

Institutional change and the development of lagging regions in Europe

Andrés Rodríguez-Pose¹ and Tobias Ketterer²

¹ Department of Geography and Environment, London School of Economics
(a.rodriquez-pose@lse.ac.uk)

² DG EcFin, European Commission (Tobias.KETTERER@ec.europa.eu)

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Abstract:

This paper examines whether both the levels and the degree of change in government quality influence regional economic performance in Europe and, in particular, in lagging regions of the EU. It also looks at whether the effect of government quality – and that of the other more traditional factors included in growth theories – resists deep changes in the economic cycle, such as those experienced by the EU since 2008. Regional quality of government data is used in conjunction with indicators referring to endowments and investments in accessibility, education and training, and innovation to assess the economic performance of 249 NUTS2 regions in the EU for the period between 1999 and 2013. The econometric analysis, conducted using fixed effects (FE) panel data analysis and complemented by heteroscedasticity-robust ‘Generalized Method of Moments’ (GMM) and standard pooled OLS estimation and Driscoll and Kraay-type fixed effects regressions, finds that not only institutions matter, but that improvements in quality of government are one of the most powerful drivers of development in Europe. While a poor initial quality of government need not be an insurmountable handicap for economic growth, failure to improve government quality, to reduce corruption, facilitate transparency and accountability, and increase government efficiency do represent serious obstacles for development. There is also evidence of the existence of an institutional trap: while in the poorest regions of the EU basic endowment shortages are still the main barrier to development, in the more developed low growth regions the benefits from improving basic growth endowments have become exhausted and economic dynamism is increasingly related to institutional improvements, such as reducing corruption or enhancing government effectiveness. Consequently, one-size-fits-all policies for lagging regions are not the solution. The determinants of growth across lagging regions of Europe are far from homogeneous and, therefore, different approaches are required depending on the specific conditions of every type of lagging region.

Keywords: Institutions, institutional change, government quality, economic growth, regions, European Union

1. Introduction

According to the dominant economic theories, economic growth is the result of a combination of three factors – physical capital, human capital or labour, and innovation – plus a residual factor or error term, which represents what we do not know or cannot explain. Depending on whether a neoclassical growth (Solow, 1956; Swan, 1956) or an endogenous growth approach is adopted (Romer, 1986; Lucas, 1988), the weight attributed to each of the components varies, but they remain, in different guises the fundamental drivers informing development policies across the world. The European Union's (EU) regional development and cohesion policy has been no exception. The bulk of cohesion investments have been channelled towards improving the infrastructure endowment and accessibility of the least developed regions of the EU, as well as increasing the availability and quality of human resources, and developing the innovative capacity of individuals and firms across lagging areas of Europe.

By and large, this sort of intervention has borne fruit, as the performance of lagging regions of Europe has outstripped that of the core in recent years (Cappelen et al., 2003; Becker et al., 2010; Pellegrini et al., 2013). However, the success of the policy in delivering greater economic convergence does not hide the fact that we are witnessing a decline in the returns of intervention in the three main growth axes. There is, for example, growing concern about a potential exhaustion of additional investments in transport infrastructure and of improvements in accessibility as drivers of growth in certain lagging regions of Europe (Crescenzi and Rodríguez-Pose, 2012). While this issue remains controversial, the truth is that physical capital, human capital, and technology can explain a waning share of the variation in regional economic growth in Europe. Growth theories that accounted for differences in economic performance relatively well two decades ago are becoming less capable of doing so. The residual factor is growing, meaning that, in spite of improvements in growth theory, we tend to know less about what determines regional growth in Europe.

This declining explanatory capacity signals that a key factor in the growth equation has been missing. Most eyes have turned to the role of institutions, in general, and government quality, in particular (Charron et al., 2013). However, measuring

institutional quality, especially at the regional level, has been difficult and fraught with controversy (Rodríguez-Pose, 2013). Despite these problems, significant strides have been made of late in terms of assessing the quality of government at a regional level in Europe. The biggest breakthrough has been made by the Quality of Government Institute of the University of Gothenburg which, at the request of the European Commission, has produced a subjective quality of government (QoG) index which has been an instant hit (Charron et al., 2011, 2014a, and 2014b). Numerous studies have turned to the QoG in order to explain how institutions, in general, and quality of government, in particular, contribute to shape the economic dynamism of regions in Europe. The large majority of these studies has reached the conclusion that government quality matters for economic performance and that poor government in lagging areas of Europe represents a significant barrier to development. Government quality not only affects economic growth, but also the returns of European cohesion policies (Rodríguez-Pose and Garcilazo, 2015), shapes regional competitiveness (Annoni, 2013). Moreover, corrupt and/or inefficient governments undermine regional potential for innovation (Rodríguez-Pose and Di Cataldo, 2015) and entrepreneurship (Nistotskaya et al., 2015) and weaken the attractiveness of regions to migrants (Ketterer and Rodríguez-Pose, 2015). Regional environmental performance (Halkos et al., 2015) and decisions on the type of public good investment (Crescenzi et al., 2016) are also affected, as well as the inclusiveness and participation in political processes (Sundström and Wängnerud, 2014).

These studies represent substantial progress in our understanding of the role of institutions as shapers of regional growth in lagging areas of Europe, but are limited in two respects. First of all, they consider institutional conditions as a static factor affecting economic development. Regions have a better or worse endowment of institutions, depending, among other factors, on their history (Charron and Lapuente, 2013) and quality of government operates in a path dependent way. This perception of institutions often implies that government quality remains more or less stable over time, as a permanent barrier/enabler to/of economic development. Yet, while institutional conditions do persist in time, they also change and, sometimes, change rapidly. This potential for institutional change has, nevertheless, been overlooked by the literature, limiting our understanding of how institutional change impacts on economic development and shapes the returns of public intervention.

Second, because of data constraints, most of the above-mentioned analyses on government quality have considered a period covering exclusively the boom that preceded the 2008 economic crisis. Hence, we know how government quality affects economic performance in a period of economic expansion, but we know next to nothing about whether institutional conditions have a similar effect on regional economic performance in periods of deep recession, such as that of post-2008 Europe, or over changes in the economic cycle.

In this report we address these issues by assessing whether both the levels and the degree of change in government quality influence regional economic performance in the whole of Europe and, in particular, in lagging regions of the EU. We also analyse whether the effect of government quality – and that of the other more traditional factors included in growth theories – resists deep changes in the economic cycle, such as those experienced by the EU since 2008. In order to do so, we use Charron et al.’s (2011; 2014a) regional quality of government dataset in conjunction with indicators referring to endowments and investments in accessibility, education and training, and innovation. These data are gathered for a total of 249 NUTS2 regions in the EU for the period between 1999 and 2013. The aim is to discriminate between the role played by traditional areas in development policy intervention, such as infrastructure, human capital and innovation, from that of different institutional aspects, such as corruption, the rule of law, government effectiveness, and government accountability. Particular attention is paid to changes in all these factors, as well as to the importance of quality of government for development of lagging regions of Europe. Another differentiating factor from previous studies is that lagging regions are not considered as a uniform mass, but are divided, following the European Commission (2014), into low income and low growth regions, based on the initial levels of development and the economic performance over the period of analysis.

Different econometric techniques are employed. The preferred fixed effects (FE) panel data analysis is complemented by heteroscedasticity-robust ‘Generalized Method of Moments’ (GMM) and, in certain cases, by standard pooled OLS estimation and Driscoll and Kraay-type fixed effects (within) regressions.

The results of the analysis can be summarised in five basic the points:

a) ***Institutions matter***: As highlighted in previous studies, regional government quality is a fundamental factor affecting the economic performance of regions in Europe, not only in the short-term, but also during periods such as that covered in the analysis when the economic cycle changes rapidly and profoundly.

b) ***Improvements in quality of government are a powerful driver of development***: The analysis unveils that quality of government matters for economic development, but, that changes in government quality matter even more. While a poor initial quality of government need not be an insurmountable handicap for economic growth, failure to improve government quality, to reduce corruption, facilitate transparency and accountability, and increase government efficiency do represent serious obstacles for development.

c) ***One-size-fits-all policies for lagging regions are not the solution***: Recognising that improvements in government quality make a big difference for economic performance does not, however, imply that the same path and the same strategies in order to improve government quality should be adopted. The determinants of growth across lagging regions of Europe are not the same and, therefore, different approaches are required depending on the specific conditions of every type of lagging region.

d) ***Government quality improvements are essential for low growth regions***: The low growth regions of Southern Europe stand to benefit the most from improvements in government quality. The results of the analysis indicate that in these regions the benefits from improving basic growth endowments have become exhausted and that a considerable share of economic dynamism is increasingly related to institutional improvements, such as reducing corruption or enhancing government effectiveness.

e) ***In low income regions basic endowment shortages are still the main barrier to development***: By contrast, in low income regions of the EU investments in the traditional drivers of growth are still the main factors behind successful economic trajectories. These areas are too far away from the economic frontier, meaning that improving accessibility, human capital, and innovation are still capable of delivering the

bulk of economic growth. This does not mean, however, that government quality needs to be overlooked, as the problems affecting low growth regions may still emerge in a part of Europe still characterised by a subpar quality of government, once the basic endowment deficits are reduced.

The rest of the report is structured as follows. In the next section the theoretical model is presented. Section 3 introduces the empirical approach and the data used in the analysis. Section 4 exposes the results of the econometric analysis. The policy implications appear in the fifth and final section.

1. The theoretical model

The standard neoclassical Solow-Swan growth model with physical and human capital (Solow, 1956; Swan, 1956, Mankiw et al., 1992) has for decades informed development policies across the world. We use this model and approach as our benchmark investigation framework.¹ In this simple model regional output is determined by the following production function:

$$Y(t) = F[A(t), K(t), H(t), L(t)] \quad (1)$$

where regional output (Y) is broadly the consequence of a technology parameter (A), regional physical capital (K), regional human capital (H), and the labour force (L). We assume that technological and economic progress are affected by institutional parameters reflecting the quality, efficiency, accountability of governments, the relevance of corruption in a territory, and the state of the judicial system. From this perspective economic growth is constrained by government or social capability, meaning that the institutional environment contributes to determine why certain development strategies and types of public policy intervention take hold, and others do not. Institutional conditions, such as government quality, affect technical progress, the efficiency of investment, and, as a consequence, the responsiveness of output to human and physical capital (i.e. infrastructure, property rights, and education – which all tend

¹ Mankiw, Romer and Weil (1992) expanded the Solow (1956) growth framework into a full-blown theoretical and empirical model including human and physical capital. The Solow-Swan-type growth framework used in this analysis can be extended into a spatial model of economic growth (cf. Ertur and Koch, 2006).

to be sensitive to institutions). Institutional parameters may thus be sub-divided into elements focusing on human capital related components and local region-specific legal and governmental aspects (Acemoglu and Dell, 2009) both of which influence technical, as well as non-technical regional growth parameters.

Taking this into account, we define the technology parameter $A(.)$ as a combination of technological know-how – i.e. productive efficiency $T(.)$, which again is determined by technology adaption choices of profit-maximising firms, and the presence or quality of local and national institutions, $I(.)$, reflected in the provision of public goods and services, the availability of a functioning legal system, and the protection of property rights. We can therefore illustrate the technology parameter as a function $G[.]$, of $T(.)$ and $I(.)$:

$$A(t) = G[T(.), I(.)] \quad (2)$$

Following Grigorian and Martínez (2000) and Breton (2002), we develop the traditional Solow-Swan growth framework considering both physical and human-capital aspects à la Mankiw et al. (1992), on the one hand, and institutional regional parameters, on the other. We hence assume a simple linear relationship between $T(.)$ and $I(.)$ and substitute equation (2) into equation (1). Using a constant-returns-to-scale Cobb-Douglas production function, the equation (1) is re-written as follows:

$$Y(t) = K^\alpha(t) H^\beta(t) [I(.) T(t) L(t)]^{1-\alpha-\beta} \quad (3)$$

where $I(.)$ denotes a matrix of institutional measures and $T(.)$ a vector of company-based productive efficiency. We further assume that European regions may differ in their initial technology level (i.e. in technological effectiveness or institutional background) and that the overall productive efficiency $T(.)$ is similar across all territories (Mankiw et al., 1992). By computing steady-state values of human and physical capital per effective unit of labour (3) and taking natural logarithms, the following structural equation for a region's long-run income per capita levels can be derived (cf. Mankiw et al., 1992):

$$\ln \left[\frac{Y(t)}{L(t)} \right] = \ln T(0) + gt + \ln I(0) - \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n_t + g + \delta) + \frac{\alpha}{1-\alpha-\beta} \ln(s_k) + \frac{\beta}{1-\alpha-\beta} \ln(s_h) \quad (4)$$

where $Y(t)/L(t)$ denotes regional GDP per capita, $s_{k,t}$ regional savings or investment, $s_{h,t}$ represents human capital accumulation, n_{it} regional population growth, g the exogenous

technology growth rate, and δ the rate of depreciation.² The model predicts higher real income in territories with higher savings- (i.e. investment-) rates, a higher level of innovative capacity, technological progress, and better institutional conditions.

2. Empirical approach

3.1 *Estimation strategy and econometric specification*

The empirical methodology is based on the extended neoclassical Solow-Swan-type estimation model presented in the previous section. In line with the existing literature on regional economic growth determinants, we first estimate a standard economic growth model, before considering an extended growth framework in which we distinguish between different indicators of a region's physical accessibility, human-capital and innovation-related regional factors, as well as between several different measures of a region's institutions. The extended growth framework is estimated by successively inserting the independent variables in the empirical analysis.

In a first stage, we control for heteroscedasticity and serial and spatial correlation, using – alongside a standard pooled OLS estimation technique – a fixed effects regression model. This is complemented with a fixed effects (within) estimation with adjusted standard errors by means of a non-parametric covariance matrix, as suggested by Driscoll and Kraay (1998). The Driscoll-Kraay estimator takes into account common influences which may impact on our variables of interest and may lead to biased results if ignored.³

In order to control for potentially omitted variables and reduce endogeneity concerns, due to reverse causality or simultaneity, we introduce all independent variables with a five-year lag. The use of a five-year lag responds to the expectations that the types of capital investment associated with regional development policies, in general, and

² More precisely s_k and s_h denote the fraction of income invested in physical and human capital, respectively. Several empirical growth studies assume that g and δ are the same for all regions and time-constant. Mankiw et al. (1992) suggests taking a combined value of these two indicators of about 5%.

³ Hoechle (2007:1) highlights that “erroneously ignoring cross-sectional correlation in the estimation of panel models can lead to severely biased statistical results”. For a more detailed discussion of the estimator see Hoechle (2007).

European Cohesion policies, in particular – improvements in accessibility, education and training, and science and technology investments – are likely to leave a long-lasting impact which goes well beyond short-term Keynesian-type multiplier effects. Institutional and government quality also shows a large degree of persistence and path dependence (Charron and Lapuente, 2013; Charron et al., 2014). In addition, we provide further empirical results by resorting to a heteroscedasticity-robust system ‘Generalized Method of Moments’ (GMM) estimator (Roodman, 2009) which, in theory, addresses potential endogeneity issues.

The empirical model accounts for physical and human capital, as well as for different levels of innovative capacity and regional institutional quality. It adopts the following form:

$$\begin{aligned} \ln(y_{i,t}) - \ln(y_{i,t-1}) = & \\ & \beta_0 + \beta_1 \ln(y_{i,t-5}) + \beta_2 \ln(\text{investment}_{i,t-5}) + \beta_3 \ln(\text{human_capital}_{i,t-5}) + \\ & \beta_4 \ln(\text{institution}_{i,t-5}) + \beta_5 \ln(n_{i,t-5} + g + \delta) + \gamma_i + u_t + \varepsilon_{i,t} \end{aligned} \quad (5)$$

where the index i represents the region with $i \in [1, 249]$ and t denotes a time index in a sample covering the period 1999-2013. Real GDP per capita (in PPS) of NUTS-2 region i at time t is denoted by $y_{i,t}$. Regional physical capital (i.e. $\text{investment}_{i,t-1}$) is measured by the level of gross fixed capital formation (in % of nominal GDP). In the empirical analysis we decompose the investment variable into a more general indicator of a region’s physical capital stock (see below) and into an additional parameter accounting for regional accessibility.

The human capital parameter ($\text{human_capital}_{i,t-1}$) represents regional education levels. Due to the limited data availability of comparable and high quality human capital indicators on an EU regional level, we employ the share of people in employment with tertiary education as our proxy for human capital endowment. $n_{i,t-1}$ denotes population growth rate in the region, while g and δ reflect technological progress and capital depreciation, which we assume to be constant over time and to jointly add up to a value of 5% (cf. Mankiw et al., 1992).

The greatest novelty of the analysis lies, however, in the introduction of institutional variables at a regional level – and, more precisely, of a measure of institutional change – in the estimation. In order to find out not just whether institutions matter, but also how do they matter we use Charron’s et al. (2011; 2014a; 2014b) index of regional quality of government. The regional government quality index is decomposed into four constituent components which include (i) corruption, (ii) rule of law, (iii) government effectiveness and bureaucracy, and (iv) government accountability.⁴ The empirical model (5) includes regional fixed effects (γ_i) and annual time fixed effects (ν_t) as a means to control for regional or time-specific characteristics. $\varepsilon_{i,t}$ represents the idiosyncratic error term.

The estimated standard growth model of equation (5) is further extended by including the level and changes of innovation, education and investment-related indices, combining several potential economic growth indicators by means of principal component analysis. Principal component analysis can be used to account for potential multicollinearity issues when simultaneously introducing certain potentially correlated explanatory variables. Different regressors are merged into one composite index, allowing us to preserve “as much as possible of the variability of the original indicators” (Crescenzi and Rodríguez-Pose, 2012: 57). The resulting augmented Solow-Swan-type growth model adopts the following form:

$$\begin{aligned} \ln(y_{i,t}) - \ln(y_{i,t-1}) = & \\ & \beta_0 + \beta_1 \ln(y_{i,t-5}) + \\ & \beta_2 \ln(\text{investment})_{i,t-5} + \beta_3 \ln(\text{accessibility index})_{\text{level and growth}}_{i,t-5} + \\ & \beta_3 \ln(\text{human capital and innovation index})_{\text{level and growth}}_{i,t-5} + \\ & \beta_4 \ln(\text{institutions})_{\text{level and growth}}_{i,t-5} + \beta_5 \ln(n_{i,t-5} + g + \delta) + \gamma_i + \nu_t + \varepsilon_{i,t} \quad (6) \end{aligned}$$

where all parameters are defined as above and the three composite indices account for the stock and improvements in regional accessibility, as well as for the level and change in educational and innovation-related regional attributes. The accessibility index is built combining road network data, measuring potential road accessibility as the inverse

⁴ Since the ‘quality of government’ index (QoG) and its individual components are adjusted around zero, with positive and negative values reflecting favourable and less favourable institutional environments, respectively, we add a 10 in order to be able to include logged variables in our specification.

time-distance weighted population⁵ with the ratio of air transport passengers over regional population, using principal component analysis.

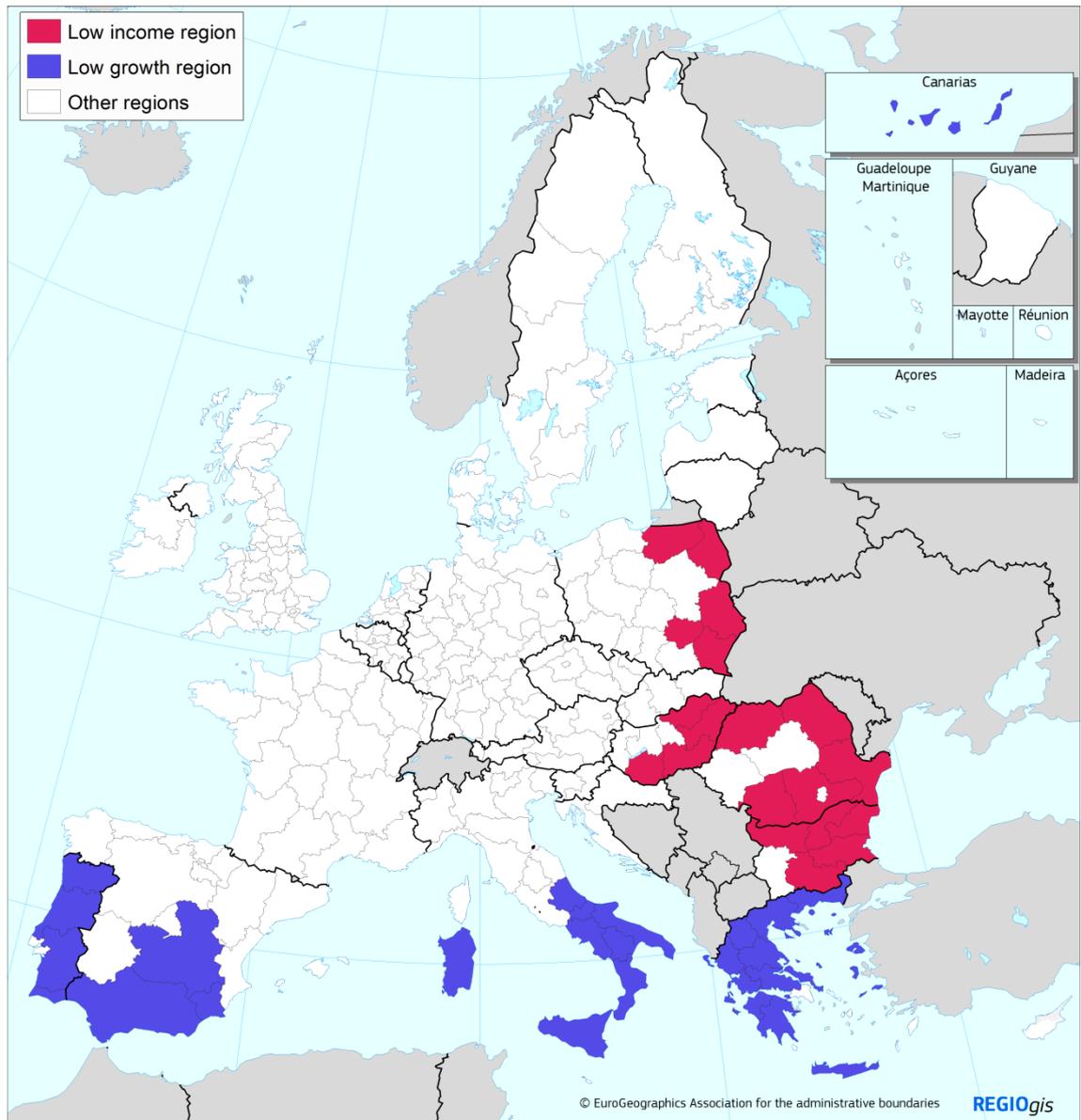
In order to benchmark the determinants of economic growth in lagging regions relative to the drivers of growth in the EU as a whole, we estimate both growth models for the EU as a whole, as well as for lagging regions of the EU only, distinguishing, in turn, between low growth and low income lagging regions.⁶ The distinction between low growth and low income regions was established by the European Commission in the 6th *Cohesion Report* (2014). In it, for the first time, the considerable heterogeneity of lagging-behind regions in Europe was brought to the fore. In particular, the different trajectories of regions in the economic periphery of Europe that, despite remaining very poor, had grown over the period between 2000 and 2013 well above the European average (*low income regions*) and those that, although starting from a higher level of development, had failed to converge (*low growth regions*) (Figure 1) has been highlighted. Low growth regions are located in the south of Europe (Greece, Italy, Portugal, and Spain) and have received the highest level of European support since the reform of the Structural Funds in 1989. Low income regions are concentrated in Bulgaria, Hungary, Poland, and Romania and have been the object of cohesion investment for a much shorter period of time (since 2004 in the case of Hungarian and Polish regions and 2007 for regions in Bulgaria and Romania).

Figure 1. Low income and low growth regions in Europe.

⁵ The road accessibility data are based on road network data for the years 2001, 2006, 2011 and 2014, with the remaining years being extrapolated or interpolated. The raw data were gathered by Klaus Spiekermann and provided by Lewis Dijkstra in the European Commission. The distance decay function is a fairly steep exponential function that becomes close to zero after four hours of travel.

⁶ Focusing on specific subsectors of lagging regions has the drawback of reducing the number of observations, making the coefficients less stable.

Lagging Regions



Source: European Commission.

Both types of regions exhibit considerable differences with respect to the European average in basic indicators, but low growth regions are distinctly worse off than low income regions in overall employment and unemployment rates and have a higher problem of low educational attainment of adults (Table 1). By contrast, their levels of investment in R&D and the quality of government is higher than in low income regions (Table 1). Finally, although their infrastructure endowment is better, road accessibility remains a problem.

Table 1. Basic indicators in low income and low growth regions.

	Employment rate 20-64 2013	Unemployment rate 2013	Low education attainment in % of people aged 25-64 2013	R&D as a % of GDP 2011	Quality of Government index 2013	Road accessibility 2013
EU-28	68.3	10.8	24.8	2	0	272
Low Income regions	62.5	10.1	21.3	0.5	-1.1	95
Low Growth regions	51.2	24.9	51.4	0.9	-0.8	82

Source: European Commission (2015)

The greatest concern with low growth regions relates to the need to increase their economic dynamism. Economic growth in these areas has been seriously affected by the economic crisis, although, in many of the regions belonging to this category – and mainly in Portuguese and southern Italian regions – lack of dynamism was already in evidence well before the start of the crisis. One of the goals for low income regions is to tailor cohesion strategies in order to make sure that both their higher levels of growth become sustainable, while the development trajectory and pitfalls of low growth regions are avoided (European Commission, 2015).

3.2 Data

The exact definitions of the variables introduced and data sources used in the empirical analysis are summarized in annex Table A1. The aim of this section is to highlight some of the most important characteristics of the dataset. The analysis is based on regional NUTS-2 level⁷ data covering the whole of the EU during the period between 1995 and 20013 (1995-2009 for the independent variables, 1999-2013 for the dependent variable: regional economic growth). For countries without regional subdivisions at NUTS-2 level (Estonia, Latvia, Lithuania, and Luxembourg) country-wide statistics were used. Data for a total of 256 regions in 24 EU countries was gathered. However, some individual regions and countries were excluded due inadequate data availability or as a consequence of recent changes in NUTS-2 boundaries.⁸ This left a dataset with

⁷ Nomenclature of Territorial Unit for Statistics (NUTS) as defined by the European Commission.

⁸ Croatia, Cyprus, Denmark, and Malta had to be excluded from the analysis due to missing data. In addition, a number of individual regions were not included in the analysis for the same reasons. These

complete data for a total of 249 regions. With the exception of the institutional parameters, the source for all variables is Eurostat's Regio database.

The institutional variables stem from Charron et al.'s (2014a) quality of government (QoG) index. This index is constructed by combining the World Bank's country-level 'World Governance Indicators' (WGI) (Kaufmann et al., 2009) with an EU-wide regional survey based on approximately 34,000 EU citizens.⁹ The survey includes 16 questions aimed at evaluating the citizens' experience and perception of the local institutional quality (Charron et al., 2011). The questions focus on three general public services that are administered or financed in a considerable number of countries at a regional (i.e. sub-national) level: education, health care, and law enforcement. Rating these services with respect to their quality, impartiality, and the presence of corruption, the respondents assigned different scores to each of the 16 questions. The responses were then aggregated from the individual to the regional level and also to the national level. The 16 regional scores were classified into four subgroups identifying citizens' perception of (i) the prevalence of corruption, (ii) the rule of law, (iii) regional government, and (iv) the strength of democracy and electoral institutions (voice and accountability). A list of the 16 questions included in the survey and their division into the four different categories can be found in annex Table A2. The scores were standardized and the regional value subtracted from the national score. This provided a regional distance to the national score based on the survey expressed in standard deviations. The regional distance was subsequently standardised at the EU level using the World Bank Worldwide Governance Indicators (WGI) time series.¹⁰ Finally, all four individual components were merged into a composite measure of quality of government: the quality of government index (QoG). A series of robustness tests were conducted by Charron et al. (2014a), showing that the quality of government index is

regions comprise Ceuta and Melilla, all French overseas departments (Guadeloupe, Martinique, Guyane, Réunion), Açores, and Madeira, as well as for North Eastern Scotland (UKM5) and the UK's Highlands and Islands (UKM6). Recent changes in NUTS-2 boundaries also led to the exclusion of the Finnish regions of Helsinki-Uusimaa, Etelä-Suomi, and Pohjois-Suomi, and Itä-Suomi.

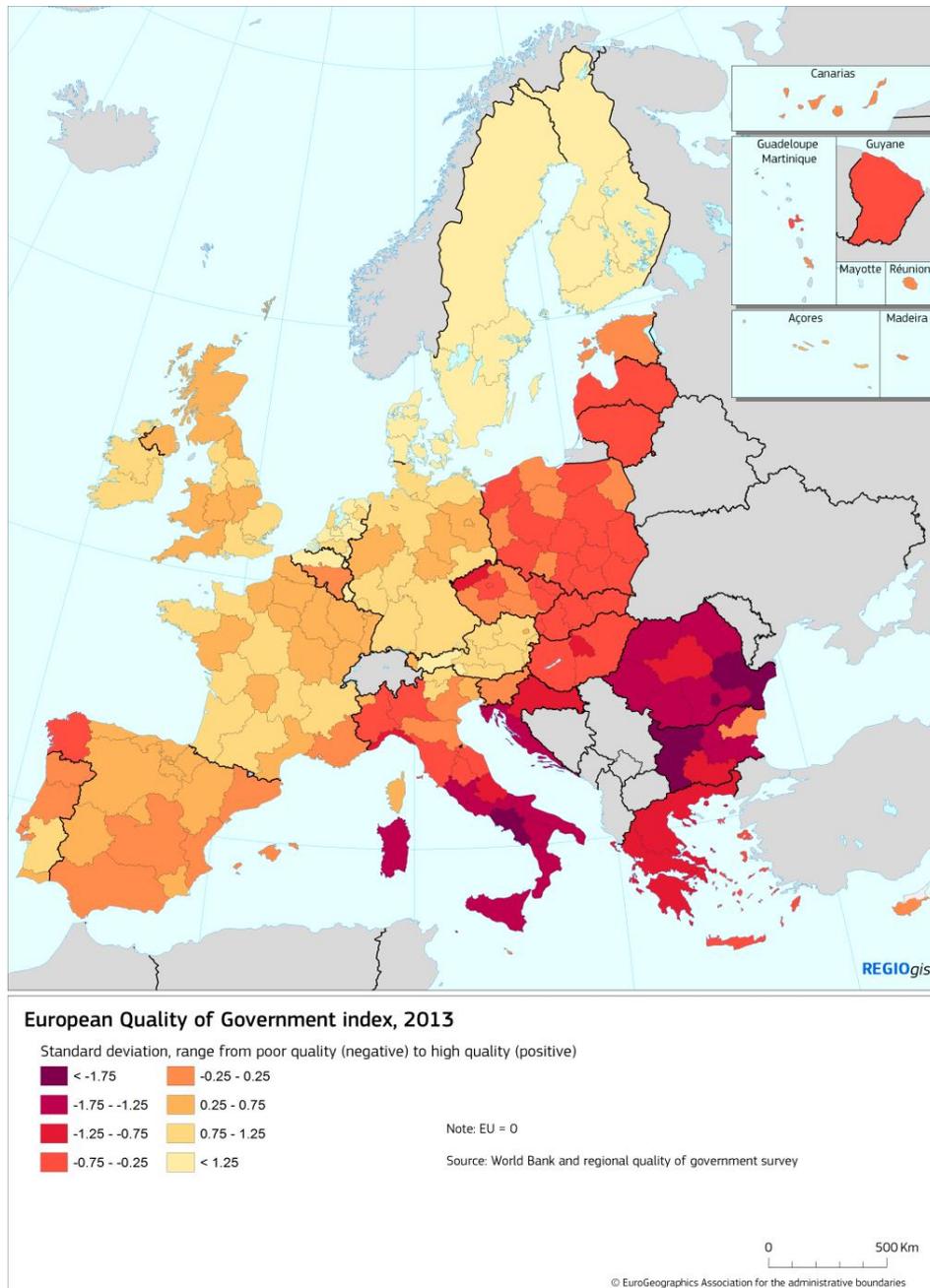
⁹ The survey – one of the largest ever conducted at a regional (i.e. subnational) level – is based on around 200 participants per region and consisted of 34 quality of government-, and demography-related questions, amongst others on education, health care, and law enforcement – services often provided by local or regional authorities. For more detailed information on the survey as well as the construction of the indices see Charron et al. (2011 and 2014a).

¹⁰ The method of standardization implies making the EU average zero, with a standard deviation of one.

highly robust to changes in weighting and aggregation, as well as to the social and age-related composition of the survey respondents.

When mapping the quality of government index for the year 2013, the presence of four different areas in terms of government quality becomes immediately evident (Figure 2). Regions in the Nordic countries, as well as in Austria, the Netherlands, and Flanders display the best overall scores in government quality. The weakest quality of government is concentrated in the south-eastern corner of Europe and in Bulgaria, Greece, Romania, and southern Italy, in particular. Post-2004 European member states from Croatia in the south to Estonia in the North have scores above those found in the regions with the lowest quality of government, but still below the European average. Regions in Western Europe from Portugal to Germany and from Ireland to central Italy, despite some exceptions, tend to have government quality scores around the European average (Figure 2).

Figure 2. Quality of government in European regions.



Source: European Commission (2014)

3. Estimation of results

4.1 'Classical' estimation framework

In this section we first consider the determinants of growth across regions of Europe during the period of analysis (1999-2013). In particular, the aim is to unveil the factors that have contributed to economic dynamism and resilience in a period marked by early boom and subsequent bust. It is expected that, with the striking change in the economic cycle from 2008 onwards, many of the drivers of growth during the boom period may have not worked in the same way during the crisis, consequently rendering many of the coefficients irrelevant. The European analysis is followed by a focus on the lagging regions of the EU.

Table 2. The drivers of growth at a regional level in the EU (1999-2013).

Variables	Growth (1999-2013) as a dependent variable			
	Pooled OLS (1)	Fixed Effects (2)	Driscoll-Kraay (3)	System-GMM (4)
Initial GDP per capita	-0.022*** (0.004)	-0.097*** (0.009)	-0.097*** (0.019)	-0.033*** (0.009)
Investment (gross fixed capital formation)	0.005** (0.002)	-0.012*** (0.004)	-0.012 (0.008)	0.026*** (0.006)
Population growth	-0.555*** (0.107)	-0.417** (0.161)	-0.417** (0.193)	-0.908*** (0.237)
Agglomeration	0.004** (0.001)	0.001 (0.016)	0.001 (0.0185)	0.019*** (0.005)
Accessibility	-0.001 (0.002)	-0.088*** (0.025)	-0.088*** (0.022)	-0.006 (0.005)
Tertiary education employment	0.005* (0.003)	0.023*** (0.008)	0.023* (0.012)	-0.001 (0.006)
Government quality Index (QoG)	-0.017 (0.021)	0.053 (0.059)	0.053 (0.090)	-0.010 (0.032)
Constant	0.258*** (0.034)	2.083*** (0.398)	- -	- -
R ²	0.508	0.545	0.545	-
Number of observations	3,147	3,147	3,147	3,147
Number of NUTS-2 regions	249	249	249	249
AR (2) test statistic: p-value	-	-	-	0.355
AR (4) test statistic: p-value	-	-	-	0.619
Number of instruments	-	-	-	176

Notes: *, **, *** illustrate significance at 10%, 5%, and 1%, respectively. The standard errors are listed in parentheses. Panel data analysis for regions in the European Union using a standard Solow-Swan-type growth framework. Investment is proxied by regional gross fixed capital formation as a percentage of GDP. All independent variables are included with a five year lag. Natural logarithms have been taken for most regressors apart from the population growth variable. The GMM calculations were done using the first-step version of xtabond2 by Roodman (2009). All regressions include constant time dummies.

Table 2 presents the results for all regions in the EU. It discriminates among the factors affecting economic growth using the standard neoclassical Solow-growth type estimation framework of model (5).

The results of analysis underline that, in spite of the radical change in the economic cycle and the prolonged crisis which has followed the 2008 downturn, several factors still firm in explaining differences in regional performance across Europe. Some of the estimations are in line with the predictions of the neoclassical growth theory and point to a significant regional catch-up between 1999 and 2013. The negative and highly significant coefficient of the initial GDP per capita indicator – regardless of the econometric method used – is a sign of regional convergence during the period of analysis. Although the crisis has hit the low growth income regions of southern Europe particularly hard, their divergence since 2008 has been more than compensated by a faster growth in the economic periphery than in the core between 1999 and 2008 and by the relatively resilient performance of many of the low income regions of Central and Eastern Europe since the inception of the crisis (Cuadrado-Roura et al., 2016). Lagged regional population growth rates are also negatively and significantly connected to economic per capita growth, suggesting declining living standards in regions with increasing populations. Agglomeration is generally positively and significantly associated to regional economic performance.

The more interesting results relate, however, to the factors that are traditionally most consistently associated with economic dynamism. Neither levels of investment, nor the accessibility of a region display any strong association with regional economic growth in Europe. Productive capital stock investments, measured as regional gross fixed capital formation, exhibit in two – pooled OLS and SysGMM – of the four specifications a positive and statistically significant association with regional economic growth. The coefficient is negative and significant in the fixed effects regression and insignificant in the Driscoll-Kraay analysis (Table 2), stressing the instability of the investment estimator on regional economic growth. The coefficient for road accessibility is negative and significant in the fixed effects and Driscoll-Kraay analysis and insignificant in the other two (Table 2). Hence, a good accessibility – the aim of a considerable proportion of the European cohesion effort until now – has not contributed to a noticeable rise in economic growth in recent years. The proxy for human capital –

the regional proportion of adults in employment with higher education degrees – displays a positive and significant coefficient in three of the four specifications (Table 2). This highlights the relevance of human capital and education for a region’s future growth prospects, as well as for preparing regions to weather the risks associated with economic downturns.

The coefficients for the quality of government index, the independent variable of interest, are insignificant in three of the four specifications (Table 2). This result contrasts with previous studies using pre/crisis data (Nistotskaya et al., 2015; Rodríguez-Pose and Garcilazo, 2015; Rodríguez-Pose and Di Cataldo, 2015) and implies that, when considering a period of time that involves pre-and post-crisis performance, regional quality of government seems to have less of an influence on economic outcomes.

4.2 Considering change in institutional quality

Do these result stands when the basic framework presented above is enlarged in order to consider not only improvements in institutional quality, but also change in infrastructure and in innovation and human capital? In order to assess whether this is the case, we estimate an extended Solow-type growth approach following model (6), with the different composite indices included both in levels and in growth rates. The analysis also considers the decomposition of the institutional quality index into its four main components. Tables 3 and 4 report the results for the extended growth model using only – and because of restrictions in space – a fixed effects and a System-GMM dynamic panel specification.

Table 3 presents the fixed effects estimations for the 249 EU regions included in the analysis, highlighting the decomposition of the quality of government index into its four main constituents: corruption (regression 2), rule of law (regression 3), government effectiveness (regression 4), and government accountability (regression 5).

Table 3. The drivers of growth – levels and change – at a regional level in the EU (1999-2013). Fixed effects estimation.

Variables	Fixed effects analysis				
	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita	-0.107*** (0.011)	-0.110*** (0.010)	-0.104*** (0.011)	-0.106*** (0.011)	-0.103*** (0.011)
Investment	-0.016*** (0.006)	-0.016*** (0.005)	-0.016** (0.006)	-0.015** (0.006)	-0.016*** (0.006)
Population growth	-0.308* (0.165)	-0.328** (0.159)	-0.296* (0.163)	-0.262 (0.164)	-0.344** (0.164)
Agglomeration	0.003 (0.016)	0.003 (0.015)	0.001 (0.016)	0.003 (0.016)	0.005 (0.016)
Level of accessibility index	-0.105*** (0.027)	-0.105*** (0.026)	-0.109*** (0.027)	-0.108*** (0.028)	-0.100*** (0.027)
Change of accessibility index	-0.151 (0.093)	-0.120 (0.091)	-0.099 (0.091)	-0.149 (0.091)	-0.151 (0.094)
Level of human capital & innovation index	0.008 (0.011)	0.007 (0.011)	0.012 (0.011)	0.010 (0.010)	0.011 (0.011)
Change of human capital & innovation index	-0.024* (0.012)	-0.023* (0.012)	-0.023* (0.013)	-0.027** (0.013)	-0.022* (0.012)
Level of institutional quality (QoG)	0.007 (0.062)				
Change of institutional quality (QoG)	0.227** (0.088)				
<i>Institutional index components</i>					
Level of corruption index		-0.021 (0.053)			
Change of corruption index		0.195*** (0.053)			
Level of rule of law index			0.030 (0.046)		
Change of rule of law index			-0.310*** (0.081)		
Level of government effectiveness				0.002 (0.038)	
Change of government effectiveness				0.158*** (0.038)	
Level of government accountability					0.056 (0.035)
Change of government accountability					0.059* (0.032)
Constant	2.399*** (0.431)	2.505*** (0.443)	2.396*** (0.428)	2.444*** (0.432)	2.138*** (0.444)
Observations	2,802	2,802	2,802	2,801	2,802
Number of regions	249	249	249	249	249
Time FE	YES	YES	YES	YES	YES
R ² within	0.555	0.556	0.560	0.556	0.556
R ² between	0.0917	0.0946	0.0773	0.0884	0.0862
R ² overall	0.0846	0.0833	0.0779	0.0817	0.0912

Notes: *, **, *** illustrate significance at 10%, 5%, and 1% , respectively. The standard errors are listed in parentheses.

Investment is proxied by regional gross fixed capital formation as a percentage of GDP. All independent variables are included with a five year lag. Natural logarithms have been taken for most regressors apart from the population growth variable. All regressions include constant time dummies.

All model specifications displayed in Table 3 corroborate to a large extent the findings of Table 2, regression 2, which report the fixed effects estimation results for the basic model. The negative coefficients for initial GDP per capita, investment, population growth, and level of accessibility are confirmed, as are the statistically insignificant coefficients for agglomeration and regional government quality. Once changes in basic endowments are taken into consideration and when human capital is combined with innovation inputs (proxied by R&D investment), the human capital and innovation index also displays no significant association with economic growth. Hence, in a period which has been dominated by a radical alteration in regional growth patterns following the inception of the 2008 economic crisis, better or worse regional endowments in the factors that, according to standard economic theory, are likely to have a greater sway of regional growth, do not seem to have played an important role in determining regional growth trajectories (Table 3).

Does this also apply to changes in these factors? Have improvements in accessibility, human capital and innovation, and quality of government made a difference for the performance of European regions during the period of analysis? The coefficients for improvements in accessibility show no significant connection to economic growth. Increases in the human capital stock and the innovation effort are, by contrast, negatively and significantly related to economic growth (Table 3). Given these results, changes in the three fundamental growth theory factors do not seem to have shaped regional economic performance in a Europe characterised by a strong one and bust cycle.

This does not apply, however, for changes in the regional quality of government. The coefficient for improvements in the composite government quality index is positive and significant at the 1% level (Table 3, regression 1). Similarly, improvements in three of the four dimensions of regional government quality – control of corruption, government effectiveness, and accountability – are positively and significantly associated with economic growth (Table 3, regressions 2, 4, 5). Improvements in the rule of law, in contrast, show a negative and significant connection with regional growth. It can therefore be inferred that a weak government quality has not represented a significant barrier for economic growth during the period of analysis. All coefficients for the variables depicting the levels of government quality are insignificant (Table 3,

regression 2). By contrast, reducing corruption and improving government effectiveness and accountability have been crucial in determining which regions have performed better and which worse in recent years.

These results for the quality of government variables are confirmed when the method of estimation is changed. Table 4 presents the same analysis as in Table 3 using heteroscedasticity-robust System-GMM estimation techniques in all regressions.¹¹ We resort System-GMM dynamic panel data methods not only as a robustness check of the results of the fixed effects analyses, but also to control for potential endogeneity.

Once again, it is change in institutional quality rather than the initial levels of government quality that determine whether a European region has managed to grow between 1999 and 2013. As in the case of the fixed effects analyses, improvements in government effectiveness and accountability as well as the capacity to reduce corruption have an important impact on economic performance. Changes in the rule of law index remain negative and significant (Table 4). In contrast with Table 3, lower initial corruption and better rule of law are also factors which have promoted regional economic growth in recent years (Table 4, regressions 2 and 3).

¹¹ All independent variables were classified as endogenous in all regressions and the fourth and third lag were employed as (internal) instruments for the endogenous variables.

Table 4. The drivers of growth – levels and change – at a regional level in the EU (1999-2013). System-GMM analysis.

Variables	System-GMM analysis				
	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita	-0.047*** (0.008)	-0.052*** (0.008)	-0.048*** (0.007)	-0.040*** (0.007)	-0.045*** (0.007)
Investment	0.011*** (0.004)	0.011*** (0.004)	0.009** (0.004)	0.013*** (0.004)	0.011*** (0.004)
Population growth	-0.248 (0.217)	-0.277 (0.227)	-0.400* (0.237)	-0.348* (0.211)	-0.314 (0.216)
Agglomeration	0.013*** (0.004)	0.012*** (0.004)	0.010** (0.004)	0.010*** (0.004)	0.012*** (0.003)
Level of accessibility index	-0.005 (0.004)	-0.002 (0.004)	-0.0012 (0.0041)	-0.005 (0.004)	-0.005 (0.004)
Change of accessibility index	-0.219** (0.110)	-0.165 (0.112)	-0.214* (0.118)	-0.238** (0.111)	-0.218* (0.112)
Level of human capital & innovation index	0.010 (0.006)	0.008 (0.006)	0.011* (0.006)	0.016*** (0.006)	0.0150*** (0.005)
Change of human capital & innovation index	-0.070*** (0.026)	-0.050** (0.024)	-0.060*** (0.020)	-0.072*** (0.022)	-0.049** (0.022)
Level of institutional quality (QoG)	0.043 (0.035)				
Change of institutional quality (QoG)	0.384*** (0.133)				
<i>Institutional index components</i>					
Level of corruption index		0.062* (0.036)			
Change of corruption index		0.135* (0.072)			
Level of rule of law index			0.063** (0.030)		
Change of rule of law index			-0.331*** (0.0997)		
Level of government effectiveness				0.007 (0.026)	
Change of government effectiveness				0.279*** (0.053)	
Level of government accountability					0.018 (0.026)
Change of government accountability					0.317*** (0.068)
Observations	2,802	2,802	2,802	2,801	2,802
Number of NUTS-2 regions	249	249	249	249	249
Number of instruments	286	286	286	289	286
AR (2) test statistic (p-value)	0.205	0.385	0.865	0.280	0.248
AR (3) test statistic (p-value)	0.112	0.129	0.275	0.221	0.0585
Hansen Test (p-value)	0.764	0.267	0.000	0.000	0.000

Notes: *, **, *** illustrate significance at 10%, 5%, and 1%, respectively. The standard errors are listed in parentheses. Investment is proxied by regional gross fixed capital formation as a percentage of GDP. All independent variables are included with a one year lag. Natural logarithms have been taken for most regressors apart from the population growth variable. The GMM calculations were done using the first-step version of xtabond2 by Roodman (2009). All regressions include constant time dummies.

Of the other variables initial GDP per capita and, to a lesser extent, population growth remain negative and significant, underlining the robustness of the convergence process in spite of the crisis, and both changes in accessibility and in the human capital and innovation index display negative and highly significant coefficients. Levels of agglomeration, in contrast, become positive and significant.

4.3 Institutions and lagging regions in the EU

The previous analysis has looked at the role played by quality of government and the traditional factors behind economic growth according to theory in determining the economic performance of European regions between 1999 and 2013. But what happens when we focus exclusively on lagging regions? Do lagging regions benefit in the same way as the average European region from improvements in quality of government? Table 5 depicts the results of conducting the fixed effects analysis of Table 3 on 47 of the subset of 48 officially designated lagging regions by the European Commission. The exception is the Spanish region of Melilla.

Table 5. The drivers of growth – levels and change – in lagging regions of the EU (1999-2013). Fixed effects estimation.

Variables	Fixed effects analysis				
	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita	-0.054** (0.024)	-0.081*** (0.022)	-0.059*** (0.019)	-0.056** (0.022)	-0.047** (0.019)
Investment	-0.015 (0.009)	-0.019* (0.010)	-0.015* (0.008)	-0.020** (0.009)	-0.014 (0.009)
Population growth	-0.178 (0.301)	-0.147 (0.309)	-0.184 (0.277)	-0.172 (0.291)	-0.198 (0.280)
Agglomeration	0.089 (0.060)	0.110* (0.058)	0.087 (0.059)	0.083 (0.064)	0.052 (0.058)
Level of accessibility index	-0.149*** (0.042)	-0.161*** (0.039)	-0.145*** (0.043)	-0.147*** (0.042)	-0.140*** (0.040)
Change of accessibility index	-0.414*** (0.152)	-0.350** (0.150)	-0.360*** (0.131)	-0.411*** (0.148)	-0.514*** (0.142)
Level of human capital & innovation index	0.037 (0.027)	0.042 (0.027)	0.037 (0.026)	0.043* (0.025)	0.040 (0.026)
Change of human capital & innovation index	-0.0014 (0.031)	-0.007 (0.031)	-0.000 (0.032)	-0.002 (0.031)	0.010 (0.031)
Level of institutional quality (QoG)	-0.205 (0.151)				
Change of institutional quality (QoG)	0.118 (0.204)				
<i>Institutional index components</i>					
Level of corruption index		0.040 (0.101)			
Change of corruption index		0.198** (0.098)			
Level of rule of law index			-0.150 (0.094)		
Change of rule of law index			-0.315*** (0.098)		
Level of government effectiveness				-0.139 (0.105)	
Change of government effectiveness				-0.008 (0.124)	
Level of government accountability					-0.378*** (0.068)
Change of government accountability					0.407*** (0.126)
Constant	1.773** (0.717)	1.379** (0.669)	1.668** (0.698)	1.665** (0.795)	2.440*** (0.710)
Observations	591	591	591	591	591
Number of regions	47	47	47	47	47
Time FE	YES	YES	YES	YES	YES
R ² within	0.472	0.475	0.483	0.472	0.494
R ² between	0.139	0.172	0.160	0.116	0.209
R ² overall	0.158	0.167	0.175	0.152	0.172

Notes: *, **, *** illustrate significance at 10%, 5%, and 1%, respectively. The standard errors are listed in parentheses.

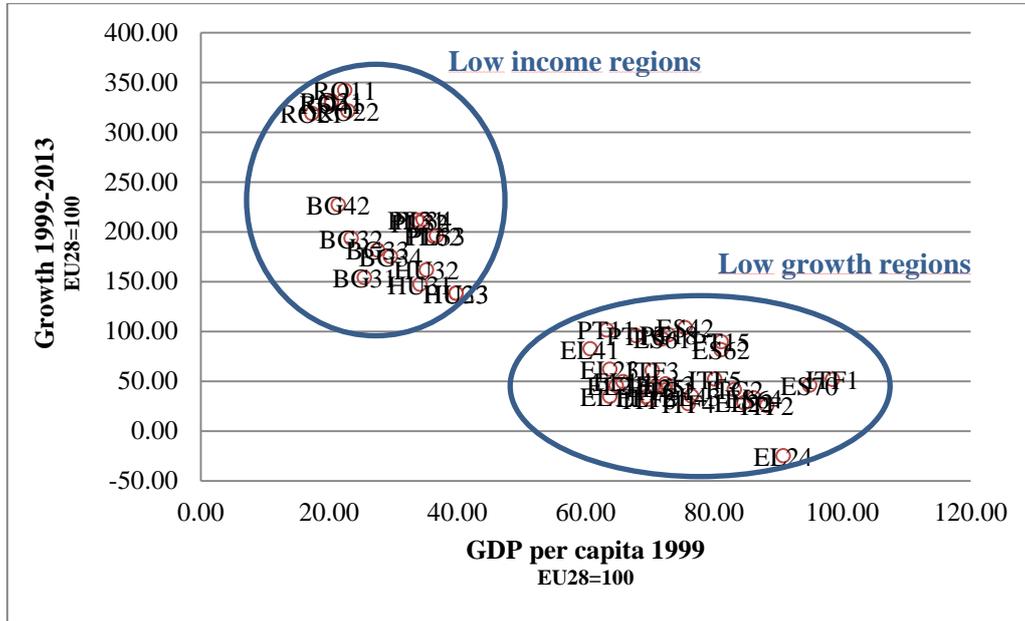
Investment is proxied by regional gross fixed capital formation as a percentage of GDP. All independent variables are included with a five year lag. Natural logarithms have been taken for most regressors apart from the population growth variable. All regressions include constant time dummies.

The analysis of the factors behind economic growth in lagging regions of Europe between 1999 and 2013 portrays a different panorama from that involving the whole sample. There is a noticeable reduction in the number of variables with significant coefficients. The results of the analysis point to a certain degree of convergence among lagging regions – as a consequence of the faster growth of regions in Central and Eastern Europe relative to most regions in southern Europe during the period of analysis – and levels of gross fixed capital formation are, to a much lower extent than in the case of the whole sample, negatively connected to economic performance in three of the five regressions. Quality of government also is less connected to economic growth in lagging regions than in the full sample, although reductions in corruption and, especially, improvements in government accountability have remained powerful drivers of economic growth in the less developed regions of Europe (Table 5).

However, the most remarkable result of the analysis for lagging regions are the two coefficients for levels and change in accessibility, which become negative and strongly significant. Neither the levels, nor improvements in accessibility – the star intervention of the European regional development policies in lagging regions until recently – have led to higher economic growth. Indeed, lagging regions which have seen their accessibility improve the most, mainly as a result of the European intervention, have tended to grow less than those regions where improvements in accessibility have been less evident.

The lower explanatory capacity of the model for the ensemble of lagging regions is likely to be a direct consequence of the heterogeneity among lagging regions in terms of both economic structure and growth performance both before and during the economic crisis. The majority of lagging regions in Southern Europe were considerable more developed in 1999 than those in Central and Eastern Europe (Figure 3). Yet the latter group has been substantially more dynamic from an economic point of view. As shown in Figure 3, this diverse trajectory between the low income regions of Central and Eastern Europe and the low growth regions of Southern Europe becomes immediately evident, with two subgroups in terms of both initial levels of GDP per head and economic dynamism clearly emerging. This diversity validates the recent subdivision of lagging regions into low income and low growth regions by the EU (European Commission, 2014).

Figure 3. Economic performance in lagging regions of Europe (1999-2013).



Source: own elaboration based on Eurostat data.

Once this heterogeneity is taken into account, have institutional conditions in low growth and low income groups left an imprint on the economic performance of their respective regions? Table 6 presents the results of applying model (6) to the low growth regions of Greece, Italy, Portugal, and Spain.

Table 6. The drivers of growth – levels and change – in low growth regions of the EU (1999-2013). Fixed effects estimation.

Variables	Fixed effects analysis				
	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita	-0.224*** (0.038)	-0.218*** (0.039)	-0.276*** (0.044)	-0.259*** (0.045)	-0.179*** (0.039)
Investment	-0.037** (0.017)	-0.029* (0.015)	-0.033* (0.017)	-0.043** (0.018)	-0.025* (0.013)
Population growth	0.078 (0.705)	0.130 (0.701)	-0.576 (0.627)	0.142 (0.696)	0.044 (0.624)
Agglomeration	0.172*** (0.047)	0.191*** (0.058)	0.155*** (0.045)	0.138** (0.054)	0.162*** (0.046)
Level of accessibility index	-0.065** (0.030)	-0.125*** (0.034)	-0.024 (0.042)	-0.067* (0.035)	-0.100*** (0.031)
Change of accessibility index	-0.438*** (0.100)	-0.229* (0.128)	-0.150 (0.126)	-0.437*** (0.107)	-0.296*** (0.087)
Level of human capital & innovation index	0.095*** (0.032)	0.069* (0.037)	0.087** (0.034)	0.095** (0.034)	0.074** (0.033)
Change of human capital & innovation index	-0.020 (0.037)	-0.009 (0.042)	-0.017 (0.039)	-0.014 (0.041)	-0.011 (0.041)
Level of institutional quality (QoG)	-1.117*** (0.193)				
Change of institutional quality (QoG)	0.792*** (0.171)				
<i>Institutional index components</i>					
Level of corruption index		0.013 (0.116)			
Change of corruption index		0.281*** (0.090)			
Level of rule of law index			-0.792*** (0.184)		
Change of rule of law index			-0.103 (0.073)		
Level of government effectiveness				-0.621*** (0.16)	
Change of government effectiveness				0.231** (0.096)	
Level of government accountability					-0.233 (0.147)
Change of government accountability					0.795*** (0.117)
Constant	3.124*** (0.686)	1.222** (0.556)	2.603*** (0.680)	2.778*** (0.791)	1.401*** (0.466)
Observations	347	347	347	347	347
Number of regions	27	27	27	27	27
Time FE	YES	YES	YES	YES	YES
R ² within	0.589	0.562	0.603	0.578	0.600
R ² between	0.014	0.044	0.002	0.024	0.017
R ² overall	0.015	0.049	0.0280	0.031	0.054

Notes: *, **, *** illustrate significance at 10%, 5%, and 1% , respectively. The standard errors are listed in parentheses.

Investment is proxied by regional gross fixed capital formation as a percentage of GDP. All independent variables are included with a five year lag. Natural logarithms have been taken for most regressors apart from the population growth variable. All regressions include constant time dummies.

The analysis is conducted for 27 of the officially designated ‘low growth regions’. Melilla in Spain is excluded from the analysis.

The results of the analysis indicate that the factors which have been crucial in shaping the economic performance of the low growth regions of Europe differ to some extent from those for the set of lagging regions. As in all the other regional groups considered, the 2000s and early 2010s have been characterised by territorial convergence within the group. Greater investment has been associated with lower levels of growth, while the population growth rate is disconnected from economic performance. Population agglomeration, by contrast, has been a strong factor behind economic dynamism in low growth regions. A good initial accessibility as well as improvements in accessibility have been more often than not a drag for the performance of these regions, as virtually all the coefficients are negative and significant (Table 6, regressions 1, 2, 4, and 5). And while improvements in the human capital and innovation index are not associated to regional economic growth, initial endowments in this index have been essential for good economic performance in this group of regions.

There are also important changes concerning quality of government, the independent variable of interest. Seven of the ten government quality variables – level of corruption, change in the rule of law and the degree of government accountability being the exceptions – are statistically significant, denoting the important role played by this type of institution in shaping recent economic performance in the lagging regions of the south of Europe. The sign of the coefficients also point to the view that a poor quality of government has not necessarily been an insurmountable barrier for the economic performance of these regions. Regions with a weaker government quality, and, in particular, those with a less efficient judicial system and less effective governments have outperformed those with better initial levels of institutional quality (Table 6, regressions 1, 2, 3, and 4). Improvements in government quality have also been fundamental channels in order to increase economic performance. Regions which have experienced the greatest improvements in overall quality of government and, specifically, in reducing corruption and in increasing government effectiveness and accountability have had a better economic trajectory.

Hence, the results indicate that in the low growth regions of Europe institutional conditions and government quality are powerful catalysts of economic growth, as well as mechanisms to stem economic decline. Unfavourable institutional settings have not

deterred growth, while improvements in government quality have been central in determining which regions have ridden best the boom and bust cycle of the last few years.

Do the low income regions of Bulgaria, Hungary, Poland, and Romania behave in the same way? Table 7 reproduces the same analysis for the 19 officially designated low income regions. As expected by their different growth trajectories, the results differ considerably from those of the low growth regions group. The only constant is the presence of convergence within the group. In the case of low income regions, economic performance in recent years has been boosted by the sorts of interventions which have been at the heart of European Cohesion Policy. Regions with a better endowment of human capital and innovation capacity and those which have witnessed a larger improvement in accessibility have performed considerably better than those where these conditions were missing.

Table 7. The drivers of growth – levels and change – in low income regions of the EU (1999-2013). Fixed effects estimation.

Variables	Fixed effects analysis				
	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita	-0.265*** (0.044)	-0.287*** (0.042)	-0.312*** (0.050)	-0.265*** (0.049)	-0.273*** (0.043)
Investment	0.006 (0.013)	-0.003 (0.014)	0.012 (0.011)	-0.006 (0.013)	0.005 (0.010)
Population growth	0.166 (0.337)	0.162 (0.355)	0.204 (0.288)	0.0683 (0.371)	0.610** (0.264)
Agglomeration	0.211** (0.0902)	0.307** (0.111)	0.195* (0.100)	0.299** (0.116)	0.158 (0.135)
Level of accessibility index	-0.602*** (0.124)	-0.600*** (0.133)	-0.613*** (0.127)	-0.560*** (0.115)	-0.581*** (0.115)
Change of accessibility index	0.746*** (0.238)	0.808*** (0.246)	0.673** (0.268)	0.765*** (0.223)	0.706*** (0.224)
Level of human capital & innovation index	0.088** (0.034)	0.097** (0.036)	0.073** (0.032)	0.099*** (0.034)	0.0740** (0.031)
Change of human capital & innovation index	-0.038 (0.041)	-0.045 (0.042)	-0.040 (0.047)	-0.043 (0.040)	-0.010 (0.043)
Level of institutional quality (QoG)	-0.387* (0.211)				
Change of institutional quality (QoG)	-0.129 (0.311)				
<i>Institutional index components</i>					
Level of corruption index		-0.109 (0.175)			
Change of corruption index		0.038 (0.185)			
Level of rule of law index			-0.571*** (0.169)		
Change of rule of law index			0.065 (0.291)		
Level of government effectiveness				-0.185 (0.223)	
Change of government effectiveness				-0.135 (0.165)	
Level of government accountability					-0.426*** (0.142)
Change of government accountability					0.0587 (0.182)
Constant	8.585*** (2.054)	6.951*** (1.919)	9.806*** (1.879)	6.449*** (2.055)	9.145*** (2.314)
Observations	244	244	244	244	244
Number of regions	19	19	19	19	19
Time FE	YES	YES	YES	YES	YES
R ² within	0.637	0.629	0.651	0.631	0.650
R ² between	0.102	0.135	0.108	0.144	0.156
R ² overall	0.0876	0.108	0.0755	0.113	0.0966

Notes: *, **, *** illustrate significance at 10%, 5%, and 1% , respectively, respectively. The standard errors are listed in parentheses.

Investment is proxied by regional gross fixed capital formation as a percentage of GDP. All independent variables are included with a five year lag. Natural logarithms have been taken for most regressors apart from the population growth variable. All regressions include constant time dummies.

In contrast, none of the quality of government variables displays a positive and significant relationship with economic growth during the period of analysis. Only for the case of the levels of rule of law and government accountability a significant connection to economic performance emerges. The sign of the coefficient is, nevertheless, negative (Table 7, regressions 3 and 5). Hence, while in the case of the low growth regions of Southern Europe economic performance has been strongly related to improvements in government quality, growth in the low income regions of Central and Eastern Europe is much more dependent on the traditional factors behind economic change, according to growth theories. It can therefore be said that, while in low income regions investing in redressing the imbalance in endowments with the rest of Europe makes sense from an economic point of view, in the low growth regions – which have benefited from this type of investment through the Structural and Cohesion funds for a much longer period of time and where, as a consequence, the gap in basic endowments is considerably lower – the capacity to generate growth and weather economic crises has become much more dependent on improvements in improving the institutional conditions which act as a barrier for economic development.

5 Institutions and place-based policies for lagging regions in Europe.

What are the implications for policy that can be extracted from the analysis? Although measuring institutional quality is always controversial and leads to some caution when interpreting the results, a number of important policy consequences can be derived.

5.1 *Institutions matter*

The first implication of the analysis is that institutions, in general, and quality of government, in particular, matter for regional development in Europe. Over a period which includes economic boom, as well as the greatest and most prolonged economic depression Europe has experienced since the 1930s, institutional conditions have been among the most consistent predictors of economic growth and resilience. This contrasts with more mixed results in the sway of education and innovation and with what seems to be a lack of connection – when not an outright negative one – between levels and improvements in accessibility, on the one hand, and economic performance, on the

other, for the whole of Europe. This implies that, in order for economic development at a regional level in Europe to take hold, the institutional dimension needs to become an integral part of the development strategy.

5.2 Improvements in quality of government are a powerful driver of development

In particular, improvements in government quality have been fundamental for economic growth over the last decade and a half. Whereas poor institutional endowments, proxied in terms of government quality, have not represented a barrier for development – indeed, regions that are characterised by weak government institutions have, once other factors are controlled for, converged towards the EU average – regions that have managed to reduce corruption levels and have improved their government effectiveness, transparency and accountability have also had a better economic trajectory.

Consequently, improving government efficiency by either addressing widespread corruption or introducing measures aimed at making government decisions more efficient and transparent is as important a requisite for regional development in Europe, as conducting more traditional ‘hard’ types of regional development investments. This implies that measures aimed at reducing the monopoly power of bureaucrats (Rose-Ackerman, 1978; Bardhan, 1997) or creating a more adequate incentive pay structure for public administration (Bardhan, 1997; Tanzi, 1998) may have a central development policy role to play. E-government initiatives and a wider use of ICTs in government can also deliver huge improvements in government efficiency and transparency (Pina et al., 2007). Cutting red-tape (Håkanson, 2013), as well as measures aimed at increasing the education levels of civil servants can further redress public sector inefficiencies and promote economic growth (Afonso et al., 2010). It has been also argued that decentralisation may also contribute to a reduction in corruption and to greater government efficiency (Fisman and Gatti, 2002), although this issue in itself is highly controversial (Rodríguez-Pose and Gill, 2005). Other measures often cited in the literature as corruption-reducing and government efficiency-enhancing, such as encouraging whistleblowing or increasing the penalties for acts of corruption, may be less efficient in this respect (see Bardhan, 1997; Tanzi, 1998).

Overall, the implementation of government efficiency-enhancing measures and the fight against corruption can lead to significant improvements in the efficiency of public policies while, at the same time, reducing wastage and the overall use of scarce public resources (Afonso and Fernandes, 2006). But, as noted by Tanzi (1998: 587), any strategy in this respect has to start by a clear awareness and an acknowledgement that these factors are a problem and a significant barrier for public policies to take hold and for economic development intervention to take off. However, as Persson et al. (2013) stress, awareness of the problems alone is not sufficient and collective action measures need to go well beyond the traditional principal-agent approach to tackling corruption and government inefficiencies. This would imply mobilising a wide range of stakeholders – including peer pressure from below and from above – in order to address these issues, as well as implementing the necessary legal and policy changes and pushing, enforcing, and monitoring changes aimed at curtailing corruption and improving government efficiency (Dijkstra, 2013). However, even in this case, progress will not be easy and change is more likely to happen incrementally rather than through radical transformation (Pina et al., 2007; Norris et al., 2013).

5.3 One-size-fits-all policies for lagging regions are not the solution

Acknowledging the importance of quality of government and implementing the necessary steps to improve government quality, however, does not necessarily mean that the same policies targeting institutions have to be adopted across lagging regions of the EU. The results of the analysis make clear that what has worked in certain lagging regions, does not necessarily work in others. Different development strategies are needed in different places and at different stages of development. At lower levels of development, such as those found in the low income regions of Central and Eastern Europe, the factors behind economic growth in recent years differ from those at higher levels of development (Tables 3 and 4) and, more strikingly, from those of other lagging regions in Southern Europe (Tables 6 and 7). At lower levels of development, regional economic growth is driven by a good endowment of human capital and innovation, as well as by improvements in accessibility through investment in transport infrastructure. This implies that the traditional factors highlighted by the neoclassical endogenous growth theories still play a fundamental part in driving economic performance in these areas.

As the level of initial development increases, as in the low growth regions of the EU, the influence of more traditional growth factors wanes and institutional quality becomes more relevant in determining which territories are and remain dynamic and which are not.

Consequently, the story which emerges from the analysis is one in which development strategies need to be specifically tailored to the conditions of every territory – that is, the implementation of place-based policies – which will, to a great extent, depend on the stage of development in which any given European region finds itself. Therefore, while investments aimed at improving physical accessibility may play an important role in the early stages of implementation of a development strategy in the most lagging regions of Europe, the returns of such investments are bound to become less evident – and in many cases represent a waste of scarce public resources – in those areas of Europe that have already devoted substantial funds to the improvement of their transportation network through the Structural and Investment Funds, unless accompanied by significant improvements in government quality (Crescenzi et al., 2016).

5.4 Quality of government improvements as essential for low growth regions

The analysis has evidenced that low institutional capacity in lagging regions of Europe does not necessarily represent a strong handicap for future development. Lack of improvement in the quality of institutions, by contrast, does. This particularly applies to low growth regions, rather than to low income regions in the periphery of Europe. Low growth regions which have witnessed limited improvement in the quality of government or have failed to reduce corruption, have not been capable of making the most of development and cohesion policy intervention and, as a consequence, have also grown less and been more exposed to the negative consequences of the crisis. These results corroborate Charron et al.'s (2014a: 81) claim that failure to address these institutional malfunctions condemns regions “to remain stuck in low growth and low QoG equilibrium, while the regional government remains to some degree sheltered from the financial consequences of low QoG through continuing support from the EU”. A sustained effort in order to address barriers in terms of government effectiveness, corruption, and deficient voice and accountability is therefore needed if the low growth

regions are to experience both sustainable levels of development and greater convergence towards the rest of the EU. Otherwise factors such as pervasive corruption, lack of transparency and accountability, and excessive red tape will continue to permeate Southern Europe's business environment and seriously undermine the returns of any other sort of development intervention.

5.5 Addressing basic endowments shortages in low income regions

In contrast, in the low income regions of Europe more traditional factors, such as a good human capital and innovation endowment and investments targeting improved accessibility are proving their worth as catalysts for growth. In these areas of Europe, strategic investments in infrastructure, in general, and in transport infrastructure, in particular, are likely to continue to contribute to economic development for some time. With still considerable deficits in basic infrastructure, improving accessibility in low income regions becomes a precondition for economic development. Tackling the infrastructure deficit thus needs to feature prominently in the early stages of the strategy. However, it has to be noted that the returns of improvements in accessibility are likely to diminish as accessibility constraints become less important and the level of development improves. Consequently, any sort of infrastructure investment needs to be limited in time, respond to clear criteria of need and development potential, and be matched by similar efforts aimed at the enhancement of human capital and at tackling institutional bottlenecks.

The analysis also points in the direction that human resources and the skilling of the labour force should also feature prominently in any development strategy. The human capital deficit of low income regions in Central and Eastern Europe and the low degree of redeployment of the workforce are important problems not just per se, but also because they limit the innovative and 'absorptive' capacity of the region. Without a properly trained workforce many low income regions in Europe will remain stuck among the innovation averse and perhaps even become low growth regions in time. Particular attention needs to be paid to all levels of training, but especially to the insertion of university graduates into the labour force, avoiding common problems of mismatch between educational supply and labour demand and overeducation. It will be also crucial to incentivise lifelong learning, as, in a world where the technology cycles

are becoming shorter and shorter, simply relying on the skills acquired in formal education will lead to a quick depreciation of skills and to the lack of adaptation to new challenges and competition. The effort on human capital, in contrast to that aimed at addressing accessibility constraints will need to be sustained in time.

5.5 Moving to the next level

For most lagging regions in Europe moving to the next level in economic development terms will not be easy unless carefully tailored development strategies are set up paying special attention to the specific conditions of each region. If development strategies are to be both capable of successfully addressing short-term problems, as well as of putting European lagging regions on a sustainable development track in the medium- to long-term, decision-makers in every European region, nation as well as in Brussels will have to collaborate and to tread carefully in crafting development strategies that juggle the traditional investments aimed at improving infrastructure, human resources, and innovation with a greater focus on institutional issues and quality of government as a way to overcome the barriers to development that lagging regions face.

The policy lessons that emerge from the analysis point towards the need to carefully put together integrated development strategies in any development policy interventions. Development strategies would require encompassing an adequate mix of actions aimed at redressing regional infrastructure deficits, together with the active improvement of human resources and employment structures, and the upgrading of the institutional environment. The mix of all these interventions will vary from place to place, depending on initial conditions and levels of development. The timing of each action is also crucial. Invest too early, for too long, or too much on one of these development axes and the risk of ending up with a strategy that yields scarce returns is high. Under these circumstances institutional conditions are likely to become a more important and visible barrier to development. Comprehensive and well-timed place-based development strategies are therefore needed not only address some of the basic problems of lagging regions in Europe, but also to enhance their capacity – and, as a consequence, that of Europe as a whole – to adopt new technology, retain and attract talent, generate and simulate new investment, and, last but not least, make the most of

the economic potential across the whole of Europe. Such an approach is also bound to set the bases for a more sustainable growth in lagging regions of Europe.

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ANNEX

Table A1: Description of Variables

Variable	Exact definition	Data source
Dependent variable	Annual growth rate of regional GDP (PPS) per capita	Eurostat' Regio Database
Internal Factors		
Investment and Infrastructure		
Gross fixed capital formation	Gross fixed capital formation in per cent of nominal GDP	Eurostat' Regio Database
Accessibility by road	Road network data measuring potential road accessibility as the inverse time-distance weighted population	Klaus Spiekermann and European Commission
Accessibility by air	Total number of air transport passengers in thousand standardized by regional population size	Eurostat' Regio Database
Human capital, innovation and demography		
Tertiary education employment	Percentage of employed people (aged 25-64) with completed higher education (ISCED-97 levels 5 and 6).	Eurostat' Regio Database
Life-long-learning ratio	Participation of adults aged 25-64 in education and training in per cent.	Eurostat' Regio Database
Patent applications	Number of patent applications per million of inhabitants	Eurostat' Regio Database
Total R&D expenditure	Total R&D expenditure (in all sectors) in per cent of GDP	Eurostat' Regio Database
Population growth rate	Annual growth rate of the total regional population	Eurostat' Regio Database
Agglomeration	Average population living within a 25km radius	European Commission
Regional institutional measures		
Control of corruption	Index evaluating corruption in the public school and health care system, and other public services	Charron et al. (2014a)
Rule of law	Constructed index measuring residents' perception of the objectivity and confidence in the police and in regional law enforcement	Charron et al. (2014a)
Government effectiveness	Index measure identifying the quality and impartiality of regional health care and education services	Charron et al. (2014a)
Government accountability	Composite index analysing the perceived honesty of elections and the effectiveness of the media as a watchdog for public sector corruption	Charron et al. (2014a)
Quality of Government Index	Regional quality of government index constructed combining all the previous four indicators	Charron et al. (2014a)

Annex Table A2: Survey questions used for the construction of the regional institutional measures

Rule of Law-Focused Questions

How would you rate the quality of the police force in your area? (low/high, 0-10)

The police force gives special advantages to certain people in my area. (agree/disagree, 0-10)

All citizens are treated equally by the police force in my area. (agree, rather agree, rather disagree or disagree, 1-4)

Corruption is prevalent in the police force in my area. (agree/disagree, 0-10)

Government Effectiveness-focused questions

How would you rate the quality of public education in your area? (low/high 0-10)

How would you rate the quality of the public health care system in your area? (low/high 0-10)

Certain people are given special advantages in the public education system in my area. (agree/disagree, 0-10)

Certain people are given special advantages in the public health care system in my area. (agree/disagree, 0-10)

All citizens are treated equally in the public education system in my area. (agree, rather agree, rather disagree or disagree, 1-4)

All citizens are treated equally in the public health care system in my area. (agree, rather agree, rather disagree or disagree, 1-4)

Voice & Accountability-focused questions

In your opinion, if corruption by a public employee or politician were to occur in your area, how likely is it that such corruption would be exposed by the local mass media? (unlikely/likely, 0-10)

Please respond to the following: Elections in my area are honest and clean from corruption. (agree/disagree, 0-10)

Corruption-Focused Questions

Corruption is prevalent in my area's local public school system. (agree/disagree, 0-10)

Corruption is prevalent in the public health care system in my area. (agree/disagree, 0-10)

In the past 12 months have you or anyone living in your household paid a bribe in any form to:

Health or medical services? (yes/no)

In your opinion, how often do you think other citizens in your area use bribery to obtain public services? (never/very often, 0-10)

Source: Charron, N., Victor Lapuente, V., Rothstein, B., 2011, Measuring Quality of Government and Sub-national Variation, Report for the EU Commission of Regional Development European Commission Directorate-General Regional Policy Directorate Policy Development.