

DETERMINANTS OF CORRUPTION IN ROMANIA AND ITS IMPACT ON ECONOMIC GROWTH

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Abstract

It is common knowledge that corruption is harmful to the economic development, mainly because it reduces the level of foreign investments. The aim of this paper is to find the determinant factors for the corruption phenomenon in Romania and to assess the effects that it has on economic growth. An econometric model was built to explain the influence of corruption on GDP annual growth rate and on the foreign direct investments in Romania. Corruption perception index, index of economic freedom, GDP growth rate, governance indicators, along with other socio-economic indicators were used in the analysis.

Keywords: Corruption, economic growth, Romania, governance indicators, economic freedom

JEL classification: C22, C51

1. INTRODUCTION

There is an impressive literature that examines the significantly statistical evidence of the relationship between corruption and economic growth. The first and probably most cited work is Mauro's [1995], who demonstrates a strong negative correlation between corruption and economic growth, evaluated by total investments and value of GDP. His findings revealed though that when using as a control variable the investment, the effect of corruption on growth is weak. The harmful effects of corruption on growth were also studied by

Klitgaard [1998], who perceives corruption through political power for economic gain. Shleifer and Vishny [1993] suggest that corruption is an illegal and very costly tax on economic activity, while Tullock [1996] and Lui [1996] claim that it is considered corruption when officials take illicit payments as substitutes for higher wages. Méon and Sekkat [2005] show that corruption is determined by the quality of the governance. Besides considering the governance indicators as determinates of corruption, the literature also provides evidence that economic freedom index, developed by Transparency International, could show the relationship between corruption and the performance of an economy (Dawson [2003], Alli and Isse [2003], Swaleheen and Stansel [2007]).

Swaleheen and Stansel [2007] undertook a literature review analysis and revealed that:

- most empirical studies are made on cross-sectional models that cannot account for country-specific heterogeneity;
- the degree of economic freedom in an economy is not explicitly considered;
- the simultaneity between corruption, investment and economic growth is ignored.

In this paper we analyse the relationship between corruption and economic growth, and we build an econometric model in order to determine the factors that influence the level of corruption. Our research hypothesis refers to:

- the existence of a negative relationship between corruption and economic growth. We will verify whether in the case of Romania the findings of Mauro [1995] apply;
- the level of corruption depends on the degree of economic freedom, the quality of governance and the level of education.

2. METHODOLOGY

In order to verify the assumptions made in the paper, we apply, for the first part of the study, the regression analysis and the simple correlation between corruption and Economic Growth. The identification of the determinants that influence the level of corruption in Romania will be conducted, in the second part of the paper, using the principal components analysis. The principal components analysis is a descriptive method of the multivariate data analysis showing correlations among variables. This method achieved a representation of the variables on the factorial axes, which are linear combination of the variables under consideration. Then, we estimate, using the multiple linear regression, an econometric model of the relationship between corruption in Romania and the independent variables that have an impact on corruption.

The data we used include unit measures from international surveys and official sources as World Bank, INSSE (The Romanian Institute of Statistics) and Eurostat. For Romania, the availability of data forced us to use a 1997-2009 time series.

The literature provides us two main indicators for corruption that are being used: the Transparency's International Corruption Perception Index (*CPI*) and the World Bank's Control of Corruption Index (*CCI*). In this paper, we used the first indicator, for data availability reasons. The values of CPI range from 0 to 10. The higher the score, the lower the level of corruption. For economic growth we have considered the GDP annual growth rate and the foreign direct investments.

To express the degree of economic freedom, we used the Heritage Foundation's Economic Freedom Index (EFI). This index, EFI, ranges from 0 to 100, the higher the score, the bigger the level of economic freedom. The EFI is a compound of 10 indicators, and their sum gives the value of EFI. Because one of the components is Freedom from corruption, we modified the value of EPI by excluding the corruption component.

The governance quality is measured by the World Bank's Worldwide Governance Indicators, through six unit measures. The indicators' values are generated in units of a standard normal distribution, ranged between -2.5 and 2.5. Higher values correspond to better governance. The six unit measures are: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption. We used the first 5 unit measures as independent variables.

The level of education is measured by the secondary school enrolment rate, as gross percent, as provided by the INSSE (The Romanian's Institute of Statistics).

All the results are obtained using the SPSS 16.0 program.

3. THE CORRELATION ANALYSIS BETWEEN CORRUPTION AND ECONOMIC GROWTH

In order to study the correlation between corruption and economic growth, we consider, as regards corruption, the World Bank's Control of Corruption Index, CPI. The two indicators that were used for economic growth are GDP's annual growth rate and the foreign direct investments.

Before applying the correlation analysis, we tested the variables for stationarity and we found that the GDP annual growth rate is non-stationary. Thus, we transformed the variable by differentiation and we used in the analysis the first order difference variable. The results are presented in table 1.

Table no. 1 Correlation analysis for corruption and economic growth indicators

		Correlations		
		Corruption perception index	Foreign direct investment - bil. USD	DIFF(GDP_rate,1)
Corruption perception index	Pearson Correlation	1	.612*	-.536
	Sig. (2-tailed)		.035	.059
	N	13	12	13
Foreign direct investment - bil. USD	Pearson Correlation	.612*	1	-.047
	Sig. (2-tailed)	.035		.854
	N	12	19	18
DIFF(GDP_rate,1)	Pearson Correlation	-.536	-.047	1
	Sig. (2-tailed)	.059	.854	
	N	13	18	19

*. Correlation is significant at the 0.05 level (2-tailed).

We observe a significant, strongly positive relation between CPI and the foreign direct investments ($R=0,612$), meaning that the amount of foreign direct investment increases as the level of corruption decreases, because the CPI takes high values for countries with low

levels of corruption. However, there is a less significant correlation between CPI and GDP annual growth rate ($R=-0,536$). The negative relationship actually means, considering the values of CPI, a positive relationship between correlation and economic growth. This situation can be explained by the fact that economic growth in Romania is mainly based on domestic consumption and foreign loans, rather than on production and investments.

In order to verify Mauro's hypothesis for Romania, i.e. if using as a control variable the investment, the effect of corruption on growth is weak. The results are presented in table no. 2.

Table no. 2 Correlation between CPI and GDP annual growth rate, when controlling for investment

Correlations			Corruption perception index	DIFF(GDP_rate,1)
Control Variables				
Foreign direct investment - bil. USD	Corruption perception index	Correlation	1.000	-.449
		Significance (2-tailed)	.	.166
		df	0	9
	DIFF(GDP_rate,1)	Correlation	-.449	1.000
		Significance (2-tailed)	.166	.
		df	9	0

By analysing the results from table 2 one can observe that, using as a control variable the investments, we have a non-significant relationship between CPI and GDP growth rate ($Sig. =0,166$). This result confirms Mauro's hypothesis that the impact of economic growth on corruption is indirect.

4. EMPIRICAL STUDY OF CORRUPTION DETERMINANTS FOR ROMANIA

4.1. Descriptive statistics

As presented above, we used as an indicator for corruption and as dependent variable the *Corruption Perception Index (CPI)*. The independent variables are:

- for evaluating the *Economic Freedom* we use the Economic Freedom Index (*EFI*);
- for evaluating the level of *Education* of the population, we use the Secondary School Enrolment Rate, Gross %;
- to describe the *Governance efficiency*, we used several variables, such as: External debt stocks, Public and publicly guaranteed (bil. USD), Foreign direct investment (bil. USD), Total general government expenditure (% GDP), Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality and Rule of Law.

Table 3 and 4 provide descriptive statistics for the dependent variable, *CPI*, and for the independent variables.

Table no. 3 Descriptive statistics for CPI

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Corruption perception index	13	2.60	3.80	3.1646	.40531
Valid N (listwise)	13				

Table no. 4 Descriptive statistics for the independent variables

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
External debt stocks, public and publicly guaranteed - bil. USD	19	.2220000	15.20000	7.40742105	5.1015867065
Economic freedom index	15	4.40	32.90	22.4800	7.38669
Total general government expenditure % GDP	15	33.50	40.40	35.9467	2.10709
Secondary school enrollment rate	18	20.99	29.47	26.0216	2.82506
Voice and Accountability	14	.18	.51	.3821	.10207
Political Stability	14	.19	59.60	38.5757	25.39062
Government Effectiveness	14	24.30	56.30	45.9071	10.27383
Regulatory Quality	14	35.10	70.50	55.4500	11.13572
Rule of Law	14	47.60	57.50	52.4214	3.46325
Valid N (listwise)	12				

The results from the tables above suggest that for *External debt stocks* and *Political stability*, the variations between years are much higher in relation to the other independent variables, as seen in the size of the standard deviation.

4.2. Identification of the determinant factors of influence on corruption

In order to identify the factors that influence corruption, as a preliminary analysis we used the Principal Component Analysis, considering the entire group of variables. The results are presented in fig. 1.

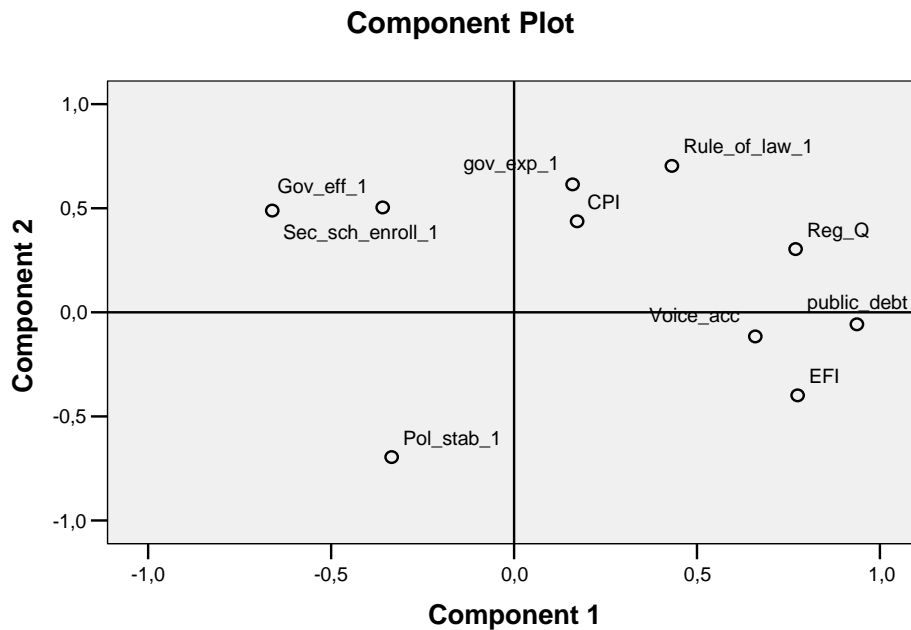


Figure no. 1 Representation of the variables on the two first factorial axes

The first factor axis, plotted on the horizontal axis, shows a positive correlation among External stocks debt (*public_debt*), Regulatory Quality (*Reg_Q*), Economic Freedom Index (*EFI*), Voice and Accountability (*Voice_acc*). Among all these variables and Secondary School Enrolment Rate (*Sec_sch_enroll_I*) there is a negative correlation.

The second factorial axis, represented on the vertical axis, reveals a positive correlation between the Corruption Perception Index (*CPI*), Total general government expenditure (*gov_exp_I*), Rule of Law (*Rule_of_Law_I*) and Secondary School Enrolment Rate (*Sec_sch_enroll_I*). Among all these variables and Political Stability (*Pol_stab_I*) there is a negative correlation.

The principal component analysis allowed the identification of statistical correlations between variables and highlighted the factors that have a significant impact on corruption in Romania. To "measure" the influence of these factors, we applied the multiple regression analysis and we estimated an econometric model to explain the relationship between the level of corruption and its influence factors.

4.3. Econometric model of corruption in Romania

In order to measure the influence of the determinant factors on the corruption level in Romania, we estimated an econometric model. The dependent variable is *Corruption Perception Index (CPI)*. As independent variables we considered all factors of influence identified by the principal component analysis. These factors can be grouped into three categories above: *Economic Freedom*, the *Level of Education* and the *Quality of Governance*.

The form of the econometric model used to describe the relationship between corruption and its factors of influence is:

$$CPI = \beta_0 + \beta_1 (\text{Economic freedom}) + \beta_2 (\text{Education}) + \beta_3 (\text{Governance}) + \varepsilon.$$

In order to estimate the model, we tested the variables for stationarity and we find that, except the *Corruption Perception Index (CPI)*, *Economic Freedom Index (EFI)* and *Voice and Accountability (Voice_acc)*, the variables were non-stationary. Thus, we transformed the variables by differentiation and we used in the model the first order difference variables.

The regression method used to select the significant independent variables is the *backward method*. Through the elimination process, only three independent variables that have a significant influence on corruption were kept in the model. The coefficients of the regression model estimated by the multiple regression analysis are presented in table 5.

Table no. 5 Regression coefficients

		Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model	B	Std. Error	Beta					Tolerance
1	(Constant)	2.279	.117		19.422	.000		
	Economic freedom index	.043	.006	.956	7.515	.000	.650	1.538
	DIFF(Sec_sch_enroll,1)	.269	.032	1.094	8.536	.000	.642	1.559
	DIFF(Pol_stab,1)	-.009	.002	-.409	-3.924	.006	.969	1.032

a. Dependent Variable: Corruption perception index

The results presented in table 5 shows the estimated model as:

$$CPI = 2.279 + 0.043(EFI) + 0.269(Diff_Sec_sch_enroll) - 0.009(Diff_pol_stab),$$

where $Diff_sec_sch_enroll = Sec_Sch_Enroll_t - Sec_Sch_Enroll_{t-1}$, and $Diff_pol_stab = Pol_stab_t - Pol_stab_{t-1}$.

The coefficients β_1 and β_2 are positive and significant ($Sig. = 0,000$), at a 0.05 level. Because the *CPI* takes high values for countries with low levels of corruption, this means that there is a strongly negative influence of the level of education and the degree of economic freedom on corruption. When the level of education and the degree of economic freedom increases the level of corruption decreases. An increase with one unit in the value of *EFI* determines an average increase with 0.043 in the value of *CPI*. Similarly, an increase with 1% in the secondary school enrolment creates an average improvement in the *CPI* value of 0.269.

The coefficient β_3 is however negative and significant ($Sig. = 0,006$). This result shows that when the level of political stability increases, the level of corruption also increases. According to the World Bank Methodology for the Governance Indicators, *Political stability* measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent events, including domestic violence and terrorism. Consequently, the higher the probability to overthrow unconstitutionally the government the higher the level of corruption. An increase with one unit in the value of *Political stability*

indicator determines an average decrease or deterioration of 0.009 units in the value of *CPI*. Such a result could be explained by the state of masses when the living situation becomes intolerable, as we experienced in the 1989 Revolution.

In order to determine the model's goodness of fit, we estimated the multiple correlation coefficients. The R square value estimated is very large ($R^2=0,926$), which means that the regression model explains 92.6% of the dependent variable's variation, so the model fits the data well (Table 6).

Table no. 6 Model summary results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.962 ^a	.926	.895	.10349

a. Predictors: (Constant), DIFF(Pol_stab,1), Economic freedom index, DIFF(Sec_sch_enroll,1)

Table no. 7 ANOVA Regression

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.942	3	.314	29.320	.000 ^a
	Residual	.075	7	.011		
	Total	1.017	10			

a. Predictors: (Constant), DIFF(Pol_stab,1), Economic freedom index, DIFF(Sec_sch_enroll,1)

b. Dependent Variable: Corruption perception index

Table 7 summarizes the results of the analysis of variance for the regression model. The small value of *Sig.* = $0,000 < 0,05$ suggests that the independent variables explain the variation in the dependent variable.

5. CONCLUSIONS

Corruption is expensive and deteriorates the welfare of a state and its citizens. The literature covers mainly the relationship between the corruption and economic growth, and less the determination of corruption's influence factors.

In this paper, as for the relationship between corruption and economic growth, we analysed the correlation between the *Corruption perception index (CPI)*, on one hand, and the GDP annual growth rate and Foreign direct investment, as economic growth indicators, on the other hand. The results suggested a positive and significant correlation between corruption and Foreign direct investment. A non-significant correlation between corruption and GDP is obtained controlling for the level of investments.

Then we identified the significant factors that affect the level of corruption, using variables such as economic freedom, level of education and several indicators that measure the governance efficiency. Using the existing literature, we constructed a multiple linear model,

where the *Corruption perception index* is the dependent variable, and the factors that we found as significant are *Economic freedom*, *Education*, and *Political stability*. Corruption was found to be negatively and significantly correlated in Romania with the *Level of education* and the degree of *Economic Freedom*, and positively correlated to the level of *Political stability and absence of violence*, i.e. the incidence that the government would be the target of overthrowing by violent means.

The main enemy in obtaining the determinants of corruption for Romania is the data availability. Even though we tried to determine some factors that significantly influence the level of corruption, the indicators used to measure the level of corruption were calculated quite recently, and without a time series to cover a large period of time, the results tend to be questionable.

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