU-28

The hypothesis on the negative impact of corruption was tested with the help of the econometric model assembled using a method of fixed effects in the Gretl program[1] for countries of the EU-28 in 1999-2014. Specifications of the model were derived from empirical papers of authors who dealt with the identification of transmission channels through which corruption affects economic growth. Based on these studies, the authors of this paper have assumed that corruption affects economic growth directly, as well as indirectly through transmission channels. These transmission channels are considered to be those of **investments, human capital, political instability, government spending, and trade openness**. Apart from these transmission channels and the determinants of economic growth, another factor included in the model was

[1] This is a freely available program used to estimate econometric models. It is available on the following website: http://gretl.sourceforge.net/.

household consumption, as one of the fundamental elements determining the gross domestic product.

After testing the stationarity of the variables, a model was constructed as follows (2):

$$GDP\_Growth_{it} = ß_0 + ß_1 CPI\_Growth_{it} + ß_2 HOUSexp\_Growth_{it} + ß_3 INV\_Growth_{it} + ß_4 GOVexp\_Growth_{it} + ß_5\, d\_NX_{it} + ß_6 HC\_Growth_{it} + ß_7 d\_PS_{it} \quad (2)$$

A description of each variable is given in Table 1.

Table 1: Description of Variables (Authors' own work)

Variable	Description	Unit	Estimated sign
i	Country		
t	Year		
GDP_Growth	Gross domestic product [2]	% growth	
CPI_Growth	Corruption Perception Index	% growth	positive
HOUSexp_Growth	Household consumption	% growth	positive
INV_Growth	Investment [3]	% growth	positive
GOVexp_Growth	government spending	% growth	positive
d_NX	Foreign trade balance	absolute change	positive
HC_Growth	Human capital [4]	% growth	positive
d_PS	Index of political stability	absolute change	positive

Testing the Hypothesis of Direct Impact of Corruption on Economic Growth

The first part of the analysis validates the hypothesis of the direct negative impact of corruption on economic growth. In the event that the analysis should also show a positive effect of one of the determinants (except for CPI) on economic growth, the hypothesis of the indirect negative impact of corruption on economic growth will be tested in another part.

Estimating the Model Parameters

An estimation of the model parameters based on the construction of the model described above is given in Table 2.

Table 2: Estimated Parameters of All Response Variables (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	0.308596	0.221999	1.390	0.1658	
CPI_Growth	−0.0103355	0.0333384	−0.3100	0.7568	
HOUSexp_Growth	0.558857	0.0457314	12.22	4.12e-027	***
INV_Growth	0.108689	0.0162584	6.685	1.56e-010	***
GOVexp_Growth	0.0696448	0.0213172	3.267	0.0012	***
d_NX	3.76316e-05	1.15964e-05	3.245	0.0013	***
HC_Growth	-0.00164874	0.00528940	-0.3117	0.7555	
d_PS	1.12822	0.711527	1.103	0.0921	

This model presents 76% variation of the response variable *GDP* ($R^2 = 0.76$). The variable *CPI* failed to show any statistical significance and also hinted at the opposite direction of effect before the specification of variables predicted. As well, no statistical significance was proved for the variables *HC* and *PS*. Because of the considerable differences between the assumptions

[2] Real gross domestic product.
[3] Expressed by the indicator Gross Fixed Capital Formation.
[4] Expressed by the indicator: Number of Registrations in Secondary Education.

and the results of this analysis, a model was tested from which the given statistically insignificant variables were taken (except for the variable *CPI*). The test results are presented in Table 3.

Table 3: Estimated Parameters of Selected Response Variables (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	0.406976	0.197465	2.061	0.0402	**
CPI_Growth	0.0484305	0.0450301	2.4093	0.06826	*
HOUSexp_Growth	0.534373	0.0428145	12.48	9.25e-029	***
INV_Growth	0.115351	0.0151493	7.614	4.02e-013	***
GOVexp_Growth	0.0730911	0.0202077	3.617	0.0004	***
d_NX	3.60494e-05	1.13827e-05	3.167	0.0017	***

This model presents 74% variation of the response variable *GDP* ($R^2 = 0.74$). After removing the statistically insignificant variables *HC* and *PS*, the variable *CPI* began to change the direction of its effect on economic growth. After a detailed examination, it was found that the variable *CPI* shows a negative sign only when the variable *PS* is incorporated into the model. As well, after eliminating these variables, the statistical significance of the variable *CPI* grew and became statistically significant. For the coefficients of other variables, no significant changes occurred.

Due to the fact that the variable *CPI* has been found to have low statistical significance in previous models and its ambiguous effect on the response variable, the possibility of its effect with a time delay to the response variable was verified. It is important to note that this delay was added only to the variable *CPI*, and not to other fundamental determinants of *GDP*, as the article's authors did not anticipate that these determinants would affect the response variable with a time delay. The model did not include any variables which failed to demonstrate statistical significance in the previous models (i.e., *HC* and *PS*). The outputs of the model are shown in Table 4.

Table 4: Estimated Parameters of the Time Delay Model (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	0.413394	0.198910	2.078	0.0386	**
CPI_Growth_1	0.0548594	0.0242974	2.5612	0.06751	*
HOUSexp_Growth	0.530530	0.0483374	16.22	5.61e-028	***
INV_Growth	0.117009	0.0153492	7.623	3.86e-013	***
GOVexp_Growth	0.0730911	0.0202077	3.617	0.0004	***
d_NX	3.61804e-05	1.14005e-05	3.174	0.0017	***

This model presents 74% variation of the response variable *GDP* ($R^2 = 0.74$). The variable *CPI* appeared in this model with a positive sign and as statistically significant. This suggests that corruption has no adverse effects on economic growth, either directly or with a time delay.

Testing the Hypothesis of Indirect Impact of Corruption on Economic Growth

The previous models were able to demonstrate the positive impact of the variables *HOUSexp*, *GOVexp*, *INV*, and *NX* on economic growth. Here, the question is whether they could be considered transmission channels through which corruption could affect economic growth indirectly. For the purposes of this hypothesis, three models were constructed, in which *HOUSexp*, *GOVexp*, *INV* and *NX* became the response variables. In order for these response variables to be designated as transmission channels, the variable *CPI* must show a positive sign.

Models taking into account the stationarity of the variables were constructed as follows (3), (4), (5), (6):

$$HOUSexp\_Growth_{it} = ß_0 + ß_1 CPI\_Growth_{it} + ß_2 GDP\_Growth_{it} + ß_3 INV\_Growth_{it} + ß_4 GOVexp\_Growth$$
$$ß_5\ d\_NX_{it} + ß_6 HC\_Growth_{it} + ß_7 d\_PS_{it}$$

$$GOV\exp\_Growth_{it} = \beta_0 + \beta_1 CPI\_Growth_{it} + \beta_2 GDP\_Growth_{it} + \beta_3 HOUS\exp\_Growth_{it} + \beta_4 INV\_Growth_{it} +$$
$$\beta_5 d\_NX_{it} + \beta_6 HC\_Growth_{it} + \beta_7 d\_PS_{it} \quad (3)$$

(4)

$$INV\_Growth_{it} = ß_0 + ß_1 CPI\_Growth_{it} + ß_2 GDP\_Growth_{it} + ß_3 HOUSexp\_Growth_{it} + ß_4 GOVexp\_Growth$$
$$ß_5\ d\_NX_{it} + ß_6 HC\_Growth_{it} + ß_7 d\_PS_{it}$$

(5)

$$d\_NX_{it} = ß_0 + ß_1 CPI\_Growth_{it} + ß_2 GDP\_Growth_{it} + ß_3 HOUSexp\_Growth_{it} + ß_4 INV\_Growth_{it} +$$
$$ß_5\ GOVexp\_Growth_{it} + ß_6 HC\_Growth_{it} + ß_7 d\_PS_{it} \quad (6)$$

Estimating the Model Parameters

The first to be tested was the direction of effect of the variable *CPI* on the response variable *HOUSexp*. The results of this model are shown in Table 5.

Table 5: Estimated Model Parameters for the Variable HOUSexp (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	1.74954	0.218725	7.999	5.06e-014	***
CPI_Growth	0.0547152	0.0229164	2.3876	0.0176	**
GDP_Growth	0.679367	0.0555928	12.22	4.12e-027	***
INV_Growth	0.0614081	0.0190981	3.215	0.0015	***
GOVexp_Growth	0.0231396	0.0288934	0.8009	0.4238	
d_NX	−3.29344e-	1.28874e-05	−2.556	0.0112	**
HC_Growth	−0.00326841	0.00582929	−0.5607	0.5755	
d_PS	−0.0112647	1.02465	−0.01099	0.9912	

This model presents 73 % variation of the response variable *HOUSexp* (R^2 = 0.73). In this model, the variable *CPI* showed a positive sign and statistical significance.

Another possible transmission channel was found to be government spending. The outputs of this model are presented in Table 6.

Table 6: Estimated Model Parameters for the Variable GOVexp (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	5.30181	0.560375	9.461	2.69e-018	***
CPI_Growth	0.0369787	0.0132721	2.786	0.0058	***
GDP_Growth	0.601786	0.184198	3.267	0.0012	***
HOUSexp_Growth	0.0506286	0.170648	0.2967	0.7670	***
INV_Growth	0.588268	0.0358350	16.42	2.65e-041	***
d_NX	−3.70039e-	3.47350e-05	−1.065	0.2878	
HC_Growth	−0.0102790	0.0155375	−0.6616	0.5089	
d_PS	−7.71748	2.68676	−2.872	0.0044	

This model presents 70 % variation of the response variable *GOVexp* (R^2 = 0.70). For government spending, the variable *CPI* was able to demonstrate a high statistical significance. Another possible transmission channel was found to be investments. The outputs of this model are presented in Table 7.

Table 7: Estimated Model Parameters for the Variable INV (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	−6.92226	0.674204	−10.27	8.66e-021	***
CPI_Growth	0.635935	0.369327	1.7219	0.0861	*
GDP_Growth	1.42429	0.213054	6.685	1.56e-010	***
HOUSexp_Growth	0.661960	0.205872	3.215	0.0015	***
GOVexp_Growth	0.892138	0.0543456	16.42	2.65e-041	***
d_NX	−3.31351e-	4.28224e-05	−0.7738	0.4398	
HC_Growth	0.0131716	0.0191327	0.6884	0.4918	
d_PS	−2.22853	3.36114	−0.6630	0.5079	

This model presents 82 % variation of the response variable *INV* (R^2 = 0.82). In this case, the variable *CPI* was also able to demonstrate a high statistical significance.
The last variable was the response variable *NX*. The results of this model are shown in Table 8.

Table 8: Estimated Model Parameters for the Variable NX (Authors' own work)

	Coefficient	Std. Error	t-ratio	p-value	
const	2649.40	1192.68	2.221	0.0272	**
CPI_Growth	−7.37360	24.7852	−0.2975	0.7663	
GDP_Growth	1099.43	338.795	3.245	0.0013	***
HOUSexp_Growth	−1774.04	678.631	−2.556	0.0112	**
INV_Growth	−73.8743	95.4718	−0.7738	0.4398	
GOVexp_Growth	−125.115	117.443	−1.065	0.2878	
HC_Growth	−3.45226	28.5948	−0.1207	0.9040	
d_PS	2763.85	5020.08	0.5506	0.5824	

This model presents only 9 % variation of the response variable *NX* (R^2 = 0.09). In this case, the variable *CPI* was not able to demonstrate a high statistical significance, although it hinted at a positive direction of effect of the response variable *NX*.

Statistical and Economic Verification

In all models, the Gauss-Markov assumptions were met except for the assumption of identical distribution of random components with zero mean. The hypothesis of normal distribution of random components was thus rejected. The results of such models cannot be generalised to a larger population (i.e., to other countries) or to another time period.

5. DISCUSSION AND CONCLUSION

The results of this analysis show that corruption has a truly negative impact on economic growth, as the variable *CPI* appeared in most of the models with a positive sign, and statistically significant. Statistical significance was exhibited even when this variable had a time delay of up to one year. This suggests that corruption can affect economic growth not only immediately but also with a time delay.

This paper also tested the hypotheses of an indirect negative impact of corruption on economic growth. The variables *HOUSexp, GOVexp, INV* and *NX* also appeared as potential transmission

channels, as the previous models demonstrated their statistical significance and positive impact on the response variable *GDP*. The analysis confirms this assumption for the variables *HOUSexp*, *INV* and especially *GOVexp*. They should therefore be identified as transmission channels, through which corruption affects economic growth. This means that with the decreasing value of the *CPI* (i.e., increasing the perception of corruption), household consumption and net exports are also reduced, which adversely affects gross domestic product. This raises the question of how corruption could affect economic growth through these transmission channels. For the variable *NX*, the validity of this hypothesis could not be demonstrated.

The transmission channels of government spending and household consumption could be associated with the inefficient management of certain EU-28 countries. An example is the issue of public tenders, which is the most common area of corruption on a global scale and which results in inefficient government expenditures and a waste of taxpayers' money. As a result of this waste of tax money, there are then losses in government budgets and a resulting need for governments to raise taxes, leading to reductions in household consumption and, by extension, to the reduction of economic growth.

Investment can also be described as a transmission channel through which corruption negatively affects economic growth. A negative relationship between corruption and investment exists because of the uncertainty and heightened risk of failure because corruption agreements are unenforceable. This also results in higher additional costs that must be spent on maintaining secrecy of corrupt activities. It is possible however to find positive effects of corruption on investment. As an example, we can again look at the issue of public tenders. In a case where the national government issues a tender, for example, for the construction of a new highway, a company may pay some money to be selected as the winning contractor. The moment they are named as the winning contractor, they may charge exorbitant prices or skimp on quality. In this case, the company benefits from corruption and can further develop its investment activities.

In conclusion, it can be stated that the group of EU-28 countries was able to confirm the hypothesis dealing with the negative impact of corruption on economic growth. To a greater extent, the corruption in these countries has reduced their economic growth. At the same time, the analysis showed that corruption affects economic growth not only directly but also with a time delay.

However, this analysis also confirmed another statement of the authors regarding foreign empirical studies on the impact of corruption on economic growth becoming statistically less significant after including other determinants of economic growth. This indicates that corruption affects economic growth directly as well as indirectly through these determinants. After testing this hypothesis, it was found that corruption has a negative effect on economic growth through household consumption and net exports.

The results of this paper cannot be generalised to other countries or to other time periods, as the hypothesis of the normal distribution of random components was rejected. Thus, these conclusions can only be applied to a set of EU-28 countries in the time frame of 1999 to 2014.

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