

Received:
15 October 2018
Revised:
22 November 2018
Accepted:
18 January 2019

Factors for adoption of EU funds in Bulgaria

Cite as:
Elena Kalfova. Factors for adoption of EU funds in Bulgaria.
Heliyon 5 (2019) e01150.
doi: [10.1016/j.heliyon.2019.e01150](https://doi.org/10.1016/j.heliyon.2019.e01150)



Elena Kalfova*

Public Administration Department, Sofia University "St. Kliment Ohridski", 125 Tzigradsko Shoes Bld., Bl 4, Sofia, Bulgaria

* Corresponding author.

E-mail address: elena_kalfova@phls.uni-sofia.bg (E. Kalfova).

Abstract

The main purpose of the current analysis is to evaluate the effect of multiple factors (including impact of the quality of governance) upon implementation of Regional policy in Bulgaria and more precisely upon absorption of structural and investment transferred funds. The methodology used is in line with the relatively recent trend in research that attempts to measure the “quality of governance” (as a complex quantitative concept) and its impact on various aspects of public governance and public policies and on the implementation of EU regional policy in particular. In order to reach the main goal of the study a regression equation was constructed and was applied to multiple linear regression build at two levels – national and regional (NUTS II).

This study aims to test the hypothesis that the quality of governance in Bulgaria has significant impact on implementation of EU Regional policy in Bulgaria. We argue that improving the quality of governance results in decreasing the deviations among regions in absorbing support from structural funds.

Keyword: Political science

1. Introduction

The topic of the factors that influence the efficiency of EU regional policy has been explored by many scientists since this is an important question for political stakeholders. The size and effectiveness of Regional policy has a decisive influence on

the development of many local economies in the EU. Studies that cover the topic quite often point out economic factors like size of the funding, administrative requirements for receiving the funds, sector specifics, and the region's convergence. Those factors can be grouped as economic: ones that are tightly focused on the main characteristics of the EU financial instruments. But there is also another tendency within scientific tradition. Non-economic factors like corruption of the local administration, lack of skills, etc. that can be labelled as quality of governance.

For 30 years, there have been three key approaches to stimulating economic development, namely investment in infrastructure, investment in education and training, and stimulating innovation. Regional policies, including those of the EU, are primarily national states' efforts. Following this approach, they have long ignored the influence of the institutional system and its local specifics on the quality of policies applied. It is believed that the bottom-up approach is sufficient to achieve growth followed by development (Pike et al., 2006). Hence, the same development strategies are being applied in all EU countries and regions despite the widely proclaimed subsidiarity principles (Rodríguez-Pose, 2013, 1034).

Research over the past twenty years has changed that direction. Numerous analyses of the EU's regional policy reached contradictory conclusions on the results of its implementation. Some researchers are suggesting that regional policy has no impact on development due to lack of convergence of regional income, nor does it lead to accelerating growth in the regions that are lagging behind (e.g. Boldrin and Canova, 2001; De Freitas et al., 2003; Dall'Erba and Le Gallo, 2007), some believe it has a significant positive impact by reporting a convergence at national level (e.g. Cappelen et al., 2003; Beugelsdijk and Eijffinger, 2005), and some consider that the impact is limited (e.g. Bussolletti and Esposti, 2004; Bouvet, 2005).

The controversial results of an impact assessment of the EU regional policy point to another essential aspect – the institutional factors. There is a growing scientific consensus in the social sciences that institutions are important for economic development. For more than a century many scholars have emphasized the importance of institutions for the efficiency of public governance and economic development (Weber, 1921; Granovetter, 1973; Coleman, 1988). Studies by various social sciences argue that long-term economic achievements are often the result of institutional activity rather than alternative economic factors (North, 1990; Putnam, 1993; Amin and Thrift, 1994; Amin, 1999; Rodrik et al., 2004). There is also an opinion that institutions and the quality of public governance have a crucial importance for development, similar to that of traditional economic factors such as physical resources and human capital (e.g. Hall and Jones, 1999; Vijayaraghavan and Ward, 2001; Rodrik et al., 2004). Institutions not only define the regulatory framework but also create incentives for economic activities which makes them a determining factor for the economic performance and reduces the risk of social and

political instability. In addition, by reducing uncertainty and the cost of access to information, institutions support the process of knowledge transfer and innovation within and between regions. They also improve the economic activity development conditions and help regions to adapt to the constantly changing economic environment. In other words, the link between the process of public policy making and the institutional system is bilateral. On the one hand, public policies are expected to not only ensure economic development, but also improve the institutional environment itself. On the other hand, the institutional environment predetermines the quality of public policies (Rodríguez-Pose, 2013).

Within the theoretical tradition of Adam Smith, Milton and Rose Friedman and Michael Walker it is assumed that economic freedom is based on the concept of self-ownership. Because of this self-ownership, individuals have the right to choose—to decide how to use their time and talents to shape their lives, but they do not have a right to the time, talents, and resources of others (Gwartney et al., 2018, p. 2). That gives additional reasoning and theoretical perspective on the influence of the public institutions on economic development. In this way the influence of the public governance and public policy is a subject of measurement in Economic Freedom of the World index (EFW). From that perspective the value for Bulgaria for 2018 is 7,41 that puts the country in the second group of countries according to the degree of economic freedom (Gwartney et al., 2018).

The main problem, also in many EU regions, remains the availability of adequate, stable and effective institutions.

The argument that the quality of governance is a key factor in the efficiency of public policies has also been adopted by the EU in the implementation of Regional policy. Although all EU Member States have adopted the so-called *Acquis Communautaire*, it is clear that the functioning of these official institutions varies greatly in individual countries, especially in the case of Central and Eastern Europe. This leads to significant differences in the quality of official institutions in the EU, and more specifically of informal institutions, where corruption and clientelism are still serious barriers to full establishment of the rule of law in many countries of Central and Eastern Europe (Guasti and Dobovsek, 2011). Moreover, the quality of governance at regional and local level is a key element in multi-level governance. Regional and local levels play a significant role in coordinating the activities relating to design and implementation of public policies, improving the delivery of public services and ensuring that local needs and specificities are presented and taken into account. All this could be a major obstacle to the efficient absorption of EU structural and investment instruments in individual countries and regions.

The importance of the quality of governance and its national and regional specifics is the topic that influences significantly the debate about the future strategy of financial aid in the EU for the period 2021–2027. As a result there is a proposal of the EC that

aid be granted conditionally – according to the level of fulfilling *Acquis Communautaire* and the rule of law (Reflection Paper on the Future of EU Finances). At that point of time the member countries support that proposal. Selection of clear and applicable criteria for measuring the fulfillment of *Acquis Communautaire* is a serious challenge that is currently far from being resolved.

Choosing the proper criteria for access of the regions to EU structural funds undoubtedly is a complex topic. For the moment GDP per capita is the crucial one but obviously it can be enriched by adding additional criteria like level of poverty, level of infrastructure development, level of the human capital, social capital etc. including the quality of governance. As evidence for that logical further step is the proposal to use the European Social Progress Index as access criteria for EU funding (Jouen, 2016).

These conclusions give us reason to believe that studying the influence of multiple factors (including quality of governance) in the implementation of Regional policy in the Central and Eastern European countries gives new opportunities to reveal the specifics of this process.

2. Methodology

2.1. Quality of governance – definition and measurement

Among all the factors that can influence regional policy, quality of governance is the one that needs more clear definition. Despite the fact that the concept of “quality of governance” is widely used, there is no consensus on how to define it. Often the quality of governance is perceived as lack of corruption. Despite the essential importance of this factor, this is a rather limited understanding because the lack of corruption does not guarantee, in all cases, the achievement of public objectives and the protection of public interest. From an economic perspective good governance is often defined as good for economic development. This definition is also quite limited because it leaves out important issues such as democratic governance, the trust of citizens in institutions and achievement of social goals (Smeriglio et al., 2015).

The most commonly used definition of good governance has been developed by Kaufmann, Kraay and Mastruzzi: “The process by which institutions are selected, monitored and replaced, the capacity of institutions to effectively formulate and implement public policies, and the trust of citizens in the institutions that govern economic and social interactions among them” (Kaufmann et al., 2009). Based on this definition, the following dimensions of good governance can be distinguished: elements relating to access to power, namely publicity, transparency, accountability of governance; elements pertaining to the exercise of power, namely government

efficiency, quality of regulations; rule of law and control of corruption (Smeriglio et al., 2015).

Although these individual measures are theoretically different, they tend to be heavily linked. The main theoretical prerequisite for this strong correlation lies in their common theoretical basis: impartiality in the treatment of the citizens, and impartiality in the treatment of economic entities. But the quality of governance and its subcomponents cannot be measured directly. The act of corruption is illegal, hence it is difficult to be studied directly, whereas impartiality is difficult to assess by simply analysing the legal framework. This requires their study through indirect indicators on the achievements of good governance, namely expert evaluations, research among citizens, companies and NGOs, etc (Charron, 2016).

To summarize, despite the numerous methodological difficulties and constraints, the number of studies on quality of governance is steadily growing. The debate on indicators that are appropriate to use in such evaluations is ongoing. However, four main ones can be identified, on which there is a relative consensus among the scientific community. These are: corruption, efficiency of governance and regulations, rule of law and responsibility and stability of democratic institutions.

In recent years, a number of studies have paid special attention to the impact of quality of governance on the Regional policy, and more specifically on the absorption of resources of its core instruments – the structural funds. An analytical approach is widely applied to aggregate data on EU structural funds' transfers, performance data – mostly macroeconomic indicators and data on quality of governance. The main conclusion is that the structural funds are conditionally efficient – where a high level of quality of governance is available, economies are able to benefit thereof, while in case of a lower level of quality of governance, the benefits are few (e.g. Rodriguez-Pose and Garcilazo, 2015; Tosun, 2014; Ederveen et al., 2006).

A number of international organizations, above all the World Bank, have a leading role in creating, using and maintaining indicators on the quality of public governance. The most used ones are composite indicators that summarize a large amount of data and apply to a significant number of countries. The World Governance Indicators (WGI), created by Daniel Kaufmann in 1996, are among the most widely-used indicators (Kaufmann et al., 1999).

Recently, the European Quality of Government Index (EQI) based on data from corruption and regional governance surveys carried out in 2010, and then again in 2013 and 2017, has been gaining popularity. The results of the implementation of this index lead to the conclusion that there are significant differences in the quality of governance in the EU, both between individual countries and individual regions (NUTS II). EU Member States can be divided into four clusters. The first one includes the Nordic EU countries, namely Scandinavia, the UK, Ireland, the

Netherlands and the German states. The second one consists mainly of the countries of southern Europe and two Eastern European countries, namely Estonia and Slovenia. The third one includes mostly EU10 Member States in Central and Eastern Europe, Cyprus and Malta, as well as two Western European countries – Italy and Greece. The fourth one consists of Bulgaria and Romania that have the lowest levels of QoG of all four groups. The indicators for different regions vary considerably for some countries – Italy, Belgium and Spain, while for others, such as Denmark, Slovakia, Poland and Austria, the differences are minor (Charron, 2016).

These studies are particularly important as they provide empirical evidence showing that the functioning of official institutions varies considerably across different EU Member States. They also show the differences at regional level – those between regions of different countries and within one and the same country. This gives us grounds to focus our study on the quality of governance at regional level.

2.2. Hypothesis

This study aims to test the hypothesis that the quality of governance in Bulgaria has significant impact on implementation of EU Regional policy in Bulgaria. We argue that improving the quality of governance results in decreasing the deviations among regions in absorbing support from structural funds.

2.3. Study methodology

Based on the methodological approaches presented above, we apply multiple linear regression as a method of assessing the influence of the quality of governance in the implementation of the Regional policy in Bulgaria. This allows us to explore the effect of multiple independent variables related to the quality of governance. The analysis is done at two levels – at national level and at NUTS II level. There are two reasons for this multiple level analysis. First, within the multilevel system of governance of EU Regional policy, the quality of institutions is essential at every level of governance. Second, in the case of Bulgaria, at NUTS II level there is no equivalent administrative territorial unit but only statistical regions. The system of regional policy is highly centralized at central government level, with some exceptions on district level governance powers (Kalfova, 2015, p. 85–89).

These reasons make it necessary to implement two separate regression models: at national level and at NUTS II level. They all have a similar design. The dependent variable is the European funds absorbed (standard deviation among districts), and as independent variables are taken both macroeconomic data for development and a composite indicator reflecting the quality of governance.

We believe that defining the deviation of structural funds absorbed as a dependent variable is the most appropriate approach. There are at least two reasons for this

choice. Structural and investment funds are the main instrument of EU Regional policy and the absorption of this funding is seen as an essential indicator for the successful implementation of Regional policy. In addition, a large part of the measures under these programs are implemented at regional level, which allows us to adequately assess the quality of governance at the regional level. The dependent variable (EU absorbed funds) is constructed from the total base of all realized projects in the period 2007–2017. In the case of Bulgaria all regions on NUTS I level are eligible for Target 1, which allows us to use and aggregate data from all Operative programs. Given the complex methodology of the study (multiple regression) several data transformations have been made illustrated in the following Fig. 1:

It is important to point out a few more important features in constructing the dependent variable. All projects in the period 2007–2017 are classified based on **the location of the project** – on the territory of which district (NUTS 3) they are located. This makes it possible (through Unified Classification of Administrative-Territorial and Territorial Units) to correctly classify and aggregate the projects according to the higher levels of governance: NUTS II level and national level. In this way, the effect of the structural funds on specific regions is localized. It is also important to notice that **excluded are all projects where the beneficiary is the state** or state structures and enterprises. There are two main arguments for this solution. First, most of the projects where the beneficiary is the state are at national level and cannot really be located to any region (administration training, motivation, systems, etc.). Even with specific cases of possible regional localization of the project (highways, roads, museums, parks, etc.), this is difficult to accept because the projects are focused on deliverables with national importance and it is impossible to attribute them to the region in which they are located alone. Absorbed funds **at national level and NUTS II level are aggregated by standard deviation**. For each year standard deviation between districts regarding EU funds absorbed is calculated. Standard

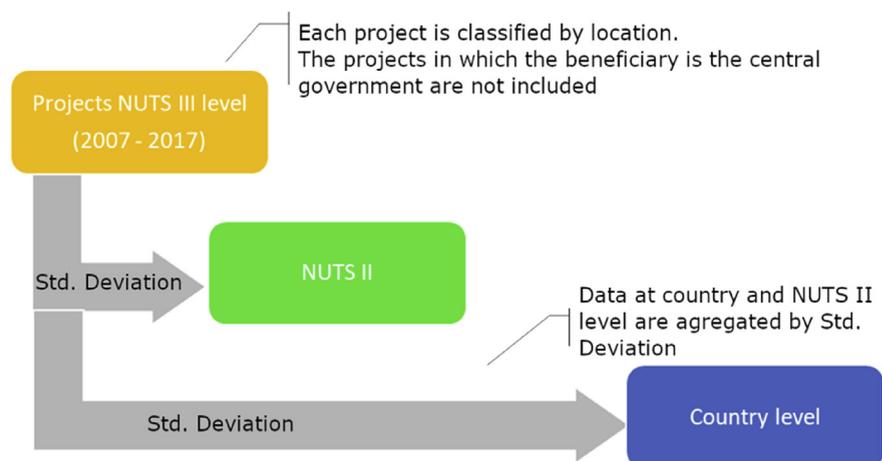


Fig. 1. Dependent variable calculation.

deviation represents differences between average at national level and disbursed amounts at each district. The following equation is used:

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{(n - 1)}}$$

The reason for that is the assumption that if the efficiency of the regional policy is improving, the standard deviation between regions for absorption of EU funds should be decreasing. Decreasing the discrepancies between regions is one of the main goals of the Regional policy. That is the reason why the Standard deviation is accepted as the most appropriate indicator for regional policy efficiency, compared to the sum of funding absorbed. Based on this assumption it is calculated that there are 10 Standard deviations (each per year) and they are used as a dependable variable in the regression equation at national level.

A main type of **independent variable** uses a couple of composite indexes for the quality of governance: Worldwide Governance Index (WGI) and European Quality of Governance Index (EQI). Using more than one type of variable (one per regression) actually increases the verification of the result. The data for these variables are used in the following timeslots:

- WGI – data on country level for the period 2008–2017
- EQI – data on NUTS 2 level for only three years (2010; 2013 and 2017)

Those indexes are selected because of a few reasons. First of all those are the most widely used indicators of quality of governance: WGI is the most widely used index that was applied for a significant period of time. It fully covers the period of years of the independent variable. EQI was widely used in the EU in recent years. The key advantage of the index is that it is calculated not only on country level but also on a regional level. This is a key advantage of the index that makes it appropriate to be used in the current study. By using it we can assess the quality of governance at NUTS II level.

A second type of independent variable uses macroeconomic data for regional development (quality of the road surfaces; density of population; level of education system; medical services, etc.).

Macroeconomic variables are important in the analysis since part of them are criteria for choosing Bulgarian regions to receive EU funds (GDP per capita). But the most important reason is that the macroeconomic variables represent the overall economic development of the companies and institutions. They are indicators of the economic activities of private companies and state institutions. Since the projects granted using EU funding are initiated by private and government organizations it is important to track the common indicators of the economic and social development. The mix of

economic and social indicators represent the overall activities of the beneficiaries of the EU funds. Without taking into account the overall economic and institutional development of the beneficiaries it is impossible to understand the behaviour of the applying organizations. EU funds are not the only reason that the companies and institutions apply for aid. Overall activities' potential of the companies and institutions (or rather potential for proactive economic/public behaviour) embedded in macroeconomic variables is an important trigger for absorbing EU funds. From a certain perspective these are the “internal” reasons for the companies to apply. Also, there are “external” reasons (like quality of governance) that shape the process of EU funds absorption – which is the main hypothesis tested in this study.

Macroeconomic variables used are shown in [Table 1](#):

Data is collected from [National Statistical Institute of Bulgaria](#) and are generated on the NUTS III level. The big advantage is that data are available (in most of the cases) for the period 2008–2017.

To get a better understanding of the macroeconomic variables in [Table 2](#) descriptive statistics of the variables for the period 2008–2017 are shown. Since these are time series data descriptive statistics give a better understanding of the variables distribution within the period.

Table 1. Macroeconomic variables.

Code	Variable	Description
M1	GDP per capita	GDP per capita on district level (NUTS3)
M2	Relative share of the population living with material deprivation (%)	Share of population living in material deprivation among the whole population.
M3	Relative share of population aged 25–64 with higher education (%)	Share of the population with higher education among people aged 25–64.
M4	Unemployment (age > 15)	Share of unemployed people among population above 15 years.
M5	Quality of the road surface, percentage in good condition	Share of the roads with good surface quality among total length of roads for each NUTS3.
M6	Density of population (#/km ²)	Number of people per square meter
M8	Number of teachers in primary and secondary education per 1,000 pupils	Number of teachers per 1,000 pupils for each NUTS3.
M9	Number of people served by one general practitioner	Average number of people served by one general practitioner in a NUTS3 district.
M10	Number of beds in the hospitals per 1,000 people	Average number of beds that can service 1,000 people in the district.
M11	Disclosed crimes against the person and property of those registered during the year	Share of disclosed crimes among all registered crimes.
M12	Foreign direct investment in non-financial corporations	The amount of Foreign direct investment for a given district.

Source: National Statistics Institute data.

Table 2. Macroeconomic variables – descriptive statistics for the period 2008–2017 (NUTS 3 level).

	Minimum	Maximum	Mean	Std. Dev.	Skewness	Kurtosis	
	Stat.	Stat.	Stat.	Stat.	Std. Error	Stat.	
GDP per capita	4785,0	26690	8038,9	3616,0	3,32	,163	12,46
Relative share of the population living with material deprivation (%)	11,30	76,3	41,3	12,1	,164	,153	–,045
Relative share of population aged 25–64 with higher education (%)	8,9	51,4	20,5	6,4	2,393	,163	7,901
Unemployment (age > 15)	1,5	28,8	11,4	5,3	,576	,153	,211
Quality of the road surface, percentage in good condition	14,9	82,5	40,8	12,9	,698	,177	,992
Density of population (#/km ²)	696,5	4936,7	1575,4	858,3	2,007	,153	4,929
Number of teachers in primary and secondary education per 1,000 pupils	63,9	106,3	75,0	6,2	1,337	,187	4,240
Population served by one general practitioner	1216,3	2461,3	1642,5	286,2	1,126	,187	,706
Number of beds in the hospitals per 1,000 people	2,2	7,4	4,2	1,1	,550	,187	,188
Disclosed crimes against the person and property of those registered during the year	25,8	73,6	48,5	11,6	,099	,153	–,936
Foreign direct investment in non-financial corporations	64,5	10051	1586,8	1900,3	2,736	,163	8,109

Source: National Statistics Institute data.

3. Background

In this section the main specifics of the variables used in the regression equations are described but what is left out is the description of the regional discrepancies in Bulgaria.

Absorption of structural funds in Bulgaria is quite uneven compared both on a territorial level and in time. In the beginning of the period under study the volume of absorbed funds is significantly lower than later. Most probably lack of experience in the Bulgarian administration was the main reason for that. The peak of absorbed funds is in the period 2011–2013. From a territorial perspective the following districts are most successful: Sofia (the capital); Plovdiv and Bourgas (Fig. 2).

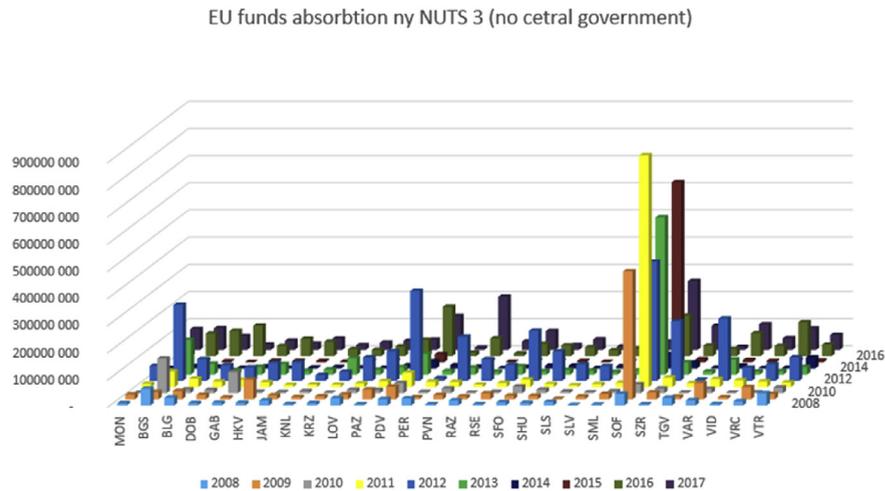


Fig. 2. EU funds absorption 2008–2017. Source: [Information system for governance and monitoring of EU funds in Bulgaria](#); own calculation.

3.1. Worldwide Governance Index

WGI is a composite index of six different indexes and the data comes from close to 30 sources. Data are generated through interviews with different social groups (entrepreneurs; citizens, workers). WGI indicators are described in [Table 3](#).

The first four sub-indexes are most relevant for the evaluation of the quality of governance in the current study. We adopt this approach because we believe that those exact spheres of governance in Bulgaria still encounter difficulties and still need improvement. In addition those sub-indexes indicate better efficiency in managing EU programs. The analysis of data clearly shows that bigger progress in Bulgaria is available in Regulatory quality. Positive development is also available (but not so extensively) in Governance effectiveness. Unlike the Rule of Law and Control of Corruption where improvement doesn't show progress. Data dynamics are shown in [Fig. 3](#).

3.2. European Quality of Government Index (EQI)

EQI is based on large-scale and representative surveys conducted on a regional level (NUTS 2). Three phases have been initiated (2010; 2013; 2017). For the purposes of the current analysis data from all the phases has been used.

[Fig. 4](#) shows the dynamics of the index both on regional and country level. EQI has significant drop-down on country level and NUTS II level as well. The only exception is the North Central region (“Severen Tsentralen”) that marks significant improvement. Moderate improvement is available for South West region (“Yugozapaden”) for 2017 (compared with 2013) but still lags the 2010 data.

Table 3. Worldwide governance indicators.

WGI indicator	Description
Government effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Regulatory quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Control of corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.
Voice and accountability	Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
Political stability and absence of violence/terrorism	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.

Source: [Worldwide Governance Indicators \(WGI\) project](#).

3.3. Macroeconomic data on district level

National specifics of regional development can also be revealed through indirect measures of economic proactivity of public and private companies – macroeconomic indexes. Although as was mentioned above, it is assumed that the increased number of motorways, hospitals, density of population, etc. exemplifies economic activities of the players that results in increasing or decreasing regional development.

Another advantage of the macroeconomic data on a regional level is that it exemplifies the regional discrepancies (at NUTS III level). To show this, in [Fig. 5](#) it was calculated the average value from the last five years for each of the parameters (in most of the cases for the period 2012–2016). The idea is to show the differences between districts in historical aspect, not just as a current situation. As can be seen the capital (Sofia) shows significantly higher development compared with the other

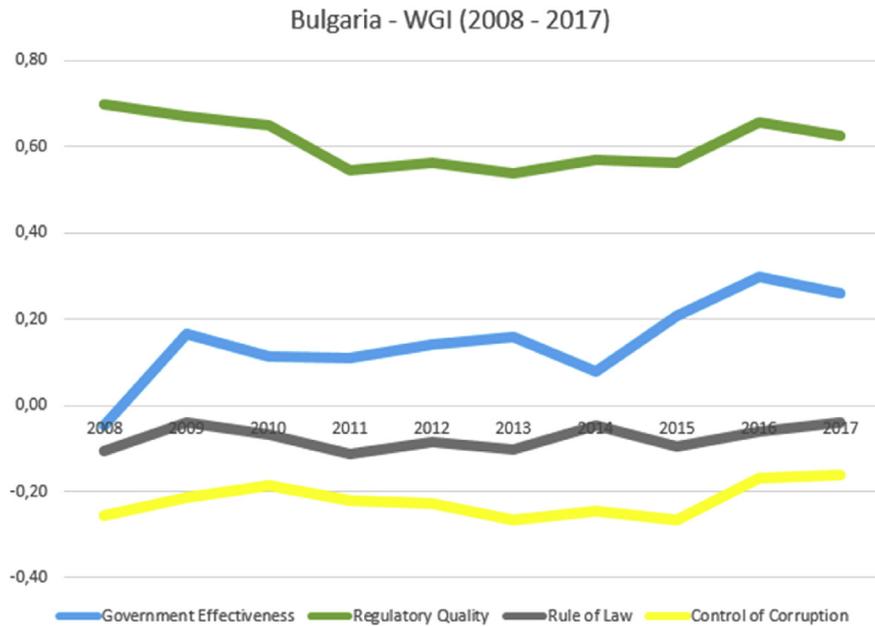


Fig. 3. Worldwide governance indicators for Bulgaria. Source: Worldwide governance indicators.

districts, which is one of the main sources of evidence for unequal development at a regional level. The other districts that show significant growth (but lower than the capital) are: Plovdiv, Bourgas, Blagoevgrad, Kardzhaly, Sliven. On the opposite end of the development scale are Dobrich, Vidin, Vratza.

Another alternative way to show the district discrepancies (on a more abstract level) is using the Multiple Correspondence Analysis. The output of multiple scaling is two dimensional space (as a result of statistical transformation of the input data in order to calculate Euclidian space between objects) that visualize the distance between districts but based on the common distances within all 12 macroeconomic indexes.

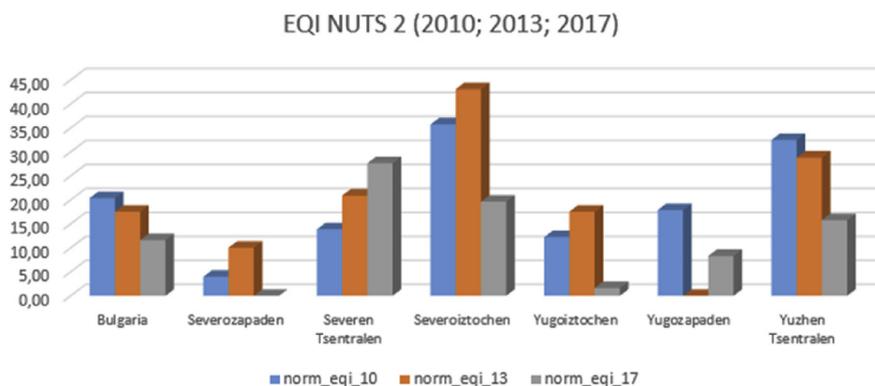


Fig. 4. European quality of governance index (EQI). Source: QoG EQI Data (Charron et al., 2013, 2015).

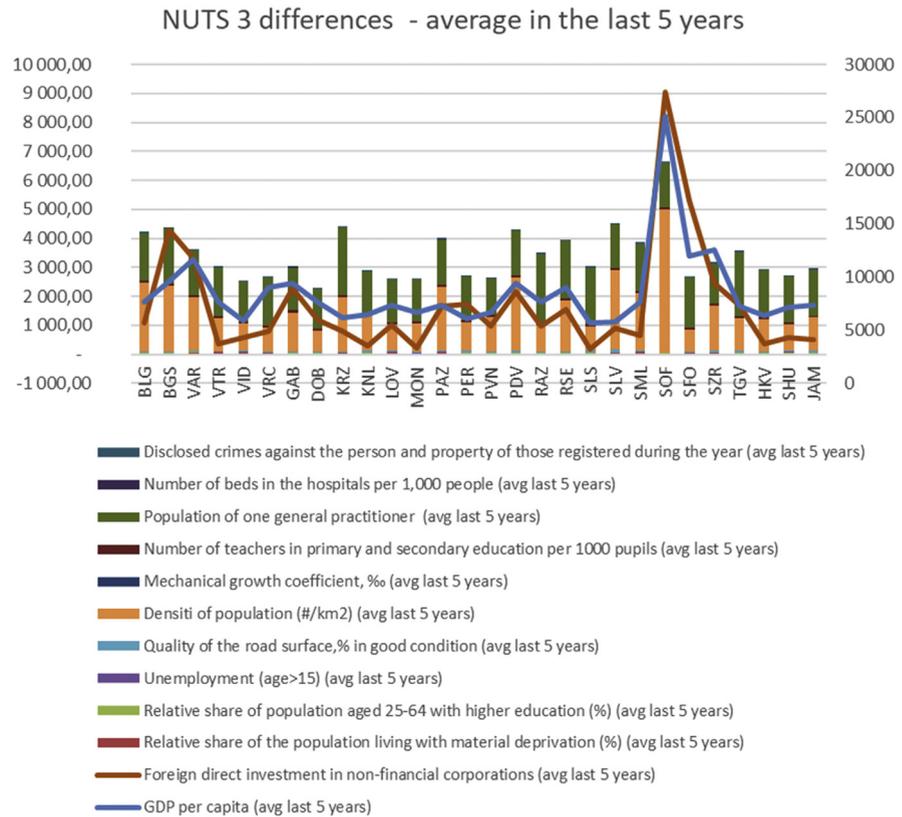


Fig. 5. NUTS 3 differences by macroeconomic variables. Source: own calculations based on National Statistics Institute of the Republic of Bulgaria data.

The result of the multiple correspondence analysis is visualization (Fig. 6) of the distances between 28 districts (calculated on data from macroeconomic indexes last five years average value). The figure above shows plane with three clearly distinguished “centres”: Sofia (capital), Varna and Bourgas (the most developed cities after the capital) and on the third cluster we have a group of small and less developed districts (Sliven, Smolyan, Rargrad, Vratza). This visualization reveals clearly the real discrepancies between districts’ development: on one side of economic and social development we have the biggest cities with increasing economic growth (Bourgas and Varna), while at the other end we can see districts with small and vastly depopulating cities with high migration abroad or to the biggest cities. The capital (due to extraordinary concentration of population, investments and administration) is the third “dimension” of the regional development that is outside of the logic “big versus small” cities.

To picture the regional discrepancies in Bulgaria is actually the area of main research interest in the current study: to what extent the quality of governance really influences closure of the gaps between districts (by absorbing EU funding)?

Multiple Correspondance Analysis (NUTS3) - 12 macroeconomic variables

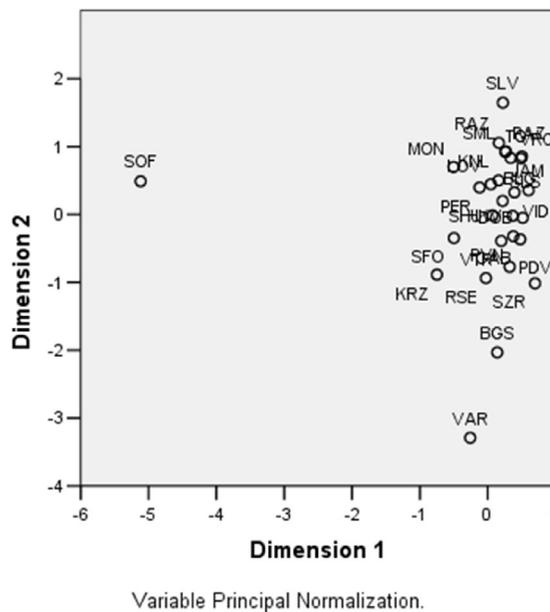


Fig. 6. NUTS 3 differences — all macroeconomic variables into single plane. Source: own calculations based on National Statistics Institute of the Republic of Bulgaria data.

4. Analysis

4.1. Country level linear regression: impact of quality of governance at national level

The results of linear regression at country level shows significant linear dependency between one of the WGI indexes and the absorbed structural funds for the period 2008–2017 (Table 4).

Before explaining the results of the regression model it is important to describe in more detail the approach applied:

- The number of observations is 10. Each row in the equation represents one year of data at national level. Since the data is for the period 2008–2017 there are ten observations;
- Dependent variable is EU funds absorbed at Country level. The value of the independent variable represents the standard deviation among EU funds absorbed at NUTS 3 level. Since the database from the EU project is aggregated on the lowest possible administrative level “oblast”/district (NUTS3), standard deviation among all projects represents country level standard deviation regarding absorption of EU funds. The higher the standard deviation is the higher the regional discrepancies are.

Table 4. Impact of quality of governance at national level.

Variables	Model 1 Beta In (Sig.)	Model 2 Beta In (Sig.)	Model 3 Beta In (Sig.)	Model 4 Beta In (Sig.)
(Constant)	(,015)*	(,371)	(,257)	(,015)*
WGI regulatory quality	−,669 (,035) *			−,669 (,035) *
WGI government effectiveness				,169 (,561)
WGI rule of law				−,248 (,415)
WGI control of corruption				,082 (,804)
WGI voice and accountability	,507 (,191)			,507 (,191)
WGI political stability and absence of violence/terrorism	,197 (,527)	−,644 (,335)		,197 (,527)
GDP per capita (StDEV)	−,160 (,732)			
Relative share of the population living with material deprivation (%) (StDEV)				
Relative share of population aged 25–64 with higher education (%) (StDEV)		−1,959 (,233)	−1,099 (,149)	
Unemployment (age > 15) (avg YOY change last 5 years)			,286 (,719)	
Quality of the road surface,% in good condition (StDEV)		−,366 (,702)	−,980 (,236)	
Density of population (#/km ²) (StDEV)	−,274 (,465)			
Number of teachers in primary and secondary education per 1,000 pupils (StDEV)		−,124 (,863)		
Population served by one general practitioner (StDEV)		,501 (,461)		
Number of beds in the hospitals per 1,000 people (StDEV)		,444 (,713)		
Disclosed crimes against the person and property of those registered during the year (StDEV)	−,436 (,452)			
Foreign direct investment in non-financial corporations (StDEV)			,334 (,557)	
Adjusted R Square	,378	,113	,105	,378
# of observations	10	10	10	10

*Significance < p = 0,05.

Dependent variable: EU funds on Country level (standard deviation among NUTS 3 level).

Source: own calculations.

- Independent variables representing quality of governance is one year data for the WGI indexes.
- Independent variables representing macroeconomic development are those described in Table 1. It is important to emphasize that those macroeconomic parameters originally belong to NUTS3 level but are aggregated on country level.

Each observation value represents Standard deviation on country level for the given parameter. The aggregation approach is the same as applied while constructing Dependent variables on a national level.

Another important detail to be mentioned is the design of the regression analysis itself: instead of single regression model there are multiple (four) models. The reasoning behind this is the comparatively low level of observations compared to number of variables. Since this can result in over-fitting the regression model it is applied pre-selection procedure aiming to decrease the number of control variables. In order to keep a systematic approach in decreasing control variables into a regression model Factor analysis among independent variables was applied. The advantage of the factor analysis is that it assesses the common variance between a group of factors measuring the magnitude of each of the factors (components) based on eigenvalues. As a result each of the initial variables can be associated with the separate component based on the correlation with it (Rotated Component Matrix – Table 5). This association is used as a selection criteria for constructing a multiple regression model for analysing the impact of quality of governance on EU funds absorption at a national level. Independent variables in each of the four models have strong correlation (above 0,5) to the top four components from the Factor analysis (eigenvalue above 1).

Comparative results between the four regression models can help us conclude that one of the indexes representing quality of governance has significant influence upon EU funds absorption on a national level.

In Model 1 the only significant influence upon a dependant variable has WGI Regulatory Quality. The model constructed can explain close to 40% of the variation of the Standard deviation of EU absorption on a national level. Similar are the results of Model 4: within a different combination of control variables, WGI Regulatory Quality is the only variable with significant influence. Model 2 and Model 3 fit poorly the variance of the dependant variable (respectively adjusted R square 0,113 and 0,105).

As a result of the four models we have a clear observation that quality of governance on a national level (WGI Regulatory Quality) influences significantly EU absorption.

At a first glance the direction of the relationship is negative: increasing the power of WGI Regulatory Quality decreases the standard deviation of absorbed funds. Actually this result is quite logical since it is an expected result: while increasing the Regulatory Quality to decrease the discrepancies between districts – this is the ultimate goal of each good governance on a regional level and it is expected that increasing the influence of Regulatory Quality helps decrease the differences between regions. In terms of statistics it means to decrease the standard deviation

Table 5. Factor analysis rotated component matrix.

	Component			
	1	2	3	4
WGI voice and accountability	−,932			
Density of population (#/km ²) (St.Dev.)	,923			
GDP per capita (StDEV)	,880			
Disclosed crimes against the person and property of those registered during the year (StDEV)	,875			
WGI regulatory quality	−,858			
Population served by one general practitioner (StDEV)		,917		
Number of beds in the hospitals per 1,000 people (StDEV)		,910		
Relative share of population aged 25–64 with higher education (%) (StDEV)		,877		
Number of teachers in primary and secondary education per 1,000 pupils (StDEV)		,741		
WGI political stability and absence of violence/terrorism	−,643	−,664		
Foreign direct investment in non-financial corporations (StDEV)			,905	
Unemployment (age > 15) (avg YOY change last 5 years)			,835	
Relative share of the population living with material deprivation (%) (StDEV)			,783	
Quality of the road surface, percentage in good condition (StDEV)		−,583	,668	
WGI Control of Corruption				,891
WGI Rule of Law				,815
WGI Government Effectiveness				,629

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization.

between districts. Summarizing the results of the model there is clear evidence that increasing the quality of governance results in achieving the main goals of EU Regional policy.

It is also important to show the limitations of the models described. It is obvious that the number of observations is limited that is why special attention should be paid to the heteroscedasticity of the models. To exemplify this in Fig. 7 are visually represented relationships between residuals and predicted values for all the models.

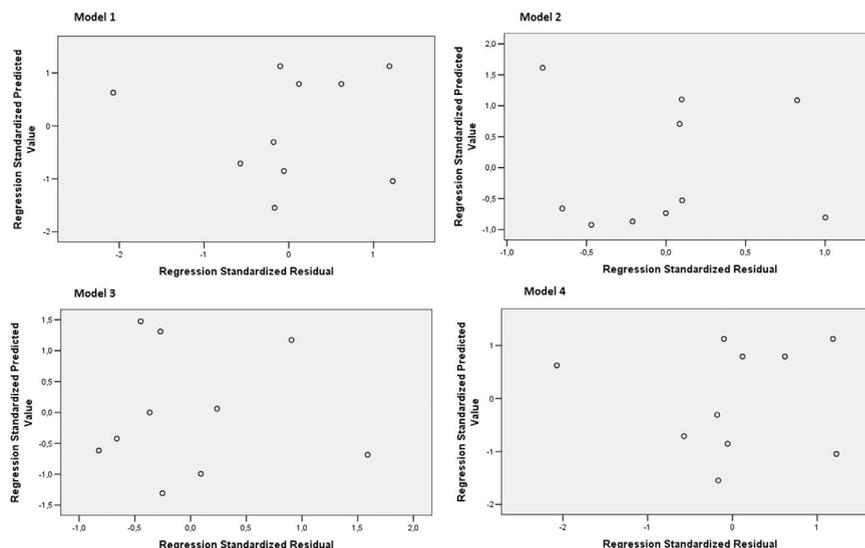


Fig. 7. Heteroscedasticity visualisation for Table 4.

4.2. NUTS II level linear regression: impact of quality of governance at regional level

The results of linear regression on NUTS II level reveals linear dependency between the EQI index and the absorbed structural funds (Table 6).

In order to get a better understanding of the results and mainly to be able to compare them with the regression models on a country level it is important to spend more time explaining specifics of the regression models on NUTS II level:

- The number of observations is 18. Each observation represents one year data on NUTS II level. Since the data is for only three years (2010, 2013 and 2017) and the total number of NUTS II units are six, the total number of these is 18;
- Dependant variable is EU funds absorbed on NUTS II level. The value of the independent variable represents the standard deviation among EU funds absorbed on NUTS 3 level. Since the database from the EU project is aggregated on the lowest possible administrative level “oblast” (NUTS3), standard deviation was calculated on upper level (NUTS II) based on the administrative membership in NUTS II structures. As in the country level modelling, the higher the standard deviation is the higher the regional discrepancies are.
- Independent variables representing quality of governance is year data for EQI on NUTS II level.
- Independent variables representing macroeconomic development represent macroeconomic parameters on NUTS3 level but are aggregated (averaged) on NUTS II level. Each observation value represents average value on NUTS II level for the given parameter. Averaging macroeconomic data gives better estimation on the specifics on that level of governance.

Table 6. Impact of quality of governance and macroeconomic variables on regional level at NUTS II.

	Model 1 Beta In (Sig.)	Model 2 Beta In (Sig.)	Model 3 Beta In (Sig.)	Model 4 Beta In (Sig.)
(Constant)	(,654)	(,001)*	(,007)*	(,001)
normalized EQI (min 0 – max 100)	–,489 (,021) *	–,474 (,047) *	–,324 (,143)	–,474 (,047) *
Foreign direct investment in non-financial corporations (NUTS 3 sum)	,481 (,023)*			
GDP per capita (NUTS 3 avg)		,371 (,101)		
Relative share of the population living with material deprivation (%) (NUTS 3 avg)			,087 (,741)	
Relative share of population aged 25–64 with higher education (%) (NUTS 3 avg)		,041 (,864)		
Unemployment (age > 15) (NUTS 3 avg)		,172 (,501)		
Quality of the road surface, percentage in good condition (NUTS 3 avg.)	–,040 (,910)			
Density of population (#/km ²) (NUTS 3 avg.)	–,033 (,879)			
Number of teachers in primary and secondary education per 1,000 pupils (NUTS 3 avg)				,024 (,920)
Population served by one general practitioner (NUTS 3 avg)				
Number of beds in the hospitals per 1,000 people (NUTS 3 avg.)				–,424 (,052)
Disclosed crimes against the person and property of those registered during the year (NUTS 3 avg.)			–,562 (,015) *	
Adjusted R square	,383	,176	,274	,176
# of observations	18	18	18	18

*Significance < p = 0,05.

Dependent variable: EU funds on NUTS 2 level (standard deviation among NUTS 3 level).

Source: own calculations.

Similar to country level analysis it is performed using a multiple regression models approach (five models). To avoid over-fitting of a single model Factor analysis among control variables is performed as a pre-selection process. As a result each of the variables is associated with the separate component/factor based on the correlation with it (Rotated Component Matrix – Table 7). This association is used as selection criteria for constructing multiple regression models (five) for analysing the impact of quality of governance on EU funds absorption at NUTS II level. Independent variables in each of the five models have strong correlation (above 0,5) to the top five components from the Factor analysis (eigenvalue above 1). The only difference with the approach taken for analysing country level is that the main variable representing quality of governance (EQI) was also introduced in all five models.

Table 7. Factor analysis Rotated Component Matrix.

	Component			
	1	2	3	4
Quality of the road surface, percentage in good condition (NUTS 2 avg.)	,924			
Density of population (#/km ²) (NUTS 2 avg.)	,859			
Foreign direct investment in non-financial corporations (NUTS 2 avg.)	,720			
Unemployment (age > 15) (NUTS 2 avg.)		,939		
Relative share of population aged 25–64 with higher education (%) (NUTS 2 avg.)		,872		
GDP per capita (NUTS 2 avg.)		,645		
normalized EQI (min 0 – max 100)		,598		
Relative share of the population living with material deprivation (%) (NUTS 2 avg.)			,892	
Disclosed crimes against the person and property of those registered during the year (NUTS 2 avg.)			,826	
Number of beds in the hospitals per 1,000 people (NUTS 2 avg.)				,795
Number of teachers in primary and secondary education per 1,000 pupils (NUTS 2 avg.)				,746
Population served by one general practitioner (NUTS 2 avg.)				

Extraction method: principal component analysis.

Rotation method: Varimax with Kaiser normalization.

Originally EQI has a strong correlation only with the first component, but the reason to introduce it in the rest of the models is to have the chance to test intensively the hypothesis about the influence of quality of governance upon EU funds absorption.

Comparative results between the five regression models clearly reveal the indexes representing quality of governance on NUTS II level – EQI has significant influence upon EU funds absorption. In four models (out of five) EQI has significant relation with the dependant variable.

In Model 1 the only significant influence upon dependant variable was EQI. The model can explain close to 40% of the variation of the Standard deviation of EU absorption on NUTS II. Next model with similar explanatory power (adjusted R square = 0,27) is Model 3 where the only variable with significant influence upon dependant variable is Disclosed crimes. The rest of the models (Model 2, Model 4 and Model 5) have similar results: poor explanatory power (adjusted R square below 0,20) and only one control variable with significant influence upon EU funds absorption – EQI.

Similar to results in Table 4 the direction of relationship is negative: increasing the power of EQI decreases the standard deviation of absorbed funds. As discussed

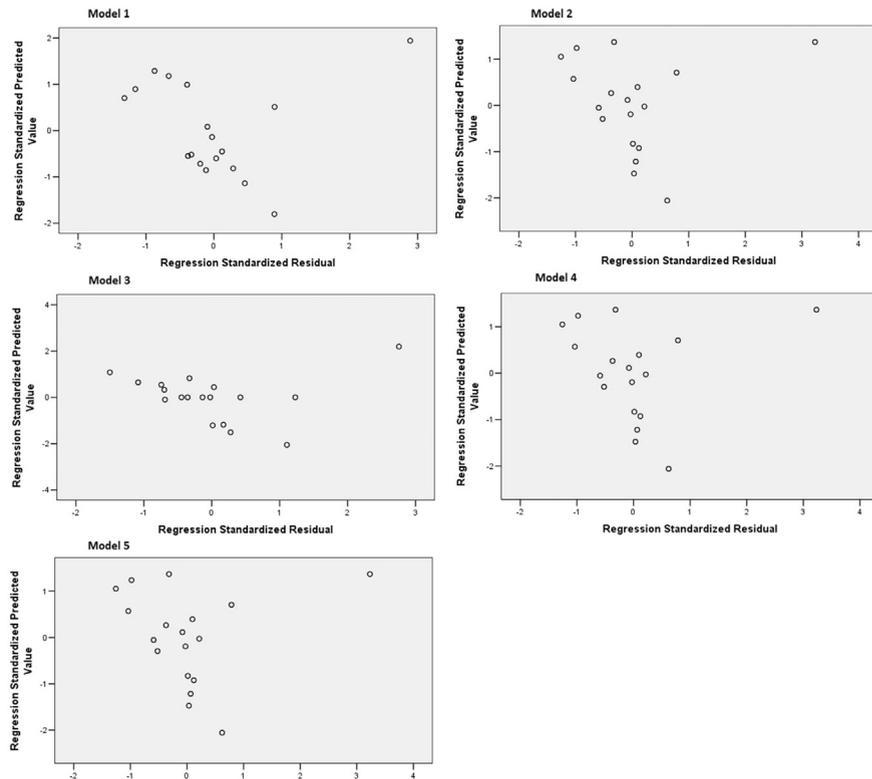


Fig. 8. Heteroscedasticity visualisation for Table 6.

before this is a positive fact regarding regional policy: increasing the quality of governance decreases the regional differences.

Visualisation of the plots between predicted values and residual values (heteroscedasticity testing) in Fig. 8 shows no linear pattern among the regression models used.

5. Conclusions

The main purpose of the current analysis is to evaluate the effect of multiple factors (including impact of the quality of governance) upon implementation of Regional policy in Bulgaria and more precisely upon absorption of structural and investment transferred funds. The methodology used is in line with the relatively recent trend in research that attempts to measure the "quality of governance" (as a complex quantitative concept) and its impact on various aspects of public governance and public policies and on the implementation of EU regional policy in particular. In order to reach the main goal of the study a regression equation was constructed and was applied to multiple linear regression build at two levels – national and regional (NUTS II). There are two main reasons for applying such an approach. The first is that within the multilevel system of governance of EU Regional policy, the quality of institutions at each level of governance is essential. That is why in the current study not only country level is included but also NUTS II level. Second, the main

objectives of the EU regional policy are exactly related to the regional territorial level. That is why it is essential the result to be achieved is precisely at this level.

The dependent variable in all the types of regression models is always the volume of absorbed structural funds. The main reason for this is the fact that the structural funds are the main tool of EU Regional policy and the level of absorption is accepted as a substantial indicator of successful implementation of Regional policy. Also the biggest part of the initiatives under these programs are implemented on a regional level which gives us the ability to adequately evaluate the quality of governance at regional level. Independent variables are of two types – composite indicators that directly measure the quality of governance – Worldwide Governance Index, European Quality of Governance Index and a number of macroeconomic indexes.

The analysis of the results of the two regression models highlights the significant influence of the quality of governance upon implementation of EU regional policy. In a number of models the variables that measure the quality of governance demonstrate significantly influence upon the dependent variable and this supports the main hypothesis. In addition it is worth mentioning that using different composite indicators for measuring quality of governance (based on the different level of governance) gives additional explanatory power to our analysis. Having this significant dependency on the different levels of governance helps us to reveal a possible dimension of further theoretical and empirical research upon the quality of governance as a supplementary tool toward reaching the goals of Regional policy in Bulgaria.

In summary this analysis should be considered as a modest attempt to explain the complex interconnectivity between public governance, its quality and the achievement of EU regional policy objectives in Bulgaria. It suffers from the limitations of any regression analysis – potentially significant test factors may be missed and the number of methodological constraints. Extension of the analysis by using qualitative methods like in-depth interviews and/or case studies could reveal a number of “invisibles” for the quantitative methods factors and specifics.

Despite the defined limitations of the analysis, we believe that it successfully demonstrates the immense importance of the quality of governance for the implementation of EU regional policy.

Declarations

Author contribution statement

Elena Kalfova: Conceived and designed the analysis; Performed the experiments; Analyzed and interpreted the data; Contributed analysis tools or data; Wrote the paper.

Funding statement

The author received no funding from an external source.

Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

References

- Amin, A., 1999. An institutionalist perspective on regional development. *Int. J. Urban Reg. Res.* 23, 365–378.
- Amin, A., Thrift, N., 1994. *Globalization, Institutions and Regional Development in Europe*. Oxford University Press, Oxford New York.
- Beugelsdijk, M., Eijffinger, S.C.W., 2005. The effectiveness of structural policy in the European Union: an empirical analysis for the EU-15 in 1995–2001. *J. Common Mark. Stud.* 43, 37–51.
- Boldrin, M., Canova, F., 2001. Inequality and convergence in Europe's regions: re-considering European regional policies. *Econ. Policy* 16, 207–253.
- Bouvet, F., 2005. European Union regional policy: allocation determinants and effects on regional economic growth. *J. Common Mark. Stud.*
- Bussoletti, S., Esposti, R., 2004. *Regional Convergence, Structural Funds and the Role of Agriculture in the EU. A Panel-Data Approach*. Università Politecnica delle Marche, Dipartimento di Economia, Working Paper.
- Cappelen, A., Castellacci, F., Fagerberg, J., Verspagen, B., 2003. The impact of EU regional support on growth and convergence in the European Union. *J. Common Mark. Stud.* 41 (4), 621–644.
- Charron, N., 2016. Quality of government, regional autonomy and cohesion policy allocations to EU regions. In: Piattoni, S., Polverari, I. (Eds.), *Handbook on Cohesion Policy in the EU*. Edward Elgar Publishing.
- Charron, N., Dijkstra, L., Lapuente, V., 2013. Regional governance matters: quality of government within European Union member states. *Reg. Stud.* 48 (1), 68–90.
- Charron, N., Dijkstra, L., Lapuente, V., 2015. Mapping the regional divide in Europe: a measure for assessing quality of government in 206 European regions. *Soc. Indicat. Res.* 122 (2), 315–346.

Coleman, James S., 1988. Social capital in the creation of human capital. *Am. J. Sociol.* (Suppl. 94), S95–S120. <http://www.jstor.org/stable/2780243>.

Dall'erba, S., Le Gallo, J., 2007. Regional Convergence and the Impact of European Structural Funds 1989–1999: A Spatial Econometric Analysis. Working Paper of the Department of Geography and Regional Development of the University of Arizona, 01-07.

De Freitas, M., Pereira, F., Torres, F., 2003. Convergence Among EU Regions, 1990–2001: Quality of National Institutions and 'Objective 1' Status, *Intereconomics*, ISSN 0020-5346, 38. Springer, Heidelberg, pp. 270–275, 5.

Ederveen, S., de Groot, H.L.F., Nahuis, R., 2006. Fertile soil for structural funds? A panel data analysis of the conditional effectiveness of European cohesion policy. *Kyklos* 59, 17–42.

Granovetter, M., 1973. The strength of weak ties. *Am. J. Sociol.* 78, 1360–1380. <http://links.jstor.org/sici?sici=0002-9602%28197305%2978%3A6%3C1360%3ATSOWT%3E2.0.CO%3B2-E>.

Guasti, P., Dobovsek, B., 2011. Informal institutions and EU accession: corruption and clientelism in central and Eastern Europe. In: Paper Presented at ECPR General Conference in Reykjavik, August 2011.

Gwartney, J., Lawson, R., Hall, J., Murphy, Ryan, 2018. Economic Freedom of the World: 2018 Annual Report. Fraser Institute. <https://www.fraserinstitute.org/studies/economic-freedom>.

Hall, R.E., Jones, C.I., 1999. Why do some countries produce so much more output per worker than others? *Q. J. Econ.* 114 (1), 83–116. <http://www.jstor.org/stable/2586948>.

Information system for governance and monitoring of EU funds in Bulgaria 2020: <http://2020.eufunds.bg/en/0/0/Project/Search>.

Jouen, M., 2016. What future priorities for the cohesion policy after 2020?. In: Policy Paper, Jacques Delors Institute, May18, 2016.

Kalfova, E. (Калфова, Е.), 2015. Implementation of programs and projects of the EU – a precondition for horizontal integration of governance at local level (Юсъществяването на ПроГрами и Проекти на ЕС – ПредШоставка за чоризонтална интеГрация на уЦравлението на местно нивоЕ). In: Stoicheva, M. (Стойчева, М.), Georgiev, V. (и В., ГеоргИев) (Eds.), A 15th Anniversary Collection to Department of European studies [Юбилеен сборник ЪЮ Години Катедра ЕвроШеистикаЕ. Sofia University Press, Sofia.

- Kaufmann, D., Kraay, A., Zoido-Lobaton, P., 1999. Governance Matters, Policy Research Working Paper (2196). The World Bank Development Research Group. <http://documents.worldbank.org/curated/en/665731468739470954/Governance-matters>.
- Kaufmann, D., Kraay, A., Mastruzzi, M., 2009. Governance Matters VIII: Aggregate and Individual Governance Indicators for 1996–2008. World Bank Policy Research Working Paper No. 4978. Washington, D.C. <http://documents.worldbank.org/curated/en/598851468149673121/Governance-matters-VIII-aggregate-and-individual-governance-indicators-1996-2008>.
- National Statistical Institute of Bulgaria: <http://www.nsi.bg/en/content/11252/regional-statistics-and-indicators-monitoring>.
- North, D.C., 1990. Institutions, Institutional Change and Economic Performance. Cambridge University Press, New York.
- Pike, A., Rodríguez-Pose, A., Tomaney, J., 2006. Local and Regional Development. Routledge, London, New York.
- Putnam, R.D., 1993. Making Democracy Work: Civic Traditions in Modern Italy. Princeton University Press, Princeton NJ.
- QoG EQI Data <https://qog.pol.gu.se/data/datadownloads/qog-eqi-data>.
- Rodríguez-Pose, A., 2013. Do institutions matter for regional development? *Reg. Stud.* 47 (7), 1034–1047.
- Rodríguez-Pose, A., Garcilazo, E., 2015. Quality of government and the returns of investment: examining the impact of cohesion expenditure in European regions. *Reg. Stud.* 49, 1274–1290.
- Rodrik, D., Subramanian, F., Trebbi, F., 2004. Institutions rule: the primacy of institutions over geography and integration in economic development. *J. Econ. Growth* 9, 131–165.
- Smeriglio, A., Bachtler, Jh., Francesco, F., Olejniczak, K., Thomson, R., Śliwowski, P., 2015. Administrative Capacity Building and EU Cohesion Policy. European Policies Research Centre, School of Government and Public Policy, University of Strathclyde, United Kingdom.
- Tosun, J., 2014. Absorption of regional funds: a comparative analysis. *J. Common Mark. Stud.* 52, 371–387.
- Vijayaraghavan, M., Ward, W.A., 2001. Institutions and Economic Growth: Empirical Evidence from a Cross-National Analysis, Working Paper Number 001302, Clemson, S.C. Center for International Trade, Clemson University.

Weber, M., 1921 (1968). *Economy and Society*. Bedminster Press, New York.

Worldwide Governance Indicators (WGI) project <http://info.worldbank.org/governance/wgi/#home>.