Selective regional convergence, Cohesion policy and macroeconomic conditions

Faruk Balli[*], Carmelo Petraglia[†], Eleonora Pierucci[‡]

Abstract

This paper assesses regional growth factors in EU less developed regions in the 2000s using a newly constructed dataset on 2000-2006 and 2007-2013 European structural and cohesion funds. We show that heterogeneous national-level macroeconomic factors, especially more expansionary budget policies, significantly explain observed regional growth differentials. Most importantly, the growth impact of cohesion policies emerges in estimated models where national macroeconomic factors are neglected, whilst vanishing in "full" models. This evidence supports a general policy conclusion: the lack of harmonization of national policies generates asymmetric regional competitive conditions that the future design of European regional policies should reconsider.

Keywords: EU Cohesion Policies; regional growth and convergence; lagging regions; macroeconomics factors

JEL codes: E62, H50, R58

[*] *School of Economics and Finance, Massey University, Auckland, New Zealand.*
[†] *Department of Mathematics, Computer Science and Economics, University of Basilicata, Potenza, Italy*
[‡] *Department of Mathematics, Computer Science and Economics, University of Basilicata, Potenza, Italy*

INTRODUCTION

The 6th European Commission Report on economic, social and territorial Cohesion accounts for a marked reduction in regional disparities occurred in the EU during the 2000s: "Until the crisis in 2008, disparities between regional economies in the EU were shrinking. This was mainly due to the regions with the lowest GDP per head growing faster than average and catching up with the more prosperous ones. However, the crisis seems to have brought this tendency to an end and between 2008 and 2011 regional disparities widened." (European Commission, 2014: 3).

This evidence is generally used by European Institutions to support a positive evaluation of Cohesion policies: they have been effective in reducing regional disparities until the crisis, which suspended this virtuous process due to its exceptionality. However, although average EU figures show that GDP per capita has grown faster in less developed regions than in more prosperous ones, it is also possible to observe significant variations within the EU periphery (i.e. in the group all less developed regions)[1] since the beginning of the 2000s. As a matter of fact, the most noticeable differences are those observed among backward regions belonging to new (EU-13) and old (EU-15) Member States. Economic growth has proceeded in less developed regions of Eastern Europe substantially faster than in those belonging to EU-15 countries. The cumulative 2001-2007 per capita GDP increase in EU-13 backward regions has been almost twice as large as in EU-15 ones. GDP per head declined in EU-15 backward regions in the crisis, while it continued to increase in EU-13 ones (SVIMEZ, 2016; Giannola, Petraglia, & Provenzano, 2016). The 2000s have thus been characterized by relevant changes in the geography of economic gains within the EU periphery. Mediterranean weak regions of Portugal, Greece, Spain and Italy have lost ground, while their Eastern peers have gained relevant advantages from the European enlargements started in 2004.

Accounting for this heterogeneity allows highlighting a "selective" process of convergence which excludes EU-15 backward regions (SVIMEZ, 2015, 2016; Petraglia & Pierucci, 2016). That is, the claim of the European Commission seems to be valid only for the EU periphery taken in aggregate. Pointing to within-periphery variability reveals that the regional convergence pattern

occurred since the beginning of 2000s has been largely due to sustained growth of new Eastern Member States, while their EU-15 peers lagged behind.

This paper moves from the consideration that this descriptive evidence calls for an in-depth quantitative analysis of regional growth in the EU periphery, disentangling the different drivers that: have spurred sustained growth in EU-13 lagging regions, caused the observed variations in growth performances across EU less developed regions, and supported such a "selective" regional convergence process in the EU.

A number of related research questions deserve attention: what are the driving forces of differing regional growth performances among EU less developed regions? To which extent these forces are linked to region-specific characteristics? Are policies parts of the story? Can differences in local and national capabilities to implement effective and timely Cohesion policies explain alone the lack/speed of regional growth? Do growth-friendly macroeconomic national conditions play a role? And to which extent?

We believe these are all relevant research questions. In this paper we will focus on the assessment of regional growth factors in EU less developed regions since the beginning of 2000s. We will estimate an empirical model where, after controlling for region-specific characteristics, regional economic growth depends on: *a)* national macroeconomic conditions and policies; *b)* Cohesion policies funds. Our presumption, supported by some descriptive evidence for the years of the crisis (e.g. Davies, 2011; Crescenzi, Luca, & Milio, 2016), is that competition forces linked to factors *a)* may have exerted the main convergence effect for EU-13 lagging regions rather than policy measures linked to Cohesion policies.

Our contribution is at the crossroads between two lines of research that we aim to reconcile. On the one hand, our study is linked to the empirical literature on the growth impact of EU Cohesion Policy. Although this field can count on a substantial body of works, it still suffers from some limitations (Pieńkowski & Berkowitz, 2015) that we aim to overcome. On the other hand, more

broadly, we are interested in a topic which has been neglected for a long time in regional studies: the impact of macroeconomic conditions on regional growth.

Our contributions to the first line of research can be summarized as follows. First, we focus on two programming periods (2000-2006 and 2007-2013), thus fully exploiting the time dimension of our dataset, and fill the gap of the lack of empirical evidence for the 2007-2013 period. Second, we make use of yearly actual payments of Cohesion policies funds. Third, we account for the growth enhancing/hampering effects of national-level macroeconomic conditions on regional growth, thus overcoming a limitation shared by most of available work, that is, the omission of relevant national policy.

We contribute to the second line of research by suggesting that role played by country-specific macroeconomic conditions and policies goes well beyond their impact on regional short-term resistance to and recovery from negative economic shocks as shown in Capello and Camagni (2015) and Crescenzi et al. (2016). In our view, asymmetries in tax systems induced by the lack of tax harmonization, the international competition model based on wage moderation and other exogenous factors to regional economies, cause structural competitive imbalances that can potentially explain the above mentioned variations.

Our main results are as follows. First, we highlight that heterogeneous macroeconomic national conditions and policies significantly explain the observed variability of growth patterns across EU less developed regions. Second, we make use of a newly constructed dataset on Cohesion policies funds. Third, we provide evidence that structural and Cohesion funds matter for regional growth only in estimated models where macroeconomic conditions and policies are not accounted for; on the other hand, when we control for them, the growth impact of Cohesion policies vanishes. Form a policy standpoint, it implies that European regional policies have to take into account national factors to produce the intended results, otherwise a “selective” regional convergence process can occur.

The remainder of the paper is structured as follows. In the next section we provide a discussion of alternative sources of regional growth adopting a multi-level territorial framework including three (regional, national, supra-national) territorial levels. The third section presents our empirical method and the dataset used for estimations. The forth section discusses the results, also dealing with robustness checks for our findings. The last section concludes with general policy implications of our findings.

MODELING REGIONAL GROWTH IN THE EU PERIPHERY

We adopt the view that regional macroeconomic outcomes (in the short- as well as in the long-run) depend on the interplay among factors acting in a multi-level territorial framework including three dimensions: the regional, national, and supranational levels. Accordingly, we maintain that regional growth depends on: *i)* region-specific factors linked to structural supply-side characteristics of local economies; *ii)* country-specific macroeconomic conditions and policies, such as, for instance, growth-friendly national fiscal policies and favourable tax systems; *iii)* supra-national macroeconomic conditions (supra-national public budget rules; the degree of supra-national tax competition among countries; belonging/not belonging to countries with a national currency).

Region-specific factors are endogenous to regional economies, whereas macroeconomic national factors exogenously either magnify or worsen regional performances independently from the effort of local private and public actors to make local systems more internationally competitive. Assuming that regional growth solely depends on factors *i)*, not controlling for *ii)* and *iii)*, may be misleading. This potential bias is crucial in the case of EU less developed regions where supra-national economic governance may imply relevant disadvantages for some countries (for instance, fiscal rules are more binding for countries with problematic public finances) which instead may prove to provide advantages for others (for instance, countries with lower tax rates benefit from the lack of tax harmonization). This should be taken into account in any empirical study aimed at assessing the growth impact of Cohesion policies.

National macroeconomic factors and policies

As Camagni and Capello (2015) have recently pointed out, the link between national macroeconomic conditions, constraints, policies and regional disparities in the EU is "something new in the panorama of regional studies". However, the interest in such an issue has increased in the aftermath of the crisis among scholars convinced that national macroeconomic trends and policies can generate asymmetric and differentiated regional impacts in periods of financial turmoil and sluggish development for many reasons. Camagni and Capello (2015) interestingly stress that "while supply side elements, related to the structural characteristics of single areas […] are an immediate and logical explanation for the differentiated spatial impacts of the crisis, the same cannot be said of the demand-side, macroeconomic elements that – at first glance – are not expected to generate asymmetric effects at regional level. And yet, they do."

First, more resilient regions belong to countries with lower levels of sovereign debt and higher public deficits, as both conditions imply higher amounts of public resources available to be devoted to growth policies and regional support. Second, regions belonging to countries in a monetary union have a further disadvantage because they cannot rely on the short-term policy tool of currency devaluation. Third, the increase in interest rates that hit economies like Italy, Portugal, Spain, Greece and Ireland during the sovereign debt crisis in 2011–2012 generated additional spatially selective macroeconomic effects hitting more severely lagging regions (public expenditure cuts, declining private investments, the credit crunch).

Crescenzi et al. (2016) assess the extent to which "healthy" pre-crisis national-level macro-economic conditions have contributed to mitigate the contraction of the regional economy at the early stages of the crisis and test whether regions can rely on sub-national resistance factors to shelter their territories from the short-term consequences of external shocks over and above national-level conditions. They find that low levels of national public debt *per se* are not a prerequisite for better economic performance at the regional level. Furthermore, a healthy current account surplus is associated with stronger economic performance during the post-2008 recession.

Sharing the same interest in the link between national macroeconomic conditions and regional economies' performances, our analysis departs from Camagni and Capello (2015) and Crescenzi et al. (2016) in two related aspects. First, we move from the short-run scenario of regional resilience to the medium term analysis of regional growth and competitiveness. Second, as a consequence, we believe that EU national macroeconomic imbalances are good candidates to explain regional growth differentials within the periphery over the entire period mentioned in the Introduction. Hence, we confine our attention to less developed regions, rather focusing studying regional differentials among advanced and lagging regions.

Public finance imbalances across Member States are a well-known and documented fact in the EU. Although austerity measures had their pick in peripheral countries in the aftermath of the sovereign debt crisis, EU supra-national fiscal rules have been inspired by principles of sound public finances à la Maastricht since the early 1990s.

Fiscal deficits provide a support to aggregate demand that can in turn activate private investments in lagging regions of a country. Furthermore, fiscal stimulus produces stronger expansionary effects in regional economies relying more on public demand as it is the case of poorer and less productive regions. Conversely, the reduction of public expenditure has typically stronger effects on less productive regions[2].

These effects are less likely to take place in low-debt countries where austerity measures are less needed. On the other hand, weak regions within high-debt countries will suffer from the growth-hampering effect due to the need to create fiscal surpluses. Furthermore, less developed regions belonging to countries within the Eurozone may have suffered from extra disadvantages due to: the more restrictive fiscal rules imposed by the Treaties; the lack of short-term tool of currency devaluation; the lack of fiscal union undermining the optimality of the currency area not allowing for mechanisms of fiscal transfers to mitigate asymmetric shocks.

Public finance national imbalances, as suggested by Camagni and Capello (2015), will yield more or less favourable conditions on the demand-side of regional economies. The lack of tax

harmonisation in the EU and the prevailing model of external competition based on wage moderation will imply additional (supply-side) structural advantages for less developed regions belonging to national economies with both low tax burdens and labour costs. Both aspects are responsible for an unequal competition among territories willing to attract productive resources from abroad. Labour cost, capital and corporate income among Member States are indeed a key factor explaining firms' and investment location choices.

Structural and Cohesion funds

A large and growing body of empirical studies has been investigating, using of alternative econometric approaches, the impact of EU Cohesion Policy on regional economic growth and convergence. Since the contribution by Boldrin and Canova (2000) who claim the Structural Funds (SF) inefficiency for growth and convergence purposes, we have wide and fragmented evidence on the role of structural funds and Cohesion policies. If some contributions claim for a positive impact on regional convergence (Ramajo, Márquez, Hewings, & Salinas, 2008), others detect an increased role moving from 1994-1999 to 2000-2006 programming period (Rodríguez-Pose & Novak, 2013). Several others recognize a limited role of SF and Cohesion policies (e.g. Esposti & Bussoletti, 2008; Pellegrini, Terribile, Tarola, Muccigrosso, & Busillo, 2013; Maynou, Saez, Kyriacou, & Bacaria, 2016). Many others find positive evidence in favour of the effectiveness of these policies pointing to targeting and tailoring policies in order to maximise the effects. For instance, Rodriguez-Pose and Fratesi (2004) call for more tailored combination of investment policies, while according to Barrios and Strobl (2005), if the allocation of structural funds is concentrated in more dynamic regions larger welfare benefits can be gained. Fratesi and Perucca (2014) highlight the role of territorial capital which results critical for the effectiveness of European Funds. Similarly, Rodríguez-Pose and Garcilazo (2015) point out to institutional quality. Lately Percoco (2016) and Gagliardi and Percoco (2016) provided also an overview on the role played by regional economic structure and spatial patterns, thus highlighting the need of spatial planning.

With respect to the aim of our paper, it is interesting to highlight as Becker (2010) noted a positive effect on objective 1 (convergence) regions in terms of GDP growth but no effects on employment. At the same time, Tomova, Rezessy, Lenkowski, and Maincent (2013) introduced the idea that fiscal policy and macroeconomic conditions could be a relevant tool to improve effectiveness of EU funds.

Pieńkowski and Berkowitz (2015) have recently provided an up-to-date survey of most of these studies by comparing the employed econometric models according to: the underlying theoretical framework, the main issue under investigation, and the specification of the estimated model (with the definition of both dependent variable and regressors). Most of the surveyed studies are based on a neoclassical growth model, enriched in order to account for Cohesion policy in different manners. In spite of the progress made in these studies, they point to some remaining weaknesses that reduce their relevance for policy analysis. The main limitations concern the use of low quality data on Cohesion Policy transfers (or the use of dummy variable instead of actual payments) along with the exclusion from the analyses of some important variables, such as national policies and the quality of governance.

Controlling for regional economic structure

Being aware of the strong regional dimension of territorial competitiveness, and in line with most previous studies on the growth impact of Cohesion policies, we control for region-specific drivers of growth by considering the following aspects of the local economic structure: productive specialization, private capital accumulation, innovative propensity and human capital.

The accumulation of human capital and innovation capabilities (spurred by public and private resources devoted to R&D) are most significant in determining both regional competitiveness and enhancing the regional capability to react and adjust to negative external shocks. We should recall here that we are mostly interested in the EU periphery. It is well known that more innovation-friendly regional environments and higher endowments of human capital make local economies

more attractive to foreign direct investments. However, this holds especially for advanced regions hosting high-value-added productive activities. On the other hand, peripheral territories are characterized by low innovation propensity and by relevant outflows of human capital as a consequence of migration of skilled workers. The consequent higher local concentration of unskilled workers will attract foreign investors interested in exploiting the advance of low labour cost.

Since we are mostly interested in less developed regions, we do not have precise expectations on the role played by human capital and innovation in our estimated models. This is also coherent with the Regional Competitiveness Index (RCI) framework developed by the European Commission[3], where higher education and innovative propensity belong to two dimensions of competitiveness (the so-called "Efficiency" and "Innovation" pillars) that are most important for economies that have already undertaken their development path, and for highly developed regions in order to maintain their (already high) competitiveness levels. On the other hand, the so-called "Basic" factors are most relevant for less developed regions (including macro-economic stability, which, however, matters at the national level as we argue in this study).

We finally control for specialization in output. The economic integration among EU members has been accelerated intra-trade and thereby leading to specialization in output production. In the literature, Romer (1987) has provided the theoretical background on the output specialization and economic growth nexus. He proposed that the trade intensity between regions might lead specialization in products which regions have comparative advantage on. Accordingly, specialization is able to boost up regional productivity and efficiency leading to higher economic growth.

METHODS AND DATA

In line with the above discussion, aiming at disentangling different channels through which lagging European regions have grown in the observed period (2000-2012) [4], our empirical model takes the following form:

$$growth_{rt} = \alpha + \beta_1 CP_{it} + \beta_2 N_{ct} + \beta_3 X_{rt} + u_{rt} \quad (1)$$

where r are 73 NUTS 2 convergence regions; i are groups of convergence regions within a country; c are 17 EU countries and t is time.[5]

Equation (1) is estimated in two alternative specifications differing in the definition of the dependent variable $growth_{rt} = \{gva_{rt}, empl_{rt}\}$, where gva_{rt} and $empl_{rt}$ are the annual growth rates of per capita gross value added and employment, respectively, in region r. Hence, Equation (1) is first estimated with gva_{rt} as dependent variable and then re-estimated replacing gva_{rt} with $empl_{rt}$ as dependent variable. The two specifications include the same sets of explicative variables, aimed at capturing three groups of determinants, where CP_{it} is a vector of determinants linked to the implementation of Cohesion policies; N_{ct} is a vector of national-level factors common to regions r belonging to country c, and finally X_{rt} is a vector of region-specific structural characteristics. Our model is estimated though a two-way panel fixed effects model, therefore we control for regional as well as for time fixed effects with robust standard errors. Since the complete models include variables at different geographical levels, we use clustered standard errors at regional and national level to avoid potential problems of heteroskedasticity.

Our dataset includes data retrieved from three sources: Eurostat, Cambridge Economics, the European Commission Annual Reports on the implementation of the structural funds.

Relevant information on data sources and definitions of variables are reported in Table 1. Table 2 reports key summary statistics of explicative variables included in the empirical model for the full sample and for subsamples of EU-13 and EU-15 regions separately.

<< TABLE 1 ABOUT HERE >>

<< TABLE 2 ABOUT HERE >>

The vector of national factors entering Equation (1) is defined as follows: N_{ct} = *{public deficit$_{ct}$; public debt$_{ct}$; public inv$_{ct}$; euro$_{ct}$; capital and business income tax$_{ct}$; labour cost$_{ct}$; qog$_{ct}$}*.

National public finance data are retrieved from Eurostat. We consider three measures for growth-hampering/growth-friendly fiscal policies (all expressed as a share of national gdp): government consolidated gross debt (*public debt*), government deficit/surplus (*public deficit*), and government gross fixed capital formation (*public inv*).

In line with the above discussion, we expect higher public deficits and lower public debts to enhance regional growth. The role of public investment is more controversial. We do not formulate an expectation on the sign for the corresponding estimated coefficient for two main reasons. First, Member States have experienced a common declining trend in the share of public spending devoted to investment. Second, Cohesion funds currently represent a relevant share (more than 60%) of the investment budget in EU-28 countries (European Commission, 2014: xv). Euro is a dummy variable taking the value of 1 for Eurozone countries and 0 otherwise.

Our measure of the growth-friendly national environment provided by the national tax system is *capital and business income tax* defined by the implicit tax rate on capital and business income (Eurostat, 2014). In general, implicit tax rates computed by Eurostat provide a measure of the effective average tax burden on different types of economic incomes or activities. For each tax category, implicit tax rates are computed as the ratio between revenue from the tax type under consideration and its (maximum possible) base. The implicit tax rate on capital and business income considered in our analysis is computed as the ratio between taxes paid on capital income streams and the aggregate of capital and business income, thus measuring the average effective tax burden on private sector investment and saving (Eurostat, 2014: 283). Hence, we take it as a proxy of the country attractiveness for private investments.

We consider a further relevant source of attractiveness for business opportunities: labour cost. Saving on labour cost is indeed a critical factor that influences the choice of setting economic activities among alternative locations, especially low value-added activities located in peripheral

areas. In order to capture this national-level factor we include in our estimations the variable *labour cost* defined by compensation of employees in the manufacturing sector as a share of the sectorial *gva*.

In line with a large bulk of regional economics and development literature we account for the quality of institutions through the use of the Quality of Government index (Rodríguez-Pose & Garcilazo, 2015). This index is calculated as the mean value of the Indicators of Quality Government (ICRG) variables "Corruption", "Law and Order" and "Bureaucracy Quality" and is scaled between 0 and 1 (the higher the quality, the larger the value assumed by this indicator). Even though since 2012 a novel survey data on perceived quality of governance has become available for the EU at the NUTS 2 level (see Charron, Lapuente, & Dijkstra, 2014, 2015), we did not resort to the use of this last survey since, according to the time horizon covered by our dataset (2000-2012), data availability are limited at one point in time (2010). Therefore, the inclusion of a time invariant QOG at the NUTS 2 level would have removed by the inclusion of fixed effects. Moreover, given the national nature of the Cohesion fund, a national level measure of the institutional quality (quality of governance) appears to be more indicated with respect to the objectives of the present work.

Regarding structural and Cohesion funds, we focus on expenditure figures for the two programming periods 2000-2006 and 2007-2013 and use yearly data from 2000 to 2012. The data were retrieved from the European Commission Annual Reports on the implementation of the structural funds. These reports include detailed annual financial prospects on commitments (mainly used in the extant literature) and payments figures disaggregated by Member States and, for each Member State, by objectives and funds. Both yearly commitments and payments were available for the 2000-2006 programming period. On the other hand, for the 2007-2013 programming period only commitments were available, we then use a proxy for payments based on the (officially available figure of the) payments/commitments share. When computing payments, in years with

overlapping programming periods, we consider payments made out of commitments for both programming periods.

We use figures of Structural Funds targeted to less developed (convergence) regions of each Member State and Cohesion funds targeted to Member States[6]. Although imposed by the availability at the national level of *SF* data for the 2007-2013 period, the choice of country-level data is coherent with our main aim. As in previous empirical work on the growth impact of Cohesion policies (see, for instance, Puigcerver-Peñalver, 2007), we use relative measures of European funds received by a country for its less developed regions.

The *CP* vector included in Equation (1) is defined as $CP_{it} = \{SF_{it}; SF\_qog_{it}; CF_{it}; CF\_qog_{it}\}$, where SF_qog_{it} and CF_qog_{it} represent interactions between our measures of Cohesion policy variables and the national institutional quality. *SF* is the share of Structural Funds received by the group of objective 1 regions of one country on total funds received by all EU objective 1 regions. In the same manner, we define *CF* as the share of the Cohesion Fund received by the group of objective 1 regions of one country on total funds received by all EU objective 1 regions. The choice of this measure is motivated by the nature of our analysis that aims to unveil some sort of competition among those countries that are recipients of objective 1 funds.

Finally, the vector $X_{rt} = \{spec_{rt}; inv_{rt}; human_{rt}; inno_{ct}\}$ captures region-specific structural characteristics. We have adopted the Herfindahl-Hirschman index (HHI), a commonly accepted measure of market concentration. By modifying the HHI, we have created a regional specialization index ($spec_{rt}$) utilizing all basic output sectors that are common for the NUTS 2 regions at the 1-digit International Standard Industrial Classification (ISIC) level. The newly created index for each NUTS 2 region in the sample period is defined as follows. Let's say Gva_{rt}^{s} denote the gross value added of region *r* at sector *s* at time *t* and $\text{Gva}_{rt}^{\text{Ag}}$ stands for the aggregate Gva of region *r* at time *t*. The index $Spec_{rt} = \sum_{i=1}^{S} \left(\frac{\text{Gva}_{rt}^{s}}{\text{Gva}_{rt}^{Ag}}\right)^2$ simply measures how diversified region *r* is in terms of production. The higher the index the higher the specialization of a given region in sector *s*.

Similarly, values approaching to zero indicate significant evidence of output diversification in a given region across sectors.

The human capital variable $human_{rt}$ is defined by the percentage of adult population aged 25-64 with tertiary education; inv_{rt} is private gross fixed capital formation as a % of gdp; and $inno_{rt}$ is per capita total intramural R&D expenditure.

As already argued in the previous section, given that our analysis is confined to less developed regions, we maintain that the growth impact of all these factors is *a priori* unclear and we do not formulate expectations on the signs of any of the corresponding coefficients. Our explanation for this is that the regional dimension of territorial competitiveness well explains competitiveness imbalances dividing most prosperous from least developed regions, providing additional insights with respect to the well-known national competitiveness imbalances between the core and the periphery of the EU. On the other hand, it is less clear to which extent competitive asymmetries within the periphery (that is, among less developed regions) can be explained by differing local innovative capacity and human capital endowments.

EMPIRICAL RESULTS

Table 3 provides the estimates of four models for each of the two specifications of Equation (1). With respect to the gva_{rt} specification (left panel), models (1) and (3) do not consider the *N* factors, and include *SF* and *CF* explicative variables, respectively. Models (2) and (4) extend respectively models (1) and (3) by including *N* as additional explicative variables. Likewise, with respect to the $empl_{rt}$ specification (right panel), models (5) and (7) account only for *X* and *CP* factors, while models (6) and (8) also account for *N* factors. Hence, from now on we will refer to models (2), (4), (6) and (8) as "full" models. On the other hand, models (1), (3), (5) and (7) will be our "incomplete" models.

<< TABLE 3 ABOUT HERE >>

The first evidence to be discussed emerges from the comparison of each "full" model with its "incomplete" counterpart. With this respect, our results confirm the importance for controlling for *N* factors when assessing the growth impact of Cohesion policies. In fact, the inclusion of the *N* factors cancels out the significant effect of Cohesion policies, the only exception being detectable for models (1) and (2). These results highlight that the variability of growth performances across EU less developed regions in the observed period is attributable to variations in national-level macroeconomic conditions. Indeed, the growth impact of Cohesion policies vanishes when we control for the growth-enhancing effect linked to more favourable macroeconomic policies. Furthermore, as far as the institutional quality is concerned, it cannot explain the variability within the periphery of the Union.

Further interesting insights emerge from the alternative specifications of the "full" models. In the gva_{rt} specification, estimated coefficients of the *N* factors show the expected signs and are statistical significant with one exception: *capital and business income tax* in model (4). In the $empl_{rt}$ specification, estimated coefficients of the *N* factors are less statistically significant, however, both the magnitude and significance of *public decifit* and *public debt* coefficients increases. Hence, pretty consistent results concern public finance variables: government deficit and debit are always highly significant having respectively a positive and a negative effect on growth and employment as expected. This result is consistent across specifications and equations.

Public investments (*public inv*) are always statistically insignificant. This result might be due to the fact that the economic growth effect is moderated by the presence of the European funds variables that have been a crucial channel for public investment financing. The quality of governments as well as its interaction with *SF* and *CF* is never significant. A possible cause can be due to the low variability of the *qog* indicator over time. This result is unexpected according to the growing body of literature from difference disciplines (economics, geography, sociology) over the positive role of institutions on economic development (for instance, Acemoglu, Johnson, & Robinson, 2001; Rodrik, Subramanian, & Trebbi, 2004 and references therein). Nevertheless our

results are somehow in line with previous evidence on European structural funds (see Rodríguez-Pose & Garcilazo, 2015) which highlights as the quality of governance at regional level below a certain threshold of distributed funds. Our findings seem to corroborate this result at the national level.

The output specialization index has positive and significant coefficients in various models indicating a strong relationship between the output growth and output specialization among EU regions. First, Romer (1987) claimed that in countries/regions that have specialized in production of certain sectors, the efficiency and productivity will increase thereby leading to higher level of output production. Later Hummels (2001), Bougheas, Demetriades and Mamuneas (2000) have provided empirical evidence on these phenomena. Our models reveal strong relationship between specialization and output growth (in Table 3, the coefficients of $Spec_{rt}$ are positive and highly significant).

Finally, some puzzling results on the estimated coefficients for the *X* factors deserve attention. Despite being against the common wisdom, one possible explanation for the uncommon result of not significant growth impact of human capital and innovation may be found in the peculiarity of the sample analysed, i.e. EU lagging regions. A second reason can be found looking at the results on the macroeconomic factors. Lagging regions compete on national factors such as cost of labour and capital and business income taxation rather than on factors such as R&D innovative activities.

Robustness Checks

We consider two robustness checks for our findings. Assessing the impact of *N* and *CP* factors on regional growth – as it is done in Equation (1) – might threaten the robustness of our findings in the presence of significant cross-border relations among less developed regions belonging to the same national economy[7]. For instance, not clustering weak regions at the country level might underestimate the growth-hampering effect of fiscal discipline when expansionary effects of higher public spending go beyond regional borders. The same reasoning applies to, for instance,

interregional infrastructure projects financed by Cohesion policies. Then, in our first robustness check we cluster less developed regions belonging to the same country. Accordingly, we estimate two alternative models differing from our baseline estimations in the definition of the dependent variables, in the attempt to control for the presence of cross-border effects of policies on regions within the same national economy *c*:

$$growth_{it} = \alpha + \beta_1 CP_{it} + \beta_2 N_{ct} + \beta_2 X_{rt} + u_{it} \qquad (2)$$

with $growth_{it} = \{meangva_{it}, meanempl_{it}\}$, where $meangva_{it}$ and $meanempl_{it}$ are, respectively, average rates of growth of gva per capita and employment of less developed NUTS 2 regions clustered at the country level.

Estimates of Equation (2), both with the $meangva_{it}$ and $meanempl_{it}$ specifications, are in Table 4. With respect to results obtained estimating Equation (1), our main findings on the role played by the national macroeconomic factors are largely confirmed and reinforced. Indeed, when looking at the average *gva* rate of growth (Columns from 1 to 4), *euro*, *labour cost*, *capital and business income tax*, *public decifit* and *public debt* are always very significant and with the expected sign according to our hypotheses, i.e. belonging to the euro area, for lagging regions, may be a disadvantage and there is a underling "competition" among convergence regions over labour cost and taxation on business income and capital tax (the lower the better for economic growth). At the same time, the possibility to run public deficit is a consistent and strong determinant of growth (implying a positive effect of public deficit and a negative one of public debt). Considering the average employment growth rate, results are consistent even though we observe that *labour cost* and *euro* lose statistical significance. In any case, the positive impact of Cohesion policy variables exists only if we disregard macroeconomic variables, while it vanishes once these are accounted for.

A second issue that might threaten the robustness of results obtained by estimating Equation (1) is that payments of Cohesion policies' funds might be endogenous. That is, while payments data are needed to measure actual spending, their use may bias the estimates since they could be directly linked to economic growth. A possible check for this kind of potential endogeneity problem has

been addressed by estimating our models in Table 3 through an instrumental variable model, where the instruments chosen were the commitments (the most used variable in studies on the role of Cohesion policies) and their lagged value (at *t-1*) corresponding to the fund employed in the estimation. In Table 5 we report the diagnostic of the estimated IV regressions[8]. We focus on the complete model (both regional and national factors are included) and once verified the goodness of the chosen instruments (see Hansen-Sargan statistics) we performed the endogeneity tests, which never reject the null hypothesis, confirming that our suspected regressor can be treated as exogenous and the results obtained from FE and are reliable.

CONCLUDING REMARKS

In this paper, we have provided evidence on the determinants of regional growth in European less developed regions in the period 2000-2012. Our results are based on panel data estimations controlling for region-specific characteristics, and distinguishing among national macroeconomic conditions and policies and Cohesion policies funds. We have explored the link between national macroeconomic conditions and regional growth performances in the observed period. In this respect, our results show that growth-friendly national macroeconomic conditions, especially those linked to more expansionary fiscal policies, have exerted a crucial role in determining the observed "selective" regional convergence process in the EU. Furthermore, our contribution advances the empirical literature on the growth impact of Cohesion policies in two ways. First, we base our estimations on a newly constructed (panel) dataset including actual payments figures for two programming periods. Second, we have shown that the growth impact of Cohesion policies only emerges in estimated models not accounting for macroeconomic conditions and policies. On the other hand, this effect vanishes once we control for national-level macroeconomic factors.

Our results contribute to the debate on the determinants of regional convergence and to the discussion on how the effectiveness of Cohesion policies in different regions should be enriched by

the consideration of all the key national growth factors: European regional policies need to account for national macroeconomic policies to produce their intended effects.

The evidence provided in this paper points to a revision of the Cohesion policies in light of this macroeconomic heterogeneity of Member States which can determine asymmetric competition among lagging regions. As these national macroeconomic policies have a strong impact on the effectiveness of European regional policies, the policy makers need to take into account the responsibilities of the entire framework of EU policies to evaluate the strength of regional convergence in the Union.

REFERENCES

Acemoglu, D., Johnson, S., & Robinson, N. J. A. (2001). The colonial origins of comparative development: an empirical investigation. American economic review, 91(5), 1369–1401. DOI: 10.1257/aer.91.5.1369.

Annoni, P., & Dijkstra, L. (2013). *EU Regional Competitiveness Index: RCI 2013*, JRC Scientific and Technical Reports, Report EUR 26060 EN, Luxembourg, Publications Office of the European Union.

Barrios, S., & Strobl, E. (2005). The dynamics of regional inequalities, European Economy, Economic Papers No 229, European Commission, DG ECFIN.

Becker, S.O., Egger, P., & von Ehrlich M., Going NUTS (2010), The Effect of EU Structural Funds on Regional Performance. *Journal of Public Economics,* 94(9–10), 578–90. DOI: 10.1016/j.jpubeco.2010.06.006.

Boldrin, M., & Canova, F. (2001). Inequality and Convergence in Europe's Regions: Reconsidering European Regional Policies. *Economic Policy*, 16(32), 207-253. DOI: https://doi.org/10.1111/1468-0327.00074.

Bougheas, S. , Demetriades, P.O., & Mamuneas, T.P. (2000) Infrastructure, specialization, and economic growth. *Canadian Journal of Economics/Revue canadienne d'économique*. 33(2), 506-

522. DOI: 10.1111/0008-4085.00026.

Camagni, R., & Capello, R. (2015). Rationale and design of EU Cohesion policies in a period of crisis. *Regional Science Policy & Practice*, *7*(1), 25–47. DOI: 10.1111/rsp3.12047.

Charron, N., Dijkstra, L., & Lapuente V. (2014). Regional Governance Matters: Quality of Government within European Union Member States. *Regional Studies*, *48*(1), 68–90. DOI: 10.1080/00343404.2013.770141.

Charron, N., Dijkstra L., & Lapuente V. (2015). Mapping the Regional Divide in Europe: A Measure for Assessing Quality of Government in 206 European Regions, *Social Indicators Research*, 122 (2), 315-346. DOI: 10.1007/s11205-014-0702-y.

Crescenzi, R., Luca, D., & Milio, S. (2016). The geography of the economic crisis in Europe: national macroeconomic conditions, regional structural factors and short-term economic performance. *Cambridge Journal of Regions, Economy and Society*, 9(1), 13–32. DOI: https://doi.org/10.1093/cjres/rsv031.

Davies, S. (2011). Regional resilience in the 2008–2010 downturn: comparative evidence from European countries. *Cambridge Journal of Regions, Economy and Society, 4*(3), 369–382. DOI: https://doi.org/10.1093/cjres/rsr019.

Esposti, R., & S. Bussoletti, (2008). Impact of Objective 1 funds on regional growth convergence in the European Union: a panel-data approach. *Regional Studies*, 42(2), 159–173. DOI: 10.1080/00343400601142753.

European Commission (2014). *Investing for Jobs and Growth. Promoting development and good governance in EU regions and cities. Sixth report on social, economic and territorial Cohesion*. July 2014, Brussels.

Eurostat (2014), Taxation trends in the European Union, 2014 edition.

Fratesi, U., & Perucca, G. (2014). Territorial capital and the Effectiveness of Cohesion Policy: an Assessment for CEE Regions. *Investigaciones Regionales*, 29.

Gagliardi, L., & Percoco, M. (2016). The impact of European Cohesion Policy in urban and rural

regions. *Regional Studies*, DOI: 10.1080/00343404.2016.1179384

Giannola, A., Padovani, R., & Petraglia, C. (2015). Spending review e divari regionali in Italia. *Economia Pubblica. The Italian Journal of Public Economics, 1*, 129–155. DOI: 10.3280/EP2015-001006.

Giannola, A., Petraglia, C., & Provenzano, G.L.C. (2016). Regional convergence and the future of Cohesion policies in the Eu. *Rivista economica del Mezzogiorno*, 30(4), forthcoming.

Hummels, D., Ishii, J., & Yi, K. M. (2001). The nature and growth of vertical specialization in world trade. *Journal of international Economics*, 54(1), 75-96. DOI: 10.1016/S0022-1996(00)00093-3.

Maynou, L., Saez, M., Kyriacou, A. & Bacaria, J. (2016). The Impact of Structural and Cohesion Funds on Eurozone Convergence, 1990–2010. *Regional Studies*, 50(7), 1127-1139. DOI: 10.1080/00343404.2014.965137

Pellegrini, G. , Terribile, F., Tarola, A., Muccigrosso, T. & Busillo, F. (2013). Measuring the Impact of the European Regional Policy on Economic Growth: a Regression Discontinuity Approach. *Papers in Regional Science*, 92(1), 217-233. DOI: 10.1111/j.1435-5957.2012.00459.x.

Percoco, M. (2016). Impact of European Cohesion Policy on regional growth: does local economic structure matter? *Regional Studies*, DOI: 10.1080/00343404.2016.1213382

Petraglia, C., & Pierucci, E. (2016). Fu vera convergenza? Le Politiche di Coesione e la questione delle periferie dell'Ue. *Eyesreg. Giornale di Scienze Regionali*, *6*(1), 5–10.

Pieńkowski, J., & Berkowitz P. (2015). Econometric assessments of Cohesion Policy growth effects: How to make them more relevant for policy makers?, European Commission Working papers n.02/2015.

Puigcerver-Peñalver M. (2007). The impact of structural funds policy on European regions' growth. A theoretical and empirical approach. *The European Journal of Comparative Economics*, 4(2), 179–208.

Ramajo, J., Márquez, M., Hewings, G., & Salinas, M., (2008). Spatial heterogeneity and

interregional spillovers in the European Union: Do Cohesion policies encourage convergence across regions? *European Economic Review* 52 551–67.

Rodrik, D., Subramanian, F. & Trebbi, F. (2004). Institutions rule: the primacy of institutions over geography and integration in economic development. *Journal of Economic Growth* 9, 131–165.

Rodríguez-Pose, A., & Fratesi, U. (2004). Between development and social policies: the impact of European Structural Funds in Objective 1 regions. *Regional Studies,* 38, 97–113

Rodríguez-Pose, A., & Garcilazo, E. (2015). Quality of Government and the Returns of Investment: Examining the Impact of Cohesion Expenditure in European Regions. *Regional Studies*, 49(8), 1274-1290.

Rodríguez-Pose, A., & Novak, K. (2013). Learning processes and economic returns in European Cohesion Policy, *Investigaciones Regionales*, 25, 7-26.

Romer, P. M. (1987). Growth based on increasing returns due to specialization. *The American Economic Review*, 77(2), 56-62.

SVIMEZ (2015). Le politiche dell'Unione europea a un bivio. In SVIMEZ (Ed.), *Rapporto SVIMEZ 2015 sull'Economia del Mezzogiorno* (pp. 337–362). Bologna: Il Mulino.

SVIMEZ (2016). I divari regionali di sviluppo e competitività nell'Unione europea. In SVIMEZ (Ed.), *Rapporto SVIMEZ 2016 sull'Economia del Mezzogiorno* (pp. 335–350). Bologna: Il Mulino.

Tomova, M., Rezessy, A., Lenkowski, A., & Maincent, E. (2013) EU governance and EU funds – testing the effectiveness of EU funds in a sound macroeconomic framework, European Commission, DG ECFIN, European Economy, Economic Papers No 510.

[1] Throughout the paper the terms "Less developed", "convergence", "backward", "objective 1", "weak" regions are used as synonymous. In any case they are identified as NUTS2 European regions with a GDP per head of less than 75% of the EU average.

[2] In the case of Italy, Giannola, Petraglia and Padovani (2015) show that austerity policies pursued in the crisis have largely been financed by cuts in resources devoted to regional policies, thus lessening public support to the Mezzogiorno and amplifying output and employment contractions.

[3] The RCI has been developed by the European Commission in order to improve the understanding of territorial competitiveness at the regional level in the EU (Annoni & Dijkstra, 2013). The eleven pillars of the RCI describe both inputs and outputs of territorial competitiveness, grouped into three sets describing *Basic*, *Efficiency* and *Innovative* factors of competitiveness. The *Basic* pillars include the following factors: quality of institutions; macro-economic stability; infrastructure; health; and the quality of primary and secondary education. Despite being important for all economies, all these pillars are most important for less developed regions. The *Efficiency* pillars are the following: higher education and lifelong learning; labour market efficiency; and market size. All these factors are crucial for economies that have already undertaken their development path. The *Innovation* pillars include: technological readiness; business sophistication; and innovation. This group plays a more important role for intermediate and especially for highly developed regions in order to maintain their (already high) competitiveness levels.

[4] Due to lack of data for the year 2013, our sample is restricted to the time horizon 2000-2012.

[5] We started with a larger sample of regions and countries (24), however this number was reduced due to data availability for all regional as well as national factors. Countries more affected by data restrictions are mainly those entering the European Union in 2007.

[6] Less developed regions are identified according to the Decisions of the European Commission setting out the lists of regions eligible for funding from the European Regional Development Fund and the European Social Fund for the periods 2000-2006 and/or 2007-2013. For the 2000-2006 period SF include the European Social Fund (ESF), European Regional Development Fund (ERDF), the European Agricultural Guidance and Guarantee Fund (EAGGF) and the Financial Instrument for Fisheries Guidance (FIFG); for the 2007-2013 period SF include the ERDF and the ESF.

[7] The most noticeable case in our sample is that of Italian convergence regions.

[8] We estimate the complete model including regional as well as national factors. For space reason we do not report the entire set of regressions, however results are available upon request.

Table 1. Definition of variables and sources of data

Variables	Definition	Source	Unit
	Dependent variables		
gva	annual growth rate of per capita gva by NUTS 2 regions	Own elaboration on Cambridge econometrics	% points change
meangva	average annual growth rate of per capita gva in NUTS 2 regions belonging to the same country	Own elaboration on Cambridge econometrics	% points change
empl	annual growth rate of employment by NUTS 2 regions	Own elaboration on Cambridge econometrics	% rate of growth
meanempl	average annual growth rate of employment in NUTS 2 regions belonging to the same country	Own elaboration on Cambridge econometrics	% rate of growth
	Structural regional factors (X)		
spec	Specialization index by NUTS 2 regions: Herfindahl-Hirschman index $\text{Spec}_{rt} = \sum_{i=1}^{S} \left(\frac{\text{Gva}_{rt}^{s}}{\text{Gva}_{rt}^{Ag}}\right)^2$	Own elaboration on Cambridge econometrics	Index scaled 0 – 1
inv	Private gross fixed capital formation by NUTS 2 regions	Cambridge econometrics	% of GDP
human	Adult population aged 25-64 holding a degree in tertiary education by NUTS 2 regions	Eurostat	% of total population aged 25-64
inno	Per capita total intramural R&D expenditure by NUTS 2 regions	Eurostat	Euro per capita in logs
	National policy Factors (N)		
public deficit	government deficit/surplus	Eurostat	% of GDP
public debt	government consolidated gross debt	Eurostat	% of GDP
public inv	government gross fixed capital formation	Eurostat	% of GDP
euro	Dummy = 1 for Eurozone countries and 0 otherwise		0/1
Capital and Business Income Tax	Implicit tax rate on Capital and Business income	Eurostat	%
labour cost	compensation of employees in the manufacturing sector	Cambridge econometrics	% of GVA
qog	ICRG_qog Indicator of Quality of Government is the mean value of the Indicators of Quality Government (ICRG) variables “Corruption”, “Law and Order” and “Bureaucracy Quality”.	THE QOG OECD DATASET 2016. Quality of Government Institute (University of Gothemburg)	Index scaled 0 – 1
	Cohesion policies (CP)		
SF	European Structural funds	Own elaboration on European Commission (various years)	% of total SF funds
CF	Cohesion fund	Own elaboration on European Commission (various years)	% of total Cohesion fund

Table 2. Descriptive statistics

		EU17					EU15					EU13				
	Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dep var	gva_{rt}	490	0.0118	0.0327	-0.1533	0.1131	288	0.0056	0.0244	-0.0685	0.0760	202	0.0206	0.0402	-0.1533	0.1131
	$empl_{rt}$	490	0.0041	0.0315	-0.1369	0.1691	288	0.0050	0.0312	-0.1369	0.1691	202	0.0029	0.0320	-0.0691	0.1203
X	*spec*	490	0.2231	0.0325	0.1743	0.3582	288	0.2189	0.0345	0.1743	0.3582	202	0.2290	0.0284	0.1870	0.3120
	human	490	0.1939	0.0686	0.0520	0.4070	288	0.2042	0.0796	0.0520	0.4070	202	0.1792	0.0451	0.0680	0.3340
	inno	490	-2.2472	0.8275	-4.5218	1.0278	288	-2.0447	0.7480	-4.3041	1.0278	202	-2.5360	0.8512	-4.5218	-0.2622
	inv	490	0.1730	0.0608	0.0704	0.4597	288	0.1990	0.0628	0.0774	0.4597	202	0.1359	0.0318	0.0704	0.2501
N	*euro*	490	0.5673	0.4960	0.0000	1.0000	288	0.8889	0.3148	0.0000	1.0000	202	0.1089	0.3123	0.0000	1.0000
	labour cost	490	0.4681	0.0885	0.2604	0.7305	288	0.4967	0.0917	0.2604	0.7305	202	0.4274	0.0649	0.3088	0.5910
	Capital and Business Income Tax	490	0.1858	0.0422	0.0880	0.2860	288	0.2085	0.0369	0.1110	0.2860	202	0.1533	0.0241	0.0880	0.2070
	public deficit	490	-0.0384	0.0326	-0.1120	0.0500	288	-0.0349	0.0388	-0.1120	0.0500	202	-0.0433	0.0198	-0.0790	-0.0010
	public debt	490	0.6859	0.2783	0.2180	1.2620	288	0.6752	0.2630	0.2360	1.2620	202	0.7012	0.2988	0.2180	1.2620
	public inv	490	0.0402	0.0093	0.0150	0.0580	288	0.0362	0.0083	0.0150	0.0530	202	0.0459	0.0076	0.0310	0.0580
	qog	490	0.7084	0.1018	0.5231	1.0000	288	0.7528	0.1126	0.5231	1.0000	202	0.6450	0.0161	0.6111	0.6667
CP	*SF*	490	0.0219	0.0190	0.0000	0.0867	288	0.0244	0.0220	0.0000	0.0867	202	0.0185	0.0128	0.0017	0.0343
	SF_qog	490	0.0154	0.0142	0.0000	0.0648	288	0.0178	0.0167	0.0000	0.0648	202	0.0119	0.0082	0.0011	0.0225
	CF	490	0.0229	0.0282	0.0000	0.0923	288	0.0236	0.0336	0.0000	0.0923	202	0.0220	0.0178	0.0007	0.0489
	CF_qog	490	0.0163	0.0210	0.0000	0.0714	288	0.0179	0.0255	0.0000	0.0714	202	0.0141	0.0114	0.0004	0.0312

We started with a sample of 24 EU countries, however due to lack of data on some of the macroeconomic factors particularly for those countries joining the Union in 2007, the final sample on which we perform the regression analysis includes 73 “convergence” (less developed) regions belonging to 17 European countries (a total of 490 observations).

Table 3. Equation (1) estimation

		Dependent variable: gva_{rt}				Dependent variable: $empl_{rt}$			
	Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
X	*spec*	0.6418***	0.6017**	0.6298***	0.6205**	0.2653	0.3517**	0.2252	0.3171**
		(0.201)	(0.273)	(0.202)	(0.263)	(0.233)	(0.130)	(0.203)	(0.122)
	human	0.0156	0.0911	0.0068	0.0674	-0.0760	0.0551	-0.1160	0.0440
		(0.065)	(0.094)	(0.066)	(0.104)	(0.114)	(0.156)	(0.096)	(0.137)
	inno	-0.0070	-0.0072	-0.0066	-0.0065	-0.0077	-0.0072	-0.0063	-0.0052
		(0.005)	(0.004)	(0.005)	(0.004)	(0.007)	(0.009)	(0.007)	(0.007)
	inv	0.0514	0.0842	0.0348	0.0885	0.2193***	0.0087	0.1550***	0.0563
		(0.045)	(0.086)	(0.043)	(0.096)	(0.075)	(0.074)	(0.058)	(0.079)
N	*euro*		-0.0342***		-0.0349***		0.0039		0.0033
			(0.007)		(0.007)		(0.006)		(0.006)
	labour cost		-0.0937*		-0.0952*		0.0338		0.0186
			(0.051)		(0.054)		(0.049)		(0.050)
	Capital and Business Income Tax		-0.2563*		-0.2539		-0.1102		-0.1264
			(0.140)		(0.149)		(0.101)		(0.098)
	public deficit		0.3030**		0.2660**		0.6162***		0.4704***
			(0.104)		(0.114)		(0.159)		(0.109)
	public debt		-0.0502*		-0.0517*		-0.0656***		-0.0779***
			(0.026)		(0.027)		(0.011)		(0.014)
	public inv		-0.4828		-0.5072		-0.5773		-0.7772*
			(0.407)		(0.482)		(0.332)		(0.383)
	qog		-0.0443		-0.0948		0.1104		-0.0087
			(0.078)		(0.095)		(0.080)		(0.084)
CP	*SF*	0.1376**	-0.9385			0.4841***	1.4114		
		(0.062)	(0.734)			(0.105)	(0.856)		
	SF_qog		1.3828				-1.8538		
			(0.996)				(1.303)		
	CF			0.1356**	-2.1321			0.6002***	0.8694
				(0.064)	(3.081)			(0.075)	(1.611)
	CF_qog				3.0423				-0.6684
					(4.031)				(2.104)
	Constant	-0.1517***	0.0385	-0.1452***	0.0734	-0.0993	-0.0933	-0.0800	0.0067
		(0.051)	(0.071)	(0.051)	(0.065)	(0.066)	(0.062)	(0.056)	(0.068)
	R^2	0.582	0.629	0.583	0.632	0.331	0.436	0.365	0.445

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Number of id (regions) equals 73 and the total number of observation is 490.

Table 4. Robustness check: Equation (2)

		Dependent variable: $meangva_{it}$				Dependent variable: $meanempl_{it}$			
	Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
X	*spec*	0.9907***	0.7644***	0.9752***	0.8116***	0.5206***	0.2848***	0.5196***	0.3254***
		(0.242)	(0.241)	(0.239)	(0.262)	(0.152)	(0.095)	(0.134)	(0.096)
	human	-0.2782***	0.0088	-0.2983***	0.0442	-0.2735***	-0.0021	-0.2988***	0.0094
		(0.058)	(0.069)	(0.058)	(0.061)	(0.052)	(0.066)	(0.049)	(0.076)
	inno	-0.0111***	-0.0064	-0.0104***	-0.0070	-0.0107***	-0.0058	-0.0090**	-0.0043
		(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
	inv	0.2725***	0.0361	0.2337***	0.0542	0.3812***	0.0417	0.3088***	0.0689
		(0.060)	(0.079)	(0.057)	(0.096)	(0.076)	(0.060)	(0.062)	(0.077)
N	*euro*		-0.0334***		-0.0344***		0.0064*		0.0046
			(0.006)		(0.006)		(0.004)		(0.004)
	labour cost		-0.1135**		-0.1145**		0.0346		0.0255
			(0.046)		(0.047)		(0.026)		(0.023)
	Capital and Business Income Tax		-0.5030***		-0.4845***		-0.1742***		-0.1585***
			(0.108)		(0.097)		(0.059)		(0.054)
	public deficit		0.6966***		0.7047***		0.5919***		0.5152***
			(0.095)		(0.125)		(0.077)		(0.078)
	public debt		-0.0618**		-0.0611**		-0.0477***		-0.0516***
			(0.023)		(0.023)		(0.013)		(0.012)
	public inv		-0.1282		-0.0115		-0.4796		-0.6121
			(0.260)		(0.221)		(0.377)		(0.398)
	qog		-0.0132		-0.0348		0.1124		0.0382
			(0.147)		(0.131)		(0.111)		(0.118)
CP	*SF*	0.3347***	-0.5907			0.6069***	1.0701		
		(0.101)	(1.102)			(0.114)	(0.778)		
	SF_qog		0.4733				-1.3784		
			(1.526)				(1.063)		
	CF			0.2730***	-2.3702			0.5669***	-0.4587
				(0.066)	(3.745)			(0.066)	(1.935)
	CF_qog				2.9060				0.8535
					(5.002)				(2.663)
	Constant	-0.2349***	0.0738	-0.2181***	0.0611	-0.1623***	-0.0740	-0.1405***	-0.0278
		(0.056)	(0.125)	(0.054)	(0.105)	(0.043)	(0.096)	(0.036)	(0.090)
	R^2	0.222	0.532	0.227	0.534	0.400	0.727	0.455	0.733

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Number of id (regions) equals 73 and the total number of observation is 490.

Table 5. Robustness Check: endogeneity tests

	Dependent variable: gva_{rt}		Dependent variable: $empl_{rt}$	
	(1)	(2)	(3)	(4)
	SF	*CF*	*SF*	*CF*
Observations	454	454	454	454
Number of id	73	73	73	73
Hansen Sargan test	0.1062	0.6544	0.7018	0.6276
Endogeneity test	0.9597	0.1507	0.1352	0.2249

Endogeneity tests on Equation (1). Instruments used are Commitments at time *t* and *t-1*. Columns (1) and (3) refer to the use of SF Cohesion policy variable, while Columns (2) and (4) correspond to the use of *CF* variable.