ARRESTED DEVELOPMENT: CORRUPTION AND REGIONAL DEVELOPMENT IN BULGARIA

By

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ABSTRACT

This research uses disaggregated data of perceived corruption and regional data of macroeconomic performance in order to investigate the relationship between levels of perceived corruption and regional development on the NUTS 3 level in Bulgaria for the years 2004, 2007, and 2010. I use data collected through a nation-wide survey to create a proxy variable of corruption and estimate regional development through Gross Domestic Product per capita for the selected years. Through a multiple linear regression, I first establish that corruption is a function of the region of residence before moving onto the main question of whether perceived levels of corruption are a determinant of GDP. A simple linear regression shows no significant association between the two in 2004 and 2007. However, the results reveal that in 2010 regional GDP is in fact positively correlated to the perceived levels of corruption. In order to explain this shift, I look into NUTS level 3 data of amount of EU funds absorbed for the 2007-2009 period and find a meaningful relationship between the amount of assimilated funds and the perceived levels of corruption. I also establish that there is a positive association between the quantity of absorbed funds and the levels of GDP in 2010. Thus, I conclude that the positive relationship between corruption and GDP in 2010 can be explained through the absorption of EU funds during the 2007-2009 period. I then derive several policy recommendations.

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CHAPTER 1: INTRODUCTION

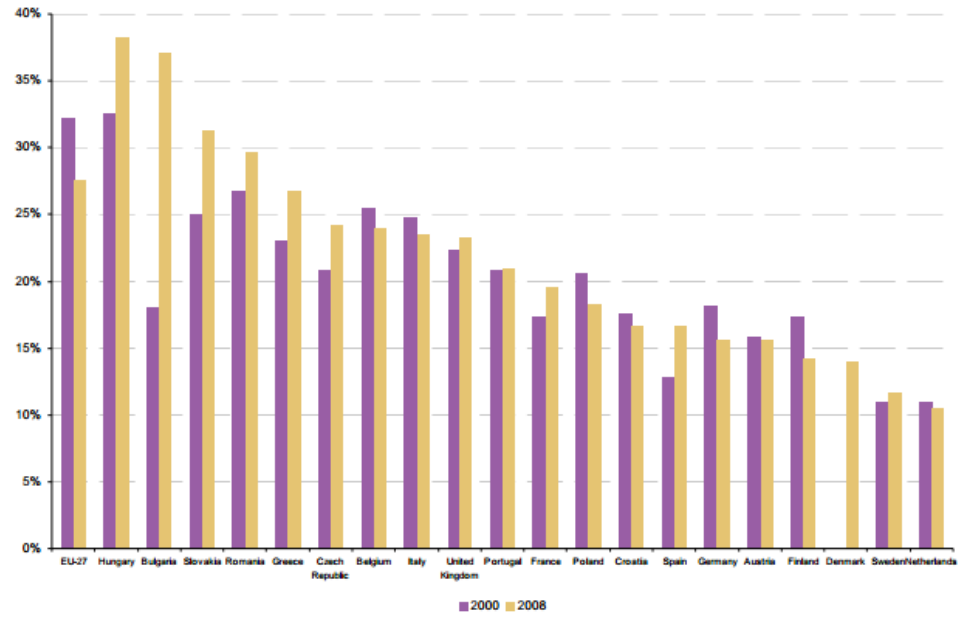
In early May 2013, Peter Popham wrote for *The Independent* that "Bulgarian corruption is a cancer in the EU's body politics that will only grow more serious". However, the cancerous corruption is killing not only the EU's body, but also that of Bulgaria. As of 2012, Transparency International[1] ranks Bulgaria 75th out of 176 countries included in the annual Corruption Perception Index, scoring worse than all other EU Member States and worse than some of its non-EU neighbours, such as FYR Macedonia and Bosnia and Herzegovina ("Corruption Perception Index 2012"). In comparison, upon EU accession in 2007, Bulgaria ranked 64th before Romania, FYR Macedonia, and Bosnia and Herzegovina ("Corruption Perception Index 2007"), and in 2001 – 47th before current EU Member States Romania and Latvia ("Corruption Perception Index 2001"). Thus, not only is Bulgaria the most corrupt EU Member State in 2012, but it has been exhibiting a persistent downward trend.

Similarly, regional disparity in Bulgaria has been increasing since the early 2000s despite EU accession in 2007 and consequent efforts to decrease regional inequality (Krueger, 2011). As Figure 1 below illustrates, inequality of regional dispersion of Gross Domestic Product (GDP)[2] in Bulgaria was the second highest in the EU in 2008, but more importantly, is the one that marked the highest growth for the said period. The increasing economic gap between regions creates a vicious circle, as it is accompanied by a negative population change, low life expectancy, a high

[1] Transparency International is the leading international civil society organization dealing with the issue of corruption worldwide. They have been publishing the annual Corruption Perception Index (CPI) report since 1995.
[2] The dispersion of regional GDP (at NUTS level 2 and 3) is measured by the sum of the absolute differences between regional and national GDP per inhabitant, weighted with the share of population and expressed in per cent of the national GDP per inhabitant. The indicator is calculated from regional GDP figures based on the European System of Accounts (ESA95) ("Eurostat Metadata")

old age dependency ratio, and low levels of participation in the education system that in turn further hinder economic development ("Eurostat Regional Yearbook 2012").

Figure 1: Dispersion of Regional GDP 2000 -2008



Source: Eurostat (online data code: nama_r_e0digdp)

Acknowledging the significance of these problems, the EU has set corresponding priorities in the Europe 2020[3] strategy aimed at achieving economic and social cohesion across regions. Under the core regional objectives – convergence, competitiveness, and cooperation - EUR 347 410 million has been allocated to projects nourishing job creation, competitiveness, economic growth, and sustainable development ("Eurostat Regional Yearbook 2012"). However, despite the availability of those funds, the dispersion of regional GDP by NUTS 3 regions has been exhibiting an increasing trend even in 2008 and 2009. In 2007 it was 36,1% , in 2008 - 37,1% and in 2009[4] – 39,6%; in comparison, the corresponding values in the same years for the antipode of

[3] Europe 2020 is the 10-year-strategy developed by the European Union for the purpose of achieving "smart, sustainable, and inclusive growth". It is the successor of the Lisbon Strategy.
[4] No data is available after 2009

Bulgaria in this criterion, the Netherlands, are: 10,6%, 10,9%, 10,6% ("Dispersion of regional GDP by NUTS 3 regions (%)").

Evidently, the problem of regional inequality in Bulgaria has not been tackled successfully through the EU funds. One possible explanation is that there is a time lag between funding a project and benefiting from its implementation. However, there are also country and even region-specific factors that cannot be taken into account when tailoring regional policies on a supranational level. Thus, domestic factors might represent an inherent weakness in the EU's strategy that does not allow for achieving regional cohesion. This research hypothesizes that corruption is one such factor in the case of Bulgaria.

Academic research has shown that corruption can indeed have a detrimental effect on economic development. On a national level it can hinder growth, cause political turmoil, discourage investment, or decrease the overall quality of human capital through diminishing the quality of education. Pak Hung Mo (2001) focuses on human capital and political instability as the main channels of corruption to reducing growth and concludes that a 1% increase in corruption leads to a 0.72% decrease of growth (Mo, 2001, p.76). Mo bases this study on Paolo Mauro's work *Corruption and Growth* (1995), which is among the first to empirically show a causal relationship between corruption and growth. In comparison to Mo, Mauro choses investment as the main channel and finds statistically and economically significant results that corruption slows down economic development ("Corruption and Growth", 1995). In his subsequent research, Mauro also investigates and finds evidence for the adverse effect of corruption on government spending on education, resulting in reduced human capital and economic growth. A number of other researchers such as Lambsdorf (1999), Tanzi and Davoodi (2000), and Shao, Ivanov, Podobnik and Stanley (2007) reinforce Mauro's findings.

Despite those findings, there is no finite consensus on the causal relationship between corruption and economic development. Some economists such as Leff (1964) and Huntington (1968) argue that corruption can in fact increase the efficiency of bureaucrats as well as allow for an informal selection of the most cost efficient company. However, those studies are not based on conclusive cross-country data analysis and thus are incomparable with the empirical research of Mauro and the likes.

Overall, little has been done by the academic community to evaluate the impact of corruption on the economic growth of the regional units. Considering that a negative association between corruption and economic growth has already been established on the national level, it is worth investigating whether it exists on the subnational level, thus accounting for the downward trend in regional cohesion in Bulgaria. Consequently, the purpose of this thesis is to look into the relation between corruption and regional development on the NUTS 3[5] level in Bulgaria for the years 2004, 2007, and 2010. Being the smallest regional unit according to EU classification, NUTS level 3 research will render the most accurate and meaningful results that can capture the difference in performance accounting for the slower economic growth of the subunits. The sample years were chosen specifically in order to observe whether the effect of corruption in Bulgaria is consistent over time or EU accession in 2007 had an either positive or negative impact on it. Thus, the two central questions of this paper are: is corruption a function of the regional structure in Bulgaria and if yes, how is it related to regional development? The answer to the second question will establish whether the hypothesis of this research is correct and economic performance on the subnational level is as susceptible to corruption as it is on the national level.

[5] NUTS level 3: smallest level of Nomenclature of Territorial Units for Statistics defined by population between 150 000 and 800 000 persons

To obtain this answer, I use disaggregated corruption data collected through a survey conducted by a statistical agency for 2004, 2007, and 2010. Based on it I create two datasets – on the individual and the regional levels, and calculate a composite corruption index for each of the respondents and each of the NUTS level 3 regions in Bulgaria. The particular contribution of this research comes precisely from using individual rather than aggregated levels of perceived corruption. This approach allows for observing the impact of the phenomenon across regions rather than across countries, which provides a novel view on the issue and its policy implications.

From the individual data set, I estimate the dependence of the perceived levels of corruption on a number of personal characteristics including region of residence, and derive that the region of residence is indeed a determinant of corruption. The test of joint significance for the regional variables confirms the initial hypothesis that perceived corruption is a function of the regional structure in Bulgaria. This finding is important, as it establishes that corruption is not national phenomenon and aggregate values do not adequately reflect the reality across regions.

I then move on to the subnational data set and run a simple linear regression of regional GDP on the corresponding values for perceived corruption. The data reveals no association in 2004 and 2007, but it does for 2010. In order to explain this change in the performance of the model, I look into the distribution of EU funds across the regions in Bulgaria for the 2007 - 2009 period. The data shows that the funds were assimilated in the regions with higher levels of perceived corruption. The absorption of more EU funds is also associated with higher GDP in 2010. Interestingly, the data reveals that the funds were assimilated in regions that already had comparatively higher GDP in 2007. Instead of being allocated to the poorest regions, the funds went to the richer ones, as a result of corrupt practices. Those investments then lead to higher GDP per capita in 2010. Thus, I conclude that the positive relationship between corruption and

regional development in 2010 is due to the maladministration of EU funds in the first three years following Bulgarian EU accession in 2007. This conclusion has important policy implications as it reveals that the EU funds in Bulgaria are not being utilised for achieving social and economic cohesion across regions, on the contrary – they are partially responsible for the increase of regional disparity by benefitting the regions that are already better-off.

This paper is structured as follows: Chapter 2 presents the relevant literature on the relationship between corruption and economic growth on the national level and identifies the main channels of transmitting this effect. Chapter 3 describes the survey and regional data, explains how the relevant indicators were selected, and clarifies the importance of the two datasets. Chapter 4 answers the first question of this research and shows the dependence between perceived levels of corruption and region of residence on the individual level. In Chapter 5, I establish the empirical relationship between corruption and regional GDP and provide evidence that the absorption of EU funds constitutes a channel for transmission of this effect. Chapter 6 presents suggestions for policy alterations that can limit the corrupt practices in the assimilation of EU funds and allow for their equal and fair distribution.

CHAPTER 2: LITERATURE REVIEW

For the purpose of this research, corruption is defined as the abuse of entrusted power for private gain ("What is the corruption perception index", 2012). There are two main reasons for giving this definition. Firstly, this is the definition given in the survey with which the data on corruption was collected, and secondly, it is the most commonly used one in both theoretical and practical research. In practice, Transparency International uses this definition in composing the Corruption Perception Index which is the data source for the majority of the cross-country analyses in the field, and in the theoretical discourse many economists such as Svensson (2005), Podobnik et al. (2008), and Vishny and Shleifer (1993) rely on this definition in their approach of the issue. Thus, the given definition is unambiguous and widely accepted, ensuring that the findings of this research will be comprehendible and replicable.

Despite the overall consensus on the definition, a number of contradictory studies have explored the relationship between corruption and economic growth through different channels and reaching different conclusions. Some economists, such as Svensson (2005), do not find any significant relationship between corruption and growth, while others like Mauro (1995) discover evidence that corruption in fact hinders economic development. Finally, there are also proponents of corruption as a determinant of growth with Leff (1964) being the most prominent example. This chapter will summarize the main arguments and findings on both sides that might be relevant in interpreting the relationship between corruption and regional development in Bulgaria.

In 1964, Leff created one of the first theories positively linking corruption and economic growth (Leff, 2009). He identifies several channels through which corruption increases bureaucratic

efficiency. Governments, Leff maintains, are likely to be indifferent to the needs of the business or be occupied by other priorities, thus not holding a favourable view of entrepreneurs (2009, p.312). In such cases, a bribe improves the bargaining position of entrepreneurs and speeds up the bureaucratic processes creating the so-called 'speed money'. Leff further argues that corruption can be a way of securing investment and innovation, and of productive competition between firms, selecting the most cost-efficient one that is able to afford the highest bribe (2009, p.314). It can also be a means of safeguarding the private sector from bad policies implemented by the government and limit the costs of poor decisions. Overall, Leff maintains that corruption is a tool of increasing government efficiency and creating a communication channel between the private and public sectors.

Turning to the more intuitive hypothesis that corruption slows down the economic development of a country, Rose-Ackerman maintains that a corrupt bureaucracy can lead to a number of negative outcomes (Rose-Ackerman, 1997). In response to Leff[6], she argues that corruption creates inefficient government contracting and privatization as the most efficient bidder is not necessarily the one willing to pay the highest bribe for either of two main reasons: 1) lack of desire to participate in criminal and unethical activities or 2) the lack of necessary connections (Rose-Ackerman, 1997, p.42). Moreover, such practices can lead to an inefficient distribution of subsidies, monopolistic benefits and other payoffs that hurt the general public. Instead of speeding up the bureaucratic process as Leff suggests, Rose-Ackerman argues that corruption in fact creates further delays and red tape, along with unproductive use of corrupt payments, inequalities, and damaged political legitimacy. For these reasons, she concludes that countries

[6] Rose-Ackerman does not directly quote or refer to Leff, however, her argument is in essence an answer to Leff's fundamental ideas.

with a high level of corruption suppress economic growth, one of the channels being creating unbearably high costs for entrepreneurs and small businesses.

Shleifer and Vishny develop a similar argument. They claim that there are two main channels through which corruption hinders economic development: the weakness of the central government and the secrecy of corruption (Shleifer and Vishny, 1993, p.20). The latter suggests that a government may prioritize investments in unnecessary projects if they provide greater secrecy and opportunities for corrupt behaviour. They also claim that private investment is discouraged by a weak central government, as a potential investor will be asked to pay bribes to multiple independent governmental agencies, increasing the costs for investment and eventually rendering it unbeneficial (1993, p.21). Their finding is supported by Tanzi and Davoodi (2000) in their report for the International Monetary Fund *Corruption, Growth, and Public Finances,* which finds a significant negative relationship between corruption and small and medium enterprises' performance. This is among the strong, consistent arguments in the corruption literature that remains undisputed by empirical analysis.

Mauro follows up on Shleifer and Vishny's argument and conducts an extensive cross-country study of about seventy countries, which is widely accepted as the first thorough empirical research on the topic. He found a statistically and economically significant negative association between the corruption index and the rates of investment and growth, which are robust to controlling for endogeneity ("Corruption and Growth", 1995, p.709). Thus, Mauro concludes that a corrupt bureaucracy compromises growth and investment ("Corruption and Growth", 1995, p.705). He later conducts another study supporting the theory of secrecy of corruption proposed by Shleifer and Visny. In *The Effect of corruption on Growth, Investment, and Government Expenditure: A Cross-Country Analysis,* Mauro (1997) finds significant empirical evidence that

more corrupt governments spend less on education and health and more on unnecessary investments. His works are a common reference point for many of the researchers interested in the topic.

A number of other economists reinforce the empirical findings of Mauro. Mo (2001) takes on the argument and conducts ordinary least square estimations. His results show that a 1% increase in corruption is associated with a 0.72% decrease in growth rate (Mo, 2001, p.66). However, Mo finds three channels of transmission of the effect of corruption on growth: human capital, private investment, and political instability, with the latter accounting for 53% of the total effect (Mo, 2001, p.66). Podobnik et al also contribute with empirical research and find a negative correlation between corruption and growth, estimating that in a general case a 1% increase in corruption is associated with a 1.7% decrease in growth rate, and for European countries the decrease is estimated at 2.4% (2008, p.544). While the exact numbers differ from study to study, they are consistent in the nature of the relationship between corruption and growth.

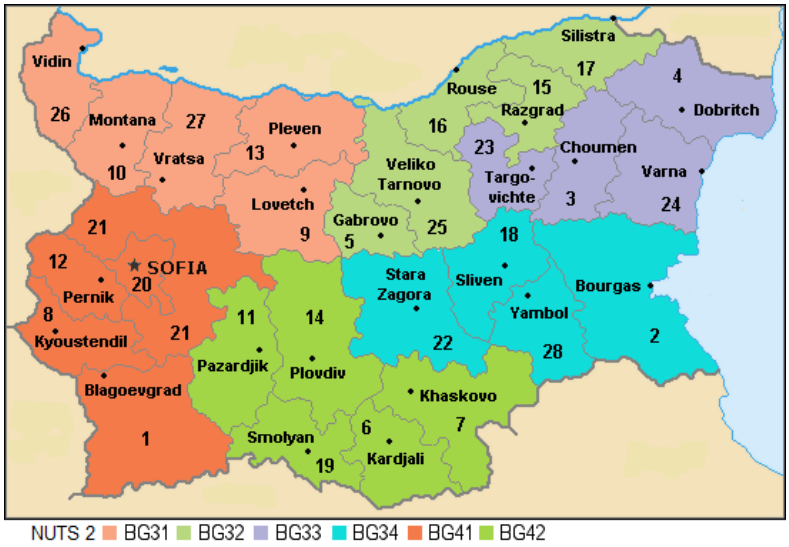
The main debate in the literature on corruption and economic growth centres around the question whether corruption increases or decreases bureaucratic efficiency and investment on a national level. While Leff maintains that there can in fact be a positive relation between the two, the majority of the empirical research conducted suggests otherwise. For the most part, reliable empirical evidence supports the intuitive hypothesis that corruption actually deters economic development. For the purpose of this research, it is not of crucial importance whether this is achieved through less government spending on education and health, reduced investment or political instability. Theoretical and empirical research already covers the most important debates on the effect of corruption on a national level. However, whether this effect transcends to the subnational level remains unresolved.

CHAPTER 3: DATA DESCRIPTION

3.1 Regional Development Data

The data used in this research is cross-section micro level data collected for the NUTS 3 regions, including indicators of macroeconomic performance as well as disaggregated corruption data. As Figure 2 below illustrates, there are twenty-eight such regions in Bulgaria. However, two regions – numbered 20 and 21 in Figure 2, are excluded from the data set. These are Sofia (capital) and Sofia region. The latter is excluded due to lack of available information on corruption perception for 2010. In order to keep the data sets the same size for the three years studied, it is also excluded from the 2004 and 2007 samples.

Figure 2: Regions Bulgaria NUTS level 3



Source: http://en.wikipedia.org/wiki/File:NUTS_BG_Level_1_and_2.png

Sofia, the capital city and a NUTS 3 region on its own, is omitted from the sample as a significant outlier in terms of its GDP per capita. As evident from Figure 3 below, Sofia's GDP[7] (equal to the maximum value for each of the years) varies from two times higher than the mean in 2004 to almost four times the mean in 2010. Considering that the perceived levels of corruption in Sofia fall within the normal distribution, keeping Sofia in the GDP sample will lead to recording the outcome of odd data in the final result. The disproportionally large GDP will cause either an

[7] Further evidence that Sofia (capital) should be omitted from the data set is given in Appendix I. It shows a graph of distribution of GDP per capita for each of the regions and each of the years.

overestimation or underestimation of the corruption coefficient in the second regression analysis. To avoid recording atypical data, the total number of regional observations is kept to twenty-six.

Figure 3: Descriptive statistics for GDP, NUTS 3 regions (2004, 2007, 2010)

	N	Minimum	Maximum	Mean	Std. Deviation
GDP in EUR per inhabitant 2004	28	1700,00	5100,00	2203,5714	658,55180
GDP in EUR per inhabitant 2007	28	2100,00	9100,00	3082,1429	1316,85753
GDP in EUR per inhabitant 2010	28	2300,00	11500,00	3503,5714	1722,93508
Valid N (listwise)	28				

Note: GDP refers to per capita in EUR; 28 NUTS level 3 regions including the capital region Sofia; Maximum value = Sofia.

For the purpose of this research, regional development is proxied by GDP per inhabitant expressed in euro. While this is not a perfect measure, it is among the most commonly used indicators of economic development employed by Eurostat[8] and the European Structural Cohesion Funds, whose eligibility criteria are expressed in term of GDP in Purchasing Power Standard (PPS) per inhabitant. In the case of this research, GDP will be used in numerical per capita terms rather than in PPS, as there is no regional estimation of purchasing power on the NUTS 3 level, and the index is the same across all regions in Bulgaria. Thus, whether calculated in real terms or purchasing power standard, GDP ratios between regions will be the same. It is an especially relevant measure for this type of research, as it is easily comparable across time and regions.

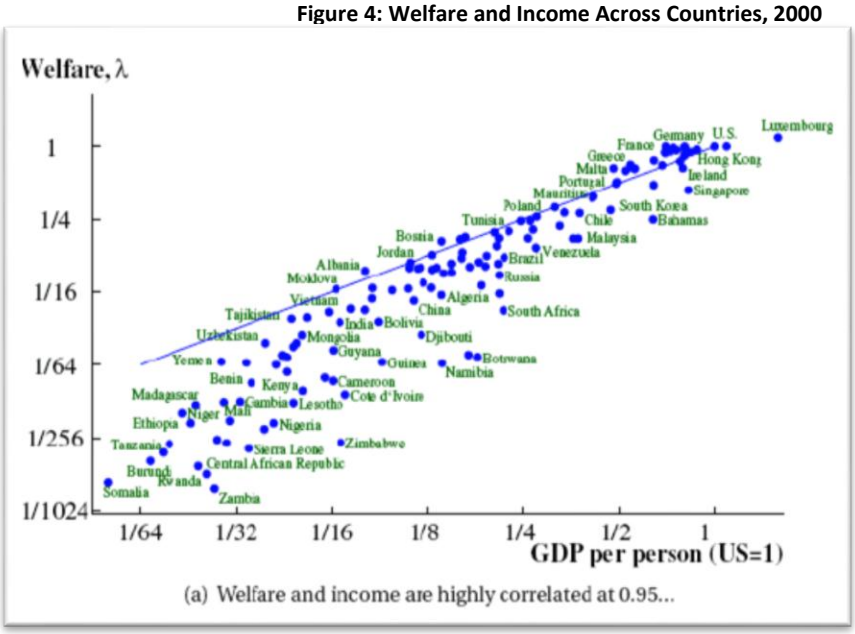
There are certain limitations to this indicator that need to be taken into account when measuring regional development through GDP. Firstly, GDP as such does not necessarily account for intra-

[8] Eurostat is the European Union's Directorate-General responsible for the collection and systematisation of statistical information

regional transfers, thus, the Gross Regional Product (GRP) may differ from the regional net income; this particular issue, however, would be significant if this research was interested in regional productivity or sustainability of regional development. As I am looking into the relationship between corruption and regional development in general, the difference between GDP and GRP is irrelevant.

Secondly, GDP does not reflect all societal, political, and environmental issues; for instance, it is not a measure of social equality or environmental sustainability. Theoretically, a region can have high GDP without societal welfare; however the contrary is highly unlikely; GDP is a precondition of societal welfare. Moreover, Jones and Klenow (2010) present in their article *Beyond GDP? Welfare Across Countries and Time* that there is a high correlation between the two. As Figure 3 below shows, the correlation between GDP per inhabitant and welfare is estimated at 0.95 (Jones and Klenow, 2010, p.19). Thus, despite its weaknesses, GDP is the most appropriate measure of regional development for its wide use and close correlation to the ideal measure.

Figure 4: Welfare and Income Across Countries, 2000



Source: "Beyond GDP? Welfare Across Countries and Time"

Another benefit of restricting the understanding of regional development is to avoid adding further complications with a comprehensive environmental or societal index that might make results harder to compare. Being a

first step in the analysis between corruption and growth on a regional level, this research sustains the basic and clear task of estimating the simple linear relationship between the two. Depending on the result, a more comprehensive index of regional development can be developed for future research.

All of the regional GDP per inhabitant data was assembled from Eurostat and is measured in Euro per inhabitant for the selected year. Additional regional data on the amount of EU funds absorbed was collected from the Unified Management Information System for the EU Structural Instruments[9]. The descriptive statistics of GDP per inhabitant for the twenty-six NUTS 3 regions included in the sample are given below:

Figure 5: Descriptive Statistics of GDP NUTS 3 level (2004, 2007, 2010)

	N	Minimum	Maximum	Mean	Std. Deviation
GDP in EUR per inhabitant 2004	26	1700,00	2900,00	2080,7692	337,06881
GDP in EUR per inhabitant 2007	26	2100,00	4500,00	2823,0769	577,79421
GDP in EUR per inhabitant 2010	26	2300,00	4900,00	3165,3846	709,89707
Valid N (listwise)	26				

Note: GDP refers to GDP per capita expressed in EUR for the NUTS 3 regions excluding Sofia (capital) and Sofia (region).

Evidently, the average level of GDP per inhabitant grew within the three years. Interestingly enough, from 2004 until 2010 the standard deviation more than doubled, the maximum statistics increased by 2000 EUR, whereas the minimum – by a mere 600 EUR, which confirms the initial underlying assumption that regional disparity has been increasing despite EU accession and the availability of the Structural funds.

[9] The Unified Management Information System for the EU Structural Instruments is a module under a project financed by the EU Regional Development Funds created to provide information on the financial implementation of funds paid and contracted under the EU operational programmes

3.1 Corruption Data:

As the occurrence of corruption cannot be measured in itself due to the secretive and criminal nature of the phenomena, this research relies on a proxy variable – perceived corruption. Even though it is the commonly accepted variable, some studies do use others, such as number of bribes reported or court cases related to corruption. However, as described in the literature, investors' behaviour is among the main channels of transmission of the effect of corruption on regional development. Thus for the purpose of this particular research, it makes more sense to use a variable which best reflects public expectations and perceptions, rather than the effectiveness of anti-corruption legislation.

The cross-sectional data on corruption for the years 2004, 2007, and 2010 is comprised through a national public poll conducted by *Vitosha Research*, an independent statistical agency[10] using the same questions throughout the three years. Moreover, the composition of respondents remains consistent in terms of gender and level of education[11]. The only visible variation is in the self-evaluation of personal income and employment status.

Figure 6 Self-evaluation of personal income, survey results (2004, 2007, 2010)

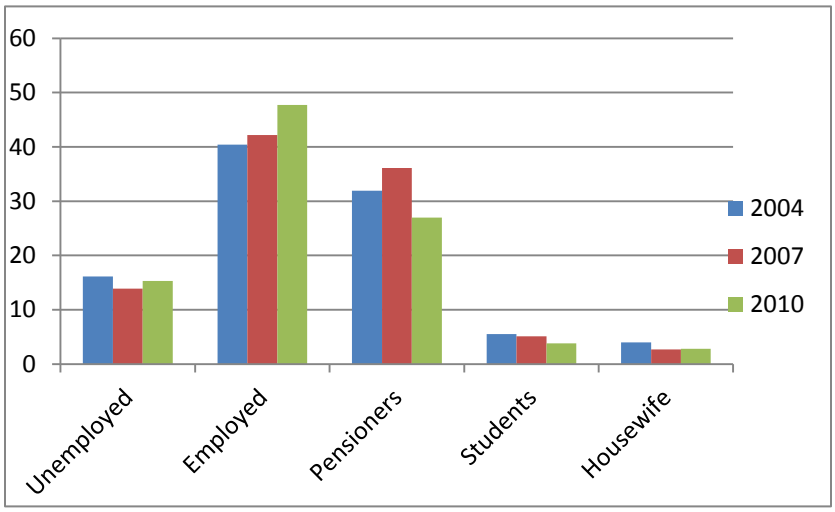
Figure 6 shows that in comparison to 2004 and 2007, in 2010 less people perceived themselves as "poor" and more as "middle class". While that might initially appear counterintuitive in the context of

[10]Vitosha Research is an established research agency in Bulgaria, which specialises in market, social, political, advertising and media research http://www.vitosha-research.com/index.php?id=668

[11] The respective graphs can be found in Appendix II.

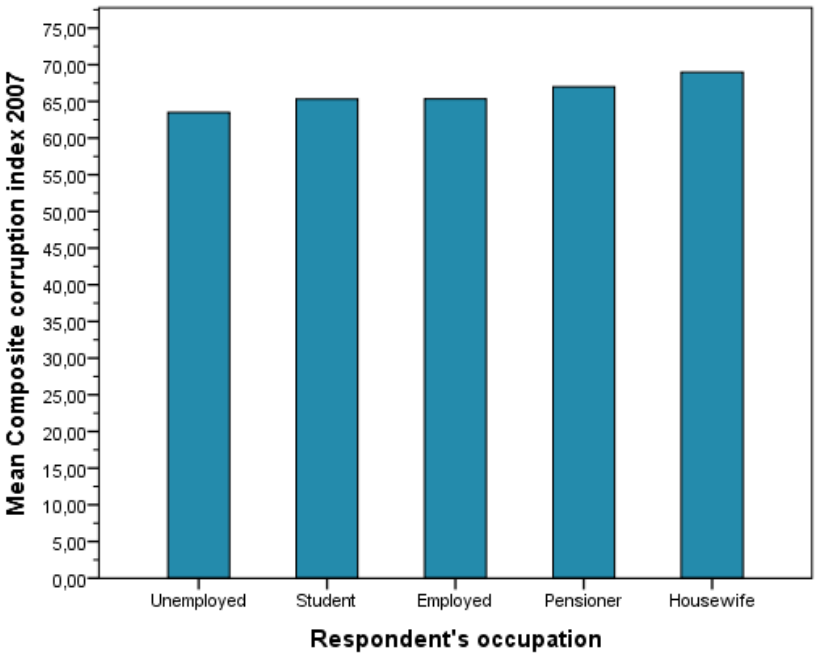
an economic crisis, it does not necessarily reflect income in numerical or real terms; rather it reflects the self-perception of people in comparison to the others around them. Since the economic crisis hit Bulgaria with a slight delay in late 2009 when the country recorded its highest budget deficit in its recent history at 4.3% of GDP ("Bulgaria Government Budget"), only then the shift in self-evaluation occurred. As the amount of "poor" people increased, more people started to perceive themselves as "better off" and or in other words - middle-class, rather than poor. The downward shift in standards after the initial wave of the crisis is responsible for the change in self-perception. Thus, the findings of the survey are still comparable with the previous years despite alteration of self-evaluation of personal income.

Figure 7: Respondents' occupation, survey results (2004, 2007, 2010)



As it is evident from Figure 7, in 2010 there were more employed respondents at the expense of pensioners. This might be an issue when comparing the final results between the three years in case the respondent's occupation has an impact on the perceived levels of corruption. However, Figure 8 illustrates that the perceived level of corruption was distributed equally across the different occupation groups. The difference is especially small between the employed and the pensioners. Thus, interviewing more employed and less pensioners in 2010 in comparison with the other two years, does not disturb the final findings of this research.

Figure 8: Distribution of corruption perception across types of profession occupation



The definition of corruption used in the survey is fundamentally the same as the one used by Transparency International and a number of prominent independent researchers. As directly translated from the survey's methodology, the definition of corruption reads:

> *Corruption as a social phenomenon is the abuse of power for the purpose of personal gain/interest. In the broader sense of the word, we have corruption when a public official is abusing the power of his position in order to serve private rather than public interests. The distinction between private, personal, and common interests is comparatively complex and dependent on a variety of factors. Generally speaking, we can say that distinguishing is related to the social, economic, legal, etc structure of state power. That is why, often this distinction can carry a different meaning in a different country and different political regimes.*

The survey includes twenty-two core questions on corruption with each of them broken down into sub questions, accounting for a total of 126 answers given by the 1 000 respondents. After screening the questions and comparing them with those of the internationally recognized public surveys such as the Global Corruption Barometer conducted by Transparency International, four questions were selected for the final stages of the research:

- How widespread is corruption among public sector employees?
- In order to solve a problem, how likely is a person to give money to a public employee?

- In order to solve a problem, how likely is a person to give a present to a public employee?
- In order to solve a problem, how likely is a person to do a favour for a public employee?

To use them in estimations, however, the variables had to be transformed from ordinal to scale ones, so that their numerical values would carry a meaning. Thus, for each of the four variables above, I assigned a weight to the possible answers depending on their progression and calculated it into a unified scale variable for the entire region depending on the answers of all respondents from that region[12]. In order to make use of all of the information that the four variables convey, while still keeping the analysis simple, I combined the four variables into one 'composite corruption index' by assigning equal weights to each of the four original questions. The composite corruption index will be used in the final calculations and the results compared with those that the individual variables give. In this way, I ensure that the results are consistent regardless of which index of perceived corruption is chosen. The descriptive statistics of the composite corruption index on the individual level are summarised in Figure 9 below. Looking at the data, it is evident that the overall levels of perceived corruption decreased over time, while the variance of increased significantly from 2004 to 2010.

Figure 9: Descriptive statistics, corruption indicator, individual (2004, 2007, 2010)

	N	Minimum	Maximum	Mean	Std. Deviation
Composite corruption indicator 2004	772	50,50	100,00	85,3701	12,29118
Composite corruption indicator 2007	809	1,00	100,00	65,8477	20,18163
Composite corruption indicator 2010	781	1,00	100,00	61,4754	24,75841
Valid N (listwise)	772				

Note: Composite corruption indicator measured in % of levels of perceived corruption. Values presented for the survey respondents for each year. Numbers vary depending on amount of invalid answers or missing answers.

[12] The descriptive statistics of each of the scale variables are presented in Appendix III.

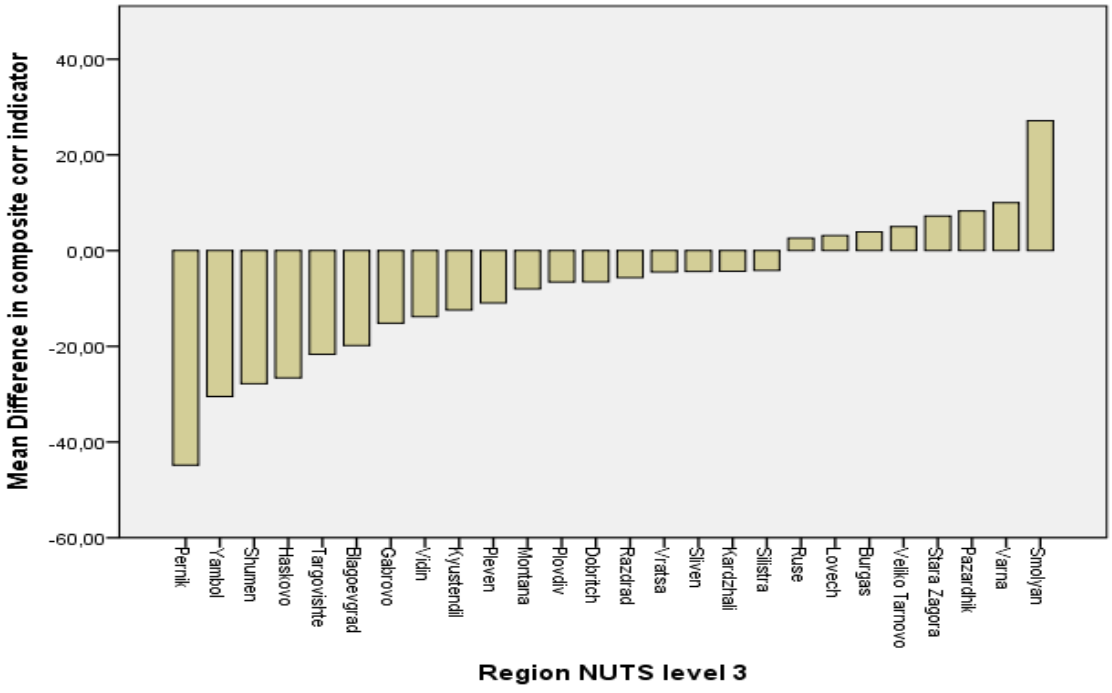
Figure 10: Descriptive statistics, corruption indicator, region (2004, 2007, 2010)

	N	Minimum	Maximum	Mean	Std. Deviation
Composite corruption indicator 2004	26	76,43	94,29	84,9025	5,02249
Composite corruption indicator 2007	26	54,41	80,55	65,7885	7,14157
Composite corruption indicator 2010	26	35,74	93,17	58,0904	12,16036
Valid N (listwise)	26				

Note: Composite corruption indicator measured in % of levels of perceived corruption. Values presented for the 26 NUTS level 3 regions in Bulgaria for the three years.

Similarly, Figure 10 above shows that the regional mean of the corruption perception index has also been significantly decreasing for tor the given time period. From the value for standard deviation it is evident that corruption perception, like regional GDP, also exhibits greater variety in 2010 in comparison to the previous years. Figure 11 below visualizes this change in corruption perception across regions. It shows the regional distribution of the change in the composite corruption index between 2004 and 2010.

Figure 11 Difference in corruption perception 2004 - 2010 across regions



Evidently, corruption did not decrease uniformly across Bulgaria, but some regions witnessed great increase, while others – great decrease. There could be a number of reasons for this phenomenon such as a change in the regional government or shift in business structure. Regardless of the reason, the change in distribution is considerable and is expected to render an impact on the final result.

Finally, it is important to note that the survey conducted by *Vitosha Research* is comparable with its international counterpart, the Global Corruption Barometer, not only in content but also in number and composition of respondents. For 2007, the Global Corruption Barometer collected 993 surveys, while *Vitosha Research* – 1 000. Moreover, the distribution of interviewees across gender, occupation, education, and income level in the two public polls is comparable and any small variations would not render the final results irrelevant. The details of the composition of respondents in the two surveys are given in Figure 12 below.

Figure 12: Comparability of respondents' composition

Public Poll	Sex of respondents	Occupation	Education	Income level
Global Corruption Barometer 2007	Female- 52.5% Male– 47.5%	Employed- 50.2% Unemployed- 16.3% Pensioners- 26.8% Not working- 6.7%	Higher education- 17.5% High-school- 51.4% Below high-school- 31.1%	Poor- 17.1% Lower middle class- 15.9% Middle class- 14.1% Upper middle class- 17.9% Rich- 16.7% No answer- 18.4%
Vitosha Research Corruption Survey 2007	Female- 51% Male- 49%	Employed- 42.2% Unemployed- 13.9% Pensioners- 36.1% Students- 5.1% Housewives- 2.7%	Higher education- 15.8% College- 5.8% High-school- 48.5% Below high school- 29.9%	Poor – 28.6% Lower middle class - 34.3% Middle class -33.1 Upper middle class – 1.7% Rich – 0.1%

Note: The table compares the respondents of the Global Corruption Barometer and Vitosha Research Corruption Survey for 2007 across gender, occupation, education, and income level.

The composite corruption index is used in two separate data sets. The first one has the survey respondents as unit of observation and the second – the NUTS level 3 regions. The use of two datasets is necessary in order to answer the two separate but interrelated questions. The first one being: *is corruption perception is a function of the regional structure*, and the second - *whether GDP per inhabitant in a given region is a function of the level of perceived corruption*. Without receiving a positive answer on the first question, the second is irrelevant.

CHAPTER IV: REGIONAL VARIATION OF CORRUPTION

4.1 Defining the Question

Before answering the question *how are corruption and regional development related*, this research needs to establish whether the level of perceived corruption is a function of the regional structure in Bulgaria, or simply put: *does the answer that each respondent gives depend on the region that they live in*? A positive answer to this question will provide justification for conducting additional research and exploring the relation between perceived corruption and regional development. Alternatively, if the data analysis establishes that corruption is independent from the regional structure and is a uniform national phenomenon, there will be no need for further investigation.

4.2 Methodology

In order to answer the first question of this research, I will use a multiple linear regression to model the relationship between the perceived levels of corruption of each survey respondent and their personal characteristics, including the region of residence. The purpose of this method is to quantify and determine the significance of the effect of the independent regional variables on the dependent corruption variable.

Apart from the region of residence, the model will include multiple individual characteristics: sex, age, income, level of education, and number of family members in order to estimate the extent of the effect which is unique to the regional variation independent from all the other personal characteristics. The final form of the model is the following:

$$corr = \beta_0 + \beta 1 * age + \beta_2 * edu + \beta_3 * fam + \beta_4 * income + \beta_5 * sex + \beta_6 * DummyR1 +$$

$$\beta_7 * DummyR2 + \ldots\ldots + \beta_{26} * DummyR25 + \beta_{27} * DummyR26 + u$$

On the left hand side of the model is the dependent variable, which in this case is the composite corruption indicator composed from the original four variables as shown in Chapter 3: Data Description. On the right hand side are all of the personal characteristics of the respondents that might have an impact on their answers. The unit of observation is the individual and the number of observations is 1 000. The β coefficients of the regional dummy variables will show what would be the difference in perceived corruption between a person from region A and a person from the capital region of Sofia if all other characteristics are held constant. The particular value of each coefficient is not of great relevance to this research, rather it is interesting to find out whether the bundle of regions carries explanatory power.

The variable *age* has been included as people in advanced working age might be more exposed to corruption in comparison to people who are still at the beginning of their careers; the initial assumption is that the β_2 coefficient will be positive – the level of perceived corruption increases with age. The *edu*(education) variable is also considered to be significant, as people with more years of education are more likely to distinguish occurrences of corruption or to follow recent news; *income* is also added to the model, as wealthier individuals might be more attractive victims of corrupt public officials simply because they are able to afford a more substantial bribe. A variable representing the number of family members (*fam*) is included, as it too might be a determinant of perceived corruption: the more people an individual has in his/her family, the more likely he/she is to hear about an instance of corrupt behaviour. As was the case with the *age* variable, the β coefficient for all the other variables mentioned so far is also expected to be positive. A dummy variable for *sex* is also included in the model, as it is possible that because men more often occupy higher positions, they are more exposed to corruption than women. Finally, the variables that are of most interest to this particular research are the twenty-six

dummy variables for the NUTS level 3 regions in Bulgaria. Each region is represented by a dummy variable except for the capital city of Sofia, which will be the control group.

The final step of coming to a conclusive answer to the first research question will be to conduct an F-test of joint significance of the regional dummy variables in order to find out whether region-specific factors affect the levels of perceived corruption. To determine this, I will run a restricted (excluding regional dummy variables) and an unrestricted (including regional dummy variables) regression and use the general F-stat formula to compute the value of interest:

Equation 1: F-test of joint significance

$$F^{r}_{dfU} = \frac{(RSS_R - RSS_U)/r}{RSS_U/dfU}$$

I will then use an F-test table to determine whether I should accept or reject the H_o of joint insignificance. This procedure will be conducted independently for the three sample years, 2004, 2007, and 2010, in order to prevent registering single-year anomalies as final results.

4.3 Results and Implications

The specified model is statistically different from a random walk in all three years and the respective F values indicate that the H_o of joint insignificance does not stand[13]. Hence, adding the twenty-six regional dummies to the model improves its estimation power, implying that corruption is a function of the regional structure in Bulgaria. Figure 13 shows the output results of the restricted and unrestricted models, as well as the results of the F-test of joint significance and their associated p-values. As expected, the models including the regional dummies do explain a

[13] The full regression output for each of the three years is included in Annex IV.

greater part of the variation in each of the three sample years as evident by the significant increase in R^2.

Figure 13: Estimation power of restricted and unrestricted models; joint significance of dummy variables
Dependent variable: Composite corruption indicator 2004, 2007, 2010

Sample	Restricted model R^2	Unrestricted model R^2	Unrestricted Sig.	F-value	p-value
2004	,017	,137	,000	2,753	,000
2007	,011	,128	,000	3,118	,000
2010	,014	,211	,000	5,198	,000

Note: The table shows how the restricted and unrestricted linear models estimating the individual level of corruption perception performs in 2004, 2007, and 2010. The last two columns present the results of the F-test of joint significance.

More importantly, the results of the F-test for 2004, 2007, and 2010 show that the unrestricted models have greater explanatory power than the restricted, and the H_0 of joint insignificance is rejected. The assumption that the level of perceived corruption depends on the region of residence of the respondent is confirmed by the data analysis.

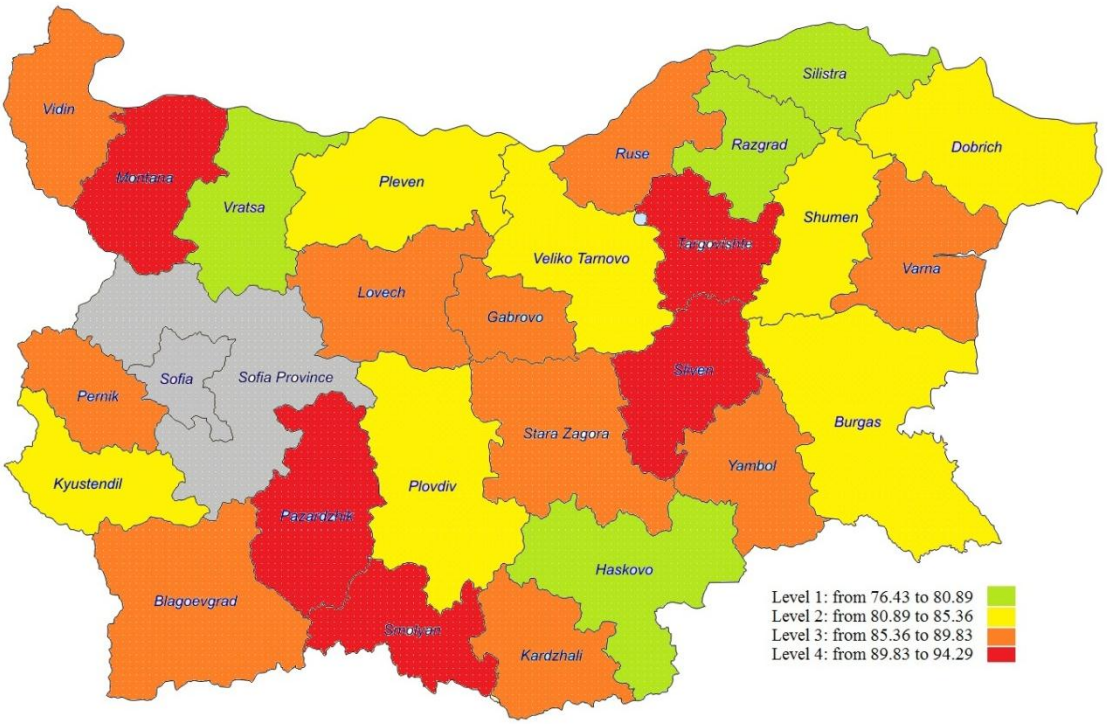
4.4 Discussion of Results

As expected, the regional structure in Bulgaria does have an impact on the levels of corruption perceived by the respondents in the survey regardless of which year is taken into account. This is an important finding as it shows that corruption is not a national phenomenon and the aggregate levels used in other studies do not adequately reflect the status-quo in the subunits. In fact, regional variation is large enough to speculate that it can have an impact on the indicators of macroeconomic performance. The data also shows that the relationship is becoming stronger over time with 2010 giving the results with the highest significance. This finding confirms the initial hypothesis of this research that EU accession in 2007 had an impact on the performance of the

corruption indicators. Chapter 5 will explore in more detail the relationship between EU accession and change in corruption perception across regions.

The results show that the distribution and evolution of corruption across regions was not consistent across the different sample years. The gap between the perceived levels of corruption in the NUTS 3 regions and its correlation to regional structure has been increasing over time, which is evident by the growing R^2 and variance between coefficients. This suggests that the impact of corruption is becoming more significant over time.

Figure 14: Corruption perception at NUTS 3 level (2004)



After establishing this fact, it is worth looking into the distribution of corruption across regions and determining whether the variation is due to an agent of economic geography or another 'common sense' factor. For this purpose, Figure 14 above shows the NUTS 3 regions in Bulgaria

coloured according to the 2004 mean value of the corruption perception index with green being the lowest and red – the highest levels of perceived corruption.

Looking at the map for 2004, there is no logical association between the more and less corrupt regions; their distribution on the map appears random. I have also plotted the corruption levels across regions in the same way for the other two years – 2007 (Figure 15) and 2010 (Figure 16) in order to observe the 'movement' of regions across the spectrum of corruption. Again, no logical relationship becomes evident; the evidence does not support a theory that corruption is a national or a predictable phenomenon that is more or less likely in the biggest cities, or those near the national borders.

Figure 15: Corruption perception at the NUTS 3 level (2007)

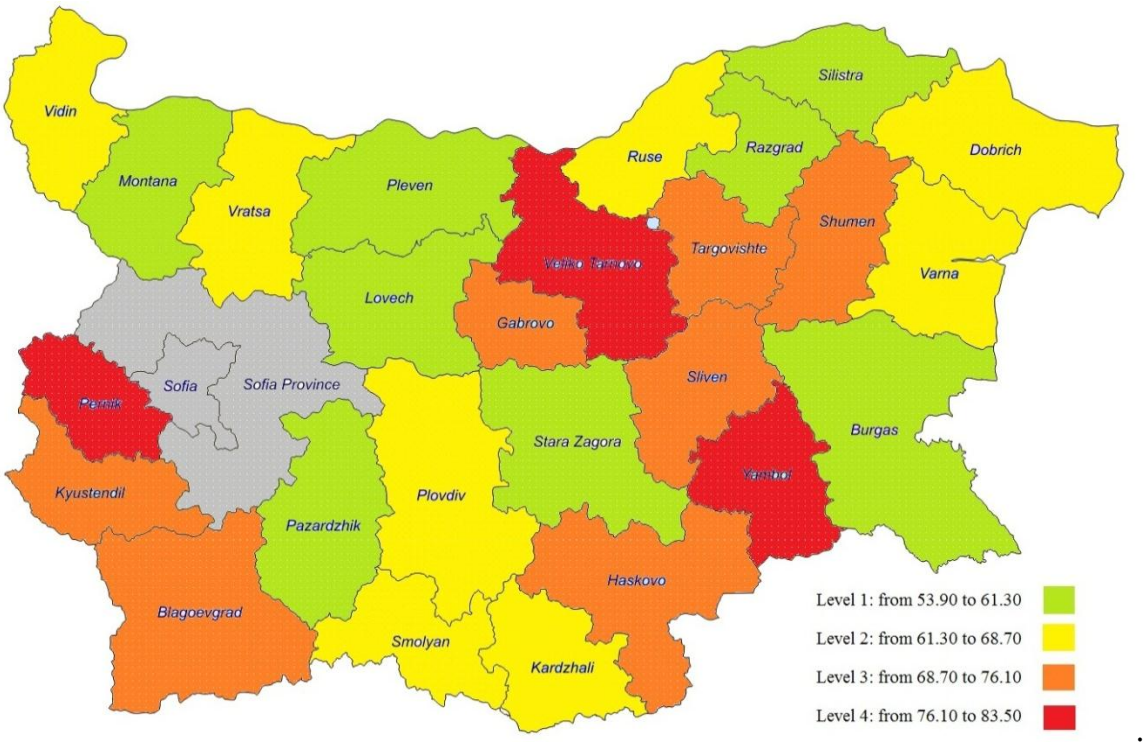
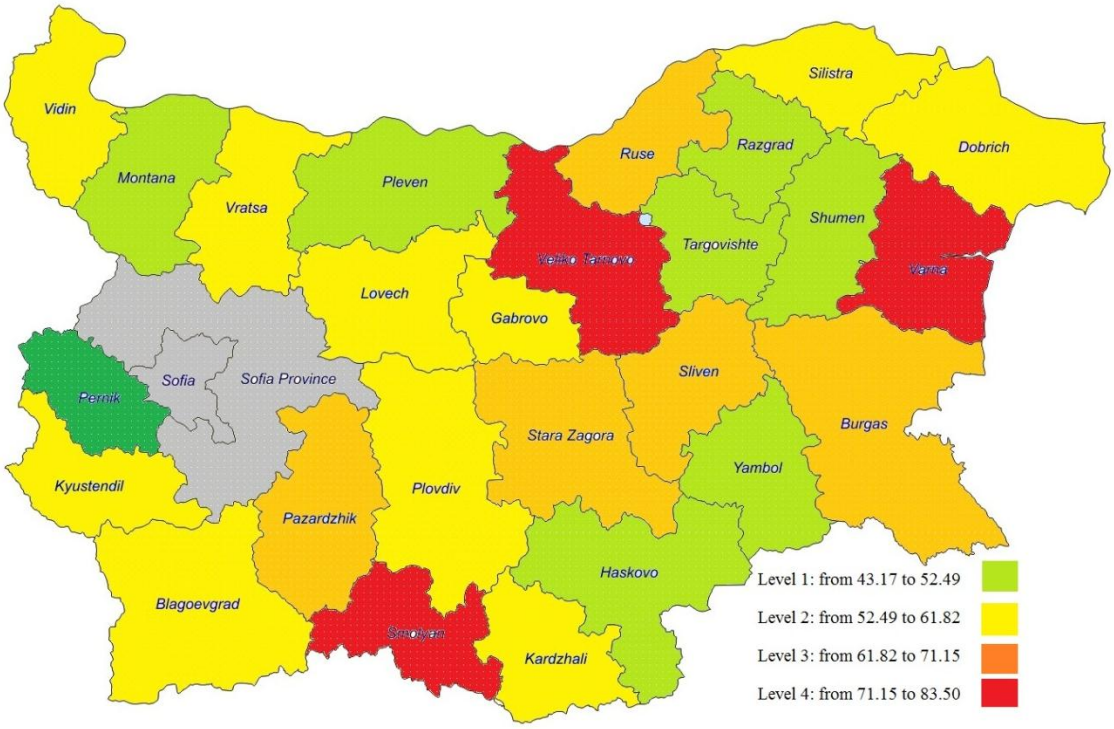


Figure 16: Corruption perception at the NUTS 3 level (2010)



Visualizing the change from 2004 to 2007 and from 2007 to 2010, there is no particular trend of transformation from more to less corrupt. Regions such as Veliko Tarnovo that were 'yellow' in 2004, turned 'red' in 2007 and 2010, whereas regions like Pernik that used to be 'red' in 2007, became 'green' in 2010. This research is not interested in where this change came from, as there could be a number of possible explanations. However, it is important to note that while there was an overall decline in the levels of perceived corruption, it was not uniform and affected different regions differently. There is no clear cut explanation of the distribution of corruption across regions throughout the three years.

Overall, the results of the multiple linear regression prove that the level of corruption perceived by the individual depends on the region that they live in. The F-test shows that the regional dummies significantly improve the performance of the model. Without this precondition all

further research on the relationship between corruption and regional development would have been meaningless. Taking it one step further, the data analysis presented in this chapter proves that the regional structure in Bulgaria is a more significant determinant of corruption in 2010 in comparison to the previous two sample years. Figures 14-16 serve to show that there is no intuitive explanation of this change in the performance of the model. Thus, in Chapter 5 I will speculate and present evidence that EU accession in 2007 was at least partially responsible for the difference in corruption perception and its impact in 2010.

CHAPTER 5: CORRUPTION AND DEVELOPMENT

5.1 Defining the Question

This research has already established that the regional structure in Bulgaria is indeed a determinant of the perceived levels of corruption. From here, I can approach the main question, which is: *do the perceived levels of corruption on the regional level have an effect on the regional GDP*?

There are three possible answers to this question: that there is no association between corruption and GDP, that corruption has a positive impact on GDP, or that corruption has a negative impact on GDP. Each of those answers would carry different policy implications.

5.2 Methodology

In order to establish whether there is a functional dependence between corruption and regional development on the NUTS 3 regional level, I will plot regional GDP against levels of perceived corruption for 2004, 2007, and 2010. The unit of measurement will be the NUTS level 3 region, and there are twenty-six observations, excluding the two Sofia regions. This methodological approach is often used in the literature on corruption and growth. Mauro (1995) uses a simple univariate regression to estimate the relationship between corruption and investment, Podobnik et al (2008) – for the relationship between corruption and economic growth and investment, and Tanzi and Davoodi (2000) apply it in their IMF report on corruption, growth and public finances. Hence, the simple univariate regression is an adequate and justifiable approach toward establishing the association between corruption and development.

Firstly, I will regress regional development, proxied by GDP per capita, on the composite corruption index, as it is the one incorporating all of the available information. Then, I will run

the same regression three more times but with the individual corruption indicators and compare the results to make sure that they are consistent regardless of which one is used. I will only omit the results from the question *In order to solve a problem, how likely is a person to do a favour for a public employee?* as it clearly does not reflect the overall levels of corruption in society.

Considering the literature and previous academic research conducted on the relationship between corruption and growth on the national level, I expect to observe similar results – a negative but not necessarily significant association. As the results of the data analysis described in Chapter 4 suggest, there might be some variation across the year, considering that EU accession in 2007 might have had an impact on the relation between corruption and GDP.

5.3 Results and Implications

The regression results of the composite corruption indicator present a very interesting association between the perceived levels of corruption in a given region and its GDP across the three sample

Figure 18: GDP on composite corruption indicator (2004)

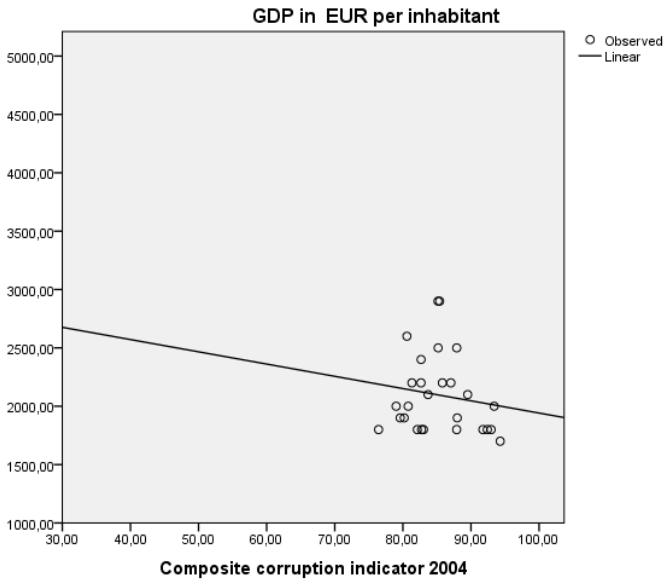
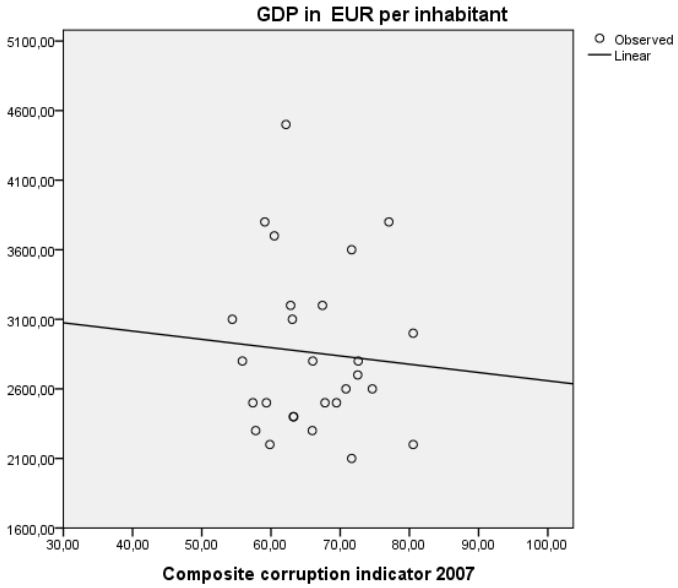


Figure 17: GDP on composite corruption indicator (2007)

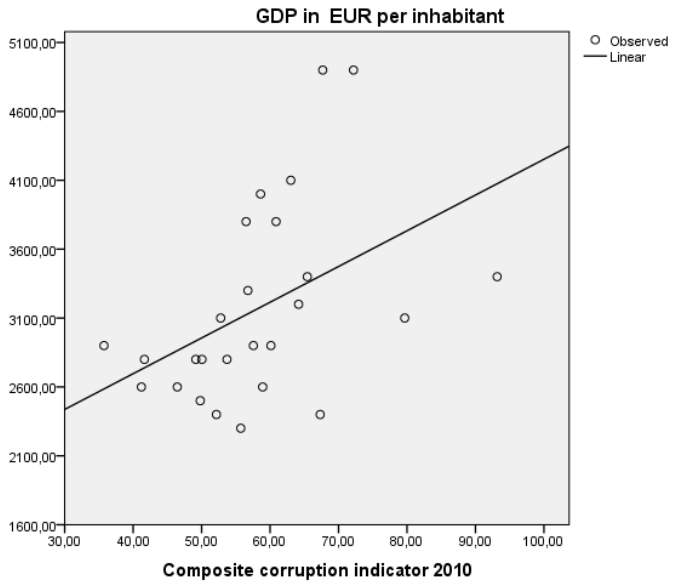


years[14].

The results of the univariate model for 2004 and 2007 are similar: in both cases, the corruption coefficient is not statistically different from zero. For 2004 and 2007 the reported p-values are respectively 0,146 and 0,370, which confirms that there is no statistically significant relationship between corruption and GDP. As Figures 17 and 18 illustrate, the slopes of the coefficients for 2004 and for 2007 are comparatively low. In both cases, the implication is that a 1% increase in the levels of perceived corruption would lead to an insignificant decrease in the GDP per inhabitant. For 2004, β_1 = -19,702 and for 2007 β_1 = -14,820. Considering that the mean of GDP for 2004 is 2096 EUR and for 2007 - 2859 EUR, these results are neither statistically, nor economically significant.

In 2010, there is a sudden change in the performance of the model. Two important alterations occur: corruption becomes statistically significant at the 5% level *and* it has a positive coefficient. The R^2 shows that close to 20% of the difference in GDP is explained by the variance in the levels of corruption perception. The β_1 coefficient is statistically but also economically significant. At β_1 = 25,936 and maximum difference in levels of corruption perception of 44% in 2010, 1161 EUR is explained by the variance of corruption due to the regional structure in Bulgaria.

Figure 19: GDP on composite corruption indicator (2010)



[14] Full regression results for the univariate regression for the three sample years are presented in Annex V.

Figure 20: Corruption and GDP

Dependent Variable: GDP per capita, 2004, 2007, 2010

Sample	Constant (st.error)	Corruption coefficient (st.error)	R^2	Sig.	N
Composite corruption indicator 2004	3753,514 (1113,713)	-19,702 (13,096)	,086	,146	26
Composite corruption indicator 2007	3798,090 (1074,134)	-14,820 (16,235)	,034	,370	26
Composite corruption indicator 2010	1658,742 (633,087)	25,936 (10,676)	,197	,023	26

Note: These are the reported results for the effect of the composite corruption indicator on GDP for the respective years. GDP per capita is measure in EUR and corruption in %.

Overall, the data analysis shows no meaningful and significant relationship between corruption and regional development in 2004 and 2007. Interestingly enough, the same does not hold in 2010, when the results (Figure 20) demonstrate that higher corruption is associated with a higher GDP per capita. The same pattern is observed if the other indicators are used in the univariate linear model.

If the GDP per inhabitant is regressed on the regional scores for *In order to solve a problem, how likely is a person to give money to a public employee*, the outcome is similar: statistically and economically insignificant results in 2004 (Figure 22) and 2007 (Figure 21) with p-values of respectively 0.594 and 0.763 and coefficients of 6.771 and 4.071. As the scatterplots show, both slopes are nearly flat and there is no meaningful relationship between corruption and GDP on the NUTS 3 level. The only difference that we observe is in the overall reduction in the perceived levels of corruption and the shift of the coefficient from a negative to positive one.

Figure 22: GDP on Solving a problem with money (2004)

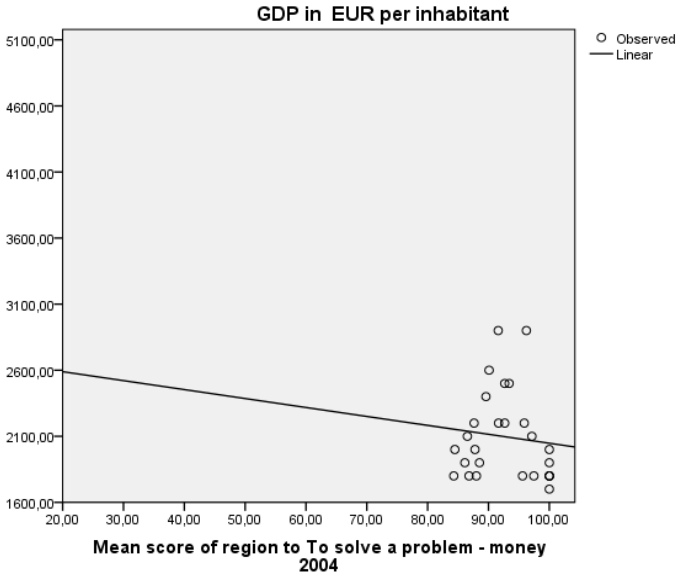
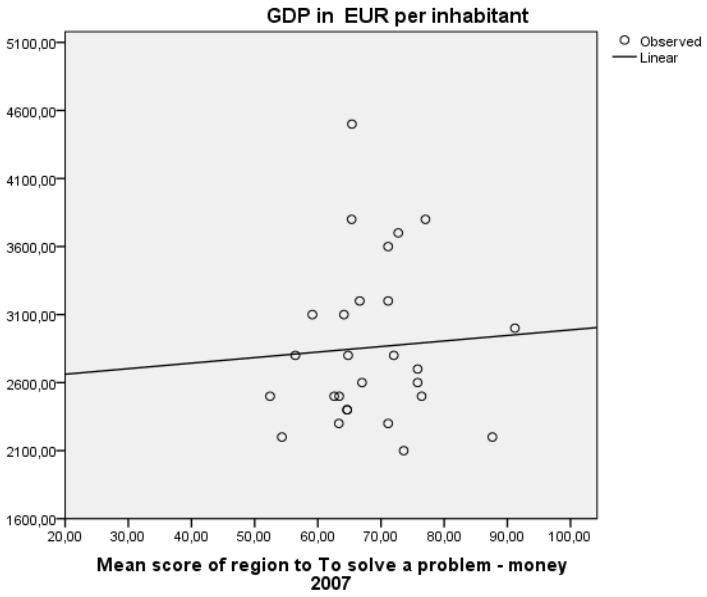


Figure 21: GDP on Solving a problem with money (2007)



The result for 2010 is again statistically and economically significant, giving almost the same R^2, p-value, and coefficient as in the previous regression output. In order to make the results from the different regressions easy to compare, they are summarized in Figure 23 below:

Figure 23: Regression results for all indicators (2004, 2007, 2010)

	2004 R^2	2004 coefficient	2004 p-value	2007 R^2	2007 coefficient	2007 p-value	2010 R_2	2010 coefficient	2010 p-value
Composite corruption indicator	,022	-10,494	,456	,006	-5,990	,707	,201	26,384	,022
Solve a problem - money	,012	-6,771	,594	,004	4,071	,763	,248	21,688	,010
Solve a problem - present	,086	-21,204	,137	,036	-13,697	,345	,197	19,867	,023
How widespread is corruption	,004	2,634	,747	,022	9,375	,462	,000	,355	,982

Note: The table presents the 2004, 2007, and 2010 results of running the same regression of GDP per capita (measured ln EUR) on four different indicators of perceived corruption.

Evidently, all but one of the corruption indicators exhibit substantial similarities. The only 'outlier' is the *How widespread is corruption* index. This might be simply due to inappropriate

wording of the question or the answers. Excluding the fourth possible indicator, is not an issue, as it is incorporated into the composite corruption indicator. In any case, the other three variables exhibit notably close trends throughout the sample years. As Figures 24 and 25 below illustrate, the slope of the relation between corruption and GDP for *To solve a problem – money* and *To solve a problem- present* is analogous with the slope of the composite corruption indicator.

Figure 24: GDP on Solving a problem with money (2010)

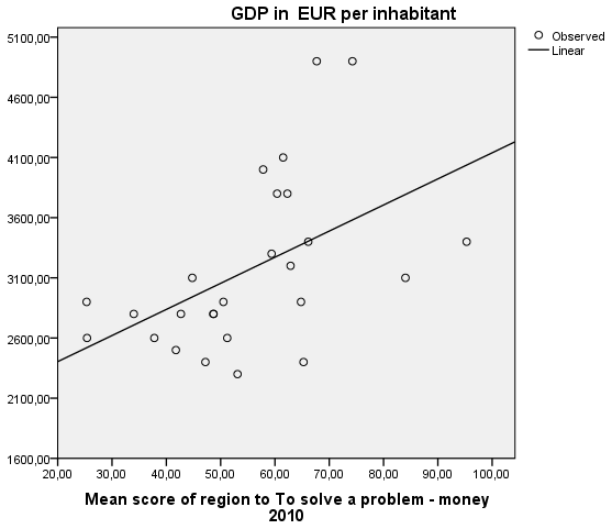
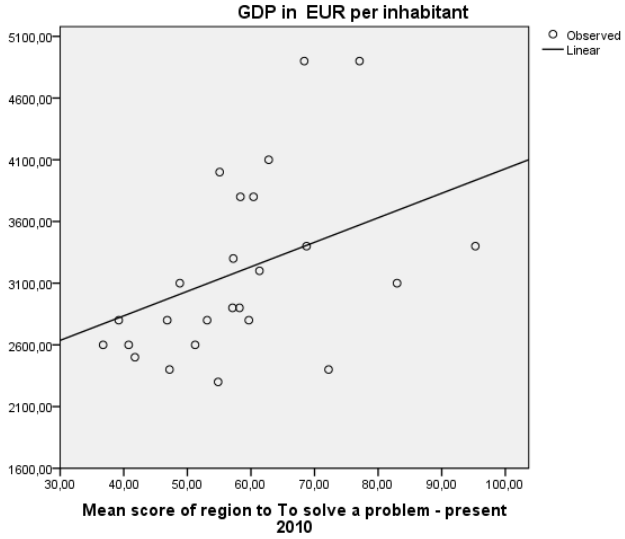


Figure 25: GDP on Solving a problem with a present (2010)



The initial hypothesis that corruption might have an insignificant effect with a negative slope on GDP per inhabitant was only confirmed for the first two years. Against the expectations, the data for 2010 reveals the opposite relationship: three of the possible four corruption indicators confirm that in 2010 there was a positive and statistically and economically significant relationship between the levels of perceived corruption and GDP.

Running the same simple linear regression with four different corruption indicators leads to the firm conclusion that the levels of perceived corruption were unrelated to GDP at the regional level in 2004 and 2007. In 2010, however, corruption became a significant determinant of GDP with a strong positive coefficient.

5.4 Discussion of Results

The simple explanation of why corruption is not a factor of regional GDP in 2004 and 2007 might be that in those years the variation of corruption across regions was not sufficient to make an impact. This hypothesis is confirmed by the relatively small standard deviation of the composite corruption index for those years: 4,959 in 2004 and 7,330 in 2007. In comparison, the 2010 value of standard deviation is 12,160 – more than double that in 2004.

Going back to the first regression results, while being significant, the explanatory power of the same model for 2004 and 2007 was much smaller than that in 2010, meaning that the regional structure had a greater effect on the perceived levels of corruption, confirming the hypothesis that corruption was more uniformly spread across Bulgaria in 2004 and 2007. There also might be other factors contributing to this result, however, they are a matter of another discussion.

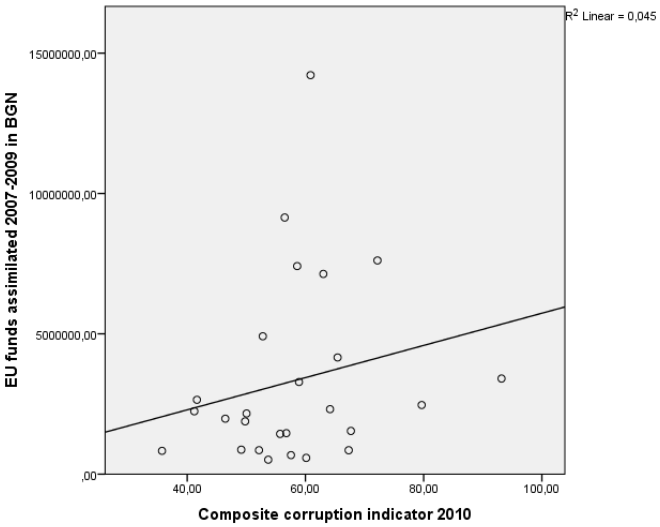
What is the more intriguing finding is the growing importance of corruption in 2010 and its counterintuitive coefficient. Certainly, one of the possible explanations might come from Leff, who suggests that corruption brings about more cooperative and efficient bureaucracy; however, there are reasons to believe that there was a different channel between regional levels of corruption and GDP in the case of Bulgaria.

Bulgaria joined the EU in 2007, and in 2008, the European Commission suspended a total of 486 million euro from the available funding for Bulgaria over speculations for corruption and maladministration. The EU published a special report on the management of EU funds in Bulgaria in July 2008 in order to draw attention to the administrative weaknesses and loopholes, and to provide guidance for improvement ("Report on the Management of EU Funds in Bulgria"). The funds remained closed until 2009. This gives reasons to believe that the money

which was assimilated under the pre-accession and structural funds in 2007 and early 2008 was absorbed in the more corrupt regions. Those regions then benefited from the implementation of the projects which in turn increased their regional GDP. Thus, in order to explain the positive and significant relationship between corruption and GDP in 2010, I hypothesize that EU funds were the channel of transmission of this effect. The disproportionate improvement in economic performance, which is observed in 2010, could be the effect of the money assimilated through the maladministration and corrupt practices reported by the European Commission.

To establish whether there is in fact such a relationship between the perceived levels of corruption and the amount of EU funds absorbed, I will simply plot them against one another in a scatter plot. Evidently, higher levels of corruption are associated with the assimilation of more EU funds during the 2007 – 2009 period.

Figure 26: EU funds on composite corruption index (2010)



Moreover, Figure 28 shows that there is a positive association between the GDP in 2007 and the

Figure 28: EU funds on GDP (2007)

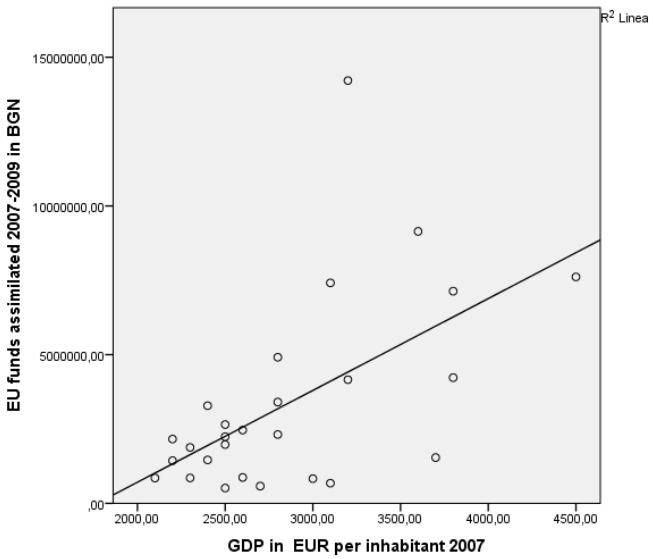
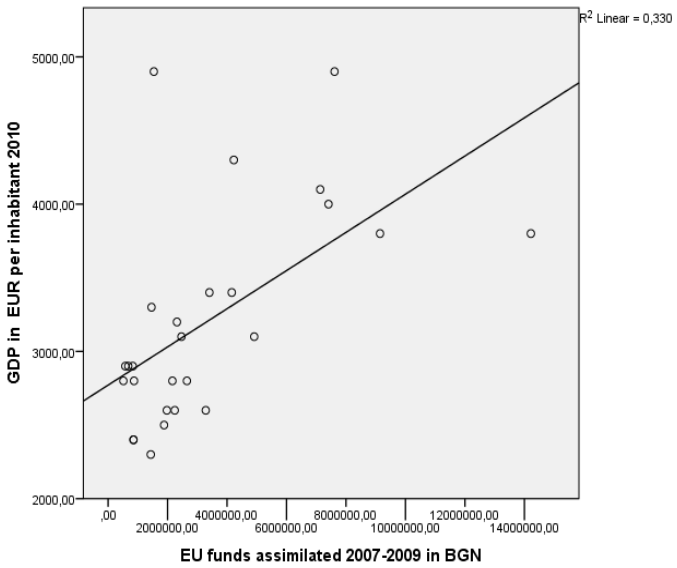


Figure 27: GDP (2010) on EU Funds



amount of funds absorbed. Interestingly, the ones that benefited from more funds were the ones that were already better-off in 2007, which means that the money was not necessarily distributed in accordance with its goals of achieving social and economic cohesion. Rather through corrupt practices it was absorbed in the regions that were already performing better in terms of their GDP per capita in 2007.

The last step of tying the logical chain is to show that in reality the European Funds partially account for the disproportionately higher growth of some regions. Hence, I will plot the 2010 GDP values against the corresponding values for EU funds assimilated between 2007 and 2009[15]. As the Figure 27 shows, the beneficiaries of more EU funds were those with larger GDP in 2010. This proves that the European transfers were at least partially responsible for the increasing regional gap in Bulgaria. They were absorbed in the regions that were already richer in 2007. Thus, they did not serve their function of benefitting the poorest regions in order to help them converge to the richer. Through corrupt assimilation, the funds profited the rich, making them even richer in 2010 and accounting for the significant positive relation between corruption and GDP in 2010.

The results of the univariate regression of regional GDP on the levels of perceived corruption in Bulgaria for 2004, 2007, and 2010 show an interesting inconsistency across the three years. While they are expectedly negative and insignificant for 2004 and 2007 regardless of the corruption index used, the output for 2010 is economically and statistically significant establishing a positive relationship between corruption and regional GDP. A possible explanation for this finding is that the perceived levels of corruption in 2010 are a function of the amount of money that goes in the region. It might be that as Leff speculates corruption increases the

[15] These data also include projects that were contracted but not yet implemented in 2009.

efficiency of the bureaucrats or that the money was simply going to the local governments representing the ruling party. With simple scatterplots I have established that higher transfers in the 2007-2009 period are associated both with the higher GDP per capita, but also with higher levels of corruption. Thus, the inappropriate assimilation of EU funds in the first years of accession is responsible for the positive relationship between corruption and regional performance in 2010. The more corrupt the region – the higher the absorption levels – the faster GDP growth.

CHAPTER 6: POLICY RECOMMENDATIONS

The regression results have shown two main insights on the relationship between corruption and regional development in Bulgaria for the years 2004, 2007, and 2010. Firstly, that corruption is a regional phenomenon across the years, but especially in 2010, and that the higher corruption attracts more EU funds, which in turn increase the GDP per capita of the region. This unexpected conclusion, however, does not mean that corruption should be promoted in order to allow informal bargaining for funds. Quite the contrary, it should be discouraged for the sake of achieving social and economic cohesion across the NUTS level 3 regions in Bulgaria. While occurrences of graft have been proven beneficial for the individual regions, their effect is still detrimental on the national level, as they are partially responsible for the increasing regional disparity in Bulgaria. If EU funds are to become a tool of social convergence, rather than divergence, they have to benefit those who need them the most. In order to restrict the corrupt practices and allow for more transparent distribution of the funds, policies need to allow for greater competition between firms and increase the potential harm of corruption for all parties involved.

There are several policies that can be implemented in order to achieve that:

- Increasing the cost of corruption (Elliott 48): In the metro system in Vienna there are hardly ever employees monitoring whether people have valid tickets; nevertheless, the majority of them do because the fine of being caught without a ticket is so great. The same logic can be applied to preventing instances of corruption. If the costs of being caught are unbearable, few people will attempt to participate in corrupt transactions;

- In order to increase the costs for the public servants accepting the bribes: public sector jobs can provide greater long term benefits, not only in terms of wages, but also pensions. If a public employee is found to be involved in acts of corruption, they will lose those benefits regardless of how long they have been in the system. Such benefits and penalties will provide a long term incentive to act within the norms. However, those policies have to be accompanied by a transparent and competitive recruitment process for public employees in order to avoid abuse of personal connections. In the absence of transparent selection procedure, the proposed policy may lead to a different type of corruption;

- Increasing the costs for the individuals paying the bribes: firms that have been found guilty of paying bribes must be required to pay back the excess profit that they have made as a result of the corrupt deal. Moreover, they will be prohibited from further participation in government tenders. Depending on the severity of their crime, that ban can be for a short or long period of time;

- Allowing for more competition in public tenders: if corruption is widespread, this measure can bring about the most beneficial outcome, as it does not require substantial supervision or implementation from the official that they themselves can be dishonest;

  - One way to improve the competition in public tenders is to limit the amount and type of specifications that can be required from the firms in order to participate. This will prevent opening a tender in which only two or three selected firms can take part;

- In addition, firms should be subject to a restriction of the amount of public procurement projects, in which they participate. This can be done either in terms of projects per year (ie. to participate in a maximum of two projects in five years) or in terms of assimilated money (ie. cannot participate in projects worth more than 10 bill EUR in five years);
- Create a channel for the losing firms to raise concerns over unfair selection process.

The suggested policies can limit the incentive and opportunities for firms and public officials to distribute EU funds dishonestly. They can be a means of eliminating the channel of transmission between corruption and disproportionate GDP growth. If this channel is destroyed, then the funding can be distributed according to the needs of the regions rather than 'the wants' of the public officials and the firms. Nevertheless, those measures have to be accompanied by strict internal control and effective anti-corruption legislation.

CHAPTER 7: CONCLUSION

This paper looked into disaggregated corruption data to establish that corruption in Bulgaria is not a national phenomenon, but instead a function of the region of residence of each individual. It has also shown that the difference in levels of perceived corruption between regions is greater in 2010 than in 2004 and 2007. The lack of a clear explanation of this change, allowed me to speculate that EU accession in 2007 is at least partially responsible for the greater variance in the levels of perceived corruption across regions in 2010.

In the second part of my research, I demonstrated that corruption in 2010 has a statistically and economically significant positive effect on the regional GDP. In comparison, the results for 2004 and 2007 are not significantly different from zero, which allowed me to go back to my hypothesis of the effect of EU accession and investigate the evidence. I looked at regional data of assimilation of EU funds throughout the 2007 – 2009 period, and the first important finding was a positive association between corruption and the amount of funds absorbed. The data also revealed that the funds were allocated to the regions that were already better off in 2007, and thus accounted for the greater intraregional gap in 2010.

Being the first results of investigating the relationship between corruption and growth on the subnational level, the findings of this research paint an interesting picture in the case of Bulgaria. Corruption was a not a significant determinant of GDP prior to EU accession; however, after 2007, the availability of the Structural funds created a channel of transmission between corruption and economic growth. The funds that were absorbed through corrupt practices

accounted for the higher GDP in 2010, thus explaining the positive association between perceived corruption and growth.

While the presented findings are significant, this research could be enhanced by adding a more comprehensive measure of regional development that includes societal and environmental factors different from GDP or by using a different proxy variable of corruption. Introducing new indicators may show which aspect of corruption is most important to regional development, or present new factors that were not accounted for in this research. Also, the performance of the model could be improved by looking at the relationship between corruption and other individual determinants of growth, such as investment or government spending on education rather than the amount of EU funds absorbed. However, considering the years in the sample used for this research, EU accession was the most appropriate factor to take into account, as it can explain why the change in corruption perception occurred precisely between 2007 and 2010. For future research, it will be interesting to observe the relationship between corruption and GDP for each of the years following EU accession 2007 and to draw more detailed conclusions.

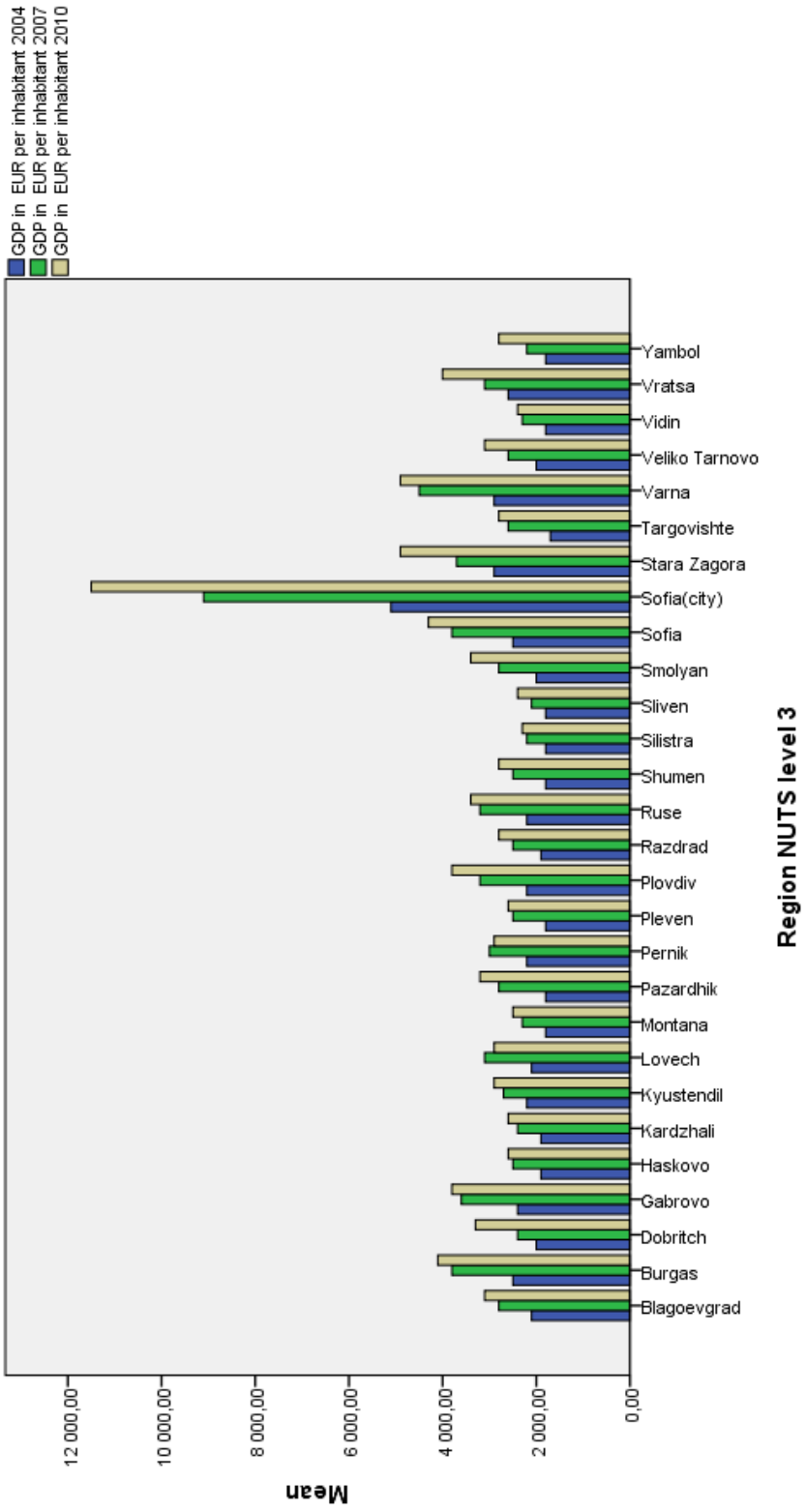
This research opens many opportunities to explore the association between corruption and economic growth on the regional, rather than the on national level, as I have already established that the aggregate values for corruption do not adequately reflect the reality in the subnational units. It would be particularly valuable to observe whether there is a similar relation between corruption and GDP in other new EU Member States, or the phenomenon is exclusive to Bulgaria. If a similar association is found in other MS, this would have great implications for the regulation and administration of EU funds.

The findings that I have presented can explain why NUTS levels 3 regions in Bulgaria have been diverging instead of converging despite the availability of EU funds following accession in 2007. They show that the cancerous corruption is more dangerous than anticipated, as it is responsible for the increasing gap between regions in Bulgaria, which in turn leads to an overall decrease of societal welfare in the regions that are lagging behind. Thus, a number of policies should be implemented in order to restrict corruption in public tenders for allocation of EU funds.

APPENDICES

Appendix I: GDP per capita for 2004, 2007, 2010

Figure 29: GDP per capita 2004, 2007, 2010 for the NUTS level 3 regions



Appendix II: Composition of survey respondents across gender and level of education for 2004, 2007, and 2010

Figure 30: Respondents' sex for 2004, 2007, 2010

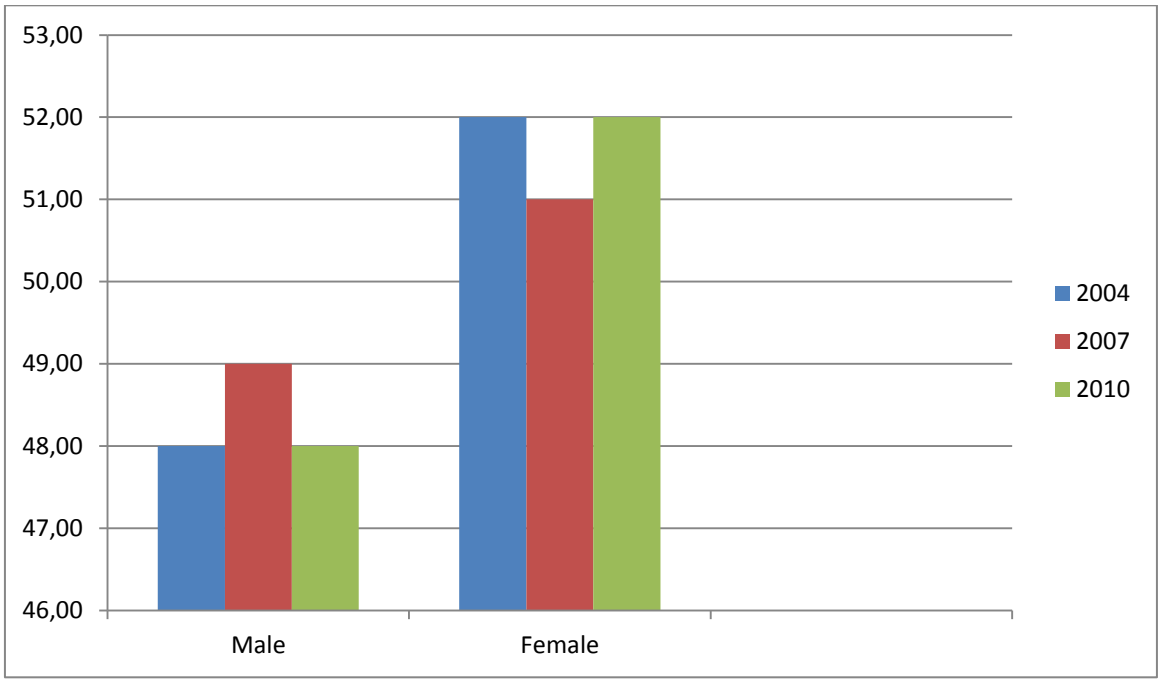
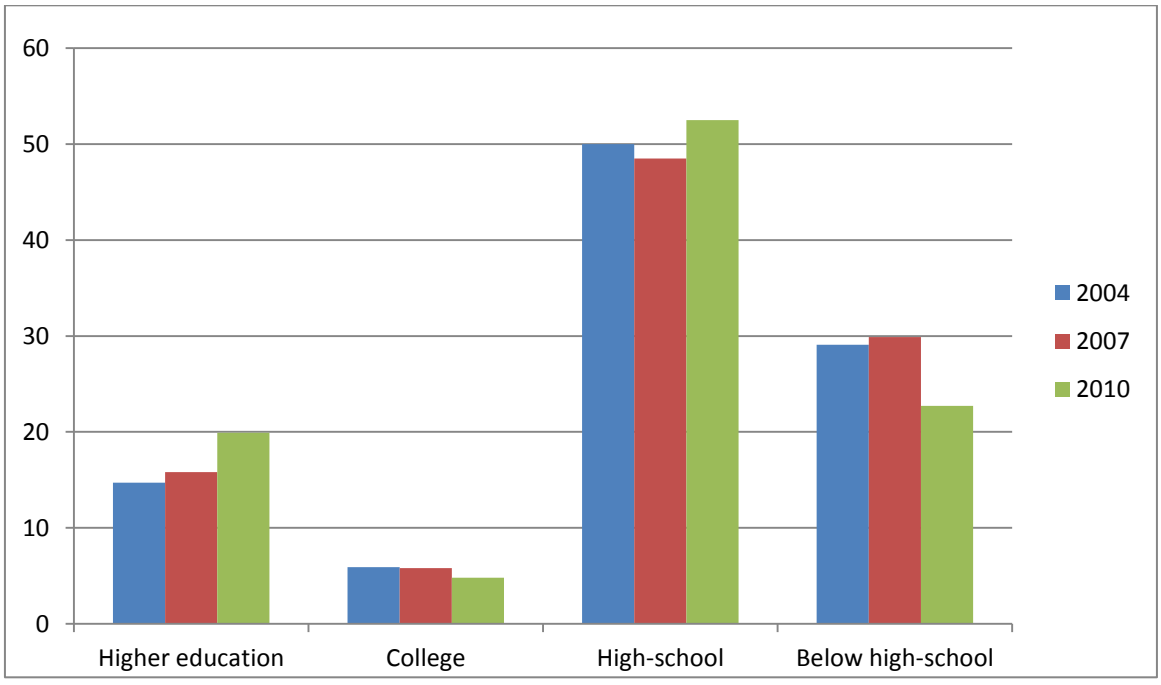


Figure 31: Respondents' level of education for 2004, 2007, 2010



Appendix III: Descriptive statistics of the four original corruption indicators used to calculate the composite corruption indicator

Composite corruption indicator:

corr = 0.25*PerCor_Q1+0.25*PerCor_Q2+0.25*PerCor_Q3+0.25*PerCor_Q4

Table 1: Descriptive statistics for *How widespread is corruption among public sector employees* 2004, 2007 and 2010 for the 26 NUTS level 3 regions included in the sample

	N	Minimum	Maximum	Mean	Std. Deviation
Mean score of region to How widespread is corruption among public sector employees_2004	26	45,00	78,48	63,8092	8,35753
Mean score of region to How widespread is corruption among public sector employees 2007	26	42,25	75,80	62,6508	9,23505
Mean score of region to How widespread is corruption among publi sector employees 2010	26	50,50	86,80	66,4538	9,12034
Valid N (listwise)	26				

Table 2: Descriptive statistics for *In order to solve a problem, how likely is a person to give money to a public employee* 2004, 2007, and 2010 for the 26 NUTS level 3 regions included in the sample

	N	Minimum	Maximum	Mean	Std. Deviation
Mean score of region to To solve a problem - money 2004	26	84,29	100,00	92,7473	5,50086
Mean score of region to To solve a problem - money 2007	26	52,44	91,20	68,1862	8,92912
Mean score of region to To solve a problem - money 2010	26	25,32	95,29	55,1088	16,30081
Valid N (listwise)	26				

Table 3: Descriptive statistics for *In order to solve a problem, how likely is a person to give a present to a public employee* 2004, 2007, and 2010 for the 26 NUTS level 3 regions included in the sample

	N	Minimum	Maximum	Mean	Std. Deviation
Mean score of region to To solve a problem - present 2004	26	85,15	100,00	92,4696	4,80820
Mean score of region To solve problem - present 2007	26	54,09	87,63	67,5450	8,09408
Mean score of region to To solve a problem - present 2010	26	16,63	95,29	56,6131	15,85903
Valid N (listwise)	26				

Table 4: Descriptive statistics for *In order to solve a problem, how likely is a person to do favour for a public employee* 2004, 2007, and 2010 for the 26 NUTS levels 3 regions included in the sample

	N	Minimum	Maximum	Mean	Std. Deviation
Mean score of region to To solve a problem - favour 2004	26	81,85	100,00	91,5242	5,20881
Mean score of region To solve problem - favour 2007	26	40,60	81,44	64,7719	9,62689
Mean score of region to To solve a problem - favour 2010	26	18,37	95,29	54,1858	16,10233
Valid N (listwise)	26				

Appendix IV: Multiple linear model of corruption on personal characteristics for the survey respondents

Unrestricted model full output

$$corr = \beta_0 + \beta 1 * age + \beta_2 * edu + \beta_3 * fam + \beta_4 * income + \beta_5 * sex + \beta_6 * DummyR1 +$$

$$\beta_7 * DummyR2 + \ldots\ldots + \beta_{26} * DummyR25 + \beta_{27} * DummyR26 + u$$

Results 2004

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,370[a]	,137	,085	11,73244

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11667,847	32	364,620	2,649	,000[b]
	Residual	73367,468	533	137,650		
	Total	85035,315	565			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	89,698	3,279		27,352	,000
	Age	-,009	,034	-,013	-,271	,787
	Years of education	-,621	,540	-,055	-1,149	,251
	Monthly household income /BGN/	,000	,002	,008	,150	,881
	Number of family members	,218	,400	,027	,544	,587
	Dummy sex /male/	,423	1,041	,017	,406	,685
	Dummy_Blagoevgrad	-,630	2,588	-,013	-,244	,808
	Dummy_Burgas	-4,301	2,853	-,071	-1,507	,132
	Dummy_Varna	,808	2,498	,016	,323	,747
	Dummy_VelikoTarnovo	-10,448	3,410	-,141	-3,064	,002
	Dummy_Vidin	-1,654	3,892	-,019	-,425	,671

	Dummy_Vratsa	-10,828	3,755	-,127	-2,884	,004
	Dummy_Gabrovo	-,884	3,703	-,010	-,239	,811
	Dummy_Dobritch	-6,607	3,272	-,095	-2,019	,044
	Dummy_Kardzhali	-,415	4,342	-,004	-,096	,924
	Dummy_Kyustendil	-6,228	3,780	-,073	-1,647	,100
	Dummy_Lovetch	3,624	6,124	,025	,592	,554
	Dummy_Montana	3,550	4,473	,034	,794	,428
	Dummy_Pazardzhik	5,515	3,346	,075	1,648	,100
	Dummy_Pernik	-2,195	3,418	-,029	-,642	,521
	Dummy_Pleven	-6,252	2,874	-,105	-2,175	,030
	Dummy_Plovdiv	-6,274	2,260	-,149	-2,776	,006
	Dummy_Razgrad	-10,943	3,536	-,143	-3,095	,002
	Dummy_Ruse	-2,524	2,502	-,050	-1,009	,314
	Dummy_Silistra	-11,517	3,156	-,178	-3,650	,000
	Dummy_Sliven	3,166	3,600	,040	,879	,380
	Dummy_Smolyan	3,625	4,456	,035	,813	,416
	Dummy_SofiaRegion	,811	3,892	,009	,208	,835
	Dummy_StaraZagora	-,288	2,860	-,005	-,101	,920
	Dummy_Targovishte	6,028	3,956	,068	1,524	,128
	Dummy_Haskovo	-1,385	3,132	-,021	-,442	,659
	Dummy_Shumen	-5,596	2,736	-,102	-2,045	,041
	Dummy_Yambol	-1,874	6,127	-,013	-,306	,760

a. Dependent Variable: Composite corruption index

Results 2007

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,358[a]	,128	,084	19,50443

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34959,718	32	1092,491	2,872	,000[b]
	Residual	237764,133	625	380,423		

	Total	272723,852	657			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	74,736	4,595		16,265	,000
	Age	-,041	,054	-,034	-,749	,454
	Years of education	-1,365	,810	-,069	-1,686	,092
	Household income in the last month /BGN/	7,452E-005	,000	,049	1,239	,216
	Number of family members	-1,726	,612	-,122	-2,821	,005
	Dummy sex /male/	-,053	1,572	-,001	-,034	,973
	Dummy_Blagoevgrad	12,251	4,129	,133	2,967	,003
	Dummy_Burgas	-5,643	4,182	-,059	-1,349	,178
	Dummy_Varna	-1,612	3,475	-,022	-,464	,643
	Dummy_VelikoTarnovo	11,018	4,540	,103	2,427	,016
	Dummy_Vidin	,957	5,400	,007	,177	,859
	Dummy_Vratsa	,752	5,136	,006	,146	,884
	Dummy_Gabrovo	9,128	5,415	,069	1,686	,092
	Dummy_Dobritch	-,106	4,509	-,001	-,023	,981
	Dummy_Kardzhali	1,718	5,107	,014	,336	,737
	Dummy_Kyustendil	8,180	5,693	,058	1,437	,151
	Dummy_Lovetch	-9,163	5,393	-,069	-1,699	,090
	Dummy_Montana	-20,702	6,898	-,118	-3,001	,003
	Dummy_Pazardzhik	1,171	6,165	,008	,190	,849
	Dummy_Pernik	19,254	5,873	,132	3,279	,001
	Dummy_Pleven	-3,355	4,431	-,033	-,757	,449
	Dummy_Plovdiv	-,294	3,472	-,004	-,085	,933
	Dummy_Razgrad	-7,048	6,931	-,040	-1,017	,310
	Dummy_Ruse	-1,220	4,251	-,012	-,287	,774
	Dummy_Silistra	-5,169	6,600	-,031	-,783	,434
	Dummy_Sliven	8,481	4,594	,080	1,846	,065
	Dummy_Smolyan	9,727	10,081	,037	,965	,335
	Dummy_SofiaRegion	13,199	5,406	,100	2,442	,015
	Dummy_StaraZagora	-2,279	3,804	-,027	-,599	,549

	Dummy_Targovishte	10,180	6,403	,064	1,590	,112
	Dummy_Haskovo	11,852	6,701	,071	1,769	,077
	Dummy_Shumen	6,423	4,711	,058	1,364	,173
	Dummy_Yambol	17,114	5,588	,125	3,063	,002

a. Dependent Variable: Composite corruption index 2007

Results 2010

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,460[a]	,211	,167	22,46980

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	72976,819	30	2432,561	4,818	,000[b]
	Residual	272641,695	540	504,892		
	Total	345618,514	570			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	68,153	6,782		10,050	,000
	Age	-,071	,066	-,050	-1,079	,281
	Years of education	-,563	1,005	-,025	-,560	,576
	Monthly household income /BGN/	,003	,003	,051	1,012	,312
	Number of family members	-,028	,884	-,002	-,032	,975
	Dummy sex /male/	4,070	1,966	,082	2,071	,039
	Dummy_Blagoevgrad	-9,982	5,196	-,106	-1,921	,055
	Dummy_Burgas	-5,492	5,305	-,055	-1,035	,301
	Dummy_Varna	5,642	4,866	,065	1,159	,247
	Dummy_VelikoTarnovo	14,989	5,942	,122	2,522	,012
	Dummy_Vratsa	-7,730	5,673	-,069	-1,363	,174
	Dummy_Gabrovo	-9,448	8,184	-,050	-1,154	,249
	Dummy_Dobritch	-6,693	6,570	-,048	-1,019	,309

Dummy_Kardzhali	5,894	9,660	,026	,610	,542
Dummy_Kyustendil	-4,607	8,148	-,025	-,565	,572
Dummy_Lovetch	15,162	8,423	,077	1,800	,072
Dummy_Montana	-19,431	7,110	-,122	-2,733	,006
Dummy_Pazardzhik	-,459	6,143	-,004	-,075	,940
Dummy_Pernik	-28,753	7,250	-,174	-3,966	,000
Dummy_Pleven	-5,825	6,116	-,046	-,952	,341
Dummy_Plovdiv	-6,656	5,146	-,070	-1,294	,196
Dummy_Razgrad	-13,435	8,862	-,064	-1,516	,130
Dummy_Ruse	-2,460	5,348	-,024	-,460	,646
Dummy_Silistra	-11,186	6,810	-,079	-1,643	,101
Dummy_Sliven	-5,553	8,032	-,030	-,691	,490
Dummy_Smolyan	31,570	7,582	,184	4,164	,000
Dummy_StaraZagora	-2,221	5,285	-,023	-,420	,674
Dummy_Targovishte	-17,630	6,709	-,122	-2,628	,009
Dummy_Haskovo	-29,484	7,217	-,185	-4,085	,000
Dummy_Shumen	-23,171	6,816	-,155	-3,399	,001
Dummy_Yambol	-15,144	6,816	-,102	-2,222	,027

a. Dependent Variable: Composite corruption index 2010

Appendix V: Simple linear regression, GDP on perceived levels of corruption for the 26 NUTS level 3 regions

Results 2004

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,294[a]	,086	,048	328,86122

a. Predictors: (Constant), Composite corruption indicator 2004

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	244791,797	1	244791,797	2,263	,146[b]
	Residual	2595592,818	24	108149,701		
	Total	2840384,615	25			

a. Dependent Variable: GDP in EUR per inhabitant 2004

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3753,514	1113,713		3,370	,003
	Composite corruption indicator 2004	-19,702	13,096	-,294	-1,504	,146

a. Dependent Variable: GDP in EUR per inhabitant 2004

Results 2007

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,183[a]	,034	-,007	579,73035

a. Predictors: (Constant), Composite corruption indicator 2007

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	280059,181	1	280059,181	,833	,370[b]

	Residual	8066094,665	24	336087,278		
	Total	8346153,846	25			

a. Dependent Variable: GDP in EUR per inhabitant 2007

b. Predictors: (Constant), Composite corruption indicator 2007

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3798,090	1074,134		3,536	,002
	Composite corruption indicator 2007	-14,820	16,235	-,183	-,913	,370

a. Dependent Variable: GDP in EUR per inhabitant 2007

Results 2010

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,444[a]	,197	,164	649,10273

a. Predictors: (Constant), Composite corruption indicator 2010

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2486821,787	1	2486821,787	5,902	,023[b]
	Residual	10112024,367	24	421334,349		
	Total	12598846,154	25			

a. Dependent Variable: GDP in EUR per inhabitant 2010

b. Predictors: (Constant), Composite corruption indicator 2010

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	1658,742	633,087		2,620	,015
	Composite corruption indicator 2010	25,936	10,676	,444	2,429	,023

a. Dependent Variable: GDP in EUR per inhabitant 2010

Appendix VI: Selected results including capital region Sofia**:** Simple linear regression of GDP on perceived corruption 2010 for 27 NUTS level 3 regions

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,295[a]	,087	,050	1703,94951

a. Predictors: (Constant), Composite corruption indicator 2010

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6905753,671	1	6905753,671	2,378	,136[b]
	Residual	72586098,181	25	2903443,927		
	Total	79491851,852	26			

a. Dependent Variable: GDP in EUR per inhabitant 2010

b. Predictors: (Constant), Composite corruption indicator 2010

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	971,824	1655,297		,587	,562
	Composite corruption indicator 2010	42,853	27,786	,295	1,542	,136

a. Dependent Variable: GDP in EUR per inhabitant 2010

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