

European Commission

Joint Research Centre
Institute for Prospective Technological Studies

Contact information

Institute for Prospective Technological Studies
Address: Edificio Expo, C/ Inca Garcilaso, s/n 41092 Seville, Spain
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 9544 88318
Fax: +34 9544 88300

<http://ipts.jrc.ec.europa.eu/>
<http://www.jrc.ec.europa.eu/>

This publication is a Technical Report by the Joint Research Centre of the European Commission.

Legal Notice

This publication is a Technical Report by the Joint Research Centre, the European Commission's in-house science service. It aims to provide evidence-based scientific support to the European policy-making process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

This document replaces the publication titled 'The role of government institutions for smart specialization and regional development' with ISBN number 978-92-79-34522-7, EUR number 26280 EN and PUBSY request number JRC85996.

The corrections made in the new document are: addition of authors' affiliations; addition of abstract and keywords' list; addition of disclaimer; use of new template.

JRC88935

EUR 26562 EN

ISBN 978-92-79-36413-6 (PDF)

ISSN 1831-9424 (online)

doi:10.2791/71842

Luxembourg: Publications Office of the European Union, 2014

© European Union, 2014

Reproduction is authorised provided the source is acknowledged.

Printed in Spain

The Role of Government Institutions for Smart Specialisation and Regional Development

Andrés Rodríguez-Pose*, Marco di Cataldo* and Alessandro Rainoldi**^a

*London School of Economics, London (United Kingdom)

**European Commission, JRC-IPTS, Seville (Spain)

S3 Policy Brief Series n° 04/2014 – January 2014

S3 Platform, JRC-IPTS

Abstract

Research and innovation strategies for smart specialisation (RIS3) are trying to introduce a new vision of innovation policy in European regions. However, the success of RIS3 policy measures is closely dependent on the capacity of regional government institutions to act as coordinators or facilitators of the interventions. The way in which institutional mechanisms govern innovation processes and provide incentives for the interaction between regional actors remains a largely unexplored area of scientific research.

This policy note discusses the importance of sound institutional frameworks for the effectiveness of smart specialisation, presenting an econometric study that investigates the link between government institutions and innovation. The empirical results confirm the key role played by governance structures for technological advances at the regional level, suggesting that the greatest gains in innovative capacity from institutional reforms would be obtained in peripheral territories where the initial level of government quality is lower. This analysis has important implications for the identification of the necessary pre-requisites for successful RIS3 strategies in EU regions.

Keywords: Regional Policy, Institutional framework, Coordination, Governance structures.

^a The views expressed are purely those of the author and may not in any circumstances be regarded as stating an official position of the European Commission.

1. Introduction

The promotion of research and innovation strategies for Smart Specialisation (RIS3) is one of the cornerstones of the new place-based approach characterising regional development interventions in the European Union (EU). In order to fulfil Europe 2020 strategic objectives on Research and Innovation, EU regions will have to implement RIS3 and define a new transformation agenda capable of stimulating the competitive advantage and key knowledge assets of each place. Whilst this may prove relatively easy to achieve in the more advanced areas, the periphery of Europe has a series of structural institutional conditions that may make the implementation of RIS3 significantly more difficult in lagging regions, despite the substantial amount of resources devoted to Research, Technological Development and Innovation (RTDI) goals in lagging regions by the EU. The Commission already earmarked one fourth of the total 2007-2013 budget of EU Cohesion Policy for the funding of RTDI in regions receiving Structural Fund support, and more financial resources will be made available over the 2014-2020 programming period. However, despite this considerable financial effort, the returns to research and innovation policy in the periphery of Europe has been far from satisfactory. The design and implementation of RIS3 is thus likely to face important challenges.

Setting the adequate conditions for achieving a competitive position in the knowledge economy is far from a simple process. Successful RIS3 interventions are more likely to take place in areas with a sound and functioning regional innovation system, where the core actors and suitable investment priorities and to allocate resources efficiently are more easily identifiable. This will happen in areas where local institutions create the conditions for unearthing the RTDI potential in which a territory is most likely to excel. Good government institutions are thus pivotal for the effective application of RIS3 interventions, as they are responsible for designing and implementing all necessary measures to trigger the process of structural and technological change. Territories where the quality of political and regulatory system is poor, rent-seeking is pervasive and judicial structures are inadequate – as in a number of regions of the European periphery – may therefore face substantial obstacles for the successful implementation of effective place-based policy measures (Farole et al., 2011), in general, and RIS3 strategies, in particular.

The absence of well-functioning regulatory and administrative frameworks and the presence of local policy-makers pursuing self- over public-interest represents a serious constraint for the generation of innovation and for achieving greater economic development. These institutional conditions may derail policy interventions such as the promotion of technological progress through expenditures in Research and Development (R&D) activities, generally the traditional recipe for innovation. Poor institutional conditions may thus affect the efficacy of policies aimed at the generation and diffusion of knowledge in peripheral areas (Rodríguez-Pose and Crescenzi, 2008). In this respect, ‘institution-building’ can be a key to the modernisation of a region’s economic structure, but also to the identification those activities which may

guarantee a region's capability to adapt to a rapidly evolving technological context – i.e. diversifying through 'related variety' (Boschma and Iammarino, 2009). The question is thus to what extent does the improvement of weak institutional conditions and of inadequate government structures in lagging areas of the EU represent a precondition for development and for the effective implementation of innovation policies. That is, to what extent in regions marked by weak governmental structures is the improvement of the local institutional setting more conducive to innovation and growth than investing resources in R&D.

The present policy concept note, derived from Rodríguez-Pose and Di Cataldo (2013), aims to shed more light on these questions by investigating the role of government institutions for the promotion of innovation and smart specialisation in European regions. The main objective is to provide a clearer understanding of how local quality of government institutions conditions the effectiveness of innovation investments. This implies discussing the role played by the quality of regional governments in RIS3 on the basis of an econometric study identifying the key institutional elements affecting innovation. The analysis is also reproduced by focusing exclusively on a number of core and peripheral EU regions, in order to assess the main determinants of technological progress in regions at distinct levels of economic and institutional development.

2. Government institutions for smart specialisation strategies

The smart specialisation concept develops from the recognition that successful development and innovation strategies cannot be replicated mechanically in each and every different regional context. Rather than trying to generate 'technology miracles' in economically disadvantaged areas, the best way to close the gap between less innovative regions and technology hubs is to try to identify the unique assets that make the potential for innovation in a peripheral region. In contrast of the traditional linear model of devoting more resources into R&D, RIS3 strategies require a much higher effort in planning, as policy measures are not transposed from the best performers, but the result of a careful examination of a region's weaknesses and potential strengths. This analysis looks at the potential for knowledge-based transformation of the regional economy and is based on the assessment of the supportive infrastructure for innovation existing in the region, including its connectedness to the rest of the world and the behaviour of its innovation actors.

Given that RIS3 strategies are based on information and on a systematic evaluation of the existing regional capabilities for innovation support, a high degree of capacity and competency on the part of regional governments is an essential pre-condition for performing a transparent evaluation and for determining the future success of the RIS3 intervention. Local and regional governments play a crucial role in the activation of this scanning procedure. They have to scrutinise all elements and actors of the

innovation system in order to identify the most promising activities on which to invest. Local governments should also have the capacity to correctly identify the position of the region in the international value chain and the potential niches for smart specialisation.

Once the innovation players have been correctly identified, the RIS3 approach requires their direct involvement in the design process. Whoever among firms, higher education institutes, public research centres, members of the civil society, or any other local actor is best suited to facilitate the 'discovery' of the most promising activities and/or areas for regional innovation should be involved in the formulation of the strategies. The role of government institutions in this phase is to provide the adequate incentives for the development of effective collaborations among all stakeholders in the innovation system, that is, to set the conditions for an "inclusive" approach to the identification of policy priorities. However, the risk is that vested interests from the most powerful regional stakeholders and lobbies may condition decision-makers, letting partisan politics become prevalent and often giving rise to problems of impacted information (agency theory), insider-outsider phenomena and clientelism. In the absence of effective systems of control and of sanctioning inefficient and/or corrupt government behaviours, regional public officials may be influenced by strong external pressures from interest groups, more interested in either promoting their own private interests or preserving the status quo than in improving the overall innovative capacity of the region (Anokhin and Schulze, 2009).

Regional innovation systems often develop inefficient lock-in situations, thus jeopardising the genuine potential of smart specialisation. This has not necessarily to do with endemic corruption, but it usually develops when so-called "leading" stakeholders play the game of partnership with the sole aim of perpetuating their consolidated position in the regional system, irrespective of their actual ability to take part in the entrepreneurial discovery process. The reasons driving lock-in have to do with economic survival (secure public support over time), social prestige (keep being part of the VIP club), or simply because the whole system itself is essentially governed by inertia.

This is not a feature of EU peripheral regions only. A number of policy-makers coming from advanced regions in the European innovation arena have put forward and discussed, in the context of a number of the S3 Platform peer-review workshops held so far in 2012 and 2013, experiences and suggestions on how to exit from the lock-in inertial situations described above. In more concrete terms, this issue has been related to the presence in the region of a leading mature large business, a number of surviving clusters, and/or leading institutions whose leading status is defined by census or tradition rather than by their actual contribution to the innovation challenge and debate. They indeed behave as rent-seekers maximising their monopolist rents coming from their exclusive position in the policy decision process.

The presence of a functioning system of checks and balances ensures the transparent definition of priority objectives in cooperation with all relevant actors, guaranteeing that each one of them is assigned the

appropriate role. Effective governments contribute to make sure that the priorities included in a regional action plan are selected coherently with the areas of higher innovative potential previously recognised in the analytical phase. It is the regional government that bears the primary responsibility of defining the key policy objectives in the main competitive areas, and to elaborate a long-term vision on the evolution of the regional innovative path.

Finally, the success of the Smart Specialisation approach is dependent on the adoption of practices of programme monitoring and evaluation, both during and after the fermentation of the interventions. These policy mechanisms assessing the impact of a strategy are directly managed by local authorities and are conceived in order to verify if the action plan is always up to date with respect to the evolving economic context. Therefore, the effective application of RIS3 may be undermined by the presence of regional governments with limited effectiveness and little experience in project implementation and evaluation, even using the resort to external evaluations. At this stage, the absence of an evaluation culture may become a singular obstacle for a complete and satisfactory development of RIS3. Lack of adequate economic resources to develop and apply RIS3 can also represent a substantial barrier for future innovation and development.

3. Empirical model and regression results

In the previous section it has been highlighted that poor quality of government can be considered as a serious barrier for the formulation and application of Smart Specialisation strategies and for innovation. In order to assess whether this is the case and empirically demonstrate how government institutions impinge on regional innovation and RIS3 strategies, we develop a knowledge production function (Griliches, 1979; Jaffe, 1986) where the annual change in patents' applications – our proxy for innovation – is a function of regional government quality and a number of other control variables.

The model takes the following form:

$$\Delta \ln patents_{r,t} = \beta \text{ Quality of Government index}_{r,t} + (\theta_1 - 1) \ln patents_{r,t-1} + \theta_2 \ln business R\&D_{r,t} + \theta_3 W \ln business R\&D_{r,t} + \gamma \text{ Social Filter index}_{r,t} + \mu_r + \epsilon_{r,t}$$

Where $\Delta \ln patents_{r,t}$, the dependent variable of the model, is the first difference of the natural logarithm of patents application filled to the European Patent Office (EPO) per million inhabitants in region r at time t . It represents our proxy for innovative capacity, as customary in knowledge production function estimations (Griliches, 1990). Our main coefficient of interest is β , capturing the effect of a one unit increase in institutional quality on regional innovation. The proxy employed for regional institutions is the

Quality of Government (QoG) index developed by the Quality of Government Institute of the University of Gothenburg for the regions of the European Union (Charron et al., 2011). This index, originally created for a single year (2010), was subsequently transform into a panel variable by combining it with the World Bank Governance Indicators (WBI) (Kauffmann et al., 2009). The integration of the two indices has allowed also to sub-divide the main index into four governance categories, namely control of corruption, rule of law, government effectiveness and government accountability (Charron et al., 2013). The QoG index and its components have been normalised in order to make them range between 0 (minimum level of institutional quality) and 1 (maximum level).

The model is completed with other traditional elements of a knowledge production function. A control for the initial level of technological development, i.e. the annual lag of the natural logarithm of regional patents application ($\ln patents_{r,t-1}$); the percentage of expenditures in Research and Development (R&D) by the private sector ($\ln business\ R\&D_{r,t}$); the spatial weight of business R&D expenditures, to proxy for knowledge spillovers from R&D investments in neighbouring regions ($W \ln business\ R\&D_{r,t}$); the 'social filter' index, an indicator of the key social and structural conditions influencing the capacity of a region to generate new knowledge (Rodríguez-Pose, 1999). The 'social filter' index is calculated as the first principal component of (1) the employed population with tertiary education in region i , (2) long-term unemployment as a percentage of total unemployment, (3) the percentage of the regional labour force employed in the primary sector, (4) manufacturing employment in the high-tech sector (*Social Filter index* $_{r,t}$).

The analysis is performed on a sample of 225 NUTS2 regions covering all EU countries for which the variables of the model are available, covering the 1995-2009 period.¹ The estimation – conducted with Least Squared with Dummy Variables (LSDV) with heteroskedasticity-robust standard errors – allows controlling for unobservable region-specific effects.

The results of the baseline model are presented in Table 1 in the appendix. Column (i) reports a specification including all elements of the social filter index, which are individually included in the regression in columns (ii)-(v). Column (vi) reports the final specification in which all regional socioeconomic elements affecting innovation are integrated into the social filter index. In all different formulations, the results point to a positive and strongly significant impact of the regional quality of government index on the capacity to achieve higher levels of innovation. Therefore, the analysis confirms that a sound institutional environment is a determining factor for enhancing the technological and economic competitiveness of a region. The coefficient of QoG is always statistically significant at the 5% confidence level and its magnitude is high, indicating a notable degree of elasticity of patenting production to

¹ The analysis includes the NUTS2 regions of the following EU countries: Austria, Belgium, Czech Republic, Estonia, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, United Kingdom.

changes in institutional quality. According to the empirical results in Table 1, a one decimal point increase in the QoG index leads to an improvement in patenting of between 6% and 9%.

All the controls variables have the expected sign. The one-year time lag of patents' applications is negative, suggesting a process of technological convergence among the regions in the sample. R&D expenditures and R&D spillovers both display a positive and significant correlation with innovation. And finally, all socio-economic variables included in the social filter index appear to be robust predictors of regional innovative performance. The endowment of human capital and the share of high-tech employment contribute to increase the potential of the local industry to generate knowledge and innovate, whereas the proportion of agricultural employment and the rate of long-term unemployment are major barriers for technological progress in a region. The positive and significant coefficient displayed by the social filter index indicates that by improving its social and structural economic conditions, a region may gain higher returns from additional investment in innovation.

The Quality of Government Index is then sub-divided into its four components to identify the key institutional factors affecting the successful promotion of innovation at the regional level in Europe. The estimation outcomes, illustrated in Table 2 in the appendix, show that *Control of corruption* and *Government effectiveness* are the two dimensions of regional governance that most condition the production of patents in Europe. This result is of extreme relevance for the realisation RIS3 strategies. Government effectiveness has to do with a region's capacity to formulate and implement interventions and to identify those activities most likely to respond positively to innovation stimuli. Governments with limited planning and monitoring experience and/or with scarce economic resources at their disposal – i.e. governments bearing the characteristics of ineffective governments – will encounter greater difficulties in order to set up adequate Smart Specialisation strategies, inhibiting the innovation potential of the region.

Similarly, a transparent evaluation of a region's key assets and potential, as well as there is indication of the most innovative entrepreneurial activities cannot be done efficiently, if corruption is rife and public officials have developed close personal ties with the local business environment. In the process of establishing key strategic priorities for innovation, the presence of bribery may distort the action of local policy-makers towards the selection of suboptimal targets. Corruption practices and clientelism have also the effect of undermining the development of mutual trust among all social and innovation players, thus impacting the expectations of economic agents with respect to the behaviour of government members. In these circumstances, investments in innovation activities become more costly and the application of long-term development strategies – of the kind linked to Smart Specialisation – more complex to achieve.

Overall the model provides robust evidence that good-quality government institutions may be considered as an essential prerequisite for the development of effective innovation strategies in Europe. However, it can be assumed that some regions may benefit from improvements of their institutional framework more

than others. In particular, territories in which governance bottlenecks are more pronounced and the legal and governmental structures are more deficient will arguably be those more in need of institutional reforms. Conversely, at a later stage of economic, social, political and technological development, the regional innovative potential will be fostered in other ways, more in line with the predictions of the linear model of innovation.

In order to test for the presence of different effects of variations in institutional quality on innovation in different economic contexts, we divide the sample into two sub-groups: 'periphery' (regions eligible for Objective 1 or 'convergence' support in the European regional policy during the period 2000–2006) and 'core' (all remaining regions).² Of the 225 regions included in the full sample, 78 are classified as 'periphery' and 147 as 'core'. A relevant characteristic of the regions in the 'periphery' group is a much lower average score for quality of government with respect to the 'core', both for the composite QoG index and for all of its four categories.³

The regression results of the fixed effects model estimated for the two sub-groups are presented in Table 3 in the appendix. Columns (1)–(5) present the estimation of the model with the different institutional indexes included each at a time for the group of peripheral regions, while columns (6)–(10) report the same specification for the regions in the core of Europe. The estimates confirm the presence of significant differences in the factors that affect innovation in the core and the periphery of Europe. The innovative performance of peripheral regions appears to be explained primarily by the quality of government institutions and by the socioeconomic conditions in place. As in the case of the estimations covering the full sample, the combined QoG index, control of corruption and government effectiveness display a strongly significant association with regional patenting capacity (columns 1, 2 and 4). The higher magnitude of the coefficients of institutional variables provides evidence of the fact that, on average, institutional improvements have a much greater bearing on the innovation potential of regions in the periphery of Europe. By contrast, core regions, whose quality of government institutions is generally much higher, benefit little in terms of innovation from further increases in quality of government. Of the four variables relating to the QoG index, only control of corruption remains positive and significant (column (7)). This result reinforces the hypothesis that the institutions-innovation nexus may be subject to a threshold effect. Small changes in quality of government have important consequences for regional patenting up to a certain threshold level of institutional quality. When the quality of the local government reaches a sufficient degree of efficiency, the relevance of institutions wanes significantly until ultimately disappearing.

² Romania was not a member of the EU during the period 2000–2006. All its regions have been included in the 'periphery'.

³ For example, the mean value of the QoG composite index for the 'core' group is 0.81, while the value for the 'periphery' is only 0.59 (recall that the index is normalised between 0 and 1).

Investments in R&D from the private sector show a strong connection with innovation in the core group, both if performed domestically and if they activate knowledge spillovers when realised in neighbouring regions. Conversely, the evidence of a positive effect from R&D investments is marginal or absent in the periphery. The results reinforce the 'wider view of innovation' proposed by RIS3, which argues that innovation can arise in multiple ways (for instance, via non-R&D innovation expenditures) and not only through high technology development. Innovation in economically backward territories is indeed less dependent on traditional innovation inputs and more on institutional progress and on improvements of the local socioeconomic conditions. Socio-institutional factors become more important for innovation the greater the distance from the technological frontier and the farther away a region is located with respect to the main innovation generating centres.

4. Conclusions

It is widely acknowledged that the broad set of institutional arrangements of a region condition the effective formulation and implementation of innovation strategies. The novel approach to innovation policy represented by Smart Specialisation – which requires the adaptation of policies and strategies to local contexts – is even more dependent on the quality of the local institutional framework than past top-down innovation policies. The RIS3 logic is by definition more ambitious and more complex than the one-size-fits-all intervention. It assigns an important role in the policy-making process to regional actors and puts them at the very heart of the strategy design and implementation process. This makes regional public authorities a central pillar of the innovation mechanism and implies a significant reliance on their capacity to deliver. Local and regional authorities become key players in the promotion of the interactive collaboration between all relevant regional stakeholders for the collective identification of key innovation assets and long-term strategic priorities.

This policy note has examined empirically the conditions under which the quality of government institutions may represent a determining factor in the improvement of the innovative performance in European regions. The measure of regional governance used in the analysis includes both formal institutional factors, concerning the functioning of the public administration, and more informal institutional elements, such as the degree of perceived rent-seeking and moral hazard from government officials.

The results of the analysis underline the importance of the capacity of a regional government in promoting public policies and minimising corruption for the effectiveness of strategies aimed at improving innovation. The empirical study has also demonstrated that institutional reforms are more urgent in contexts where the quality of legal, political, and regulatory administrative structures is lower and

corruption is higher. Regions featuring poor institutional settings can achieve significant gains in terms of innovative performance as a result of relatively small improvements in the quality of their governance systems. Good institutions, therefore, seem to be a significant pre-condition for the development of the innovative potential of regions and for making innovation strategies such as RIS3 work, especially in the periphery of Europe.

These results suggest a number of relevant implications for the definition of an ideal institutional environment for Smart Specialisation and subsequent public policy action. First, they confirm the central role of an effective regional government in the whole process, coordinating and monitoring the advancement of the policy action plan and stimulating the participation of all regional innovation agents in a concerted effort. In order to develop the necessary collaborative leadership skills, public sector bodies with scarce experience in promoting collective strategies should encourage formal action learning programmes of the kind of the Place-Based Leadership Programme suggested in the European Commission's RIS3 guide (European Commission, 2012). Such a programme involves development agencies, regional governments, and universities in joint projects exploring prospects for related variety in the regional economy. Collaborative leadership is developed by inducing participants to share their substantive knowledge, professional networks, and skills with all other members of the project team.

Tools aimed at mutual learning across borders should be promoted. Beyond the participation in trans-national co-operation networks, where regional policy-makers can take profit from each other's experience and practice, the establishment of medium-term twinning programmes with regional administrations providing advice on governance techniques and methods could be widely beneficial to lagging regions facing inertia, lock-in, clientelism, corruption and, in more general terms, low quality of institutions.

The use of peer-review techniques should be fostered as well. Regular exchange and comparison with peer administrations coming from different countries would help inefficient regional administrations become accustomed to external connections and be confronted with practices and experience coming from outside, challenging inertia and clientelism which prevail in locked-in systems.

Last but not least, competence and quality should be put in the conditions to develop internally in the administrations, therefore giving a concrete perspective of incorporating the competence acquired from external sources into the permanent assets of the public administration.

Second, improving government effectiveness should be accompanied by strategies aimed at combating corruption, in order to prevent RIS3 support initiatives from being 'captured' by traditional interest groups of the region. Especially in peripheral economies in Europe, but not exclusively, corruption can be regarded as one of the main barriers to innovation. In many lagging areas the formation of networks among agents involved in the process of knowledge production may risk fostering inertia, clientelism, nepotism and not

very transparent ties between local decision-makers and lobbying groups. Minimising the risks of lock-in, clientelism and corruption requires the design of adequate checks and balances limiting the risk of pervasive incentives for public officials. These risks may be the consequence of a political system that fails to maintain high standards of efficiency, that is unable to ensure a good quality of the public administration, and that is incapable of establishing a clear and transparent merit-based selection of officials. Efforts to promote transparency and accountability can further contribute to minimise opportunities for corruption by reducing the distance between policy-makers and the civil society.

Importantly, reforms are not generalizable and should be appropriately designed and tailored taking into account the specific institutional weaknesses of the different regions of Europe. The set of formal and informal institutions in a given place is unique and non-transferable to other contexts. Therefore, the recognition that good institutions are a prerequisite for effective RIS3 strategies re-confirms, rather than questions, the place-based approach to regional development.

References

- Anokhin, S., and Schulze, W. S. (2009) Entrepreneurship, innovation, and corruption. *Journal of Business Venturing*, 24: 465–476.
- Boschma, R. A. and Iammarino, S. (2009) Related Variety, Trade Linkages and Regional Growth. *Economic Geography*, 85: 289-311.
- Charron, N., Lapuente, V. 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.
- Charron, N., Lapuente, V., Dykstra, L. (2013) Regional governance matters: A study on regional variation in quality of government within the EU. *Regional Studies*, forthcoming.
- European Commission (2012) Guide to Research and Innovation Strategies for Smart Specialisation (RIS3). European Commission, DG Regional Policy, Brussels.
- Farole, T., Rodríguez-Pose, A., Storper, M. (2011) Cohesion Policy in the European Union: Growth, Geography, Institutions. *Journal of Common Market Studies*, 49: 1089-1111.
- Griliches Z. (1979) Issues in assessing the contribution of research and development to productivity growth. *Bell Journal of Economics*, 10: 92–116.
- Griliches, Z. (1990) Patent statistics as economic indicators: a survey. *Journal of Economic Literature*, 28: 1661-1707.
- Jaffe, A. (1986) Technological Opportunity and Spillovers of R&D: Evidence from Firms' Patents, Profits, and Market Value, *American Economic Review*, 76(5): 984-1001.
- Kaufmann, D., Kraay, A., Mastruzzi, M. (2009) Governance matters VIII: aggregate and individual governance indicators 1996-2008. Policy Research WP Series No. 4978. World Bank, Washington, DC.
- Rodríguez-Pose, A. (1999) Innovation prone and innovation averse societies: Economic performance in Europe. *Growth and Change*, 30: 75–105.
- Rodríguez-Pose, A. and Crescenzi, R. (2008) Research and development, spillovers, innovation systems, and the genesis of regional growth in Europe. *Regional studies*, 42: 51-67.
- Rodríguez-Pose, A. and Di Cataldo, M. (2013) Quality of government and innovative performance in the regions of Europe, mimeo.

Appendix

Table 1

Robust fixed Effects estimation - Innovation and quality of government, 1995-2009

Dependent variable: Δ Patents application	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Quality of Government Combined Index (QoG)	0.828*** (0.271)	0.785*** (0.283)	0.667** (0.280)	0.612** (0.265)	0.617** (0.252)	0.906*** (0.267)
Patents application (t-1)	-0.489*** (0.0220)	-0.480*** (0.0212)	-0.482*** (0.0211)	-0.483*** (0.0218)	-0.484*** (0.0214)	-0.490*** (0.0214)
Business R&D expenditure as percentage of GDP	0.113*** (0.0309)	0.122*** (0.0303)	0.111*** (0.0314)	0.112*** (0.0309)	0.109*** (0.0308)	0.113*** (0.0310)
Spatial weight of business R&D expenditure	0.0956* (0.0503)	0.127** (0.0552)	0.132** (0.0570)	0.132** (0.0568)	0.106** (0.0517)	0.1000* (0.0523)
Social Filter Index ^a						0.125*** (0.0221)
Employed people with tertiary education	0.117*** (0.0402)	0.136*** (0.0406)				
Long-term unemployment	-0.0774** (0.0369)		-0.0658* (0.0393)			
Agricultural Employment	-0.0395 (0.0331)			-0.0796** (0.0338)		
Employment in high tech industry	0.129*** (0.0238)				0.130*** (0.0239)	
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,047	3,051	3,067	3,063	3,067	3,047
Nuts regions	225	225	225	225	225	225
R ² within	0.542	0.533	0.529	0.529	0.535	0.540

Note: Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. All variables are in natural logarithms except for the QoG Index and the Social Filter Index. a/ the Social Filter is obtained as the first principal component of: Employed people with tertiary education, Unemployment rate, Employment in high tech industry, Agricultural Employment.

Table 2

Robust fixed Effects estimation - Innovation and QoG components, 1995-2009

Dep. variable: Δ Patents application	(i)	(ii)	(iii)	(iv)
Control of Corruption	1.058*** (0.235)			
Rule of Law		0.262 (0.227)		
Government Effectiveness			0.540*** (0.166)	
Government Accountability				-0.223 (0.137)
Patents application (t-1)	-0.490*** (0.0215)	-0.492*** (0.0212)	-0.489*** (0.0214)	-0.491*** (0.0211)
Business R&D in percentage of GDP	0.106*** (0.0309)	0.108*** (0.0316)	0.110*** (0.0314)	0.0999*** (0.0317)
Spatial weight of bus R&D expenditure	0.0862* (0.0498)	0.0888* (0.0525)	0.103* (0.0532)	0.0805 (0.0521)
Social Filter Index	0.112*** (0.0202)	0.120*** (0.0239)	0.121*** (0.0218)	0.108*** (0.0214)
Time effects	Yes	Yes	Yes	Yes
Observations	3,047	3,047	3,047	3,047
Nuts regions	225	225	225	225
R ² within	0.542	0.538	0.540	0.538

Note: Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1.

Table 3

Robust FE estimation - Innovation and QoG in peripheral regions, 1995-2009

Dep. variable: Δ Patents application	Peripheral regions					Core regions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Patents application (t-1)	-0.571*** (0.0429)	-0.573*** (0.0419)	-0.570*** (0.0417)	-0.570*** (0.0433)	-0.569*** (0.0406)	-0.484*** (0.0263)	-0.482*** (0.0268)	-0.484*** (0.0263)	-0.485*** (0.0262)	-0.482*** (0.0268)
Business R&D expenditure as % of GDP	0.0544* (0.0324)	0.0450 (0.0326)	0.0463 (0.0332)	0.0500 (0.0324)	0.0406 (0.0342)	0.158*** (0.0514)	0.156*** (0.0517)	0.156*** (0.0511)	0.157*** (0.0518)	0.153*** (0.0510)
Spatial weight of R&D expenditures	0.0334 (0.163)	0.0109 (0.155)	-0.000953 (0.156)	0.0402 (0.167)	-0.0122 (0.151)	0.119** (0.0558)	0.116** (0.0536)	0.117** (0.0554)	0.117** (0.0562)	0.113** (0.0555)
Social Filter Index	0.0927** (0.0371)	0.0760** (0.0363)	0.100** (0.0388)	0.0962** (0.0377)	0.0913** (0.0390)	0.0666** (0.0267)	0.0678*** (0.0239)	0.0586** (0.0296)	0.0629** (0.0244)	0.0580** (0.0240)
QoG Index	1.271*** (0.434)					0.125 (0.327)				
Control of Corruption						1.216*** (0.378)				
Rule of Law						0.742 (0.495)				
Government Effectiveness						0.867*** (0.319)				
Government Accountability						0.0699 (0.315)				
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,006	1,006	1,006	1,006	1,006	2,041	2,041	2,041	2,041	2,041
Nuts regions	78	78	78	78	78	147	147	147	147	147
R ² within	0.428	0.428	0.423	0.428	0.421	0.632	0.633	0.632	0.632	0.632

Note: Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1.

Europe Direct is a service to help you find answers to your questions about the European Union
Freephone number (*): 00 800 6 7 8 9 10 11

(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server <http://europa.eu/>.

How to obtain EU publications

Our priced publications are available from EU Bookshop (<http://bookshop.europa.eu>),
where you can place an order with the sales agent of your choice.

The Publications Office has a worldwide network of sales agents.
You can obtain their contact details by sending a fax to (352) 29 29-42758.

European Commission

EUR 26562 EN – Joint Research Centre – Institute for Prospective Technological Studies

Title: The Role of Government Institutions for Smart Specialisation and Regional Development

Authors: Andrés Rodríguez-Pose, Marco di Cataldo, Alessandro Rainoldi

Luxembourg: Publications Office of the European Union

2014 – 16 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online)

ISBN 978-92-79-36413-6 (PDF)

doi:10.2791/71842

Abstract

Research and innovation strategies for smart specialisation (RIS3) are trying to introduce a new vision of innovation policy in European regions. However, the success of RIS3 policy measures is closely dependent on the capacity of regional government institutions to act as coordinators or facilitators of the interventions. The way in which institutional mechanisms govern innovation processes and provide incentives for the interaction between regional actors remains a largely unexplored area of scientific research.

This policy note discusses the importance of sound institutional frameworks for the effectiveness of smart specialisation, presenting an econometric study that investigates the link between government institutions and innovation. The empirical results confirm the key role played by governance structures for technological advances at the regional level, suggesting that the greatest gains in innovative capacity from institutional reforms would be obtained in peripheral territories where the initial level of government quality is lower. This analysis has important implications for the identification of the necessary pre-requisites for successful RIS3 strategies in EU regions.

JRC Mission

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new methods, tools and standards, and sharing its know-how with the Member States, the scientific community and international partners.

Serving society
Stimulating innovation
Supporting legislation

