# CORRUPTION, GOVERNMENT SPENDING AND ECONOMIC GROWTH: THE CASE OF CENTRAL AND EASTERN EUROPE

**Predrag Trpeski**
*University Ss. Cyril and Methodius in Skopje, Faculty of Economics – Skopje,*
predrag.trpeski@eccf.ukim.edu.mk

**Gunter Merdzan**
*University Ss. Cyril and Methodius in Skopje, Faculty of Economics – Skopje,*
gjunter.merdzan@eccf.ukim.edu.mk

**Kristijan Kozeski**
*University Ss. Cyril and Methodius in Skopje, Faculty of Economics – Skopje,*
kozeski@eccf.ukim.edu.mk

**Marijana Cvetanoska**
*University Ss. Cyril and Methodius in Skopje, Faculty of Economics – Skopje,*
marijana.cvetanoska@eccf.ukim.edu.mk

***ABSTRACT***
*This study delves into the relationship between corruption, government spending, and economic growth in selected Central and Eastern European countries. The high prevalence of corruption and suboptimal allocation of public resources in these countries present a significant obstacle to increasing economic growth. These issues are particularly impactful in low and middle-income countries, where corruption persists longer. The effects of corruption can distort market signals and lead to inefficient allocation of resources, especially in the public sector. In addition to hampering public consumption, corrupt practices negatively impact a country's ability to increase economic growth and bridge the gap between high and low-income countries. By utilising fixed and random effects methods, this paper employs panel regression analysis to examine the impact of government spending and corruption on the economic growth of selected Central and Eastern European countries from 2011 to 2021. The study found that government spending, corruption perception, and control of corruption have a positive and statistically significant influence on economic growth in the selected countries.*

***Keywords:*** *Corruption, Government spending, Economic growth.*

***JEL classification:*** *D73, O10, H54.*

## 1. INTRODUCTION

The theoretical conceptions of establishing and maintaining economic development are continuously subject to debate among the academic community and economic policymakers. In addition to the wide range of economic and non-economic determinants of economic development, part of the theories about determinants of essential importance apostrophises the level of corruption and government spending. The complex relationship between the degree of corruption and economic development is based primarily on two theoretical approaches. The first theoretical approach, "grease the wheels", starts from the assumption that corruption positively impacts economic growth. This assumption is based on the

possibility of "bypassing" some of the strict, rigorous bureaucratic procedures that represent an obstacle to the optimal functioning of economic relations in the national economy. Part of such obstacles are the high administrative and bureaucratic barriers to starting your own business. Such bureaucratic procedures largely deter entrepreneurs from formalising their business, that is, being part of the formal economy. Hence, this theoretical assumption is because if economic agents bypass inefficient, bureaucratic, and suffocating regulations, they pave the way for increased and efficient economic activity. Contrary to this assumption, the theoretical hypothesis "sand the wheels" starts from the assumption that corruption is one of the most important factors that prevent the establishment and maintenance of stable economic development. This assumption is because widespread corrupt practices discourage innovation, entrepreneurial spirit, and suboptimal functioning of economic activities. The highly widespread corruption is one factor that contributes to a high level of mistrust towards the institutions and the inefficient allocation of resources, which will have a low or negative level on economic development. In this direction, if high corruption prevails in the economy, it leads to inefficient allocation of scarce and limited resources, especially government spending.

The two opposite theoretical views on the influence of corruption on economic activities find their application in practice. Regarding which of the theories will prevail in practice, most empirical studies point to the fact that it primarily depends on the level of corruption in individual national economies (Dzhumashev, 2014; Muritala and Taiwo, 2011). Most empirical research shows that a high level of corruption disincentive affects economic growth, especially in developing countries with low investment and pronounced mistrust in public institutions (Campos et al., 2010; Chang and Hao, 2017). Most empirical research uses the corruption perception index as an indicator of control of corruption. The corruption perception index is internationally comparable and has been used in many empirical analyses examining the relationship between corruption and economic growth (Swaleheen, 2011; Tsanana et al., 2016).

The level of corruption is also one of the factors for the efficiency in the distribution of public finances, i.e. the effectiveness of government spending (Hashem, 2014). The relationship between economic growth and government spending can also be represented as the influence of the public sector on economic growth in individual national economies. Hence, this relationship sets the basic assumption of whether the size of government spending contributes to the establishment of sustainable and long-term economic growth or is one factor that contributes to insufficient economic growth rates. In this direction, it is particularly important to distinguish between government spending in investments and government spending for current consumption. The theory starts from the fact that government investments positively impact economic growth, while government expenditures related to current consumption disincentives impact economic growth (Barro, 1990). In general, the prevailing opinion is that the increase in government spending, especially for infrastructure and human capital investments, affects the improvement of economic growth. Also, the total effect of government spending must include the connection with the private sector, that is, whether such activities directly or indirectly affect the increase of the total economic activity initially led by the private sector. The connection between government spending and the economic activity of the private sector will, first, depend on whether and to what extent investments in infrastructure, education, health, and social transfers are aimed at establishing an optimal business environment for the business sector.

Government plays a multifaceted role in fostering economic development and enhancing resource allocation. It can establish the necessary economic infrastructure to facilitate growth while ensuring social harmony and bolstering labour force productivity through transfer payments. Investments in healthcare and education further contribute to a dynamic and

productive labour force. Empirical research confirms the complexity of the analysis between government spending and economic growth, especially because of the impossibility of completely distinguishing government spending from current consumption and government investments. The empirical results show a significant negative impact of the increase in government spending on economic growth, while the rest come to a statistically insignificant causality of this relationship (Agell et al., 1999; Fölster and Henrekson, 2001). What is important to emphasise is that a small part of empirical research is focused on the impact of government spending on economic growth in developing countries. Some of the analyses in developing countries show that government spending positively impacts economic growth regardless of current or investment consumption (Adams et al., 1991). On the other hand, some of the empirical studies emphasise the negative connection of government spending with economic growth, as well as significant budget deficits and increased public debt as a direct result of the inefficiency of government spending.

In this paper, an attempt has been made by applying panel regression analysis with the methods of fixed and random effects to analyse the impact of government spending and corruption on the economic growth in the case of selected countries from Central and Eastern Europe for the period 2011- 2021 year. For our research, to analyse the impact of public spending and corruption on economic growth, we use data from Albania, Bosnia and Herzegovina, North Macedonia, Serbia, Bulgaria, Croatia, Romania, Slovenia, Estonia, Latvia, Lithuania, Czech Republic, Hungary, Poland, and Slovakia for the period 2011-2021.

This research analyses how government spending and corruption contribute to Central and Eastern European economic growth. A significant contribution is made by applying a methodology that has been applied in other analyses in this field, with which the obtained results can be compared to other empirical studies. The paper is structured in the following way: after the introduction, a brief review of the relevant empirical literature will be made, and in the other part, the appropriate methodology will be presented. Next, the results are discussed, and finally, the concluding findings are given.

## 2. EMPIRICAL LITERATURE REVIEW

Corruption is a pervasive issue that hinders economic development and can negatively affect a country's growth prospects. Various studies have shown that corruption can reduce investment in physical and human capital, political stability, and government spending, negatively affecting growth. However, some studies have indicated that controlling corruption and government effectiveness can positively impact average growth rates. Thus, it is essential to understand the complex relationship between corruption and economic growth to develop effective policies and measures to tackle this issue.

Corruption significantly negatively impacts economic growth, as shown by various studies. Ahmad et al. (2012) found that decreased corruption had an inverted U-shaped effect on economic growth that remained robust across alternative econometric specifications. Corruption reduces investment in physical and human capital, political stability, and government spending, negatively affecting growth. However, it could foster growth by increasing trade openness, but the net effect remains negative, as per Hodge et al. (2011).

Meanwhile, Evrensel (2010) research indicates that control of corruption and government effectiveness significantly negatively impact average growth rates. Bai et al. (2013) found that government corruption is more prevalent in poorer countries, but corruption could potentially subside as poor countries experience economic growth. Gründler and Potrafke (2019) analysed new data from 2012 to 2018 and showed that corruption negatively affects economic growth, especially in autocracies. Similarly, Swaleheen (2011) study utilising

advanced dynamic panel data techniques found that corruption has a notable influence on the growth rate of real per capita income, and this effect is non-linear.

Saha and Ben Ali (2017) study suggests that a reduction in corruption is possible through the interactive relationship between economic and political freedoms and the government size. However, the study also highlights the concerning trend that an increase in income correlates with an increase in corruption in natural-resource-rich countries. Finally, research by Shera et al. (2014) reveals that corruption deters investors, reduces productivity and public expenditures, distorts resource allocation, and ultimately lowers economic growth. In summary, corruption remains a significant obstacle to sustainable economic growth, and it is crucial to address it through effective policies and measures.

The studies conducted by Aidt et al. (2008), d'Agostino et al. (2012), and Del Monte and Papagni (2001) all suggest that corruption can have significant negative impacts on economic growth. Aidt et al. (2008) found that the political institutions quality determines the relationship between corruption and economic growth. They identified two governance regimes and concluded that corruption hinders growth significantly in the regime with high-quality institutions. At the same time, it does not impact growth in the regime with low-quality institutions. Del Monte and Papagni (2001) show how bureaucratic corruption can reduce the efficiency of public expenditure, leading to a significant negative impact on productivity and public investment that has long-term effects on economic growth. d'Agostino et al. (2012) explored the impact of corruption and government spending on economic growth and found strong negative impacts on economic growth.

Similarly, Goel and Nelson (1998) analysed state-level data from 1983 to 1987 to investigate the impact of government size on corruption among officials. They found that state government spending has a strong positive influence on corruption. Gupta and Abed (2002) also analysed various research studies and explored how corruption can hinder economic growth, exacerbate poverty, and negatively impact governance. They delved into factors contributing to corruption, such as civil service wages, natural resource availability, and the growth of small and medium-sized enterprises. They also examined the effects of corruption on a country's income distribution, government spending and the need for structural reforms to combat it.

Furthermore, Kotera et al. (2012) found that the relationship between government size and corruption is inconsistent. They analysed data from 82 countries between 1995 and 2008 and found that increasing government size can decrease corruption if the democracy level is high enough, and vice versa. Arvate et al. (2010) analysed data from developed and developing Latin American countries from 1996 to 2003 and discovered that larger government size caused corruption in both samples. Thus, the authors recommend reducing government involvement in private markets to promote good governance and combat corruption.

Finally, Dzhumashev (2014) shows that the interplay between corruption and governance affects public spending efficiency, affecting economic growth. Corruption benefits economic efficiency only when the government size exceeds optimal levels and decreases as economic development progresses. Targeting tax evaders is a more effective approach to reducing corruption and enhancing an economy's growth potential. Tanzi and Davoodi (2000) comprehensively analysed the various channels through which corruption impinges on economic growth and found that corruption can adversely affect enterprises, the allocation of talent, and investment and even have implications on certain aspects of public finance. Similarly, Tanzi and Davoodi (1997) found that corruption, particularly political or "grand" corruption, has a damaging impact on the decision-making process of public investment projects, leading to decreased productivity, reduced spending on operations and maintenance, lower quality public infrastructure, and decreased government revenues.

The studies cited in the text suggest that corruption significantly negatively impacts economic growth and that the quality of political institutions plays a crucial role in the relationship between corruption and growth. Corruption can reduce the efficiency of public expenditure and lead to a significant negative impact on productivity and public investment, which has long-term effects on economic growth. The impact of government size on corruption is inconsistent, and corruption negatively affects enterprises, talent allocation, investment, and certain aspects of public finance.

## 3. DATA AND METHODOLOGY OF EMPIRICAL RESEARCH

The empirical research of this paper is based on the extended Solow model with the public sector expressed in Cobb-Douglas production function form. The Cobb-Douglas production function is a fundamental model in economics that is widely used to analyse the relationship between inputs, such as capital and labour, and output, such as economic growth.

$$Y(it) = F[K(it), A(it)L(it)] = K(it)^{\alpha}(A(it)L(it))^{1-\alpha}, 0 < \alpha < 1 \quad (1)$$

where Y represents the output, A is the total factor productivity that measures technology and efficiency, K is the capital input, L is the labour input, and α is the output elasticity of capital that represents the share of output attributed to capital.

To incorporate the impact of government size and corruption into this framework, we modify the production as follows:

$$\begin{aligned} Y(it) &= F[K(it), G(it), C(it), A(it)L(it)] \\ &= K(it)^{\alpha}G(it)^{\beta}C(it)^{\gamma}(A(it)L(it))^{1-\alpha-\beta-\gamma}, (\alpha+\beta+\gamma) < 1 \end{aligned} \quad (2)$$

where G represents government spending as a share of GDP, β represents the elasticity of output related to government spending that indicates how government spending affects economic growth, C represents the level of corruption in the economy, and γ represents the elasticity of output related to corruption that indicates how corruption affects economic growth.

To conduct the empirical analysis, we estimate the values of α, β and γ using various panel data analysis techniques. This extended Solow model with the public sector expressed in the Cobb-Douglas production function form enables the analysis of both government spending (through β) and corruption (through γ) on economic growth while considering the traditional capital and labour factors.

This research analysed a sample of 15 countries in Central and Eastern Europe, specifically Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, North Macedonia, Serbia, Slovakia, and Slovenia, between 2011 and 2021. The production function used in this model incorporated the size of government and corruption and is in the Cobb-Douglass production function form (Baklouti and Boujelbene, 2016; Pulok, 2010).

The variable Y in the above specifications represents the real GDP per capita, a substitute for income per worker. We collected the data for real GDP per capita (in 2015 US$) from the World Bank's World Development Indicators database. This variable is often used to measure a country's economic growth in most empirical literature related to this paper. Gross fixed capital formation (as a percentage of GDP) is used to measure physical capital formation, represented by K in the above equations. We sourced this data from the same base as real GDP per capita. We used employment (in thousands) from the International Labour Organization database to measure the labour factor denoted by L.

We used two proxies to measure government spending: general government final consumption expenditure (% of GDP) from the World Development Indicators database and government effectiveness from the World Governance Indicators of the World Bank. General government final consumption expenditure (% of GDP) is an important indicator that measures the proportion of a country's gross domestic product (GDP) spent by the government on providing public goods and services. It includes government spending on education, healthcare, defence, and social welfare. The Government Effectiveness indicator is a measure the World Bank uses to assess a country's governance quality. It considers factors such as the effectiveness of public services, the quality of the civil service, and the level of corruption. A high score on this indicator indicates that the government can deliver services efficiently and transparently. In contrast, a low score suggests that there are significant challenges in the way the government operates.

We used the corruption perception index from Transparency International and the control of corruption from the World Governance Indicators of the World Bank to measure corruption levels. The *c*orruption *p*erception *i*nde*x* is a tool used by Transparency International to rank countries based on their perceived levels of corruption. It collects data from surveys and assessments to assign a score to each country, ranging from 0 (highly corrupt) to 100 (very clean). The C*orruption* PI helps to identify trends, track progress, and formulate targeted anti-corruption strategies. However, it's important to note that the C*orruption* PI is a perception-based assessment, not an exact measure of corruption. Despite many countries improving their scores, corruption remains a persistent global challenge that Transparency International advocates for greater transparency and accountability to combat. The control of corruption indicator is a vital tool for measuring corruption levels. It's a Worldwide Governance Indicators project component and relies on surveys to assess corruption's prevalence in the public sector. The indicator's scale ranges from -2.5 to +2.5, with higher scores indicating lower levels of corruption. Governments and policymakers can use the indicator to identify areas of weakness and implement effective anti-corruption measures. However, it's important to note that subjective perceptions may influence the indicator's accuracy.

Additionally, we used the institutional variable index of economic freedom from the Heritage Foundation. The index of economic freedom is an annual report created by the Heritage Foundation that assesses countries' economic freedom worldwide. This comprehensive index ranks countries on a scale of 0 to 100, with a higher score indicating greater economic freedom. It evaluates four key pillars of economic freedom: rule of law, government size, regulatory efficiency, and open markets. The index provides valuable insights into the impact of economic policies and reforms on a country's prosperity and overall well-being. It is essential for governments, policymakers, investors, and businesses to make informed decisions.

Using these variables, we created two models. The first model used the logarithm of real GDP per capita (Log GDP) as the dependent variable and the logarithm of gross fixed capital formation (Log GFCF), the logarithm of employment (Log Employment), the logarithm of general government final consumption expenditure (Log GFCF), corruption perception index (Corruption PI), and the index of economic freedom (IEF) as the independent variables. The second model used the logarithm of GDP per capita as the dependent variable and the logarithm of gross fixed capital formation, the logarithm of employment, government effectiveness (GE), control of corruption (CC), and the index of economic freedom as the independent variables. The equations can be written as follows.

$$Log(GDP_{it}) = \beta_0 + \beta_1 Log(GFCF)_{it} + \beta_2 Log(Employment)_{it} + \beta_3 Log(GFCE)_{it} + \beta_4 CorruptionPI_{it} + \beta_5 IEF_{it} + u_t \quad (3)$$

$$Log(GDP_{it}) = \beta_0 + \beta_1 Log(GFCF)_{it} + \beta_2 Log(Employment)_{it} + \beta_3 GE_{it} + \beta_4 CC_{it} + \beta_5 IEF_{it} + u_t \quad (4)$$

There are different ways to evaluate the above equations. Fixed effects and random effects models are popular techniques for panel data. The fixed effects model assumes that the unobserved factors that affect the dependent variable are constant over time. On the other hand, the random effects model assumes that the unobserved factors are random and uncorrelated with the independent variables. Both models have advantages and disadvantages, and the choice of model depends on the nature of the data and the research question being addressed.

In addition to panel data methods, we used other techniques, such as correlation analysis and descriptive statistics, to analyse the data. We conducted various tests to check the robustness of our results, such as the Hausman test, the Breusch-Pagan test, and the White test. We used a rigorous and comprehensive approach to analyse the data and test our hypotheses. Our findings are robust, informative, and can contribute to the existing literature on economic growth and development determinants.

## 4. RESULTS AND DISCUSSION

In this section, we present the results of our empirical analysis following the research methodology explained above. Firstly, we give descriptive statistics about our variables. We have 165 observations for all variables, so we are working with balanced data. Although we had missing data issues, we solved them using interpolation techniques and median values in some cases.

The mean GDP per capita is 12,040 US dollars, with the minimum being 3,678 US dollars in Albania in 2011 and the maximum being in Slovenia in 2021 with 24,745 US dollars. The mean gross fixed capital formation is 21.98% of GDP, with Serbia in 2014 having the minimum investments to GDP at 15.95 and Estonia in 2020 having the maximum investments to GDP at 31.18. The mean employment is 3.4 million employers, with Estonia in 2011 having the minimum number of workers at 603 thousand and Poland in 2021 having the maximum number of employers at 16.7 million.

In 2012, Albania had the highest percentage of GDP spent on general government final consumption expenditures with 10.85%, while in 2020, Croatia had the highest with 24.02%. The mean percentage for all countries is 18.12%. The government effectiveness score ranges from a minimum of -1.045 for Bosnia and Herzegovina in 2020 to a maximum of 1.383 for Estonia in 2021, with a mean score of 0.446. Regarding corruption, the mean corruption perception index is 48.97. The minimum index score of 30.5 was obtained by Albania in 2011, while the maximum score of 75 was achieved by Estonia in 2020. Furthermore, the mean control of corruption score is 0.18, with a minimum score of -0.78 for Albania in 2012 and a maximum score of 1.61 for Estonia in 2020. The average economic freedom index is 67.24. In 2012, Bosnia and Herzegovina had the lowest index of 57.3, while Estonia had the highest of 79.1 in 2017.

*Table 1: Descriptive statistics of the variables used in the empirical analysis*

| Variable | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|
| **GDP** | 12040.13 | 5607.643 | 3678.047 | 24744.84 | 165 |
| **GFCF** | 21.978 | 3.014 | 15.950 | 31.179 | 165 |
| **Employment** | 3354.314 | 4007.668 | 603.197 | 16656.14 | 165 |
| **GFCE** | 18.124 | 2.702 | 10.845 | 24.016 | 165 |
| **Corruption** | 48.965 | 10.189 | 30.5 | 75 | 165 |

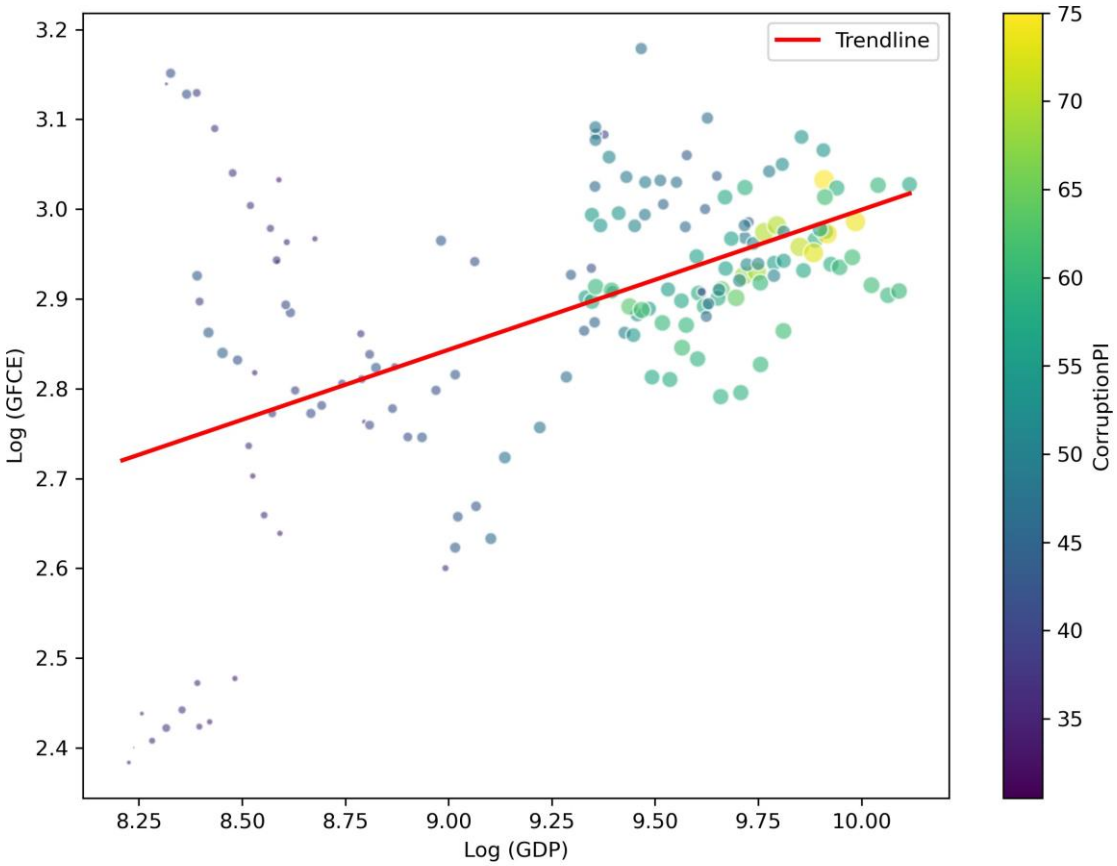
| | | | | | |
|---|---|---|---|---|---|
| **PI** | | | | | |
| **CC** | 0.179 | 0.536 | -0.779 | 1.610 | 165 |
| **GE** | 0.446 | 0.540 | -1.045 | 1.383 | 165 |
| **PS** | 0.460 | 0.444 | -0.820 | 1.120 | 165 |
| **IEF** | 67.242 | 5.075 | 57.3 | 79.1 | 165 |

*Source: Authors' calculations.*

Following that, we will showcase two bubble charts. The first one will depict the correlation between the logarithm of GDP per capita, the logarithm of general government final consumption expenditure, and the corruption perception index. The second chart will showcase the correlation between the logarithm of GDP, government effectiveness, and control of corruption. These bubble charts will help us more intuitively visualise the relationship and interplay between the mentioned variables. By analysing these charts, we can better understand the impact of corruption, government spending, and GDP on each other. These charts will be important to our data analysis and help us make more informed decisions.

It's interesting to see the correlation between government spending, GDP per capita, and corruption perception index in the first bubble chart. The data suggests that countries with higher government expenditures as a percentage of GDP tend to have higher GDP per capita. Additionally, there appears to be a positive correlation between higher corruption perception index and higher GDP per capita. These insights can provide a valuable starting point for further research and analysis.

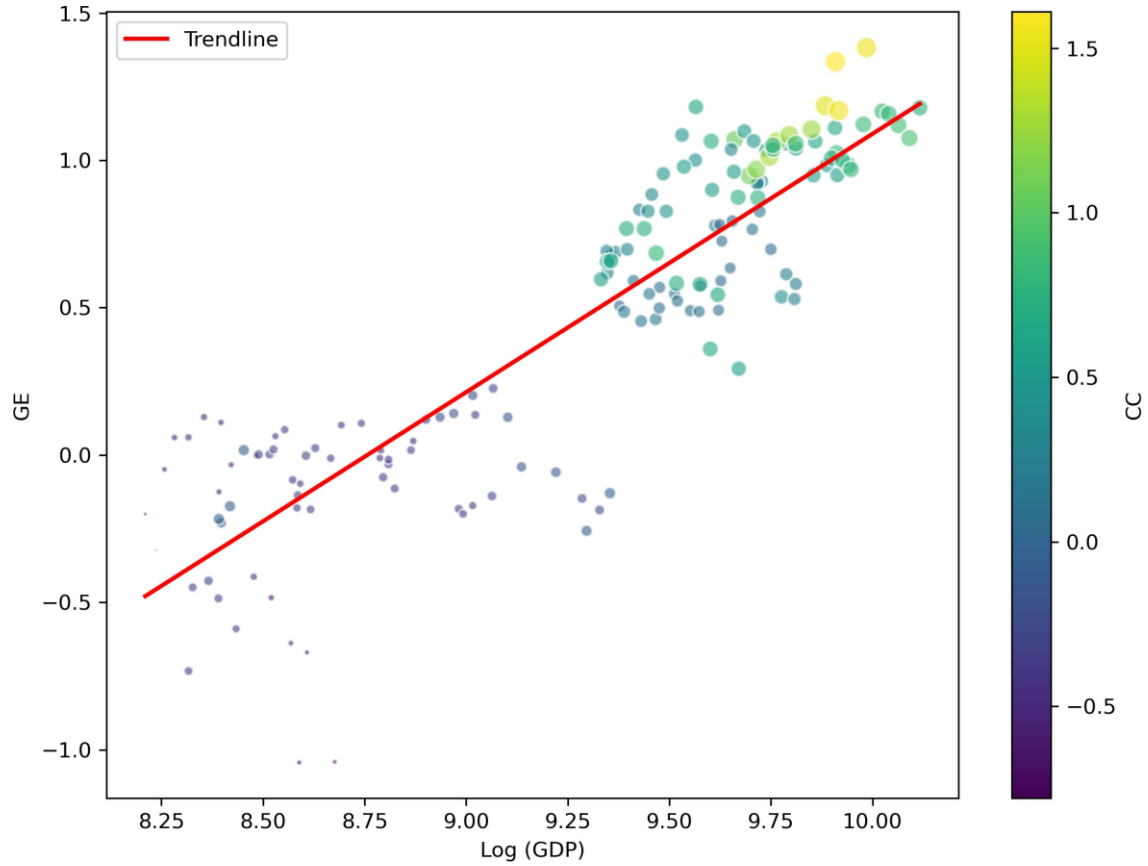
*Figure 1: Bubble chart between GDP, GFCE and Corruption PI*




*Source: Authors' calculations.*

In the second chart, we can observe that countries with higher scores in government effectiveness and control of corruption tend to have higher GDP per capita. This suggests that a strong and effective government, coupled with a low level of corruption, can positively impact a country's economic growth and prosperity. Conversely, countries with weak governments and high levels of corruption tend to have lower GDP per capita and struggle with economic development. Good governance is crucial to a country's overall well-being and success. These bubble charts provide a great visual representation of the correlation between various economic and governance indicators. By analysing the charts, we can gain valuable insights into the interplay between these variables and how they impact each other. Good governance, low corruption, and effective government are all crucial to a country's economic success, and these charts emphasise the importance of focusing on these factors.

*Figure 2: Bubble chart between GDP, GE, and CC*




(Source: Authors' calculations)

We can draw the same conclusion from the correlation matrix. The GDP has positive and statistically significant correlation coefficients with general government final expenditure (0.457), government effectiveness (0.880), corruption perception index (0.821), and control of corruption (0.858).

*Table 2: Correlation matrix for the variables used in the empirical analysis*

| Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| **(1) GDP** | 1.000 | | | | | | | | |
| **(2) GFCF** | 0.052 | 1.000 | | | | | | | |
| **(3) Employment** | 0.055 | -0.135 | 1.000 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **(4) GFCE** | 0.457* | -0.141 | -0.045 | 1.000 | | | | | |
| **(5) CorruptionPI** | 0.821* | 0.037 | 0.154* | 0.361* | 1.000 | | | | |
| **(6) Control of corruption** | 0.858* | 0.080 | 0.113 | 0.414* | 0.962* | 1.000 | | | |
| **(7) Government Effectiveness** | 0.880* | 0.064 | -0.007 | 0.275* | 0.833* | 0.866* | 1.000 | | |
| **(8) Political Stability** | 0.806* | -0.018 | 0.196* | 0.248* | 0.651* | 0.678* | 0.837* | 1.000 | |
| **(9) IEF** | 0.452* | 0.392* | 0.032 | -0.099 | 0.586* | 0.585* | 0.553* | 0.399* | 1.000 |

*, denotes significance level at 5%; Source: Authors' calculations.

These findings suggest that a strong and effective government promotes economic growth and development. Moreover, the results imply that reducing corruption and improving governance can enhance the overall economic performance of a country. However, it is important to note that correlation does not necessarily imply causation and further research is needed to establish a causal link between governance and economic growth. Nonetheless, the correlation coefficients provide a useful starting point for investigating the relationship between these two variables.

As we are dealing with panel data, it is necessary to test the integrative characteristics of the series before providing regression analysis. This helps to determine whether the series is stationary or not. In this case, the variables of GDP per capita (GDP), gross fixed capital formation as a share of GDP (GFCF), employment (Employment), and general government final consumption expenditure as a share of GDP (GFCE) are all represented as logarithm transformed values. However, the control of corruption (CC), government effectiveness (GE), political stability (PS), and the index of economic freedom (IEF) are in their original values. The results from Table 3 show that all the variables are stationary at the level, and we can continue further.

*Table 3: Integrative characteristics of the variables used in the empirical analysis using the Levin-Lin-Chu unit-root test*

| Variable | Statistic | p-value |
|---|---|---|
| **Log (GDP)** | -4.786 | 0.000 |
| **Log (GFCF)** | -4.654 | 0.000 |
| **Log (Employment)** | -4.678 | 0.000 |
| **Log (GFCE)** | -1.494 | 0.068 |
| **CorruptionPI** | -1.999 | 0.023 |
| **CC** | -4.713 | 0.000 |
| **GE** | -1.496 | 0.067 |
| **PS** | -4.040 | 0.00 |
| **IEF** | -2.397 | 0.008 |

Source: Authors' calculations.

These are the results of two regression analyses and diagnostic tests, including the Hausman test. The general government final expenditure logarithm coefficient is positive and statistically significant at 0.01 in both fixed effects regression (0.310) and random effects regression (0.260). This means that if the expenditures as a share of GDP increase by 1%, economic growth will be boosted by approximately 0.3%, assuming all other factors remain

unchanged. The coefficient before the corruption perception index is also positive and statistically significant at 0.01 for fixed effects regression (0.004) and random effects regression (0.005). Although the effect is small, it is still positive and statistically significant. Additionally, the index of economic freedom has a positive and statistically significant impact on economic growth.

The R-squared values for the fixed and random effects regressions illustrate how much of the variation is accounted for by the models. The fixed effects model accounts for 0.629 of the variation, while the random effects model accounts for 0.595. To check for heteroscedasticity, both the Breusch and Pagan Lagrangian multiplier test and the Breusch-Pagan test were utilised. The results of both tests showed statistically significant outcomes, indicating the presence of homoscedasticity. Additionally, the Modified Wald test and Pesaran's test suggested the presence of homoscedasticity. The Hausman test was then conducted to choose between fixed and random effects. It indicated that the fixed effects model is preferred over the random effects model, with a statistic of 23.56 and a p-value of 0.000, less than 0.01.

*Table 4: Results of fixed effects regression and random effects GLS regression for the first model*

| | Fixed effects regression | | | Random effects regression | | |
|---|---|---|---|---|---|---|
| **Log (GDP)** | Coef. | St. Err. | p-value | Coef. | St. Err. | p-value |
| **Log (GFCF)** | 0.074 | 0.071 | 0.302 | 0.124 | 0.079 | 0.115 |
| **Log (Employment)** | 0.695*** | 0.093 | 0.000 | 0.363*** | 0.069 | 0.000 |
| **Log (GFCE)** | 0.310*** | 0.092 | 0.001 | 0.260*** | 0.099 | 0.004 |
| **Corruption PI** | 0.004*** | 0.002 | 0.010 | 0.005*** | 0.002 | 0.004 |
| **IEF** | 0.021*** | 0.003 | 0.000 | 0.026*** | 0.003 | 0.000 |
| **Const.** | 1.202 | 0.757 | 0.115 | 3.350*** | 0.645 | 0.000 |
| **$R^2$** | 0.629 | | | 0.595 | | |
| **Number of obs.** | 165 | | | 165 | | |
| **Number of groups** | 15 | | | 15 | | |
| **F(5,145) / Wald chi2 (10)** | 49.06*** | | | 191.68*** | | |
| **Prob > F / chi2** | 0.000 | | | 0.000 | | |

| | Fixed effects regression | | Random effects regression | |
|---|---|---|---|---|
| | Statistic | p-value | Statistic | p-value |
| **Breusch and Pagan Lagrangian multiplier test** | | | 436.33*** | 0.000 |
| **Breusch-Pagan test** | 355.680*** | 0.000 | 399.587*** | 0.000 |
| **Modified** | 157.07*** | 0.000 | | |

| | | | | |
|---|---|---|---|---|
| **Wald test** | | | | |
| **Pesaran's test** | 13.530*** | 0.000 | 15.385*** | 0.000 |

| | Statistic | p-value |
|---|---|---|
| **Hausman test** | 23.56*** | 0.000 |

*, **, *** denotes significance levels at 10%, 5% and 1%, respectively; Source: Authors' calculations.

In Table 5, we can see the results of the second regression model that considers the control of corruption, government effectiveness, political stability, and the index of economic freedom. According to the fixed effect regression and random effects regression, the coefficient before the control of corruption is positive and statistically significant at 0.01 (0.189 and 0.224, respectively). This means that a 1 unit increase in control of corruption can lead to an approximate economic growth of 0.19% and 0.22%, respectively, with all other variables remaining unchanged. The coefficient before government effectiveness is negative in the fixed effects regression (-0.050) and positive (0.003) in the random effects regression. However, both are statistically insignificant. The coefficient between the index of economic freedom is like the previous model, being positive and statistically significant in both regressions.

The R-squared values for the fixed and random effects regressions are 0.618 and 0.542, respectively. To check for heteroscedasticity, both the Breusch and Pagan Lagrangian multiplier test and the Breusch-Pagan test were utilised. The results of both tests showed statistically significant outcomes, indicating the presence of homoscedasticity. Additionally, the Modified Wald test and Pesaran's test suggested the presence of homoscedasticity. The Hausman test was then conducted to choose between fixed and random effects. It indicated that the fixed effects model is preferred over the random effects model, with a statistic of 34.09 and a p-value of 0.000, less than 0.01 (1%).

*Table 5: Results of fixed effects regression and random effects GLS regression for full sample for the second model*

| | Fixed effects regression | | | Random effects regression | | |
|---|---|---|---|---|---|---|
| **Log (GDP)** | Coef. | St. Err. | p-value | Coef. | St. Err. | p-value |
| **Log (GFCF)** | 0.066 | 0.072 | 0.357 | 0.122 | 0.086 | 0.155 |
| **Log (Employment)** | 0.663*** | 0.094 | 0.000 | 0.250*** | 0.057 | 0.000 |
| **CC** | 0.189*** | 0.048 | 0.000 | 0.224*** | 0.056 | 0.000 |
| **GE** | -0.050 | 0.046 | 0.279 | 0.003 | 0.054 | 0.952 |
| **PS** | 0.032 | 0.034 | 0.346 | 0.065 | 0.040 | 0.106 |
| **IEF** | 0.023*** | 0.003 | 0.000 | 0.028*** | 0.003 | 0.000 |
| **Const.** | 2.458*** | 0.654 | 0.000 | 5.045*** | 0.498 | 0.000 |
| **$R^2$** | 0.618 | | | 0.542 | | |
| **Number of obs.** | 165 | | | 165 | | |
| **Number of groups** | 15 | | | 15 | | |
| **F(5,145) / Wald chi2** | 38.80*** | | | 170.61*** | | |

| | | |
|---|---|---|
| **(10)** | | |
| **Prob > F / chi2** | 0.000 | 0.000 |

| | Fixed effects regression | | Random effects regression | |
|---|---|---|---|---|
| | Statistic | p-value | Statistic | p-value |
| **Breusch and Pagan Lagrangian multiplier test** | | | 230.99*** | 0.000 |
| **Breusch-Pagan test** | 347.061*** | 0.000 | 360.185*** | 0.000 |
| **Modified Wald test** | 360.16*** | 0.000 | | |
| **Pesaran's test** | 13.231*** | 0.000 | 15.253*** | 0.000 |

| | Statistic | p-value |
|---|---|---|
| **Hausman test** | 34.09*** | 0.000 |

*, **, *** denotes significance levels at 10%, 5% and 1%, respectively; Source: Authors' calculations.

## 5. CONCLUSION

The high level of corruption and low efficiency in spending public funds is one of the specifics that characterise Central and Eastern European countries. The high level of corruption, followed by low efficiency in state spending, negatively impacts national economies' capacity to establish and maintain stable economic development. Corruption contributes to suboptimal and inefficient allocation of available resources, especially those of the central government, thus reducing government spending efficiency. Hence, the main reason for analysing the effect of corruption and inefficiency in public spending in Central and Eastern European countries is their potential negative impact on the economic growth of Central and Eastern European countries. That is, to determine whether the high level of corruption, followed by the low level of efficiency of government spending, are part of the obstacles to generating below-average levels of economic growth in Central and Eastern European countries.

A comprehensive examination of the level of economic development among Central and Eastern European countries, as assessed by GDP per capita, reveals significant disparities. Significant heterogeneity persists despite an overall mean GDP per capita of 12,040 US dollars across these countries. Specifically, in certain countries, GDP per capita stands as low as 3,678 US dollars, while in the most developed countries, it reaches 24,745 US dollars.

The present study employs correlation analysis to examine the relationship between several economic and non-economic factors that affect the variation in economic growth in Central and Eastern European countries. The results show a statistically significant and positive relationship between GDPs per capita and government spending and corruption perception and control of corruption. This finding underscores the pivotal function of these determinants in promoting sustainable economic growth in these countries.

The results of the coefficients from the two independent regression models point to the conclusion that the level of employment, government final consumption expenditures, corruption perception index, and gross fixed capital formation have a statistically significant and positive impact on economic growth in Central and Eastern European countries. The regression models were created using the fixed and random effects methods. The value of the coefficient for the corruption perception index is positive and statistically significant, which points to the inverse relationship between the level of corruption and economies' ability to generate sustainable economic growth rates. The results show that the increase in the value of the corruption perception index contributes to the additional growth of GDP per capita, which points to the fact that the reduction of corruption contributes to the increase of GDP per capita in the Central and Eastern European countries.

The results indicate that corruption is more prevalent in poor and middle-income countries and persists for longer. The high level of corruption in these countries contributes to the distortion of market signals and leads to inefficient and suboptimal allocation of resources, especially public finances. Corrupt practices adversely affect public consumption, resulting in suboptimal economic growth rates that have lasting effects on economies' capacity to generate sustainable economic growth rates and close the development gap with other highly developed European countries.

The contribution of this research lies in its inclusion of government spending in the analysis, specifically examining the impact of public spending on economic growth, notably within Central and Eastern European countries. This study adds value to the empirical literature, particularly by applying a methodology previously utilised in similar analyses, allowing for objective comparisons with other empirical research.

Government expenditure is one of the most important factors in achieving advanced economic growth and managing state affairs. An analysis of Central and Eastern European countries reveals the relationship between government spending, corruption, and economic growth. The results of this study support the theory that high perceived levels of corruption, gross fixed capital formation, and government spending are significant factors in determining economic development.

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