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Sección ARTÍCULOS

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Learning processes and economic returns in European Cohesion policy

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ABSTRACT: This paper evaluates whether the learning mechanisms of the European Cohesion policy have contributed to improve the economic impact of Structural Fund expenditure over time. It analyses whether the evolution of the policy in response to greater internal monitoring and external scrutiny has resulted in a more efficient and better targeted Cohesion policy. This is tested using an econometric model which evaluates the effect of Structural Fund expenditure on the growth of regional GDP per capita —conditional on factor endowments, institutional quality and initial conditions— during the last programming periods for which full sets of data are available (1994-1999 and 2000-2006). The results of the analysis unveil an increase in the effectiveness of the policy in successive periods. This positive association is robust to controlling for the level of development of the country and the relative economic position of a region within a country. The results also show that, when structural factors are taken into consideration, Structural Fund investment tends to yield higher returns in better-off countries and wealthier regions within countries.

JEL Classification: R58; 020.

Keywords: cohesion; regional development; economic growth; GDP per capita; regions; European Union.

Procesos de aprendizaje y rendimiento económico de la Política de Cohesión Europea

RESUMEN: Este artículo evalúa hasta qué punto los mecanismos de aprendizaje de la política de Cohesión europea han contribuido a mejorar el impacto económi-

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co de los Fondos Estructurales. El objetivo es ver si los cambios introducidos en la política en respuesta a la evaluación interna y a las críticas externas han dado lugar a una política mejor y más eficaz. Para ello se utiliza un método econométrico que evalúa el efecto de los Fondos Estructurales sobre el crecimiento regional del PIB per cápita —condicionado por la dotación de los factores, la calidad de las instituciones y las condiciones iniciales de cada región— durante los dos últimos periodos de programación para los que existen datos completos (1994-1999 y 2000-2006). Los resultados del análisis indican una mejora de la eficacia de la política en el segundo periodo de programación. Esta asociación positiva es robusta a la introducción de controles ligados al nivel de desarrollo del país y de la posición de cada una de las regiones en el interior del país. Los resultados muestran también que, cuando se tienen en cuenta factores estructurales, la inversión en Fondos Estructurales obtiene mejores rendimientos en países con niveles de riqueza más altos y en las regiones más ricas en el interior de cada país.

Clasificación JEL: R58; 020.

Palabras clave: cohesión; desarrollo regional; crecimiento económico; PIB per cápita; regiones; Unión Europea.

Introduction

«The Union, especially during these difficult times, needs Cohesion Policy» (European Commission, 2010: III) claim European Commissioners Johannes Hahn and László Andor in the very first sentence of the foreword of the Fifth Cohesion Report. This view reflects the dominant belief that European Cohesion policy is more than a simple redistribution of funds. It is about increasing efficiency in its lagging behind regions (Garrido Yserte *et al.,* 2007).

Since the inclusion of the principle of economic and social cohesion in the Single European Act, the European Union has indeed made a considerable effort aimed at addressing territorial backwardness and attempting to reduce the disparities among the regions of EU. From modest origins, the EU Cohesion Policy has grown until becoming one of the two most important entries in the European budget. In the fourth programming period (2007-2013) € 344 billion euro were earmarked for the European Cohesion effort. This represents approximately 35% of the EU budget (European Commission, 2010: 202); a considerable increase from the 11% of the European budget devoted to regional development policy in 1980.

The rising profile and dimension of the European cohesion policy has also brought about a greater level of scrutiny. From a pure academic perspective, scholars have increasingly asked the question of whether European Cohesion Policy has delivered its stated goals of greater economic, social and territorial cohesion. The results of these scholarly analyses vary a great deal depending on the data, estimation methods, time periods considered and even the *a priori* positions held by different researchers. Successive reports by the European Commission —without necessarily being uncritical or overlooking some of the problems— have highlighted a positive impact of the policy.

However, a majority of studies by independent researchers have tended to criticize the European Cohesion effort for either not reaching its objectives (*e. g.* Boldrin and Canova, 2001; García-Milá and McGuire, 2001; de Freitas *et al.*, 2003; Dall'erba and Le Gallo, 2008b), or for having a limited (*e. g.* Bussoletti and Esposti, 2004; Bouvet, 2005), mixed (*e. g.* Puigcerver-Peñalver, 2004), or territorially uneven impact (*e. g.* Antunes and Soukiazis, 2005; Percoco, 2005; Mohl and Hagen, 2010).

The excessive focus on the overall impact of the European Cohesion Policy has inevitably led to black or white positions about its effectiveness and, more importantly, to overlooking other important aspects of the policy, such as the learning capacity of European development intervention. The question has always been whether the European Cohesion effort has delivered and not whether the impact has improved over time. Yet one of the key characteristics of European regional development intervention since the reform of the Structural Funds in 1989 has been the constant quest to reform and refine the policy instruments. Each successive programming period has brought about substantive changes in the policy, addressing what were perceived to be the main problems in the previous period or even responding to criticisms from different sources, including academic studies. This makes European Cohesion policy a process and not an event, with a significant potential for learning and improvement.

In this paper we address precisely the question of whether the changes and reforms adopted in successive programming periods have led to an improvement of the effectiveness and impact of European Structural Funds, by looking at the performance of 133 comparable European regions over the last two completed programming periods (1994-1999 and 2000-2006).

The paper is organized as follows. After this introduction, we take a look at what the scholarly literature has said about the impact of the European Cohesion policy, in general, and of the Structural Funds, in particular, as a way of framing the importance of the question, before discussing if and in which way the design and delivery of regional development policy has improved over time. The central part of the study consists of an econometric analysis of the effectiveness of the Structural Funds. The econometric model tries to capture the effects of the Structural Funds on growth in regions during the programming periods between 1994-1999 and 2000-2006. This section is followed by the discussion of results, paying special attention to the evidence of improvements in achieving policy goals. The final section presents the conclusions and some policy considerations.

1. Have the Structural Funds delivered? An analysis of the literature

There has certainly been no shortage of interest in the EU Cohesion Policy. Putting the Structural Funds under the spotlight has, nonetheless, not delivered any greater clarity. Different empirical studies have come up with varying results —often as a result of the use of different evaluation techniques (Esteban *et al.*, 2009)— con-

cerning the impact of the Structural Funds on regional economic performance. These results range from the positive to the extremely negative [1] and reflect «the difficulties in identifying impacts, particularly in isolating Structural Fund effects from other macro-economic measures and other noise» (Gripaios *et al.*, 2008: 518).

Perhaps the most positive effects of Structural Funds on regional economic performance have been found by Cappelen *et al.* (2003), who analyse this interaction during the period 1980-1997 for a sample of 105 European regions in nine member states. Their results show that «EU regional support through the Structural Funds has a significant and positive impact on the growth performance of European regions and, hence, contributes to greater equality in productivity and income in Europe» (Cappelen *et al.*, 2003: 640). They uncover a strong association between regional support and the endowment of different European regions: the effect of regional support is greater in better endowed regions (Cappelen *et al.*, 2003). Bouvet (2005) draws relatively similar conclusions in a study covering the period between 1975 and 1999. Using data for eight different European countries, she reports that «EU regional policy has a positive but modest effect on regional economic growth» (Bouvet, 2005: 17). This positive effect is greater on employment and total factor productivity growth rates than on the general investment rate (Bouvet, 2005: 17-18).

Analyses targeting specific countries often also find a positive impact of the European Structural effort. Sosvilla-Rivero (2010), for example, looking at the case of the regions with the highest level of Structural Fund support in Spain (Objective 1 or Convergence regions), remarks that the funds have contributed significantly to economic growth and to wealth and employment creation and its influence has been felt not only in the regions with the greatest level of assistance, but also in advanced regions (Mancha-Navarro and Garrido-Yserte, 2010: 77). Indeed, «EU Cohesion Policy would have allowed about a third of the fifteen percentage points that the Spanish per capita income has caught up on the EU-15 average over the 1988-2006 period» (Sosvilla-Rivero and Cuadrado-Roura, 2009: 20). These results are broadly in line with those of de la Fuente (2003). Some regional analyses reach similar conclusions. In the case of the Spanish region of Castilla-La Mancha, Sosvilla-Rivero *et al.* (2006), conclude that the European Cohesion effort has raised economic performance between 0.64 and 0.38 points, depending on the period considered. Similar results can be found in Cancelo *et al.* (2009) and Cámara and Marcos (2009) for the cases of Galicia and Madrid respectively.

The studies reporting a clear-cut positive association between structural spending and economic growth and regional convergence are, however, in a minority. The majority of academic studies tend to give inconclusive or even negative evidence in response to the question of whether the European Cohesion policy has succeeded in achieving its goals.

Among the studies with inconclusive results Mohl and Hagen (2010), Ederveen *et al.* (2003) and Rodríguez-Pose and Fratesi (2004) can be highlighted. Mohl and

[1] See Mohl and Hagen (2010) for an overview of the literature on the topic.

Hagen (2010) analyse the returns of Cohesion policies for 124 regions of EU-15 during the period 1995-2005 and conclude that the impact of the Structural Funds depends very much on the cohesion objective being considered. Regional intervention appears to have had a significant and positive impact only in the poorest regions of the EU-15 —the former Objective 1 or Convergence Regions—. The impact for the other objectives is either negative or insignificant. Similarly, Ederveen *et al.* (2003) find mixed evidence of the impact of Structural Funds in European regions between 1981 and 1996. In their view, the returns of the Structural Fund investment are highly dependent on whether we are looking at absolute convergence, conditional convergence with country-specific effects, or conditional convergence with regional-specific effects. It is only when conditional-convergence with region specific effects is considered that cohesion policy has a positive influence on convergence (Ederveen *et al.*, 2003: 37).

Finally, Rodríguez-Pose and Fratesi (2004) show that, while there is a positive, albeit marginal, effect of Structural Fund investment on regional growth per capita, this effect is fundamentally linked to Structural Fund investment in human capital —rather than in transport infrastructure or business support (Rodríguez-Pose and Fratesi, 2004: 100).

Even more common are the studies which reach the conclusion that European Cohesion policy has completely failed to achieve its goals of reducing the backwardness of lagging regions and of addressing the disparities between the levels of development of the various regions. Dall'erba and Le Gallo (2008a) fail to find any statistical significant effect of Structural Funds on regional growth during the period 1989-1999, while, in a parallel study, they report a small negative effect of some Structural Fund expenditure on economic growth which mainly affects Convergence or Objective 1 regions (Dall'erba and Le Gallo, 2008b: 339). Further analysis by these authors and Rachel Guillain confirms the supposed lack of impact of European Regional Development policies during the period 1989-1999 (Dall'erba *et al.*, 2009: 92). Other authors have gone even further and claimed that regional and structural policies in the EU have only served redistributional purposes (*e. g.* Boldrin and Canova 2001, 2003).

The conclusion that can be drawn from this brief overview of the literature on the returns of European Cohesion policy is straightforward: there is no clear academic consensus on the effectiveness and returns of Structural Funds.

1.1. Have the EU structural policies improved?

One of the aspects that the majority of these studies have ignored is that the European Cohesion policies are neither monolithical, nor have they remained stable over time. Since the introduction of the principle of programming in the 1989 reform of the Structural Funds, regional development intervention in the EU is structured around a multiannual strategic planning system which permits the constant monitoring and evaluation of policies and generates a learning process which helps address any po-

tential shortcomings in the policy. One of the key instruments in that learning process have been the regular reports on economic, social and territorial cohesion (European Commission, 1996, 2001a, 2004, 2007, 2010). These reports —commonly known as the Cohesion Reports— are published at more or less regular intervals and contain a combination of a description of the current regional situation with an evaluation of the impact of EU Cohesion policy and of the territorial dimension of other EU and national policies. One of the key changes in these reports over time has been, on top of their increasing quality, a more and more critical tone towards specific types of intervention associated with the European Cohesion effort. The diagnosis contained in successive reports has therefore contributed to refinements and improvements in the European Cohesion Policy which may have helped transform its potential impact.

In successive Reports the suggestions for changes and improvements have been coming thick and fast. The Third Cohesion Report (European Commission, 2004), for example, put the emphasis on reinforcing the priorities of Cohesion policy, including strengthening key objectives in the areas of innovation and human capital. It also proposed, among other things, an increase in the quality of the strategies in order to promote a more balanced and sustainable development effort, as well as positing a more limited and better targeted number of key interventions. Other key recommendations included paying greater attention and responding better to specific territorial characteristics and adopting a more strategic orientation of intervention to the priorities of the EU as a whole (European Commission, 2004; see also Garrido Yserte *et al.*, 2007). The Fourth Cohesion Report continued to advise the promotion of a new strategic approach with greater earmarking of resources for key interventions, as well as better and leaner regulations, including a more efficient management and eligibility rules and a simplification of the financial management principles. It also suggested a series of new future challenges (European Commission, 2007). The Fifth Cohesion Report (European Commission, 2010) recommended enforcing strategic planning, increasing, once again, thematic concentration, introducing greater conditionality and clearer delivery assistance centres, as well as improving the evaluation, performance and results. In addition it put forward the need to strengthen governance and enforce partnerships, while creating a simpler system of delivery and incentives (European Commission, 2010).

Parallel to the official EU Reports, independent reports have proposed similar improvements to the policy. The best-known of these reports (Barca, 2009) has put the emphasis on a greater concentration of resources, on conditionalities, a greater attention to the importance of institutions and a better governance system, including the promotion of more innovative and experimental expenditures and the encouragement of a learning process.

While internal EU and associated reports have been a rich source of suggestions for Cohesion Policy innovation, they are by no means the only one. Independent researchers have also looked for the potential causes which may have affected the returns of the European Cohesion policy. Crescenzi (2009) has signalled one of the core principles of regional policy, the principle of concentration (or lack of it), as a one of the culprits of the lack of clear cut returns from intervention. He indicates that

the insufficient concentration of Structural Fund expenditure in the most socio-economically disadvantaged regions has created a handicap for growth and convergence (Crescenzi, 2009: 120). His analysis also reveals that during the two programming periods considered there has been a strengthening of the geographical concentration of intervention, along the lines suggested in successive Cohesion Reports. These findings underline the existence of policy learning mechanisms which may be behind any potential improvement in the effectiveness of Structural Fund spending.

From a different perspective, Bachtler and Gorzelak (2007) have put forward three possible explanations of the relatively limited past returns of Cohesion policies. First of all and along the lines of other studies (*e. g.* Rodríguez-Pose and Fratesi, 2004; Crescenzi and Rodríguez-Pose, 2012), Structural Fund expenditure may have been too biased towards infrastructure —and, in particular, transport infrastructure— investment. Investment in transport infrastructure may have unleashed forces which increased the concentration of economic activity in core at the expense of peripheral areas.

The returns of Cohesion policy may also have been undermined by existing business support policies (Bachtler and Gorzelak, 2007: 316). Regional policy has possibly had a distortionary effect on the economy, as it aims to attract innovative activities to regions with a low- to middle-skilled labour endowments (Midelfart-Knarvik and Overman, 2002). Had regional intervention concentrated on activities more in line with the endowments of different territories, as also recommended by successive Cohesion Reports, its effectiveness could have been improved. Lastly, the meagre returns of European Cohesion Policy could also be a consequence of an inadequate regional institutional capacity (Bachtler and Gorzelak, 2007: 316). Structural Fund interventions are likely to be more effective in countries with a higher institutional quality and low levels of corruption (Ederveen *et al.*, 2006). This implies that, in line with the suggestions of the Barca Report (2009), any improvement in regional institutional capacity would lead to a greater effectiveness of Structural Fund expenditure.

Finally, from a new economic geography perspective point of view, the returns of European Cohesion Policy may have been affected by the natural tendency of economic activity to agglomerate in space. As «firms and workers prefer to locate near markets, and markets are located where firms and workers reside» (Brakman *et al.*, 2005: 51), regional intervention, regardless of its dimension, will find it difficult to offset this process. Indeed, investment in infrastructure may have contributed to reinforce this circular causation process. Cuadrado-Roura (2010) finds evidence of these processes in operation in the Spanish case, as strong investment in transport infrastructure, while significantly contributing to «the convergence process of all Spanish regions towards the European average did not mean also internal convergence» (2010: 299). Consequently regional support is likely to be most effective when spent on human capital (Rodríguez-Pose and Fratesi, 2004) or labour (Brakman *et al.*, 2005).

This constant stream of recommendations and policy advice coming both from internal and outside sources paint a picture of a cohesion effort that is far from static. The European Cohesion Policy is constantly evolving and reforming itself, with the

main changes drawing it towards becoming a more integrated and balanced policy, with a leaner set of objectives and, at least in theory, a better governance system. Yet, despite this constant change, the question of whether successive adaptations and modifications to the policy have led to improvements on its effectiveness has attracted relatively little attention. There are few studies —Cappelen *et al.* (2003) and Puigcerver-Peñalver (2004) being the main exceptions— which explicitly try to assess the dynamics of regional policy effectiveness. The focus has been always on its overall impact, on simply answering the question of whether the policy delivers or not, rather than on whether changes have led to a more or less efficient outcome. In this study we aim to address precisely this question: has there been an improvement over time in the impact of Structural Fund intervention? Have successive changes and the learning process associated to constant monitoring made the European Cohesion Policy more effective in promoting economic growth in regions where intervention is concentrated? This will be done by analysing whether there has been a significant improvement —or lack of it— in the returns of Structural Fund investment in the last two completed programming periods (1994-1999 vs. 2000-2006). In addition, we are interested in assessing where the Structural Funds have had the greatest impact. The underlying hypothesis is that through a process of institutional learning the effectiveness of Structural Funds interventions is likely to have improved in successive programming periods as a consequence of the subtle changes introduced in the design and implementation of the policy.

2. The model

2.1. Changes in Cohesion policy between the third and second programming periods

Have the returns of the European Cohesion policy improved with time? Since the introduction of the multiannual financial perspectives in 1989, every change in programming period has brought about alterations in the design of the European Cohesion Policy. The periods under study —1994-1999 and 2000-2006— were no exceptions. There were several notable differences in policy design between intervention in the third programming period (2000-2006) in comparison to the second (1994-1999). First of all, there was a significant drive towards the geographical concentration and prioritization of types of intervention. The six Objectives of the second programming period were reduced to a mere three, following recommendations included in Agenda 2000. The reduction of Objectives meant a significantly greater targeting of resources to the most deprived areas. A further indication of the greater concentration of resources in the third programming period relative to the second was the decrease in the share of population covered by regional policy spending. The population covered by Objective 1 shrunk to 20 percent of the total population of EU in the third programming period from levels of 25 percent in the previous period. What is more, while the funds available for regional policy in EU-15 states increased only marginally, there

was a more substantial increase of average per capita support in Objective 1 regions, as a consequence of the gradual phasing out of some regions. At the same time, per capita support for Objective 2 region declined (Drevet, 2008: 214). The share of population affected by the new Objective 2 also declined from 25 to 18 percent of the total. Similarly, the number of Community Initiatives was cut from thirteen to three (Armstrong and Taylor, 2000: 333-334) and the margin of manoeuvre of the European Commission to support excellence was increased with the introduction of a 4% performance reserve which could be spent on the best performing programmes in the second half of the programming period (European Commission, 2001a: 153).

Noticeable changes in the nature of investments were also undertaken, especially in Objective 1 regions. While investment in infrastructure remained very important, the «accent [...] shifted to growth, to competitiveness and job creation [...], to education and training [...] and to better distribution of specific social services over cities in the region [...]» (Molle, 2007: 233). There was also a reduction of direct transfers to individual firms —often deemed to be counterproductive and in contradiction with competition policy—.

On the more institutional side, the principle of partnership was strengthened. In addition to the traditional stakeholders (Commission, Member State governments and social partners), other socio-economic agents were invited to adopt a greater role in the design and implementation of the policy programmes. Finally, more emphasis was given to the monitoring and evaluation of the effectiveness of interventions. Using different indicators quantitative targets were set in order to evaluate the impact of the Structural funds expenditure (European commission, 2001a: 149-153).

2.2. The model

In order to assess whether these policy changes resulted in an improvement of the returns of the European Cohesion Policy, bringing it closer to its stated goals, we propose a neo-classical empirical model. The aim is to analyse the effectiveness of EU cohesion intervention, by measuring its impact on regional economic performance, while controlling for the initial conditions and factor endowments in the regions, including indicators depicting the initial wealth of a region and endowments of human capital, innovative capacity, infrastructure and quality of institutions.

The model adopts the following form:

$$y_{i,t} = \alpha_0 + \alpha_1 \ln GDP_{i,t-1} + \alpha_2 \ln(GDP/nGDP)_{i,t-1} + \alpha_3 \ln SF_{i,t-1} + \alpha_4 \ln SF_{i,t-1}. \text{ Development}_{t-1} + \alpha_5 \text{infrastructure}_{i,t} + \alpha_6 \text{education}_{i,t} + \alpha_7 \text{innovation}_{i,t} + \alpha_8 \text{institutions}_{i,t-1} + u_{t,i} \quad (1)$$

where (i denotes region and t time)

$y_{i,t}$	is the dependent variable, measuring the growth rate of regional GDP per capita;
$\ln GDP_{i,t-1}$	represents the initial level of regional GDP per capita;

$\ln(GDP/nGDP)_{i,t-1}$	depicts the ratio of regional to national level of economic development;
$\ln SF_{i,t-1}$	represents the per capita Structural Funds payments to a region concerned in the previous period;
$\ln SF_{i,t-1}$ x $Development_{t-1}$	is an interaction term of Structural Funds expenditure and the level of economic development;
$infrastructure_{i,t}$	is an indicator of infrastructure endowment in the region;
$education_{i,t}$	is an indicator of the human capital in the region;
$innovation_{i,t}$	is an indicator of the innovative capacity of the region;
$institutions_{i,t-1}$	is an indicator of the quality of institutions at the national scale;
$u_{t,i}$	represents the error term.

The rationale for the inclusion of each of the variables in the model is as follows:

— *Growth rate of regional GDP per capita*: The growth rate of regional GDP is the most standard measure of regional economic performance.

— *Level of regional GDP per capita*: The level of regional GDP per capita is used as a proxy for regional wealth. In the model the variable is lagged by one period, as our interest lies in the effect of initial wealth on regional economic performance. The inclusion of the lagged level of regional GDP per capita allows us to test for conditional convergence or divergence across regions. As is customary in the literature and in order to address possible issues of non-linearity, the variable is entered in the model using logarithms.

— *Level of national GDP per capita*: The level of national GDP per capita represents a measure of the relative wealth of a country. It is used in order to determine whether the returns of Structural Funds intervention in a particular region are conditioned by the wealth of the country. For this reason the natural logarithm of national GDP per capita is used in interaction with the level of per capita Structural Funds expenditure in any given region.

— *Ratio of regional to national GDP per capita*: Regional economic performance tends to be highly correlated with the performance of neighbouring regions, as a consequence of the presence of strong trade and other type of linkages. We therefore use a ratio of regional to national economic development as a proxy in order to capture spatial interdependencies within countries. Even though this indicator only takes into account interactions among regions in the same country, it does lead to a significant reduction of potential spatial autocorrelation problems. Regions in the same country are generally much more interdependent between one another than neighbouring regions separated by national borders (Armstrong, 1995; Rodríguez-Pose, 1999). Indirect barriers to trade, national regulatory frameworks and national tax and welfare systems ensure that this remains the case.

This variable is included in the model in two different ways. Firstly, as an independent variable; secondly, in interaction with per capita Structural Funds

expenditure in a given region, as a way to measure the difference in effectiveness of Structural Funds depending on the relative level of economic development of a region in comparison with the country average.

— *Structural Funds payments per capita*: EU regional policy intervention in a region is measured by the actual Structural Funds payments to regions. As a general rule, only payments to former Objective 1 (promoting the development and structural adjustment of regions whose development is lagging behind), Objective 2 (converting regions seriously affected by industrial decline), Objective 5b (facilitating the rural development and structural adjustment of rural areas) and Objective 6 (promoting the development of regions with an extremely low population density) are included —these are the payments within the Cohesion policy which can be considered as direct territorial interventions—. The data for Structural Funds payments to a particular region was provided by the European Commission. In order to obtain a comparable indicator —Structural Funds per capita— the payments were divided by the total population. As a way to assess the medium- rather than the short-run, Keynesian, effect of the Cohesion policy, the regional aid to the region from the previous period is included in the model (as a means to capture the supply and not the demand side effect of expenditure). The variable is included in the model in logarithms.

— *Level of human capital*: The educational attainment of the population is used as the proxy for the human capital endowment of a region. The exact indicator is the percentage of adults (25-64) who have completed tertiary education.

— *Innovative capacity:* We resort to the percentage of private research and development (R&D) expenditure in total regional GDP as our measure of innovative capacity. R&D expenditure measures input into innovative activities in each region. The innovation capacity of a region is generally considered as «one of the key factors behind long-run interregional differences in productivity and income» (Crescenzi and Rodríguez-Pose, 2008: 69). However, for the purpose the model, we only consider private R&D expenditure, as a more genuine indicator than overall R&D expenditure of the regional innovation potential. This is because public investment may frequently serve purposes already linked to regional development other than simply aiming to generate innovation. It is often the case that public R&D is used as a way to improve the performance of regions lagging behind.

— *Infrastructure endowment*: We use the kilometres of motorway per square kilometre in any given region as our measure of infrastructure. Although this is one in a number of indicators which may represent regional infrastructure endowment, regional data availability constrains imply that this is one of two potential infrastructure proxies which could be used (the other being railways)[2].

[2] It has to be borne in mind that the use of such an infrastructure indicator introduces a series of biases. The main bias is that it tends to favour regions where the investment has taken place, but which do not necessarily benefit to the same extent from the investment, as the resulting motorways may connect more important poles outside the region.

— *Quality of institutions at the national level*: Institutions matter enormously for economic performance, but at a regional level in Europe there are virtually no indicators which measure the quality of institutions in a comparative way. Hence, due to the lack of adequate institutional data at the regional level, we are forced —despite its shortcomings— to resort to national indicators, assuming that regional institutions do not vary significantly within countries or, at least, that international variation is substantially greater than intranational variation. We use the Corruption Perception Index of Transparency International as our proxy for the quality of institutions in a particular country. The corruption perception index is a composite index based on more than ten surveys of business people and assessments of country analysts (Transparency International, 2008). The index varies between zero and ten, where zero denotes the most corrupt country and ten a corruption free country. The use of a country index can be justified by the fact that Structural Funds money is transferred from the EU through the national to the regional level. The Corruption index does not vary a great deal over time.

2.3. Estimation method

In order to test whether policy learning has occurred and, consequently, the returns of Structural Fund investment across the regions of the EU have increased between the second and third programming periods, we run Model (1) using a heteroscedasticity-robust fixed effects panel data estimation. The time periods covered correspond to the comparison between the two latest completed Cohesion Policy programming periods (1994-1999 and 2000-2006). This allows us to check whether the effect on growth of European structural expenditure varied between the periods.

The key independent variable of interest is the level of expenditure per capita of Structural Funds in each region of the EU15 for which complete sets of regional data are available for each programming period. In addition, we combine the variable of interest with an indicator of the level of economic development of the country a region belongs to (country's GDP per capita) or of the relative position of the region within a given country (ratio of regional to national GDP per capita). The aim of the use of this combination between Structural Fund expenditure and the level of development is to assess whether the returns of the Cohesion effort are affected by the level of development of the country or the region where the effort takes place. This leads to the estimation of two variations of Model (1), including in each one the country and the regional development interaction.

The relatively high volatility of both annual Structural Funds expenditure and regional GDP per capita growth may seriously affect the results. Hence, in order to minimize the impact of year-on-year volatility, we use three-year moving averages for all the variables included in the analysis. The use of the moving averages has also

the advantage of further reducing the problem of capturing a short-run demand effect of regional aid expenditure, as the average regional growth rates of GDP per capita during a period of three years are regressed on the average Structural Funds expenditure, level of development and indicator of the quality of institutions of the previous three year period, as well as on other control variables during the same period.

Given the need to make the regional sample perfectly comparable across period, only regions belonging to countries which joined the EU before 2004 and which were eligible for Structural Fund support during both programming periods are included in the analysis.

The regional sample comprises fundamentally NUTS2 [3] regions, although in some cases —and as a way to compare regions that are «reasonably large» in population size and «reasonably heterogeneous» in factor endowment» (Boldrin and Canova, 2001: 212)— the larger NUTS1 regions are used in a limited number of cases, namely Belgium, Germany [4] and the United Kingdom. Furthermore, due to the lack of regional data, Denmark, Luxembourg and Ireland are excluded from the analysis. The regional sample includes a total of 133 regions [5].

3. Analysis of results

Table 1 reports the results of estimating the models presented in the previous section. The table is divided into two sections. The three columns on the left hand side (regressions 1 to 3) present the results for the second programming period (1994-1999), while the results for the third programming period (2000-2006) are included in the three columns to the right (regressions 4 to 6).

The key result emerging from the estimation of the model for the second programming period (1994-1999) is the lack of association between regional structural funding expenditure and regional per capita economic growth, once factor endowments, initial conditions, and institutional quality are controlled for (Table 1, regressions 1, 2 and 3). None of the coefficients considering Structural Fund expenditure during the period 1994-1999 is significant. This applies when the Structural Funds expenditure is considered on its own (regression 1), as well as in combination with the level of wealth of a country (regression 2) or with the level of development of the region within a country (regression 3). The level of economic growth during this period is much more related to the initial wealth of a given region, its wealth relative to the rest of the country, its infrastructural endowment, its level of human capital, and

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[3] Nomenclature of Statistical Territorial Units level 2.

[4] The analysis does not include the East German regions of Berlin DE3, Brandenburg DE4, Mecklenburg-Vorpommern DE8, Sachsen DED, Sachsen-Anhalt DEE and Thüringen DEG.

[5] Due to data limitations the Italian regions of Provincia autonoma di Bolzano ITD1, Provincia autonoma di Trento ITD2 and the Finish regions of Länsi Suomi FI19 and Åland FI20 are excluded from the analysis. Several ultraperipheral islands and exclaves are also excluded: Região Autónoma dos Açores PT20, Região Autónoma da Madeira PT30, Ciudad Autónoma de Ceuta ES63, Ciudad Autónoma de Melilla ES64, Canarias ES70, and Départments d'Outre-Mer FR9.

Table 1. Structural Funds expenditure and growth in European regions

Dep variable: Growth of GDP per capita	*1994-1999*			*2000-2006*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Lagged regional GDP p.c.	–18.9524*** (2.2902)	–18.9842*** (2.3015)	–18.9479*** (2.2503)	–26.3054*** (4.9798)	–26.5018*** (4.9812)	–26.5549*** (4.9637)
Lagged regional GDP p.c. relative to national GDP p.c.	–0.0744* (0.0446)	–0.0741* (0.0448)	–0.0752* (0.0437)	0.1971 (0.1195)	0.2004* (0.1201)	0.1916 (0.1191)
Lagged structural funds expenditure p.c.	0.0206 (0.1338)			0.3694** (0.1706)		
Lagged structural funds expenditure p.c. * national GDP p.c.		0.0029 (0.0137)			0.0368** (0.0178)	
Lagged structural funds expenditure * regional GDP p.c. relative to national GDP p.c.			0.0002 (0.0011)			0.0033** (0.0016)
Infrastructure (motorways in km per km^2)	–42.6207*** (15.3770)	–42.5825*** (15.3735)	–42.6422*** (15.3411)	51.0176 (32.0544)	50.9235 (32.3193)	51.5033 (31.6104)
Education (% of people with tertiary education)	0.0571* (0.0324)	0.0567* (0.0324)	0.0571* (0.0320)	0.3827*** (0.0744)	0.3828*** (0.0745)	0.3809*** (0.0744)
Innovation (% of private R&D expenditure in regional GDP)	0.2120 (0.5624)	0.2112 (0.5629)	0.2133 (0.5598)	0.3295 (0.6973)	0.3322 (0.6993)	0.3203 (0.6950)
Lagged corruption perception index	0.3722*** (0.1134)	0.3724*** (0.1134)	0.371*** (0.1136)	0.063 (0.2745)	0.0672 (0.2740)	0.0068 (0.2858)
Constant	188.6956*** (19.4603)	188.9524*** (19.5483)	188.7372*** (19.2250)	225.5457*** (45.5318)	227.1426*** (45.4851)	229.1151*** (45.2803)
R^2 within	0.4820	0.4820	0.4820	0.3130	0.3121	0.3145
R^2 between	0.0999	0.0999	0.0998	0.3001	0.2990	0.2994
R^2 overall	0.0789	0.0783	0.0783	0.1424	0.1419	0.1420
F	22.86	22.84	22.95	9.88	9.79	9.97
P > F	0.000	0.000	0.000	0.000	0.000	0.000
Number of observations	532	532	532	399	399	399

Note: Heteroscedastictiy and autocorrelation robust standard errors in parentheses below coefficients; ***, **, and * denote significance at the 1, 5 and 10% level, respectively.

the quality of its institutions (the level of corruption) (Table 1, regressions 1, 2 and 3). During this programming period, the negative and statistically significant coefficient on initial wealth points towards the existence of regional convergence across the EU. This convergence is reinforced by a weak, but nevertheless significant, level of within-country convergence. Institutions also matter. Lower levels of corruption are associated with higher levels of growth, once other factors are controlled for (Table 1). Human capital endowment is, as expected, positively associated to GDP per capita growth, while infrastructure —in line with studies by Vanhoudt *et al.* (2000), for a similar time period— has a negative and strongly significant association with economic performance. The level of innovation is the only control variable that is not significant.

These results are in line with much of the literature on the returns of structural policy intervention in the EU during the second programming period (*e. g.* Rodríguez-Pose and Fratesi, 2004; Dall'erba and Le Gallo, 2008a; Esposti and Bussoletti, 2008), which tend to find either a very limited —or, in some cases, no influence whatsoever— of Structural Fund expenditure on regional growth performance across the EU. These results reinforce the idea that the 1989 reform of the Structural Funds, despite considerable improvements with respect to the pre-reform intervention, did not suffice on its own to bring the desired outcomes in terms of greater economic returns.

The results for the third programming period are in radical contrast with respect to the previous one. Between 2000 and 2006, Structural Fund expenditure had an impact on subsequent regional economic growth. The coefficient for the lagged structural fund expenditure per capita variable is positive and significant at the 5% level (Table 1, regression 4). However, this positive effect is uneven according to the level of wealth of a country where the funds are being spent and to the relative level of development of the region within the country. The returns of investment in cohesion tend to be greater, once other factors are controlled for, the wealthier the country (regression 5). They are also higher in better-off relative to worse-off regions within a country (regression 6). These changes in the sign and significance of the structural fund coefficients have a certain influence on the coefficients for all the other variables included in the model. First of all, they affect the level of within country convergence. While at the European level we still observe a degree of cross-country convergence, the limited within country convergence of the previous programming period disappears and is replaced by some level of divergence, which is only significant once the interaction between structural fund expenditure and the level of the development of the country is taken into account (Table 1, regression 5).

Another important change is related to the association between infrastructure endowment and growth. Our proxy for infrastructure endowment, which had a negative and significant relationship with economic growth in the previous programming period, becomes positive, albeit not significant, during the third programming period. By contrast, the impact of human capital is greatly enhanced. In line with similar studies (*e. g.* Rodríguez-Pose and Fratesi, 2004; Brakman *et al.,* 2005; Rodríguez-Pose and Crescenzi, 2008), human capital emerges as the basic ingredient behind

European regional economic growth. The dimension of the impact of human capital on regional growth may also contribute to determine the lack of significance of our proxy of innovation. A decent endowment in human capital may determine the ability of any territory to generate and assimilate technology. Hence, greater investment in R&D may only yield significant returns in combination with a good level of human capital. In many lagging areas human capital shortages may therefore limit the potential returns of policies and actions aimed at improving the innovative capacity, making «the local social-economic conditions [...] a better predictor of economic growth that investment in R&D» (Rodríguez-Pose and Crescenzi, 2008: 60).

4. Conclusions and policy considerations

The analysis has been aimed at testing whether successive changes in how European Cohesion policy has been implemented across regions of Europe have led to improvements in the impact of Structural Fund expenditure on economic growth. The results presented in the previous subsection indicate that this has been the case: notwithstanding an increase in the management errors in the application of Structural Funds (Moreno Enguix *et al.*, 2012), there has been a marked improvement in the returns of investment in Structural Funds between the second and third programming periods. The constant scrutiny and feedback which are at the heart of the policy making process since the 1989 reform of the Structural Funds has created a learning process which, no doubt, has contributed to an improvement in the effectiveness of intervention. Internal introspection and external scrutiny have brought about a constant trickle of changes, such as a continuous constant drive towards reinforcing priorities, a greater emphasis over the years on human capital and innovation, often at the expense of infrastructure investment, a persistent push towards increasing the quality of the design and the delivery of policy, greater attention to local, place-based, conditions, and a strengthening of the system of governance and policy, which are possibly at the root of the increasing returns of the policy with time. The growing concentration of funds in areas with the greatest level of disadvantage may have brought the level of investment over the threshold where significant differences can be made (Garrido Yserte *et al.* 2007). Learning processes may have also resulted in a more appropriate expenditure of the Cohesion funds, due to a progressive shift in their expenditure priorities. The gradual move from direct support of firms and transport infrastructure —which yielded limited returns in previous programming periods (Rodríguez-Pose and Fratesi, 2004)— towards other forms of infrastructure and human resources (European Commission, 2001b: 56) may have also contributed to this greater effectiveness.

The strengthening of the principle of partnership is another potential factor behind improvements over time. Partnership implies a greater involvement in the process by local and regional administrations and this requires a learning process. It might just be the case that, under a more decentralised framework for the implementation of European cohesion policy, regional and local administrations may have taken some

time to adapt to the new requirements endorsed in the 1989 reform of the Structural Funds (Molle, 2007: 194-196). Gradual improvements in the capacity of local and regional administrations are certain to have led to a better implementation and management of the policy and to the higher returns observed on the third programming period relative to the second. A process of institutional learning at capacity building linked to the European cohesion effort will have contributed to a more efficient use of the available funds. A final explanation of the greater effectiveness of the effort may be a greater emphasis on results and the improvements in the monitoring of expenditure in successive programming periods.

However, not all the results point in the direction that the learning processes associated to the implementation of the European cohesion policy have yielded greater returns. The European territorial development effort still works better —once other factors are controlled for— in richer than in poorer countries and in wealthy, rather than in lagging regions within countries. This result, to a certain extent, could be expected. Concentrations of knowledge and human capital and the greater accessibility of agglomerated areas is likely to generate increasing returns to scale which would favour advanced areas to the detriment of lagging ones. Because core areas have got greater comparative advantages, the returns of cohesion investment are likely to be greater in richer states and better off regions than in lagging areas. However, the increasing concentration of intervention in those regions with the greatest need may be a force that would counterbalance this tendency in the medium term. In any case, as pointed out by Begg (2008), European Cohesion policy is likely to have a hard time in trying to achieve simultaneously greater cohesion and better overall economic performance, by improving the innovative capacity and performance of lagging areas through the implementation of the Lisbon and the Europe 2020 agendas. As Begg underlines, «there is a danger that too great a "Lisbonisation" of Cohesion policy will result in inappropriate policy choices, and may also undermine equity considerations» (Begg, 2008: 7). All in all, a European regional policy more focused on Lisbon objectives can have a positive effect on improving overall competitiveness of the EU. However, it is unclear whether, at the same time, it can contribute to its stated goal of achieving greater economic, social and territorial cohesion across European regions.

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