

Quality of Government, stocks of innovation skills and level of economic activity in European regions

Authors: Aris Kaloudis* and Ondrej Svoboda**

*Department of Industrial Economics and Technology Management, NTNU Gjøvik, Norway

** Institute of Regional and Security Sciences, Faculty of Economics and Administration, University of Pardubice, Czech Republic

Abstract

This paper investigates the relationship between quality of government, R&D and innovation capacity and economic activity in European regions. We employ regional data (NUTS 1 and NUTS2) describing quality of government by European Quality Government Index (EQI) and regional human resources in science and technology (HRST) data as a proxy for stock of innovation skills in the economy. We find an overall linear positive and significant relation between levels of GDP per capita on the one hand, and HRST and quality of governance (EQI) on the other. We also identified three groups of European regions. There is no difference in GDP levels between the group of Northern European regions and the group of the Southern European regions given the levels of EQI and HRST. Conversely, the group of regions in new member states (NMS) is an important explanatory variable of GDP per capita in European regions, with significantly lower levels of GDP p.c. than the other two regions. We interpret these results by drawing from seminal contributions in the literature of economic growth. We particularly reflect upon how differently the relationship between democratic institutions, trust and corruption (Rothstein, 2011, Mauro, 2004, Acemoglu et al., 2001 and Acemoglu et al., 2002) on the one hand, and the role of stocks of skills for innovation and research on the other, may play out in these three regional clusters.

Key Words

European Quality Government Index, HRST, European regions, economic performance

JEL Classification: R10, R11

Introduction

The quality of government and adequate high-skilled competences and human resources in science and technology (HRST) has been claimed to be drivers of economic activity at a national level. This paper provides evidence that this claim is also true at the regional level. The vast majority of studies analysing these relationships did that on the basis of country-level data. In this paper we employ data from the European Quality Government Index (EQI) at the regional level as well as EUROSTAT data for economic activity and science and technology (NUTS 1 and NUTS2). The advantage of EQI-database is, among other benefits, that it enables analysis separating between metropolitan areas and the rest of regions of the country, a dimension we find highly significant in our study. Low quality of governance is associated with high corruption, high inequality and low level of trust in a society. Rothstein (2001) demonstrates how low corruption, low inequality and high trust stimulate in various ways economic activity. Conversely, various aspects

of low quality of governance result to vicious cycles of social behaviour with negative effects for economic activity and growth.

Aghion and Howitt (2008) is a standard reference of models of endogenous growth with institutions, innovation and education as important determinants to economic growth. Murvey, Schleiffer and Vishny (1993) argue for the existence of multiple equilibria and low growth traps due to excessive rent-seeking, in particular public rent seeking by government officials, and the existence of critical values (thresholds) tilting the system from a high-growth to a low-growth equilibrium scenarios. These studies show why it is appropriate to address the issue of governance in the context of economic activity, also at the regional level.

The European Quality Government (EQG) Index focusses on both perception of government quality and experiences with public sector corruption, along with the extent to which citizens believe various public sector services are impartially allocated and of good quality. The survey, conducted by The Quality of Government Institute (2019), includes 16 questions. The core of them focusses on “quality of public education, public health, law enforcement in respondent's area”, “perceived fairness and ability to report political corruption of media”, “perceived corruption of media”, “perceived corruption of the public health, education, and law enforcement system” and “respondents own experience with bribery in the public sector”.

On this basis of evidence, we believe that a more careful investigation of the relation between on the one hand democratic institutions, cultural heritage, corruption (Mauro, 2004, Acemoglu et al. 2001 and Acemoglu et al. 2002) and on the other stocks of skills for innovation and research activities in modern knowledge regional economies as determinants of economic activity is justified from a theoretical point of view.

1. Methods of Research

The European Quality Government index is measured by 16 sub-indexes. Similar index is measured by e.g. World Bank – Worldwide Governance Indicators description (WGI) (World Bank, 2015) and also exists many other similar indexes with linkages to quality of government: International Country Risk Guide (ICRG) (International Country Risk Guide, 2015), Corruption Perception Index (CPI) (Transparency International, 2015). All mentioned indexes (or groups of indexes) are constructed based on country level. For purposes of subnational (regional) analysis is available only The European Quality of Government Index (EQI) (Charron, Dijkstra, Lapuente, 2014, Charron, 2013 and Charron 2014).

The uniqueness of an approach based on regional allows sensitively capture the diverse cultural backgrounds in the same country (as is the case in Italy) and also cultural differences among countries. For this reason, we employed data from two regionally-focused surveys which was carried out under the projects of The Quality of Government Institute (2015) funded by the EU Commission in 2010, 2013 and 2017.

The survey from 2010 consists of QoG and demographic-based 34 questions. The total number of respondents was 33540. The survey from 2013 consists of 32 questions and the total number of respondents was 85248. And lastly, the survey from 2017 consist of 18 questions and the total number of respondents was 78000. All three surveys are based on the European Union's NUTS statistical regional level (in most cases on NUTS 2 and in particular cases based on NUTS 1). Survey 2010 covers 18 countries resp. 24 countries in 2013 resp. 21 countries in 2017.

Sample size per country will vary depending on the number of regions. The survey from 2013 resp. 2010 selectively sampled more than 400 (resp. more than 200) citizens per region (thus e.g. Belgium was in the survey from 2013 represented by 3 regions at NUTS 1 level and total number of respondents was 1208).

To get more robust results we used arithmetic average of indexes from three surveys (from 2010, 2013 and 2017) we employ regional composite indicator of quality of government. Because of focus on quality of government, HRST and regional product we removed regions with missing values in connections with mentioned indexes. Therefore, our sample consists only of the following 186 regions of 21 states: Austria (9 reg. NUTS 2), Belgium (3 reg. NUTS 1), Bulgaria (6 reg. NUTS 2), Croatia (2 reg. NUTS 2), Czech Republic (8 reg. NUTS 2), Denmark (5 reg. NUTS 2), Finland (2 reg. NUTS 2), France (22 reg. NUTS 2), Germany (16 reg. NUTS 1), Greece (4 reg. NUTS 1), Hungary (3 reg. NUTS 1), Italy (21 reg. NUTS 2), Ireland (2 reg. NUTS 2), Netherlands (12 reg. NUTS 2), Poland (16 reg. NUTS 2), Portugal (7 reg. NUTS 2), Romania (8 reg. NUTS 2), Spain (17 reg. NUTS 2), Slovakia (4 reg. NUTS 2), Sweden (3 reg. NUTS 1), United Kingdom (12 reg. NUTS 1). In the case of Finland, Ireland, Netherlands and Croatia are available data only from survey 2013.

We removed one region countries such as Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, Slovenia, as well as Ukraine and two regions in Spain, the Ciudad Autónoma de Ceuta and Ciudad Autónoma de Melilla and finally one French region: Mayotte. Due to missing values of regional output we removed regions of Serbia and Turkey and due to missing HRST values we removed 4 French islands (Guadeloupe, Martinique, Guyane and Reunion) and 3 regions in Finland (Itä-Suomi, Etelä-Suomi, Pohjois-Suomi).

For capturing socio-political and, perhaps, cultural diversities we defined three distinct regional geographic groups¹ – South, North and New Member States. The group named “South” consists of regions of Greece, Spain, Portugal and 8 regions of southern Italy (Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia and Sardegna). The group named “North” consists of regions of Austria, Belgium, Denmark, Germany, Finland, French, Ireland, Italy (only 13 northern regions: Piemonte, Valle d'Acosta, Liguria, Lombardia, Bolzano, Trento, Veneto, Friuli-Venezia Giulia, Emilia-Romagna, Toscana, Umbria, Marche, Lazio), Netherlands, Sweden, United Kingdom. The group named the “New Member States” consists of regions of these countries: Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania and Slovakia.

¹ Similar geographic groups, but on the state level, was used for example in Melecky (2013).

The dependent variable is GDP per capita in Purchasing Power Standard (PPS) and main indicator capturing quality of governance is the European QoG Index (EQI).

HRST is defined as (Eurostat – HRST, 2015) human resources in science and technology by occupation. The unit of this variable was the number of people employed in ISCO 08 major groups 2 and 3 as percent of economic active population.

In addition we employ five dummy variables: Region with Capital City (1 = region with capital city), South (1 = region from the South group), North (1 = region from the North group) and dummy variables for the records from the year 2013 (D_2013) and 2017 (D_2017).

The hypotheses to test are:

H1: High quality of government has positive impact on regional economic performance measured by GDP p.c.

H2: HRST has positive impact on regional economic performance measured by GDP p.c.

2. Results of the Research

Tables 1 and 2 present descriptive statistics of the key variables in total and by the three regional groups as well as for the regions that include a capital city.

Table 1: Descriptive Statistics – part 1 (year 2017)

Group	North			South			NMS			Total		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
GDP	32204.0	8648.2	99	23144.4	5394.3	36	19064.7	9056.0	51	26847.8	10100.0	186
EQI	63.8	15.8	99	36.8	17.4	36	29.9	12.7	51	49.3	21.9	186
HRST	34.3	4.8	99	22.9	4.7	36	26.1	6.5	51	29.9	7.2	186

Source: authors' own calculations, data from (Eurostat, 2019) and (QoG, 2019)

From the result table above (see Tab. 1), the descriptive statistics indicates that all the variables, GDP, EQI and HRST show the expected differences of mean values among the examined regional groups. The highest standard deviation of GDP (14530.4) is recorded in the New Member States group, while the lowest standard deviation (4432.1) is recorded in the South group. The highest average of EQI is recorded in the North group (63.8). On the other hand, the lowest average value (29.9) - as well as its standard deviation (12.7) - is recorded in the NMS group. The lowest HRST average value (22.9) is recorded in the South group - the lowest standard deviation (4.7) as well. Conversely, the highest average HRST is recorded in the North group.

Table 2: Descriptive Statistics – part 2 (year 2017)

Group	Reg. with capital city			Reg. without capital city			Total		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
GDP	40911.1	10859.7	18	25341.1	8797.7	168	26847.8	10100.0	186
EQI	46.1	23.8	18	49.6	21.7	168	49.3	21.9	186
HRST	39.3	6.0	18	28.8	6.6	168	29.9	7.2	186

Source: authors' own calculations, data from (Eurostat, 2019) and (QoG, 2019)

The table above (see Tab. 2) presents descriptive statistics for regions with and without capital city. The average GDP for regions with a capital city is by 61% higher than that of „non-capital regions“. It is worth noting that HRST is fairly higher in major regions. Although these regions also have a slightly lower average quality of administration than regions without capital.

Table 3: Estimates of Beta coefficients (dependent variable: regional GDP)

Independent variables	Regression model	VIF
Constant	-2254.7 (1248.5)	
EQI	33.56* (17.03)	2.751
HRST	640.3** (53.6)	3.075
Region with Capital City	8534.8** (951.3)	1.624
South	7227.1** (711.4)	1.622
North	7249.9** (780.4)	3.112
D_2013	1072.6 (582.3)	1.547
D_2017	2248.7** (625.1)	1.783
Adj. R sq.	0.703	
N	558	

Note 1: ** Significant at 99 per cent; * significant at 95 percent.

Source: authors' own calculations, data from (Eurostat, 2019) and (QoG, 2019)

The regression results (see in Table 3) indicate that the specified model has a fairly high coefficient of determination (adjusted R-square 0.71). The estimated coefficient of the independent variable EQI is statistically significant (p-value 0.05). For every additional point of European Quality Index, the regions increase its economic performance measured by GDP to the level of 33 Euro per capita in PPS (regardless of geographic areas of regions). The coefficient of the variable HRST exhibits the expected positive sign and it is highly significant. It thus indicates that for every additional percentage of HRST, the regional GDP increases by the level of 640 Euro per capita in PPS. Both hypotheses were not rejected. The regression result equally indicates that the

coefficients of the dummy variables South, North and D_2017 are positive and statistically significant (only D_2013 variable is not significant).

That the dummy variables North, South and D2017 are highly significant is an indication that unobserved but stable variables are accounted for in the present regression model.

A possible critique against the simple, but apparently parsimonious and robust, OLS-regression model we employ here, may be that of endogeneity problem. It is not difficult to imagine that HRST may be dynamically linked to GDP, i.e. the higher the GDP we expect to find higher shares of HRST personell in the active population. We know from a number of studies that total national R&D funding (GERD) is positively correlated with GDP per capita. The Pearson correlation coefficient between HRST and GDP variables is $r = 0.752$ and highly significant. To overcome the endogeneity problem would imply to solve a more complicated system of structural equations or the use of instrumental variables or both. Correlations between standardised and unstandardised predicted values and standardised and unstandardised residuals reveal a weak but significant negative Pearson coefficient ($r = -0.120$), a fact that in deed might be interpreted as an indication of endogeneity problem. In future research, we shall explore the same research questions with the help of more advanced statistical methods, in particular, various structural equation model (SEM) schemes.

3. Discussion

Endogenous growth economic theories suggest that both innovation capacities and institutions matter in various ways (Aghion and Howitt, 2008). North (1991) defines institutions as *the rules or constraints on individual behaviour*. Institutions and related policies such as education, health services, protection of civil and property rights are common goods of fundamental importance for the functioning of modern economies and societies, and hence regions. It is an issue to debate whether basic institutional arrangements are to be considered as more or less comparable across the EU or not. On the other hand, there is no doubt that there are variations in effectiveness and efficiency of governance. Rothstein (2011) argues that social capital, defined as access to beneficial social networks, and generalised trust in other people, tend to be determined by the QoG and not the other way around. Thus, it is reasonable to assume that QoG is a causing factor of high economic performance.

The long-term research conducted at the Quality of Governance Institute equipped us with solid indicators and data on QoG. These data demonstrate clearly that there are not only differences in quality of governance between European countries, but also within the same countries and between regions. Table 1 depicts the considerable differences between regions in the North countries compared with the regions in the South and the new member states. And these differences correlate with differences in regional GDP.

The question we set out to investigate in this paper is, however, how strong factor is the QoG in explaining differences in regional GDPs compared to another major drive of economic growth, that is R&D and innovation capacities, proxied as the share of human resources for science and technology (HRST) of the economic active population. Into a certain extent one could argue that this variable is a proxy for the share of knowledge economy activities within a region.

We experimented with many different regression models, including hierarchical regression models (Kaloudis and Svoboda, 2016). We concluded that the regression analysis presented above is the most simple and robust of all models employed. Table 3 above suggests that the share of HRST is a far more important explanatory factor of regional economic performance than QoG-index. Although the complexity of this issue is large and the model we employ is relatively simple, we believe that there are important regional, national and European implications to draw from this exercise. There is no doubt that we should intensify the struggle to improve the QoG and to reduce corruption within the entire EU. However, it is even more important to expand and develop the regional capacities to develop new knowledge and to innovate. That has been, especially the last decade, a key policy priority of the EU-policies as indicated in the spending for Structural Funds, Horizon 2020 and a number of other European programmes.

Furthermore, our results suggest that QoG and R&D capacities are to a certain extent distinct economic impact factors, that is, whatever the level of QoG, investing in knowledge infrastructures seem always to be beneficial. QoG patterns change slowly and are entrenched in a different social and cultural web of practice. It is quicker and easier to work through the channel of strengthening the performance of knowledge economies, if the goal is to achieve a rapid increase of regional GDP. Perhaps, few examples in Europe demonstrate this fact better than Estonia.

Conclusion

Our results show that quality of government and the share of high skilled human capital (HRST) has significant and positive effect on GDP per capita (especially in the case of regions of North and NMS groups). There is no difference in GDP levels between the group of Northern European regions and the group of the Southern European regions given the levels of EQI and HRST. Our study confirmed the importance of skilled human capital and also Rothstein's conclusions, which emphasize that low corruption, low inequality stimulate economic activity in various ways. The limitations of the present research are many. Future research would develop more sophisticated estimation models in order to explore better causal relations and to check for possible endogeneity issues pertinent in this analytical approach.

Acknowledgment: This article was made thanks to the support of Norway Funds resp. project „NF-CZ07-INP-4-236- 2015 Mobility for development of cooperation in research of economics and sustainable development“.

References

- ACEMOGLU, D., J. A. ROBINSON, and S. JOHNSON. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. In *American Economic Review*, 91, 1369–1401.
- ACEMOGLU, D., J. A. ROBINSON, and S. JOHNSON. (2002). Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. In *Quarterly Journal of Economics*, 117, 1231–1294.
- AGHION, P., HOWITT, P. W. (2008). *The Economics of Growth*. The MIT Press.

- EUROSTAT - HRST. (2015) Human resources in science and technology [online]. [ref. 2015-12-14]. Available from: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Human_resources_in_science_and_technology_\(HRST\)](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Human_resources_in_science_and_technology_(HRST)))
- EUROSTAT STATISTICAL DATA. (2019). General and regional statistics [online]. [ref. 2019-03-14]. Available from: <https://ec.europa.eu/eurostat/data/database>
- CHARRON, N, L. DIJKSTRA and V. LAPUENTE. (2014). Regional governance matters: quality of government within European Union member states. *Regional Studies*, 48(1), 68-90.
- CHARRON, N. (2013). From Åland to Ankara: European Quality of Government Index. 2013 Data, Sensitivity Analysis and Final Results.
- CHARRON, N. (2014). Assessing The Quality of the Quality of Government Data: A Sensitivity Test of the World Bank Government Indicators.
- INTERNATIONAL COUNTRY RISK GUIDE. (2015). ICRG Methodology [online]. [ref. 2015-12-14]. Available from: <https://www.prsgroup.com/wp-content/uploads/2014/08/icrgmethodology.pdf>
- KALOUDIS, A., SVOBODA, O. (2016). European Quality Government Index, stocks of innovation skills and level of economic activity in European regions. In The 38th Meeting of the Norwegian Association for Economists 4-5th January 2016. Norway: Trondheim.
- MAURO, P. (2004). The persistence of corruption and slow Economic Growth. IMF Staff papers Vol. 51, No. 1.
- MELECKÝ, L. (2013). Use of DEA Approach to Measuring Efficiency Trend in Old EU Member States. In KOCOUREK, A. ed. *Proceedings of the 11th International Conference Liberec Economic Forum 2013*. Liberec: Technical University of Liberec, 2013. pp. 381-390.
- MURVEY, K.M., A. SCHLEIFFER, R.W. VISHNY. (1993). Why is Rent-seeking so Costly to Growth?. In *The American Economic Review*, Vol 83, 409-414.
- NORTH, D. C. (1991). Institutions. *Journal of economic perspectives*, 5(1), 97-112.
- ROTHSTEIN, B. (2011). *The Quality of Government: Corruption, Social Trust, and Inequality in International Perspective*. University of Chicago Press.
- THE QUALITY OF GOVERNMENT INSTITUTE. (2019). QoG EU Regional Data [online]. [ref. 2019-02-04]. Available from: <http://qog.pol.gu.se/data/datadownloads/qogeuregionaldata>
- TRANSPARENCY INTERNATIONAL. (2015). Corruption perceptions index [online]. [ref. 2015-12-14]. Available from: <http://www.transparency.org/research/cpi/overview>
- WORLD BANK. (2015). The Worldwide Governance Indicators - Control of Corruption [online]. [cit. 2015-12-14]. Available from: <http://info.worldbank.org/governance/wgi/cc.pdf>.