Regional Growth and Convergence in Spain: Is the Decentralization Model Important?

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Abstract

This work is rooted on the analysis of growth and convergence at the regional level in Spain. Our contribution to that field is concentrated on the period 1980-2014, period characterized by a weak narrowing of the income per capita gap within regions. Several factors could explain that result. We focus our attention on the role of the political decentralization process in Spain, which actually began in the early eighties, on regional economic growth, a controversial and yet not enough studied issue. In Spain there are different models of decentralization, and even for each model, the different regions involved could follow different speeds gaining new administrative roles. Our econometric methodology is based on the system Generalized Method of Moments estimator. After using a general Mankiw-Romer-Weil approach, which fits well the Spanish data, our empirical work will implement other augmented growth regressions, which allow including a large set of explanatory variables. For such purpose, we try specifications with different proxies for the decentralization variable, as well as interactions with other variables that we think are linked to it, to capture the whole effect of decentralization. To sum up, our results, reinforced by several robustness exercises, are not conclusive on the relevance and sign of the effect of the decentralization path followed by the Spanish regions on growth and convergence, and points out to the importance of alternative factors. This result can contribute to the current debate in Spain on these topics.

JEL codes: O47, R11, H11, C23.

Key words: Economic Growth, Convergence, Decentralization, Spanish Regions.

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1. Introduction

The approval of the Spanish Constitution (CE, henceforth) in 1978 was the beginning of the development of what is called the State of the Autonomous Communities, with the establishment of seventeen Autonomous Communities (CC.AA., henceforth). Such process mostly took place between the years 1979 and 1983, and concluded in 1995, when Ceuta and Melilla became Autonomous Cities.

These CC.AA. are characterized by a very heterogeneous geographical dimension, population and income level. In this respect, we can highlight that there are two insular CC.AA.; seven CC.AA. are formed for just one province; Basque Country and Catalonia are in the group of wealthiest regions, fact that can be explained because they had an earlier industrialization, as well as Madrid, in better position being at the centre of the country. Other differential factors are the closeness to European countries, being on the coast or being an inland.

The decentralization process involved the transfer of competences from the central government to the CC.AA. Nevertheless, not all the CC.AA. have the same number of competences and the speed of this process of transfer of competences has also been different among them. We can distinguish three types of CC.AA.: the ones that used the article 143 of the CE, the ones that used the article 151 of the CE and the Foral Communities. The CC.AA. of the article 143 of the CE\(^1\) assumed a group of common competences at the beginning, such as the promotion of regional economic development, public works, housing, railways and roads, ports and airports, agriculture and fishing, environmental protection, tourism, economic regulation, culture and social welfare, but education and health were not yet their responsibility. Meanwhile, the CC.AA. of the article 151 of the CE\(^2\), thought for the historical nationalities, gained more competences sooner, as well did the foral\(^3\) ones, which also had their own Fiscal and Economic Regime.

In this way, the main expenditure functions are distributed across the different levels of government. The central administration takes care basically of the foreign policy, defence, justice, social security, citizenship, immigration and unemployment benefits; and the CC.AA. of health, education and culture, housing and social services. In the case of investment in public infrastructure, the responsibility is shared between both of them and the local

\(^1\) Aragon, Asturias, Balearic Islands, Cantabria, Castile-La Mancha, Castile and Leon, Extremadura, La Rioja, Madrid and Murcia.

\(^2\) Andalusia, Catalonia, Canary Islands, Comunidad Valenciana and Galicia.

\(^3\) Navarre and Basque Country.
government. As regards the promotion of economic activity, the CC.AA. have the exclusive responsibility, although the central government has a transversal power, as it sets the basis and coordinates the general planning of the economic activity⁴. In addition to that, since Spain joined the European Economic Community (nowadays European Union, EU) in 1986, the competence on certain matters, that belonged to the regional and/or member state levels, were transferred to the European institutions, which establish policies that limit the regional competences and forbid state aids to enterprises. Therefore, the economic policy is mainly developed at three levels: EU, state and CC.AA.

The decentralization process has advocates and opponents. The advocates argue the potential gains in efficiency in the provision of public goods by regional governments. In constrast, the main argument against fiscal federalism is that, unless it is combined with compensating subsidies, it will widen regional disparities, through a reduction of the redistribution of income among regions. Furthermore, when the revenues are decentralized, the wealthiest regions have more resources at their disposal than the least developed ones. Another negative aspect highlighted by the opponents is that macroeconomic instability problems may emerge if a budgetary control is not properly exercised. The empirical evidence is however not unanimous.

In this paper we aim to make a contribution to this field of research, testing the convergence hypothesis and exploring the potential effect of the decentralization process on regional Gross Domestic Product (GDP) per capita growth in Spain since the setting of the State of the CC.AA. in 1980 until nowadays. We try to focus on the policy scope, that is, the range of policies for which a regional government is responsible. We use GDP per capita as a proxy for the living standard as this is the most used variable in empirical studies. Our econometric methodology is based on the system Generalized Method of Moments (GMM) estimator technique. After using a general Mankiw-Romer-Weil (MRW, 1992) approach, which fits well the Spanish data, we implement other augmented growth regressions, which allow including a large set of explanatory variables, being the decentralization variable one of the additional regressors in the growth equation.

The rest of the study is organized as follows: Section 2 reviews the literature on the relationship between decentralization and economic growth. Section 3 takes a first look at the data and statistical sources, and explains the indicators used as proxies of decentralization. Section 4 presents the econometric specification, the system GMM estimator for dynamic

⁴ Article 149.1.13a of the CE.
panels. In Section 5 the results from the empirical analysis are discussed. Finally, the last section concludes and summarizes the most relevant outcomes from our research.

2. Overview of the literature

The meaning of decentralization is not clear-cut and may vary. In general, it can be considered as a transfer of fiscal, political and policy competences to subnational governments. Hooghe et al. (2010) measure and compare the authority of intermediate or regional governments through a Regional Authority Index (RAI) in 43 democracies or quasi-democracies on an annual basis over the period 1950-2006, and conclude that twenty nine countries surveyed (69% of the countries studied) had regionalized, two had become less regionalized, and eleven were unchanged.

Rodden (2004) points out that the attempts to define and measure decentralization have focused primarily on fiscal matters and to a lesser extent on political ones. Most empirical studies of decentralization focus exclusively on the balance of expenditures and revenues among governments.

Many studies have tried to test the relationship between fiscal decentralization and economic growth, corresponding the early outstanding contributions to Oates (1985), Rodríguez-Pose (1996) and Davoodi and Zou (1998). It has been studied for different groups of countries, or focusing on just one country. Authors like Woller and Phillips (1998), Thornton (2007), Bodman (2011) and Baskaran and Feld (2013) do not find a significant relationship. On the contrary, the results in other studies, like Davoodi and Zou (1998), Martinez-Vazquez and McNab (2003, 2006), Rodríguez-Pose and Kroijer (2009), Rodríguez-Pose and Ezcurra (2011) and Gemmel et al. (2013), point to a negative association between

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5 Spain is one of the countries of the sample.
7 Results show that, at least in the early stages, the emergence of the Spanish regional state has had slightly beneficial effects on the relative growth performance of regions achieving the greatest level of autonomy in comparison with their growth rates in the high point of Spanish centralism (1985-1991 versus 1962-1969). Nevertheless, it was still too early to assert whether this positive influence would be a long-lasting one or can be attributed mainly to the dynamics of institutional change and, thus, would be offset as time goes by. In this respect, Rodríguez-Pose and Bwire (2004), for a longer period (1963-2000), showed that no statistically significant association is evident for Spain between economic performance and devolution.
fiscal decentralization and economic growth\textsuperscript{10}. For just one country, Zhang and Zou (1998, 2001), Stegarescu \textit{et al.} (2002) and Kanbur and Zhang (2005) also seem to find a negative contribution. For the remaining international literature reviewed, in the majority of cases a positive impact has been found between decentralization and growth. For instance, Blöchliger and Égert (2013), for OECD countries, conclude that decentralization, measured using revenue or expenditure shares, is positively associated with GDP per capita levels, although the effect seems to be stronger for revenue decentralization than for expenditure decentralization.

For Spain, the results are also mixed, although mostly positive. When the indicator used is revenue share, while Agúndez (2002) does not find a statistically significant positive relationship, Gil-Serrate and López-Laborda (2006) and Gil-Serrate (2007) obtain a positive link. In the case of expenditure, Esteban (2006) also finds a positive impact. By contrast, Cantarero and Pérez (2009) do not support a significant relationship between growth in per capita GDP and expenditure distribution among fiscal administrations, although when they consider the relationship between revenue decentralization and growth, a positive sign is obtained. Finally, in Carrión-i-Silvestre \textit{et al.} (2008), who used region’s investment share and the share of region’s own revenues out of the total non-financial revenues in the region as indicators, the results show that fiscal decentralization has a positive effect on economic growth for those regions with the highest levels of fiscal and institutional decentralization, and the opposite effect is found for those regions with the lowest levels of competences.

Rodden (2004) also states that the decentralization of policy autonomy is rarely addressed by empirical scholars because it is difficult to measure, and in many cases it remains a shared responsibility between central and subcentral governments. Our work aims to cover this gap for the Spanish case. To get some insight into political decentralization we can also track regional and local elections over time. Recently there have been attempts to capture the multidimensional aspect of decentralization. For example, Schakel (2008) analyzes and compares the RAI developed by Marks \textit{et al.} (2008) with others that had appeared in previous literature. Castles (1999), Rodríguez-Pose and Ezcurra (2011), and Ezcurra and Rodríguez-Pose (2013), on the other hand, have focused on the relationship between political decentralization and economic growth. In particular, in Ezcurra and Rodríguez-Pose (2013) the results suggest a lack of statistical relationship between political

\textsuperscript{10} Rodríguez-Pose and Kroijer (2009) and Gemmel \textit{et al.} (2013) are referred to expenditure.
decentralization and economic growth, regardless of how political decentralization is measured.

3. Data and statistical sources

The main objective of our work is to analyze the determinants of the GDP per capita growth, as it is considered to be, in spite of its limitations, one of the best indicators of the economic status of a society.

For such purpose, several information requirements are needed. In first place, we have to build a long historical series that covers the period 1980-2014. The Spanish Statistical Institute (Instituto Nacional de Estadística, INE) publishes data of the GDP of the CC.AA. in the Contabilidad Regional de España (Spanish Regional Accounts), but there is not an homogenous series11. This statistic presents the data in three different bases: in Base 1986 (for the period 1980-1996), Base 2000 (for the period 1995-2010), both of them in the framework of ESA95, and Base 2010, under the new framework of ESA2010, for the period 2000-2014. Also, in the base 1986, the real terms are expressed in constant pesetas, while with bases 2000 and 2010 they are expressed in chained volume indices. We have opted for the construction of a series in constant euros of 2010 for the period 2000-2014, using the chain volume indices and the data in nominal terms of 2010. As a result we have 17 series, as Ceuta and Melilla are not going to be considered. For the period 1980-1999, the series have been linked with the real growth rates obtained from the Contabilidad Regional de España.

For the population, we have used the data referred to the first of july, from the publication Cifras de Población of INE.

The determinants of GDP per capita that we consider are the ones used in the MRW framework: the population growth12; the investment rate, obtained from the database of the Instituto Valenciano de Investigaciones Económicas (IVIE), with information for the period 1980-201213, and defined as the rate of gross non-residential investment over GDP; and for human capital the proxy used is the rate of working age population with higher education (post-secondary and over), also extracted from the IVIE database14, and completed with data

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11 De la Fuente (2016) has recently published linked series for that period, with similar characteristics to our series.
12 Plus the growth rate of technology and the depreciation rate, which we consider equal to 0.05, as in Mankiw et al. (1992).
from the *Encuesta de Población Activa* (Labor Force Survey) of INE\textsuperscript{15}. We also introduce, as control variables, the weight of the employment in agriculture over total employment, and the unemployment rate, both derived from the *Encuesta de Población Activa*.

In the second part of our analysis, and this is perhaps our main contribution, we use several variables related to the competences assigned to the CC.AA., as they proxy the regional authority over policy making. The Ministry of Finance and Public Administration offers a list of the Royal Decrees of transfers of competences to the seventeen CC.AA., sorted by date, and a summary table. We have built three series from that information: 1) contains the total number of competences as they were assigned to each CC.AA. (Figure 1); 2) cumulates those data over the period (Figure 2); and 3) normalizes the second series by the average of the 17 CC.AA. each period (Figure 3), to capture the effect of having more or less degree of autonomy than the average.

Another option is not focusing on the total number of competences but just on the ones that the Ministry considers common\textsuperscript{16}, plus university and under-university level education, health, and social services, being 20 the maximum number of these common competences (Figure 4). Considering these series we have built a simple common competences index (CC Index), which takes a value of 1 when the number of common competences is 0-3; 2 when the region has between 4 and 7 competences; 3 when there are between 8 and 11; 4 between 12 and 15; and 5 between 16 and 20 (Figure 5).

Finally, we have divided the 20 common competences in six areas: education (7 competences), health (3 competences), social services (2 competences), employment (4 competences), justice (1 competence) and productive sectors (3 competences). Each of these areas has a weight (30\%, 45\%, 10\%, 3\%, 2\% and 10\%, respectively), derived from the average amount of public expenditure in each field. Finally, we have weighted the cumulated common competences of each region, multiplying the number of competences assumed in each area by the corresponding weight (Figure 6).

\textsuperscript{15} We could also have used the information of De la Fuente and Doménech (2015).

\textsuperscript{16} The common competences to be considered are: occupational professional training, active employment policies, human and material resources of the administration of justice, religion teachers, teachers in penal institutions, management of the Spanish Agricultural Guarantee Fund, professional diving, nuclear facilities of 2nd and 3rd categories, implementation of legislation on pharmaceuticals, insurance intermediaries, vocational training for employment, student insurance, prison health care, labor and social security inspection, scholarships and study assistance, and standardization and validation of foreign academic qualifications in non-university higher education.
For the last part of the study, we focus the analysis on the interaction of the CC Index with several explanatory variables. In particular, we consider the investment rate, the percentage of working age population with higher education, the average years of schooling, the rate of entrepreneurship, the Research and Development (R&D) expenditure (as percentage of GDP), and the informal economy (as percentage of GDP as well).
Data for the average years of schooling are obtained from the database of the IVIE\textsuperscript{17}. The rate of entrepreneurship is defined as the number of new companies created per ten thousand people, both series available from the INE. This is the same source used for the R&D expenditure (as percentage of GDP). Finally, the weight of the informal economy as percentage of GDP has been calculated on the basis of the data provided by Gómez-Antonio and Alañón (2004) and GESTHA-FURV (2014).

Finally, we have also introduced two dummies: one that takes the value 1 if the CA used the article 151 of the CE or is foral, and therefore has a relative high degree of autonomy\textsuperscript{18}; while the other dummy takes the value 1 if the CA used the article 143 of the CE, having a relative lower degree of autonomy\textsuperscript{19}.

4. Econometric specification

The growth model to be estimated is based on well-known equations used empirically in this literature: the regressions à la Barro\textsuperscript{20}. The main objective of Barro’s regression equation is to remove from the error term certain variables additional to the initial GDP per capita that are considered determinants of the growth of the GDP per capita, and are correlated with the initial GDP per capita, fact that introduces a bias in the estimated coefficient for this variable (initial GDP per capita)\textsuperscript{21}.

If the estimated parameters of the vector of these additional variables are significant, then the steady-state levels are different among the regions analyzed, demonstrating the existence of conditional beta convergence.

In particular, and following the specification proposed by Durlauf \textit{et al.} (2005), the growth equation to be estimated is the following\textsuperscript{22}:

\[
Y_{i,t} = \beta \ln Y_{i,0} + \varphi X_{i,t} + \pi Z_{i,t} + \theta + \epsilon_{i,t},
\]

with \( \epsilon_{i,t} = \alpha_t + u_{i,t} \) \hspace{1cm} (1)

where \( y_{i,t} \) is the GDP per capita growth in the period under study (1980-2014); \( Y_{i,0} \) is the initial GDP per capita and contains the convergence factor (\( \beta \)); \( X \) is the vector that includes

\textsuperscript{17} Fundación Bancaja and IVIE: \textit{Capital humano en España y su distribución provincial}. January 2014.
\textsuperscript{18} Andalusia, Canary Islands, Catalonia, Galicia and C. Valenciana, plus Navarre and Basque Country.
\textsuperscript{19} Aragon, Asturias, Balearic Islands, Cantabria, Castile and Leon, Castile-La Mancha, Extremadura, Madrid, Murcia and La Rioja.
\textsuperscript{20} See for example Barro (1991).
\textsuperscript{21} See Sala-i-Martin (1994).
\textsuperscript{22} We use a log-specification in all our equations, except for those variables expressed in percentage, so that the estimates are less sensible to outliers.
the classical determinants of the Solow (1956) and Mankiw et al. (1992) models, that is, population growth, and physical and human capital; and $Z$ is the vector that includes additional determinants, in our case, the different proxies for the degree of autonomy. $\theta_i$ are time effects, $\alpha_i$ are individual effects and $u_{i,t}$ is the idiosyncratic error term. $i$ refers to the seventeen CC.AA. and $t$ to the period.

This equation will be estimated in the framework of a dynamic panel, but we are not going to consider yearly time spans, as they are too short to be appropriate for studying growth convergence\textsuperscript{23}. Using time averages reduces the effect of short-term shocks and the business cycle, and allows capturing the long-term relationships among variables. Therefore, it is a way of avoiding the problem of non-stationarity of the data series, which would cause biased results. However, as Temple (1999) pointed out, there is no consensus about which is the optimal interval. Examples of three-\textsuperscript{24} and five-year\textsuperscript{25} averages can be found in this literature. In our case we have opted for five-year intervals\textsuperscript{26}.

The strategy will be the following: in first place, we estimate the MRW model, to test the existence of conditional convergence among Spanish regions; in second place, we introduce in the growth equation the variables related to the degree of autonomy; and, in third place, we analyze the interaction of variables such as investment, education, entrepreneurship, R&D expenditure, and informal economy, with our CC Index, to discover potential synergies among the set of regressors and how they actually affect the growth of GDP per capita\textsuperscript{27}. In that case, with interactions, the equation to be estimated would be the following:

$$y_{i,t} = \beta \ln Y_{i,t0} + \varphi X_{i,t} + \pi Z_{i,t} + \rho A_{i,t} \ast B_{i,t} + \theta_i + \varepsilon_{i,t}$$

with $\varepsilon_{i,t} = \alpha_i + u_{i,t}$

representing $A$ and $B$ the variables that interact, which can be from the vector $X$ or $Z$.

Thus, for example, to calculate the marginal effect of variable $A$ on GDP per capita growth, given that $A$ belongs to vector $Z$, it would be necessary to differentiate equation (2) with respect to variable $A$:

\textsuperscript{23} Islam (1995).
\textsuperscript{24} For example, Bonneford (2014).
\textsuperscript{25} Among others, Islam (1995), Caselli et al. (1996) and Bond et al. (2001).
\textsuperscript{27} For a more detailed description of the specification of interaction models, see Friedrich (1982), Braumoeller (2004) or Brambor et al. (2006).
\[
\frac{\hat{\gamma}_{i,t}}{\hat{\alpha}_{i,t}} = \pi + \rho \cdot B_{i,t}
\]  

(3)

We show that the marginal effect of \(A\) depends on \(B\). The parameters of interest are \(\pi\) and \(\rho\). If the marginal effect of variable \(A\) increases with \(B\), \(\rho\) would be positive, although the total effect depends on the sign of \(\pi\)28.

We will focus our attention on the system GMM estimator29.

Econometric methods such as Ordinary Least Squares (OLS) or fixed effects for panel data are not appropriate in this kind of analysis, as they provide biased and inconsistent estimations in the framework of a dynamic panel30. More specifically, the omitted variables bias tends to affect the coefficients estimated with OLS, due to the influence of the specific regional characteristics. This problem could be solved with the fixed effects estimation method (within-groups), but neither of them solves the problem of the potential endogeneity of the regressors or the measurement errors. The bias of the dependent variable is positive in the case of OLS, due to the correlation between the individual effect and the lagged dependent variable. On the other hand, the fixed effects estimator presents a downward bias in a panel with few time intervals. The coefficients of the rest of the explanatory variables will also be biased as a result of the correlation with the lagged dependent variable. Therefore, OLS estimations could be considered as an upper bound, while fixed effects estimations would be a lower bound, as Bond et al. (2001) and Hoeffler (2002) explained31.

To solve these problems of omitted variable bias, endogeneity and measurement errors, Caselli et al. (1996) proposed to implement the difference GMM estimators to panel data32. However, in a next step, Bond et al. (2001) proved that, when the time series are persistent, as

28 The value of \(B\) that makes zero the marginal effect would be \(-\pi/\rho\). In case variable \(B\) had integer values, it would be possible to plot the marginal effects of \(A\) as a function of \(B\), as we will present in the next section. In this case, for interpretation purposes, as Brambor et al. (2006) point out, the standard error relative to the marginal effect must be calculated. This is calculated from the estimated coefficients and according to the following formula used in Aiken and West (1991):

\[
\hat{\sigma}_{\gamma_{i,t}/\alpha_{i,t}} = \sqrt{\text{var}(\hat{\pi}) + \rho^2 \cdot \text{var}(\hat{\rho}) + 2 \cdot \rho \cdot \text{Cov}(\hat{\pi}, \hat{\rho})}.
\]  

(4)

29 See Blundell et al. (2001) and Roodman (2009a) for thorough reviews of GMM methodology. We consider the one-step option, lag (2, 3) and small sample correction. We have used Stata and the command xtabond2 developed by Roodman (2009a). Robustness checks have also been implemented, considering alternative specifications of GMM system, which can be provided by the authors upon request.

30 See Nickell (1981) and Hsiao (1986).

31 Due to these reasons, we have also estimated all the equations using OLS and fixed effects for dynamic panel data, so we could have a benchmarking framework. These alternative estimates can be provided by the authors upon request.

32 An adaptation of the method described by Holtz-Eakin et al. (1988) and Arellano y Bond (1991).
is the case of GDP per capita, and the number of time observations is small, the first-differenced GMM estimator may perform poorly, since lagged levels of the series only provide weak instruments for subsequent first-differences. They proposed to use the system GMM estimator instead, developed by Arellano and Bover (1995) and Blundell and Bond (1998), which allows a better extraction of the information from the time series. This estimator uses an additional assumption about the initial conditions (the first differences of the instrumental variables are not correlated with the fixed effects), to obtain moment conditions that provide valid information even for series that are persistent. For this reason, Bond et al. (2001) recommended this system GMM estimator for empirical growth research. Following this advice, that will be the estimation procedure used in the present study.

The procedure of the system GMM consists in the estimation of a system of equations in both first-differences and levels, where the instruments used in the level equations are lagged first-differences of the series, and the instruments used in the first-difference equations are the lagged levels of the regressors.

The consistency of the system GMM estimator depends on two conditions: the absence of serial correlation of second order in the first-differenced error term and the validity of the instruments, which should not be correlated with the error term. To test the first condition the Arellano-Bond test is used, which examines the correlations of first and second order in the first-differenced equation residuals. By definition, there is always first-order correlation, due to the fact of applying first differences to the specification, otherwise it would indicate that there are no dynamic effects, and the system GMM estimator would not be therefore suitable. On the other hand, to test the validity of the instruments, the Sargan (1958) and Hansen (1982) tests are used. The Hansen test confirms the validity of the instruments in levels and the Sargan test the validity of the new instruments in differences for the level equation added by the system GMM.

Roodman (2009b) demonstrated that using too many instruments could bias the results of system GMM estimation. He pointed out that although there is no a consensus in the empirical literature about which is the maximum number of instruments that should be used, the usual practice is to have less instruments than individuals. In our paper, as the number of individuals is small (17), there is a potential problem of instrument profleration, as pointed out in Bowsher (2002) and Roodman (2009b), making inaccurate some of the asymptotic results of the estimators and the specification tests. One of the possible techniques for limiting the number of instruments is to use only certain lags, instead of all available lags for
instruments. In any case, Soto (2009) realized Monte Carlo simulations of system GMM for small samples, finding that, considering the existence of some persistence in the series, system GMM estimator exhibits less bias and more efficiency than the rest of the estimators considered, including the first-difference GMM estimator.

Another problem that can arise of the estimation is the existence of cross-sectional error dependence. To take account of this, time dummies have been introduced in the estimation, as they capture common trends in the dependent variable and reduce the asymptotic bias of the estimator in presence of that kind of error.

5. Results

In the next subsections we will present the main conclusions derived from the estimations. In the first one, the estimation includes the classical variables of Mankiw et al. (1992): the initial GDP per capita, the population growth, the investment rate and the percentage of working age population with higher education; plus additional control variables: the share of agricultural employment and the unemployment rate. In the second subsection, the different proxies considered for the competences of the Spanish regions are introduced in the estimation. Finally, the marginal effects of potential relevant variables for the growth of GDP per capita, estimated attending to the different degree of autonomy of the regions, are shown in the third subsection. In general, the results seem to confirm the existence of conditional beta convergence among Spanish regions during the last three and a half decades, although at a low pace.

5.1. The Mankiw-Romer-Weil approach

In Table 1 we show the results of the estimation according to Mankiw et al. (1992) (column 1), over seven five-year average periods (1980-2014). We regress the growth of GDP per capita, conditioned to the initial GDP per capita, population growth (plus the rate of technical progress and the rate of depreciation of physical and human capital), non-residential investment rate as percentage of GDP, and the rate of working age population with higher education. The negative and statistically significant sign associated with the initial GDP per capita confirms the existence of conditional beta convergence among Spanish regions.

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33 Accordingly, we have used this option. The results for lag (2,3) are analyzed in the next section.
34 Soto (2009) analyzes OLS, fixed effects, difference GMM, level GMM and system GMM, one and two-step.
35 In relation to the tests, the Arellano-Bond tests indicate the presence of a negative first-order autocorrelation in the different specifications used, while we cannot reject the null hypothesis that there is no autocorrelation of order 2 in each of the estimations. Regarding the Sargan and Hansen tests, the results should be taken with caution when the p-values are around one, circumstance that could happen due to the fact that the number of sections in the sample is small, and the number of instruments used is high.
### Table 1. Benchmark MRW model

<table>
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<tbody>
<tr>
<td>Initial GDP per capita</td>
<td>-2.722*</td>
<td></td>
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<td></td>
<td>(1.422)</td>
<td></td>
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<tr>
<td>Initial GDP per capita for regions with higher degree of autonomy</td>
<td>-2.815*</td>
<td></td>
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<tr>
<td></td>
<td>(1.405)</td>
<td></td>
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<tr>
<td>Initial GDP per capita for regions with lower degree of autonomy</td>
<td>-2.822*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.406)</td>
<td></td>
</tr>
<tr>
<td>Population growth</td>
<td>-0.417**</td>
<td>-0.414**</td>
</tr>
<tr>
<td></td>
<td>(0.159)</td>
<td>(0.158)</td>
</tr>
<tr>
<td>Investment rate</td>
<td>0.039</td>
<td>0.040</td>
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<tr>
<td></td>
<td>(0.031)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>% Working age population with higher education</td>
<td>0.060*</td>
<td>0.059*</td>
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<tr>
<td></td>
<td>(0.030)</td>
<td>(0.031)</td>
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<tr>
<td>Agricultural employment rate</td>
<td>-0.066**</td>
<td>-0.067**</td>
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<tr>
<td></td>
<td>(0.024)</td>
<td>(0.026)</td>
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<tr>
<td>Unemployment rate</td>
<td>-0.039</td>
<td>-0.044</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.037)</td>
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<td>Constant</td>
<td>30.325**</td>
<td>31.313**</td>
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<tr>
<td></td>
<td>(14.248)</td>
<td>(14.223)</td>
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<td>Arellano-Bond test order 1</td>
<td>-2.6</td>
<td>-2.61</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Arellano-Bond test order 2</td>
<td>0.74</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.465)</td>
</tr>
<tr>
<td>Sargan test</td>
<td>62.14</td>
<td>62.56</td>
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<tr>
<td></td>
<td>(0.874)</td>
<td>(0.847)</td>
</tr>
<tr>
<td>Hansen test</td>
<td>10.49</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>(1.000)</td>
<td>(1.000)</td>
</tr>
<tr>
<td>Number of observations</td>
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</tbody>
</table>

**Note:**

The dependent variable is real GDP per capita growth. Variables are five-year averages during the period 1980-2014. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the results include time dummies, not reproduced for space reasons. System GMM estimator, option one-step, with all explanatory variables being treated as potentially endogenous. Time dummies are considered predetermined. Small sample correction and lag (2, 3) is applied, with xtabond2 package for Stata (Roodman, 2009a).

For the rest of the variables, as the Solow model predicts, population growth has a negative and statistically significant impact on GDP per capita growth, while the percentage of working age population with higher education has a positive and statistically significant effect. In the case of the investment rate, the estimated coefficient has a positive sign, although of smaller magnitude than the related to human capital, and it is not statistically significant. Finally, the control variables introduced, the rate of agricultural employment and the unemployment rate, have the expected negative signs, although only the first one is statistically significant. These results suggest that, *ceteris paribus*, those regions with higher

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36 They try to capture structural differences among the Spanish regions.
ratio of workers employed in the primary sector and higher unemployment rate experienced lower GDP per capita growth than the rest. So, in short, we could point out that human capital appears to be a key determinant for growth, and could be considered a factor that enables the process of catching up among Spanish regions.

We also check if the analysis of conditional convergence varies if we consider the degree of regional autonomy (column 2). For such purpose, the same estimation is implemented decomposing the initial GDP per capita into two variables. The first variable, initial GDP per capita for regions with higher degree of autonomy, is obtained by multiplying the initial level of income by a dummy variable which takes the value 1 if the region accessed autonomy using the article 151 of the CE or it is a foral region, and 0 otherwise. The second variable, GDP per capita for regions with lower degree of autonomy, is obtained by multiplying the initial GDP per capita by a dummy variable equal to 1 if the region accessed autonomy using the article 143 of the CE, and 0 otherwise. These results also confirm the existence of conditional beta convergence, with significant and similar coefficients, that last fact checked by the test of equality of coefficients. The results for the rest of the variables follow the patterns aforementioned.

5.2. Effects of the degree of regional autonomy

The estimation obtained in the first subsection constitutes our benchmark. In the present subsection we will progressively introduce what we have considered as proxy variables for the degree of regional autonomy, so we can assess the effect of the number of transferred competences on GDP per capita growth.

The results of Table 2 show a positive, though not statistically significant, relationship between the total number of competences assumed by Spanish regions and GDP per capita growth (column 1).
### Table 2. Benchmark MRW model augmented with different proxies of decentralization

<table>
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<tr>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<td><strong>Initial GDP per capita</strong></td>
<td>-2.803*</td>
<td>-2.678*</td>
<td>-2.723*</td>
<td>-2.671*</td>
<td>-2.719*</td>
<td>-2.690*</td>
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<tr>
<td></td>
<td>(1.421)</td>
<td>(1.451)</td>
<td>(1.437)</td>
<td>(1.461)</td>
<td>(1.414)</td>
<td>(1.398)</td>
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<td><strong>Population growth</strong></td>
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<td>-0.428**</td>
<td>-0.422**</td>
<td>-0.433**</td>
<td>-0.424**</td>
<td>-0.428**</td>
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<tr>
<td></td>
<td>(0.152)</td>
<td>(0.159)</td>
<td>(0.155)</td>
<td>(0.150)</td>
<td>(0.155)</td>
<td>(0.150)</td>
</tr>
<tr>
<td><strong>Investment rate</strong></td>
<td>0.049</td>
<td>0.044</td>
<td>0.047</td>
<td>0.042</td>
<td>0.039</td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.030)</td>
<td>(0.030)</td>
<td>(0.030)</td>
<td>(0.031)</td>
<td>(0.031)</td>
</tr>
<tr>
<td><strong>% Working age population with higher education</strong></td>
<td>0.063**</td>
<td>0.058*</td>
<td>0.060*</td>
<td>0.058*</td>
<td>0.059*</td>
<td>0.059*</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.030)</td>
<td>(0.029)</td>
<td>(0.029)</td>
<td>(0.029)</td>
<td>(0.029)</td>
</tr>
<tr>
<td><strong>Agricultural employment rate</strong></td>
<td>-0.068**</td>
<td>-0.067**</td>
<td>-0.067**</td>
<td>-0.066**</td>
<td>-0.065**</td>
<td>-0.065**</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.024)</td>
<td>(0.025)</td>
<td>(0.024)</td>
<td>(0.025)</td>
<td>(0.025)</td>
</tr>
<tr>
<td><strong>Unemployment rate</strong></td>
<td>-0.040</td>
<td>-0.039</td>
<td>-0.041</td>
<td>-0.039</td>
<td>-0.040</td>
<td>-0.039</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.037)</td>
<td>(0.036)</td>
<td>(0.036)</td>
<td>(0.035)</td>
<td>(0.035)</td>
</tr>
<tr>
<td><strong>Total competences</strong></td>
<td>0.038</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cumulated total competences</strong></td>
<td></td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(0.003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cumulated total competences versus regional average</strong></td>
<td></td>
<td>0.053</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(0.247)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Cumulated common competences</strong></td>
<td></td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(0.026)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Common competences Index (CC Index)</strong></td>
<td></td>
<td>0.030</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.106)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weighted cumulated common competences</strong></td>
<td></td>
<td>0.020</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.128)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Constant</strong></td>
<td>30.556**</td>
<td>29.921*</td>
<td>30.240*</td>
<td>29.900*</td>
<td>30.316*</td>
<td>30.082**</td>
</tr>
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<td>92</td>
<td>92</td>
<td>92</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td><strong>Arellano-Bond test order 1</strong></td>
<td>-2.590</td>
<td>-2.600</td>
<td>-2.590</td>
<td>-2.600</td>
<td>-2.620</td>
<td>-2.600</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.009)</td>
<td>(0.01)</td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.009)</td>
</tr>
<tr>
<td><strong>Arellano-Bond test order 2</strong></td>
<td>0.770</td>
<td>0.740</td>
<td>0.740</td>
<td>0.740</td>
<td>0.730</td>
<td>0.750</td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.457)</td>
<td>(0.462)</td>
<td>(0.457)</td>
<td>(0.464)</td>
<td>(0.455)</td>
</tr>
<tr>
<td><strong>Sargan test</strong></td>
<td>67.090</td>
<td>66.800</td>
<td>67.200</td>
<td>66.750</td>
<td>65.090</td>
<td>65.670</td>
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<tr>
<td></td>
<td>(0.806)</td>
<td>(0.813)</td>
<td>(0.804)</td>
<td>(0.814)</td>
<td>(0.81)</td>
<td>(0.839)</td>
</tr>
<tr>
<td><strong>Hansen test</strong></td>
<td>9.470</td>
<td>3.360</td>
<td>2.960</td>
<td>8.750</td>
<td>5.760</td>
<td>7.190</td>
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<td>(1.000)</td>
<td>(1.000)</td>
<td>(1.000)</td>
<td>(1.000)</td>
<td>(1.000)</td>
<td>(1.000)</td>
</tr>
</tbody>
</table>

**Note:** See note of Table 1.
When we consider either the total number of competences (column 2) or the common competences (column 4), both in cumulative terms, the coefficient is equal to zero, pointing out that neither of these variables explains GDP per capita growth.

In the case of cumulated total competences versus the regional average (column 3), a positive but not significant impact arises, which could suggest that if a region has a higher degree of autonomy than the average, it would grow at a relative higher pace than the rest.

In column 5 we introduce in the estimation the CC Index. Again, the impact would be positive, but not statistically significant. Finally, in column 6, we work with weighted cumulated common competences, obtaining the same result, a positive effect on GDP per capita growth, but not statistically significant. In these two cases, the coefficient associated to initial GDP per capita decreases, in comparison with our benchmark estimation, when the decentralization variable is taken into account, which could point out that both variables had a positive contribution to the process of catching-up among Spanish regions.

5.3. Marginal effects of explanatory variables, according to the Common Competences Index

The Spanish regions have competences on supply-side policies, such as public investment, education, entrepreneurship, or research, development and innovation. Thus, it is interesting to analyze the direct effect of these variables on GDP per capita growth, and their marginal effect, when we consider the different degree of regional autonomy, measured by the CC Index. This could shed light on the achievements of regional policy on variables of its influence.

In column 1, an interaction between the CC Index and the investment rate is introduced. In this case, the coefficients for both variables become negative, with the interaction term positive but not statistically significant. Figure 7 represents the values of the marginal effects according to the CC Index. The marginal effect of the investment rate is slightly above zero for regions with low CC Index, increasing the positive effect as the CC Index raises. It could suggest that having more competences has a positive effect on investment and its impact on growth.
<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(12)</th>
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<tbody>
<tr>
<td>Population growth</td>
<td>-0.396**</td>
<td>-0.426**</td>
<td>-0.568**</td>
<td>-0.570***</td>
<td>-0.591***</td>
<td>-0.568***</td>
<td>-0.444***</td>
<td>-0.430***</td>
<td>-0.445**</td>
<td>-0.437**</td>
<td>-0.415***</td>
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<tr>
<td>Investment rate</td>
<td>-0.040</td>
<td>0.039</td>
<td>0.040</td>
<td>0.040</td>
<td>0.039</td>
<td>0.047</td>
<td>0.039</td>
<td>0.041</td>
<td>0.045</td>
<td>0.047</td>
<td>0.040</td>
</tr>
<tr>
<td>% Working age population with higher education</td>
<td>0.072**</td>
<td>0.057</td>
<td>0.066**</td>
<td>0.074**</td>
<td>0.017</td>
<td>0.013</td>
<td>0.069**</td>
<td>0.062**</td>
<td>0.059**</td>
<td>0.060*</td>
<td>(0.029)</td>
</tr>
<tr>
<td>Agricultural employment rate</td>
<td>-0.065**</td>
<td>-0.065**</td>
<td>-0.059**</td>
<td>-0.061**</td>
<td>-0.063**</td>
<td>-0.049*</td>
<td>-0.062**</td>
<td>-0.070**</td>
<td>-0.069**</td>
<td>-0.071**</td>
<td>-0.067**</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>-0.041</td>
<td>-0.040</td>
<td>-0.032</td>
<td>-0.032</td>
<td>-0.043</td>
<td>-0.030</td>
<td>-0.047</td>
<td>-0.044</td>
<td>-0.038</td>
<td>-0.035</td>
<td>-0.042</td>
</tr>
<tr>
<td>Common competences Index (CC Index)</td>
<td>-0.574</td>
<td>0.016</td>
<td>0.001</td>
<td>-0.216</td>
<td>-0.020</td>
<td>-0.146</td>
<td>0.058</td>
<td>0.332</td>
<td>(0.420)</td>
<td>(0.262)</td>
<td>(0.101)</td>
</tr>
<tr>
<td>CC Index x Investment rate</td>
<td>0.034</td>
<td>(0.021)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC Index x % Working age population with higher education</td>
<td>0.001</td>
<td>(0.012)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Average years of schooling</td>
<td>0.126</td>
<td>0.080</td>
<td>0.023</td>
<td>(0.355)</td>
<td>(0.346)</td>
<td>(0.085)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC Index x Average years of schooling</td>
<td>0.032**</td>
<td>0.073***</td>
<td>(0.013)</td>
<td>(0.019)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New companies created (per 10,000 people)</td>
<td>0.032**</td>
<td>0.073***</td>
<td>(0.013)</td>
<td>(0.019)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC Index x New companies created</td>
<td>-0.017**</td>
<td>(0.006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>R&amp;D expenditure (% GDP)</td>
<td>0.459</td>
<td>0.058</td>
<td>0.150</td>
<td>(0.270)</td>
<td>(0.352)</td>
<td>(0.101)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CC Index x R&amp;D expenditure</td>
<td>0.022</td>
<td>0.050</td>
<td>(0.023)</td>
<td>(0.056)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal economy (% GDP)</td>
<td>-0.014</td>
<td>(0.021)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC Index x Informal economy</td>
<td>-0.014</td>
<td>(0.021)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC Index x Dummy for regions with high degree of autonomy</td>
<td>0.014</td>
<td>(0.048)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC Index x Dummy for regions with low degree of autonomy</td>
<td>-0.013</td>
<td>(0.057)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>33.875**</td>
<td>30.257**</td>
<td>21.310</td>
<td>21.980</td>
<td>35.967**</td>
<td>31.905**</td>
<td>27.280*</td>
<td>27.969*</td>
<td>30.336**</td>
<td>29.385*</td>
<td>31.213**</td>
</tr>
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<td>Number of instruments</td>
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<td>90</td>
<td>90</td>
<td>90</td>
<td>93</td>
<td>93</td>
<td>90</td>
<td>90</td>
<td>93</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>Arellano-Bond test order 2</td>
<td>0.760</td>
<td>0.750</td>
<td>0.830</td>
<td>0.810</td>
<td>0.590</td>
<td>0.780</td>
<td>-0.920</td>
<td>-0.940</td>
<td>0.730</td>
<td>0.730</td>
<td>0.730</td>
</tr>
<tr>
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<td>61.700</td>
<td>64.960</td>
<td>66.380</td>
<td>66.030</td>
<td>69.500</td>
<td>68.740</td>
<td>77.770</td>
<td>75.830</td>
<td>65.780</td>
<td>62.350</td>
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<tr>
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<td>2.810</td>
<td>5.030</td>
<td>2.240</td>
<td>4.900</td>
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<td>7.270</td>
<td>5.800</td>
<td>3.230</td>
<td>0.570</td>
<td>1.050</td>
</tr>
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</table>

Note: See note of Table 1.
Figure 7. Marginal effect of investment rate, according to CC Index

Figure 8. Marginal effect of % working age population with higher education, according to CC Index

Figure 9. Marginal effect of average years of schooling, according to CC Index

Figure 10. Marginal effect of entrepreneurship, according to CC Index

Figure 11. Marginal effect of R&D expenditure, according to CC Index

Figure 12. Marginal effect of informal economy, according to CC Index
In the case of education, we have used the percentage of working age population with higher education (column 2) and the average years of schooling (column 4). For the first one, it does not seem to have a complementarity, being the coefficient of the interaction positive but nearly zero (Figure 8). The effect does not vary considering more or less autonomy. On the other hand, when the average years of schooling are used, the interaction is positive, though not statistically significant, and the marginal effect is almost zero regardless the value of the CC Index (Figure 9). According to this, regional education policy does not seem to have a differential impact in regions with higher or lower number of competences, while human capital bears a positive impact on GDP per capita growth.

Another relevant determinant of GDP per capita is entrepreneurship, as can be seen in column 5 of Table 3. To proxy this variable, we use the entrepreneurship rate, measured as the number of new companies created (per ten thousand people). A positive and statistically significant coefficient is obtained. We then analyze if the degree of regional autonomy has any kind of interaction with the entrepreneurship rate to explain GDP per capita growth (column 6), being the coefficient of the interaction negative and statistically significant. The results show that the greater the decentralization, the marginal effect of entrepreneurship decreases, although just slightly (Figure 10). Or the other way round, when the entrepreneurship rate is high enough (around 21 new companies created per ten thousand people), the marginal effect of CC Index would be zero, and with higher values it would have a negative impact on GDP per capita growth. This could suggest that maybe an economy with a high entrepreneurship rate, would not need additional policy action to generate effects on GDP growth.

Innovation is another key variable for regional policymakers. When we introduce the R&D expenditure, as percentage of GDP, the estimated coefficient obtained is positive, as expected, although not statistically significant (column 7). A positive complementarity is also observed when we interact this variable with the CC Index (column 8). Furthermore, it appears that a higher degree of decentralization fosters the positive effect of the R&D expenditure (Figure 11).

One possible extension that can be considered, due to its relative importance in the Spanish economy, is the impact of the informal economy and its potential interaction with the level of regional autonomy. A positive relationship between the level of informal economy and GDP per capita growth is found (column 9), which can be explained for the fact that the informal economy accounts, in average, for nearly a quarter of Spanish GDP, generating
several possible connections with the rest of the economy. Nevertheless, when we consider the interaction with the CC Index, it appears to be negative, so that when the decentralization reaches its maximum level, the marginal effect of the informal economy becomes negative (Figure 12). In contrast, when the CC Index takes value 1, the marginal effect remains positive. So it seems that having more regional autonomy could discourage the informal economy, in the sense that it would not have a positive impact on GDP per capita growth.

Finally, we have decomposed the CC Index into two variables, one that contains regions with higher degree of autonomy, and the rest (columns 11 and 12). As we expected, the complementarity is positive in the case of regions which accessed sooner to a higher level of competences, while it is negative for the rest of the regions. In any case, neither of the coefficients is statistically significant.

6. Conclusions

In this work the objective has been to analyze, on the basis of a growth equation as proposed by Barro (1991), and using the Mankiw et al. (1992) model as a benchmark, the convergence and growth process followed by the Spanish CC.AA. since the beginning of the decentralization process in the early eighties of the last century. For such purpose, a dynamic panel data has been used, applying the system GMM estimator.

In the benchmark specification, which corresponds to the regression of GDP per capita growth conditioned to the initial level of GDP per capita, population growth, the non-residential investment rate as percentage of GDP, the rate of working age population with higher education, and the control variables (rate of agricultural employment and unemployment rate), a statistically significant and negative sign is obtained for the initial GDP per capita level. That would confirm the existence of a process of catching-up among Spanish regions. Population growth has the expected negative effect, as the Solow model predicts, while human capital fosters growth. In the case of the investment rate, the estimated coefficient is positive, though it is not statistically significant. Finally, both control variables present negative coefficients, which suggests that having a high proportion of employment in the primary sector and a high unemployment rate is a drag on growth. Therefore, the empirical evidence for Spanish regions confirms the expected results, and we also obtain a positive contribution of innovation and entrepreneurship, key elements for regional policymakers.
For the sake of robustness, the process of transfer of competences has been proxied by several indicators that take into account the total number of competences assumed by regional governments, or just the competences that are considered common. In particular, we have built a CC Index that ranges between 1 and 5, trying to measure the degree of autonomy of a region. In general, it seems that the capacity of a region to implement policies has a positive contribution to GDP per capita growth, although the results are not statistically significant. Further extensions of that index considering a wider definition of decentralization would need to be investigated.

In the final part of the research we have tried to shed light on the achievement of regional policy, paying attention to some variables of its influence. For such purpose, we have selected four areas: public investment, education, entrepreneurship, and research, development and innovation. We have analyzed the direct effect of these variables on GDP per capita growth, and their marginal effect, when we consider the different degree of regional autonomy, measured by the CC Index. In general, it seems that a higher number of competences involves a stronger positive effect of the indicators on GDP per capita growth, with the exception of entrepreneurship, whose positive effect would fade and even becomes neutral, but just when the CC Index takes the upper value.

Another possible extension that we have considered interesting, due to its relative importance in the Spanish economy, is the impact of the informal economy and its potential interaction with the level of regional autonomy. A positive relationship between the level of informal economy and GDP per capita growth is found. Nevertheless, when we consider the interaction with the CC Index, it appears to be negative, so that when the decentralization reaches its maximum level, the marginal effect of the informal economy becomes negative.

Finally, when we decompose the CC Index into two variables, one that contains the regions with higher degree of autonomy, and the rest, as expected, we obtain a positive complementarity in the case of the regions which accessed sooner to a higher level of competences, while it is negative for the rest. In any case, neither of the coefficients is statistically significant.

We think that our research has robustly confirmed some results known in this literature as well as shed light on some less prolific fields, as decentralization from an administrative and political point of view. Our analysis invites to deepen the investigation of these uncovered relationships between regional growth and the process of transfer of competences, using alternative data and methods, for example, introducing spatial econometrics. All of this,
with the objective of testing with high scientific rigor the hypotheses that we have in mind. The renewed and never forgotten interest in the analysis of regional growth and convergence, deserves deepening in this type of analysis, from all possible perspectives.

References


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