

Agúndez-García, Ana

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## Fiscal Revenues Decentralization And Regional Economic Growth

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## 40<sup>th</sup> CONGRESS OF THE EUROPEAN REGIONAL SCIENCE ASSOCIATION

Barcelona (Spain), 29<sup>th</sup> August – 1<sup>st</sup> September 2.000

### **“FISCAL REVENUES DECENTRALIZATION AND REGIONAL ECONOMIC GROWTH”**

**Ana AGÚNDEZ-GARCÍA**

*Associated Lecturer*- University of Extremadura (Spain) and University of York (UK)  
Facultad de Ciencias Económicas y Empresariales  
Avda. de Elvas, s/n – 06.071 BADAJOZ – Tlfo.: 924-289300 (Ext. 9150)-Fax: 924-272509  
e-mail: [aagundez@unex.es](mailto:aagundez@unex.es) or [aag101@york.ac.uk](mailto:aag101@york.ac.uk)

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#### *Abstract*

With a simple model of growth we show how a region's economic growth responds to the degree of fiscal revenues decentralization (measured as the proportion of public revenues directly collected by decentralized governments over their total revenues). In order to characterise the optimal degree of fiscal revenues decentralization that maximizes regional economic growth, the optimal shares of the different means of financing decentralized governments (central grants or regional income taxes) over total regional revenues are obtained. The paper finishes with an empirical assessment of how Spanish regions' economic growth might have been influenced by fiscal revenues decentralization over the period 1.991-1.996.

JEL: H71, H72

Keywords: Fiscal revenues decentralization, Regional income tax, Regional economic growth.

## 1. INTRODUCTION

This paper will focus on an important side of the effects of fiscal decentralization: economic growth. Literature on economic growth has broadly studied the relationship between public expenditure and the economic growth rate in a country (Arrow and Kurz (1.970), Barro (1.990), Devarajan, Swaroop and Zou (1.996), etc.). On the other hand, the literature on fiscal federalism explains how development and national economic growth is one of the positive consequences of devolution of expenditure responsibilities to decentralized governments (Oates (1.993), Bird (1.993), etc.). More concretely, some recent studies try to show theoretical and empirically how decentralization of public expenditure to lower levels of government may affect a country's economic growth (Davoodi and Zou (1.998), Zhang and Zou (1.998), and Davoodi, Xie and Zou (1.999), for instance).

While the role of subcentral public spending in improving welfare and growth has been considered, growth implications of decentralization of revenue collection has not been accurately explored. Based on the previous studies, but focusing on the other side of decentralized governments' budgets (public revenues), our work tries to show to which extent regional economic growth depends on the degree of decentralization of public revenues, that is, on the share in total regional revenues that are collected directly by the subcentral authorities.

Fiscal federalism theory suggests that decentralization of fiscal revenues enhances the efficiency in allocation of funds for provision of local public goods, and therefore, it permits to stimulate economic growth. The economic arguments that support the assumption of likely economic efficiency gains based on fiscal revenues decentralization are several:

- When the responsibility of levying public revenues is shifted towards decentralized governments, these assume the political cost of tax collection, what leads to, at least, two different effects: on the one hand, this moderates decentralized governments' wishes of increasing local public expenditure; on the other hand, it guarantees an optimal balance between decentralization of public expenditures and revenues<sup>1</sup>.
- Decentralization of public revenues minimizes the fiscal illusion of perceiving that the cost of providing public goods is lower than it really is: taxes directly collected by governments are resources much less vulnerable to the phenomenon of fiscal illusion of

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<sup>1</sup> On the contrary, should the degree of public expenditure decentralization be much higher than revenue decentralization, then decentralized governments, that would be very depending financially of the central government, may easily transfer the responsibility of possible inefficiencies in the provision of local public goods to the financing government.

low-cost provision of public goods than other sources of fundings (i.e., public debt or transfers).

- Increasing fiscal revenue decentralization, that is, reducing financial dependence of a higher level of government, enhances the perceptibility of the public sector's accounts: citizens will have better information on which are the levels of government liable in each case for provision of public goods and tax collection. This allows them to be in a better-informed position to demand for assumptions of responsibilities in public decision-taking processes, and as a result, decentralized governments will be more responsible and efficient when deciding their fiscal policies of public expenditure and fiscal revenues collection.
- Increasing financial autonomy in obtaining fiscal revenues can increase autonomy in public spending decisions: public expenditure will be better allocated to attend citizens' preferences for local public goods than if other level of government interferes in the fundings, what may impose conditions on the destiny of the funds, being these eventually allocated to less efficient in growth-enhancing public services.

All these arguments suggest that, other things being equal, a decentralized fiscal system, in which decentralized governments had more capacity to determine the amount and composition of their revenues, would lead to a higher efficiency in the use of public revenues, and, as a consequence, to a faster economic growth.

In this work we give a theoretical support for these economic intuitions. In a model with two levels of government, central and decentralized governments (or regional governments), we try to analyze the potential contribution of decentralization of public revenues (i.e. revenue directly collected on behalf of the regional government) to regional development and growth. With this aim, we describe a general analytical framework that allows us to link a measure of the degree of fiscal decentralization in the region, with the economic growth of that region.

In this paper the degree of fiscal decentralization is measured as the fraction that represent tax revenues directly collected by a regional government over this subnational government's total revenues. The higher this proportion, the higher the degree of fiscal revenues decentralization. For example, fiscal decentralization increases if regional tax revenues rises relative to the other sources of fundings, that are supposed to be transfers from the central government<sup>2</sup>.

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<sup>2</sup> The possibility of using public debt by regional governments is ruled out in the model.

Following the theoretical model, we make an empirical examination of the relationships that it describes for the Spanish economy, in order to test the significance of efficiency gains in regional economic growth from fiscal revenue decentralization over the period 1.991-1.996.

## 2. THE MODEL

In this section we describe the theoretical model that links the degree of fiscal revenue decentralization with regional economic growth. Following Devarajan, Swaroop and Zou (1.996), Davoodi and Zou (1.998) and Davoodi, Xie and Zou (1.999), the endogenous economic growth model consists of a production function of the private sector that uses as inputs *private capital* and *public spending*.

As for the public sector of the economy respects, the model assumes that there exist two levels of government with capacity to influence in the representative region *i*'s economy by their expenditure and revenues fiscal policies: a central government (with capacity to collect an income tax from the private sector of the region and to allocate grants to finance this regional government's expenditures) and a regional government (with capacity to obtain independently public revenues by taxing the residents' income, and to spend all its revenues – that, as said above, come either from central transfers or from its own tax collection-). Thus we assume that all public expenditure is carried out by the regional government, but it is actually funded by two different types of resources, central transfers or regional taxes.

The central assumption of the model is that each of these types of resources (central transfers or regional taxes) is allocated to the provision of different public goods, which are respectively used with a different degree of efficiency by the productive sector of the economy (the private sector). This difference in the destiny of each type of resources can respond to any of the arguments that we have mentioned above to justify possible efficiency gains due to fiscal revenues decentralization<sup>3</sup>.

Therefore, if the resources with which each level of government contributes to finance total regional public spending (central grants and regional taxes) are spent in a different way, and are used

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<sup>3</sup> For instance: very often central transfers to regions' budgets respond to centrally-determined policies, that ignore geographical differences; whereas collection of revenues by regional governments respond to this government's policies, aimed at the provision of public services that are sensitive to regional conditions, and are likely to be more effective in encouraging growth. Or it can also be argued that regional governments are more responsible to citizens for the taxes that they collect directly and will allocate these resources in a more efficient growth-encouraging way, etc.

with different degrees of efficiency by the productive sector, this suggests that each type of resources may be affecting differently to regional growth. Furthermore, in accordance with this argument, it is important to know how each of these types of fundings contribute to regional economic growth, and the optimal growth-maximizing share of each type of funds in total regional revenues becomes an issue. Our model gives an answer to the question of what is the optimal composition of regional public revenues between central grants and regional taxes, when maximizing economic growth is the governments' objective.

The specification of the production function that we use, that captures the assumption that the efficiency with which the productive sector of the economy uses the public spending can be different depending on whether it has been funded by resources that come from the central or regional government, is the following (constant elasticity of substitution production function):

$$(1) \quad Y_i = f(K_i, X_c, X_i) = (\alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi)^{1/\phi}$$

where  $K_i$  is the stock of private capital in region  $i$ ;  $X_c$  are the resources transferred from the central government to finance regional government  $i$ 's expenditure, and used with a certain degree of efficiency, that is represented by the parameter  $\beta$ ; and  $X_i$  are the resources directly collected and spent by the regional government, used by the productive sector with a degree of efficiency represented by  $\gamma$ .

The models mentioned above, that study how decentralization of public expenditure affects economic growth, use a consolidated budget constraint, that is, they assume that total public expenditure (central and regional) is financed with the collection of a single income tax. One of the main contributions of our work is that we introduce the basic assumption that there are two different budget constraints, one for each level of government<sup>4</sup>: it is assumed that each level of government (central or regional) finances its contribution to total regional revenues with a tax on regional income at different constant tax rates: central tax rate,  $t_c$ , and regional tax rate,  $t_i$ <sup>5</sup>.

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<sup>4</sup> In any case, unlike those models, our focus is towards the optimal share of regional public revenues to be collected by regional governments (when the objective is economic growth in a region), rather than the optimal share of public expenditure between different levels of government for maximizing national economic growth, as in Davoodi and Zou (1.998), and Davoodi, Xie and Zou (1.999).

<sup>5</sup> Under this assumption of different budget constraints for each level of government, or, in other words, decentralization of tax collection power, following the decentralization of spending power (more concretely, decentralization of the income tax), the theoretical model gets closer to describe the actual Spanish system of financing regional governments (Comunidades Autónomas). The most important reform of this system over the last years has been the partial decentralization of the personal income tax to regional governments, justified by the convenience of increasing the degree of fiscal autonomy for such subcentral governments. The resemblance of the theoretical model to the Spanish case suggests that it might be possible to use this analytical framework to evaluate to which extent the decentralization of income taxing power to regional governments might have some influence in the economic growth of Spanish regions.

The budget constraints, independent for each level of government, are the following:

$$(2) \quad X_c = \theta_i t_c Y_i$$

$$(3) \quad X_i = t_i Y_i$$

(2) is the central government's budget constraint for financing this regional government's public spending. According to it, the central government transfers to regional government  $i$  an amount  $X_c$ , that could be different (either higher or lower) to the resources that it obtains directly from taxation of private income in that region, represented by  $t_c Y_i$ . The parameter  $\theta_i$  represents the central government's policy towards the productive sector of this region (the private sector): if  $\theta_i = 1$ , the central government transfers to regional government  $i$ , an amount equal to what it collects from the residents in that region ( $X_c = t_c Y_i$ ); if  $\theta_i > 1$  ( $\theta_i < 1$ ) the central government transfers to regional government  $i$  a higher (lower) amount than what it collects in that jurisdiction. The net positive (negative) transfer to the regional government and indirectly to the productive sector is  $(\theta_i - 1) t_c Y_i$  ( $(1 - \theta_i) t_c Y_i$ ). In this model we assume that  $\theta_i$  is an exogenous parameter: for instance,  $\theta_i$  may have been chosen by the central government in a more general model that takes into account other regions' economic growth, or it can respond to the central government's policies towards this region, etc.

(3) is the budget constraint of the regional government  $i$ . It tells us that this regional government spends an amount  $X_i$  to be charged to its own resources, equal to the amount that it collects directly from its residents,  $t_i Y_i$ .  $t_i$  is the regional tax rate that this regional government can decide with total fiscal autonomy in order to attain its own economic goals.

In order to obtain the long-run economic growth rate of this economy, we start by analyzing the traditional dynamic problem that faces the representative individual in region  $i$ , who maximizes intertemporal utility, given by

$$(4) \quad U_i = \int_0^{\infty} u(c_i) e^{-\rho t} dt$$

where  $c_i$  is consumption of the only good produced in this economy and  $\rho > 0$  is the constant rate of time preference (present consumption is given higher value than future consumption in an intertemporal utility function). As it is standard in economic growth literature, it is assumed that the individual's utility function is the following:

$$(5) \quad U(c_i) = \frac{c_i^{1-\sigma} - 1}{1-\sigma}$$

where  $\sigma > 0$ , and therefore, marginal utility has constant elasticity  $-\sigma$ . The dynamic budget constraint of this individual, who faces two different income taxes (the one that he must pay to the central government –tax rate,  $t_c$ - and the one that he must pay to the regional government  $i$  –tax rate,  $t_i$ -), and who spends his after-tax income in consumption or private investment (that increases the private capital stock), is given by:

$$(6) \quad c_i + dK/dt = (1 - t_i - t_c) Y_i \quad \text{that is,}$$

$$\dot{K} = (1 - t_i - t_c)(\alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi)^{1/\phi} - c_i \quad (k_0 \text{ given})$$

The Hamiltonian of the problem is

$$(7) \quad H_i = \left[ \frac{c_i^{1-\sigma} - 1}{1-\sigma} \right] e^{-\rho t} + \lambda_i \left\{ (1 - t_i - t_c) [\alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi]^{1/\phi} - c_i \right\}$$

or equivalently, the current value Hamiltonian is

$$(8) \quad H_i(c_i(t), K_i(t), m_i(t)) = \left[ \frac{c_i^{1-\sigma} - 1}{1-\sigma} \right] + m_i \left\{ (1 - t_i - t_c) [\alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi]^{1/\phi} - c_i \right\}$$

where  $m_i = \lambda_i e^{\rho t}$ , and the necessary conditions (and also sufficient under the assumptions of concavity of the utility function and production function in their arguments) for optimal paths of consumption and investment of region  $i$ 's representative individual are:

(9):

$$H_{ic_i} = 0 \Rightarrow c_i^{-\sigma} = m_i$$

$$-H_{iK_i} + \rho m_i = \dot{m}_i \Rightarrow \dot{m}_i = \rho m_i - m_i \alpha (1 - t_i - t_c) [\alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi]^{1/\phi} K_i^{\phi-1}$$

$$H_{im_i} = \dot{K}_i \Rightarrow \dot{K}_i = (1 - t_i - t_c) [\alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi]^{1/\phi} - c_i$$

These conditions determine this representative individual's optimal responses: i.e. the consumption growth rate at each moment of time, along the optimal path, is given by  $\chi_i$



$$(10) \quad \chi_i = \frac{dc/dt}{c_i} = \frac{\dot{c}_i}{c_i} = \frac{\alpha(1-t_i-t_c)}{\sigma} \left[ \alpha K_i^\phi + \beta X_c^\phi + \gamma X_i^\phi \right]^{1-\phi} K_i^{\phi-1} - \frac{\rho}{\sigma}$$

According to this economic growth model, this economy would reach a steady state in the long-run, at which all the variables ( $c_i$ ,  $K_i$  and  $Y_i$ ) would grow according to the rate  $\chi_i$  that shows equation (10). The long-run growth rate of region i's economy can be written as

$$(11) \quad \chi_i = \frac{dY_i/dt}{Y_i} = \frac{\alpha(1-t_i-t_c)}{\sigma} \left[ \frac{\alpha Y_i^\phi}{Y_i^\phi - \beta X_{c_i}^\phi - \gamma X_i^\phi} \right]^{1-\phi} - \frac{\rho}{\sigma}$$

Thus, according to this model, this region's economic growth is a function of the tax rates that each level of government decides, that influence negatively in economic growth ( $d\chi_i/dt_i < 0$ ;  $d\chi_i/dt_c < 0$ ); of the use of each type of resources that finance regional government's revenues (central transfers or regional taxes), both of them influencing positively in economic growth ( $d\chi_i/dX_c > 0$ ;  $d\chi_i/dX_i > 0$ ); of the tax base, that is regional income, that influences negatively in growth ( $d\chi_i/dY_i < 0$ ); and of other exogenous factors ( $\alpha, \beta, \gamma, \rho, \sigma$ ).

After the definition of a few more variables, this expression will allow us to obtain a formula that links regional economic growth with the structure of regional revenues: i.e. the share in total regional revenues that is raised by the regional government, and on the other hand, the proportion of total regional revenues that are transfers from the central government.

Let  $T_i$  be the aggregate total regional revenues, that consist of central grants ( $\theta_i t_c Y_i$ ) and regional taxes ( $t_i Y_i$ ):  $T_i = (t_i + \theta_i t_c) Y_i$ ; the shares in total regional revenues that are transfers or regional taxes are respectively defined as followed:

$$(12) \quad \Psi_{c_i} = \frac{\theta_i t_c Y_i}{(t_i + \theta_i t_c) Y_i} \quad \Psi_i = \frac{t_i Y_i}{(t_i + \theta_i t_c) Y_i}$$

being  $\Psi_{c_i} + \Psi_i = 1$ . According to our definition of fiscal decentralization, the higher  $\Psi_i$  (that is, the higher the share in total regional revenues that are obtained by the regional government from direct taxation on the residents' income), the higher the degree of fiscal decentralization for this region (from the side of public revenues).

Let  $GP_i$  be the regional government  $i$ 's total expenditure, that equals total aggregate revenues, obtained either from central grants or from regional taxation ( $GP_i = X_c + X_i = T_i = (t_i + \theta_i t_c)Y_i$ ).  $gp_i = \frac{GP_i}{Y_i}$  is the ratio that measures total regional public spending over total regional income.

Using the previous definitions, the budget constraints (2) and (3) and manipulating expression (11), we obtain that the regional economic growth rate,  $\chi_i$ , can be written as:

$$(13) \quad \chi_i = \frac{\alpha(gp_i^{-1} - \Psi_i - \frac{1}{\theta_i}\Psi_{c_i})}{gp_i^{-1}} \left[ \frac{\alpha gp_i^{-\phi}}{gp_i^{-\phi} - \beta \Psi_{c_i}^{\phi} - \gamma \Psi_i^{\phi}} \right]^{\frac{1-\phi}{\phi}} - \frac{\rho}{\sigma}$$

This expression clearly shows that the structure of regional revenues (proportions of central grants and regional taxes in total regional revenues ( $\Psi_{c_i}, \Psi_i$ )), and total regional public spending over regional income ( $gp_i$ ) affect region  $i$ 's economic growth.

In order to analyze what is the optimal degree of revenues decentralization in region  $i$  (optimal  $\Psi_i$ ) -and as a counterpart, the optimal share of central grants in total regional revenues,  $\Psi_{c_i}$  -, and the optimal ratio of regional public spending on regional income (optimal  $gp_i$ ), we assume that both the regional and central government have got as main goal maximizing this region's economic growth<sup>6</sup>.

Thus, the problem of governments is choosing  $\Psi_{c_i}, \Psi_i$  and  $gp_i$ , that maximize (13) subject to the restriction  $\Psi_{c_i} + \Psi_i = 1$  (which is a problem equivalent to that of maximizing the representative individual's consumption growth, (10), subject to the independent budget constraints of both levels of government, (2) and (3)).

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<sup>6</sup> In spite of the argument that says that maximizing economic growth should not be the objective *per se* of any government, and that it would be more plausible thinking of governments that would choose the values of the relevant variables that maximize individual's utility, our focus is in solving the model that maximizes economic growth, because in practice an often-stated objective of many governments is to adopt policies that lead to a sustained increase in per capita income, and because in order to evaluate empirically the model, *per capita* income is a magnitude easier to measure than individuals' utility.

Solving the optimization problem for the Nash-equilibrium<sup>7</sup>, we obtain that the optimal distributions of fiscal resources (central grants and regional taxes) in region i's total revenues that maximize economic growth in the region are

$$(14) \quad \psi_{ci}^* = \frac{(\beta\theta_i)^{\frac{1}{1-\phi}}}{(\beta\theta_i)^{\frac{1}{1-\phi}} + (\gamma)^{\frac{1}{1-\phi}}} \quad ; \quad \psi_i^* = \frac{(\gamma)^{\frac{1}{1-\phi}}}{(\beta\theta_i)^{\frac{1}{1-\phi}} + (\gamma)^{\frac{1}{1-\phi}}}$$

That is, the optimal shares of grants and taxes in total regional revenues, depend on the parameters that represent productivity of the public expenditure financed by each type of resources ( $\beta$  y  $\gamma$ ) respectively, on the exogenous parameter that determines the amount of transfers from the central government to the regional government ( $\theta_i$ ), and on the parameter that represents the constant elasticity of substitution of the production function (or the production technology) ( $\phi$ ). If the distribution of grants and taxes on total regional revenues does not correspond to this growth-maximizing shares, reallocation of both types of resources up to that optimal proportions would increase economic growth of the region.

The reaction function that describes the optimal link between regional and central tax rates is the following:

$$(15) \quad t_i^* = \left(\frac{\beta\theta_i}{\gamma}\right)^{\frac{1}{\phi-1}} \theta_i t_c^*$$

And the regional growth-maximizing ratio of total regional public expenditure over regional income,  $gp_i^*$ , should satisfy the following relationship at the optimum:

$$(16) \quad \left((\beta\theta_i)^{\frac{1}{1-\phi}} + \gamma^{\frac{1}{1-\phi}}\right)^{1-\phi} = \frac{gp_i^{*1-\phi}}{(1-\phi) + \phi \left(\frac{\beta^{\frac{1}{1-\phi}} \theta_i^{\frac{\phi}{1-\phi}} + \gamma^{\frac{1}{1-\phi}}}{(\beta\theta_i)^{\frac{1}{1-\phi}} + \gamma^{\frac{1}{1-\phi}}}\right) gp_i^*}$$

This general results can be easily simplified for particular cases:

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<sup>7</sup> Since the objective of both levels of government is the same, i.e. maximizing this region's economic growth, the results of the Nash-equilibrium are the same as if only one of the governments, either central or regional, chose all relevant variables:  $\Psi_{ci}$ ,  $\Psi_i$ ,  $gp_i$ .

- **If  $\theta_i=1$** , that is, if central grants to regional government  $i$  are exactly the amount that is collected by central government in region  $i$ , then the optimal shares of central grants and regional taxes in region  $i$ 's total revenues that maximize regional economic growth would be:

$$(17) \quad \Psi_{ci}^* = \frac{\beta^{\frac{1}{1-\phi}}}{\beta^{\frac{1}{1-\phi}} + \gamma^{\frac{1}{1-\phi}}} \quad ; \quad \Psi_i^* = \frac{\gamma^{\frac{1}{1-\phi}}}{\beta^{\frac{1}{1-\phi}} + \gamma^{\frac{1}{1-\phi}}}$$

Since in this case public expenditure of each level of government (central government spending indirectly by subsidising the regional government with grants) coincides with the public revenues that collects each level of government in the region, this optimal distribution of total revenues between central grants and regional taxes in the region,  $\Psi_{ci}^*$ ,  $\Psi_i^*$ , corresponds exactly to the optimal growth-maximizing proportions of public spending between two levels of government that obtain Davoodi, Xie and Zou (1.999). That is to say that in case the central transfers to the regional government equal collection of central income tax in that region, *optimal decentralization of total regional revenues equals optimal decentralization of public spending*.

On the other hand, the proportion that represents public expenditure over total regional income in this case ( $\theta_i=1$ ), should satisfy at the optimum:

$$(18) \quad ((\beta\theta_i)^{\frac{1}{1-\phi}} + \gamma^{\frac{1}{1-\phi}})^{1-\phi} = \frac{gp_i^{*1-\phi}}{(1-\phi) + \phi gp_i^*}$$

That is, at the optimum,  $gp_i^*$  should satisfy the same relationship as the optimal national tax rate that Davoodi, Xie and Zou (1.999) get for their model of optimal growth-maximizing public spending decentralization.

- **If  $\phi=0$** , that is, for the case in which the production function is a Cobb-Douglas, the optimal distribution of resources, central grants or regional taxes, over the total regional revenues, that maximizes regional economic growth is:

$$(19) \quad \Psi_{ci}^* = \frac{\beta\theta_i}{\beta\theta_i + \gamma} \quad \Psi_i^* = \frac{\gamma}{\beta\theta_i + \gamma}$$

and for this particular case we can obtain the optimal tax rates that should set each level of government, that in this case only depend on the corresponding efficiency parameters, and are the following:

$$(20) \quad t_c^* = \beta \quad ; \quad t_i^* = \gamma$$

Finally, in this case, the ratio that represents total regional public expenditure over regional income should satisfy the following at the optimum:

$$(21) \quad gp_i^* = \beta\theta_i + \gamma$$

With these results we have proved that regional economic growth depends on the financial structure of the corresponding decentralized government, and that there exists an optimal composition of regional fundings that maximize regional economic growth.

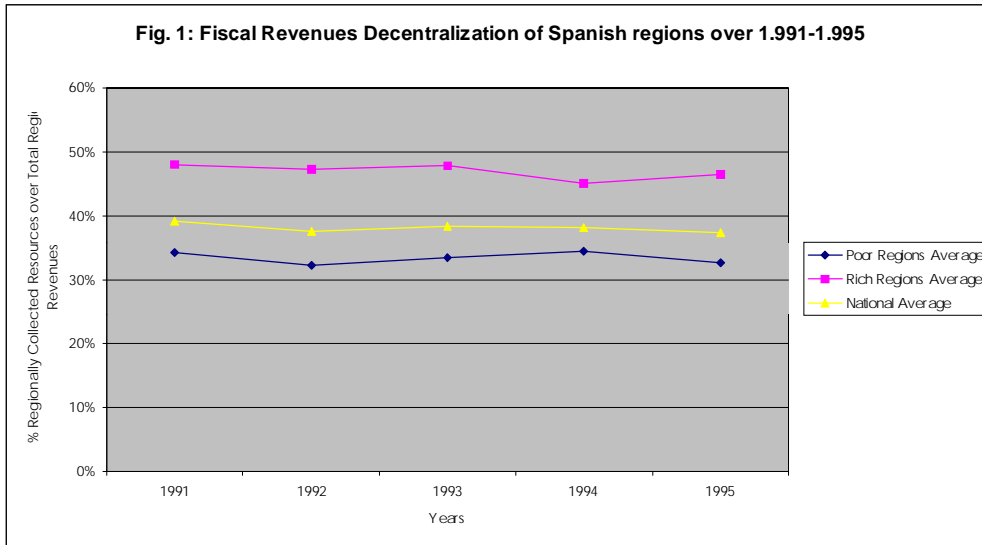
### 3. EMPIRICAL ANALYSIS

In this section we apply the theoretical model described to the Spanish economy for the period 1.991-1.996, in order to test the impact on regional growth of fiscal revenues decentralization to regional and local governments. As defined above, we measure fiscal revenues decentralization as the share of funds directly collected by decentralized governments (from the different types of taxes that they are legitimate to levy) in consolidated regional government revenues.

Figure 1 plots average shares of fiscal revenues decentralization over total regional revenues for Spain, “rich” regions and “poor” regions over the period 1.991-1.996 (the division between rich and poor regions is carried out according to the criteria of regions above and below average per capita GDP over the period 1.991-1.996)<sup>8</sup>. The degree of fiscal revenues decentralization has been pretty constant over the period for all types of grouping, being the degree of fiscal revenues decentralization clearly higher in richer regions (around 48% of their total regional revenues) than in poorer regions (around 33% of their total regional revenues), while the national average is around 39%.

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<sup>8</sup> The regions País Vasco and Navarra, that have a special system for funding their decentralized respective governments, are excluded from the sample.



In our theoretical analysis, the growth equation (13) expresses the growth rate of the economy as a function of the shares of both levels of government's contribution to total regional revenues (by central grants and regional taxes respectively) and the ratio of total regional expenditure over regional output. Our estimated equation below (22) can be thought of as a linear approximation of our nonlinear growth equation (13):

$$(22) \quad \Delta Y_{it} = a + b gp_{it} + c \Psi_{it} + d' D_i + e' N_t + f' Z_{it} + u_{it}$$

where  $i(=1, \dots, I)$  and  $t(=1, \dots, N)$  refer to region  $i$  at time  $t$ ;  $I$  denotes the number of regions (15 in Spain, or "Comunidades Autónomas", since País Vasco and Navarra are not considered in the study) and  $N$  the number of time periods (5 in our study, from 1.991 to 1.996);  $a$ ,  $b$ ,  $c$  are scalar parameters while  $d'$ ,  $e'$ ,  $f'$  are vectors.

The detailed specification of variables in Equation (22) is as follows<sup>9</sup>.  $\Delta Y_{it}$ , the dependent variable represents the growth rate of per capita output in region  $i$  at time  $t$ . It is measured as the growth rate of real per capita regional gross domestic product (GDP) at 1.992 regional prices. We use our theoretical model as a guide to measure, for our sample, the ratio of regional government expenditure on regional GDP, and the shares of participation of central and regional governments' resources in total regional revenues. Accordingly,  $gp_{it}$  is the measure of consolidated regional public expenditure on regional GDP, where total regional public expenditure has been obtained from the subcentral authorities' consolidated accounts;  $\Psi_{it}$  is the measure of revenue collection by subcentral authorities over total subcentral governments' revenues. It has been constructed using the

<sup>9</sup> All the variables have been taken from the Spanish Statistical National Institute (INE) data base and Fundación BBV (Sophinet data base).

consolidated revenues accounts of decentralized governments for our sample: the numerator of this fiscal revenues decentralization variable is the sum of revenues directly collected by decentralized authorities in each region, which may have different sources: income, property and capital taxes, public services' prices, etc. The denominator of this variable is the total revenues of decentralized governments in region  $i$  reported by the consolidated accounts. Our primary concern in this empirical analysis, is the sign and significance of the coefficient  $c$  of the **fiscal revenues decentralization** variable  $\Psi_{it}$ : out of that value we can assess to which extent there has been any influence on regional economic growth of the level of fiscal revenues decentralization of Spanish subnational authorities over the period analysed<sup>10</sup>.

$D_i$  is a vector of I-1 regional fixed-effects (i.e. region dummies)<sup>11</sup>;  $N_t$  is a vector of N-1 time fixed-effects (i.e. intercept time dummies)<sup>12</sup>. Finally, in our empirical estimation, we also include  $Z_{it}$ , a set of other variables that have been identified by growth literature as important variables that might incide in regional growth. These are: (i) initial per capita regional GDP; (ii) the growth rate of the population; (iii) real investment share of GDP;  $u_{it}$  is the disturbance term that is assumed to be serially uncorrelated to the explanatory variables.

We estimate the growth regression equation (22) using the ordinary least squares (OLS) technique. We estimate the equation using different samples that might reflect structural changes depending on the observations:

- (1) Three region groupings: the full sample (all Spanish regions), "rich" and "poor" regions sample.
- (2) With and without the set of "other variables",  $Z_{it}$ .

Our basic regression includes the first regressors in (22): a constant, percentage of regional public expenditure on regional GDP, degree of fiscal revenues decentralization, as defined, region fixed-effects and time fixed-effects. We then look at the sign and significance of the coefficient of the fiscal revenues descentralization variable as we add the "other variables" across the three region groupings. These regressions provide a rich set of sensitivity analysis regarding the possible relationship between fiscal revenues decentralization and growth for Spanish decentralized governments over the period 1.991-1.996.

The results are reported in the following Tables:

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<sup>10</sup> We should note that the proportions  $\Psi_{it}$  may be themselves a function of the regional output growth rate (i.e. specially when the income tax is the instrument used by decentralized governments to raise funds, output growth will imply tax revenues growth). We don't correct for such possible endogeneity in this study, but call attention about it as a possible improvement of this empirical study.

<sup>11</sup> In the whole national and rich regions samples, La Rioja is the region left out from the regional dummies, whereas in the poor regions sample, Murcia is the region not included.

## Dependent Variable: Real Per Capita Regional GDP Growth

| Independent Variable                    | Whole nation sample (No. of observations: 75) |                |                |                |
|---|---|----------------|----------------|----------------|
|   | (1)   | (2)            | (3)            | (4)            |
| <b>Constant</b>                         | <b>0,012</b>                                  | <b>0,372</b>   | <b>0,455</b>   | <b>0,439</b>   |
|   | (1,74)  | (39,09)        | (49,5)         | (34,57)        |
| <b>Public expenditure/GDP rate</b>      | <b>0,729</b>                                  | <b>0,497</b>   | <b>0,47</b>    | <b>0,465</b>   |
|   | (20,24)                                       | (14,43)        | (14,18)        | (13,96)        |
| <b>Fiscal revenues decentralization</b> | <b>-0,124</b>                                 | <b>-0,096</b>  | <b>-0,093</b>  | <b>-0,086</b>  |
|   | (-9,65)                                       | (-7,85)        | (-7,86)        | (-7,28)        |
| <b>Dummy for Andalucía</b>              | <b>-0,09</b>                                  | <b>-0,182</b>  | <b>-0,216</b>  | <b>-0,214</b>  |
|   | (-16,88)                                      | (-35,81)       | (-44,16)       | (-43,62)       |
| <b>Dummy for Aragón</b>                 | <b>-0,003</b>                                 | <b>0,004</b>   | <b>0,007</b>   | <b>0,006</b>   |
|   | (-0,57)                                       | (0,81)         | (1,45)         | (1,30)         |
| <b>Dummy for Asturias</b>               | <b>-0,002</b>                                 | <b>-0,069</b>  | <b>-0,082</b>  | <b>-0,082</b>  |
|   | (-0,32)                                       | (-13,56)       | (-16,85)       | (-16,65)       |
| <b>Dummy for Baleares</b>               | <b>0,021</b>                                  | <b>0,068</b>   | <b>0,064</b>   | <b>0,065</b>   |
|   | (3,89)  | (13,45)        | (13,08)        | (13,21)        |
| <b>Dummy for Canarias</b>               | <b>-0,071</b>                                 | <b>-0,112</b>  | <b>-0,142</b>  | <b>-0,139</b>  |
|   | (-13,36)                                      | (-22,11)       | (-29,05)       | (-28,38)       |
| <b>Dummy for Cantabria</b>              | <b>0,013</b>                                  | <b>-0,036</b>  | <b>-0,046</b>  | <b>-0,047</b>  |
|   | (2,47)  | (-7,08)        | (-9,40)        | (-9,59)        |
| <b>Dummy for Castilla-León</b>          | <b>-0,013</b>                                 | <b>-0,068</b>  | <b>-0,077</b>  | <b>-0,078</b>  |
|   | (-2,36)                                       | (-13,41)       | (-15,78)       | (-15,88)       |
| <b>Dummy for Castilla-La Mancha</b>     | <b>-0,04</b>                                  | <b>-0,116</b>  | <b>-0,142</b>  | <b>-0,145</b>  |
|   | (-7,5)  | (-22,91)       | (-29,14)       | (-29,44)       |
| <b>Dummy for Cataluña</b>               | <b>-0,023</b>                                 | <b>0,023</b>   | <b>0,033</b>   | <b>0,033</b>   |
|   | (-4,38)                                       | (4,53)         | (6,69)         | (6,81)         |
| <b>Dummy for Com. Valenciana</b>        | <b>-0,038</b>                                 | <b>-0,068</b>  | <b>-0,085</b>  | <b>-0,085</b>  |
|   | (-7,19)                                       | (-13,42)       | (-17,41)       | (-17,33)       |
| <b>Dummy for Extremadura</b>            | <b>-0,069</b>                                 | <b>-0,183</b>  | <b>-0,213</b>  | <b>-0,214</b>  |
|   | (-13,07)                                      | (-36,04)       | (-43,54)       | (-43,55)       |
| <b>Dummy for Galicia</b>                | <b>-0,084</b>                                 | <b>-0,165</b>  | <b>-0,187</b>  | <b>-0,186</b>  |
|   | (-15,81)                                      | (-32,47)       | (-38,23)       | (-37,87)       |
| <b>Dummy for Madrid</b>                 | <b>0,023</b>                                  | <b>0,057</b>   | <b>0,063</b>   | <b>0,065</b>   |
|   | (4,4)   | (11,26)        | (12,90)        | (13,26)        |
| <b>Dummy for Murcia</b>                 | <b>-0,006</b>                                 | <b>-0,075</b>  | <b>-0,102</b>  | <b>-0,103</b>  |
|   | (-1,06)                                       | (-14,81)       | (-20,98)       | (-20,86)       |
| <b>Dummy for 1992</b>                   | <b>0,007</b>                                  | <b>0,001</b>   | <b>-0,0001</b> | <b>0,0001</b>  |
|   | (2,19)  | (0,40)         | (-0,04)        | (0,13)         |
| <b>Dummy for 1993</b>                   | <b>-0,011</b>                                 | <b>-0,016</b>  | <b>-0,018</b>  | <b>-0,018</b>  |
|   | (-3,21)                                       | (-5,19)        | (-5,99)        | (-5,72)        |
| <b>Dummy for 1994</b>                   | <b>-0,043</b>                                 | <b>-0,04</b>   | <b>-0,039</b>  | <b>-0,04</b>   |
|   | (-13,04)                                      | (-12,6)        | (-12,92)       | (-13,04)       |
| <b>Dummy for 1995</b>                   | <b>0,0001</b>                                 | <b>-0,001</b>  | <b>-0,007</b>  | <b>-0,008</b>  |
|   | (0,02)  | (-0,21)        | (-2,18)        | (-2,60)        |
| <b>Initial per capita GDP</b>           |   | <b>-0,0001</b> | <b>-0,0001</b> | <b>-0,0001</b> |
|   |   | (-44,93)       | (-57,69)       | (-57,26)       |
| <b>Population growth</b>                |   |                | <b>1,024</b>   | <b>0,914</b>   |
|   |   |                | (6,23)         | (5,53)         |
| <b>Real Investment share of GDP</b>     |   |                |                | <b>0,067</b>   |
|   |   |                |                | (1,61)         |
| Adjusted-R squared                      | <b>0,461</b>                                  | <b>0,502</b>   | <b>0,535</b>   | <b>0,529</b>   |
| Degrees of freedom                      | 54  | 53             | 52             | 51             |
| F value                                 | 9,52  | 10,223         | 10,792         | 10,216         |

<sup>12</sup> The year 1.996 is the one not included in the regressions.



| Independent Variable             | Rich regions sample (No. of observations: 25) |                           |                          |                            |
|----------------------------------|---|---------------------------|--------------------------|----------------------------|
|                                  | (1)   | (2)                       | (3)                      | (4)                        |
| Constant                         | <b>0,01</b><br>(0,53)                         | <b>-0,201</b><br>(-5,09)  | <b>-0,047</b><br>(-1,23) | <b>0,083</b><br>(2,009)    |
| Public expenditure/GDP rate      | <b>1,026</b><br>(10,04)                       | <b>1,107</b><br>(10,74)   | <b>1,043</b><br>(10,39)  | <b>1,13</b><br>(11,38)     |
| Fiscal revenues decentralization | <b>-0,172</b><br>(-5,18)                      | <b>-0,231</b><br>(-6,89)  | <b>-0,244</b><br>(-7,5)  | <b>-0,235</b><br>(-7,30)   |
| Dummy for Aragón                 | <b>-0,006</b><br>(-1,23)                      | <b>-0,011</b><br>(-2,19)  | <b>-0,007</b><br>(-1,45) | <b>-0,003</b><br>(-0,58)   |
| Dummy for Baleares               | <b>0,029</b><br>(6,08)                        | <b>0,002</b><br>(0,47)    | <b>0,009</b><br>(1,93)   | <b>0,011</b><br>(2,47)     |
| Dummy for Cataluña               | <b>-0,037</b><br>(-7,65)                      | <b>-0,066</b><br>(-13,67) | <b>-0,05</b><br>(-10,58) | <b>-0,044</b><br>(-9,55)   |
| Dummy for Madrid                 | <b>0,028</b><br>(5,93)                        | <b>0,006</b><br>(1,28)    | <b>0,018</b><br>(3,84)   | <b>0,02</b><br>(4,23)      |
| Dummy for 1992                   | <b>0,012</b><br>(2,52)                        | <b>0,018</b><br>(3,69)    | <b>0,015</b><br>(3,13)   | <b>0,01</b><br>(2,04)      |
| Dummy for 1993                   | <b>0,0001</b><br>(0,04)                       | <b>0,009</b><br>(1,76)    | <b>0,003</b><br>(0,66)   | <b>-0,006</b><br>(-1,19)   |
| Dummy for 1994                   | <b>-0,045</b><br>(-9,51)                      | <b>-0,045</b><br>(-9,42)  | <b>-0,045</b><br>(-9,60) | <b>-0,044</b><br>(-9,49)   |
| Dummy for 1995                   | <b>-0,001</b><br>(-0,14)                      | <b>0,003</b><br>(0,57)    | <b>-0,003</b><br>(-0,65) | <b>-0,004</b><br>(-0,96)   |
| Initial per capita GDP           |   | <b>0,0001</b><br>(7,14)   | <b>0,0001</b><br>(2,86)  | <b>-0,0001</b><br>(-0,112) |
| Population growth                |   |                           | <b>0,971</b><br>(3,73)   | <b>1,655</b><br>(6,435)    |
| Real Investment share of GDP     |   |                           |                          | <b>-0,235</b><br>(-2,81)   |
| Adjusted-R squared               | <b>0,631</b>                                  | <b>0,623</b>              | <b>0,64</b>              | <b>0,646</b>               |
| Degrees of freedom               | 14  | 13                        | 12                       | 11                         |
| F value                          | 10,862  | 9,769                     | 9,592                    | 9,138                      |

| Independent Variable             | Poor regions sample (No. of observations: 50) |                           |                           |                           |
|----------------------------------|---|---------------------------|---------------------------|---------------------------|
|                                  | (1)   | (2)                       | (3)                       | (4)                       |
| Constant                         | <b>-0,012</b><br>(-1,323)                     | <b>0,373</b><br>(21,75)   | <b>0,415</b><br>(24,54)   | <b>0,356</b><br>(17,15)   |
| Public expenditure/GDP rate      | <b>0,714</b><br>(15,89)                       | <b>0,375</b><br>(8,89)    | <b>0,364</b><br>(8,76)    | <b>0,38</b><br>(9,29)     |
| Fiscal revenues decentralization | <b>-0,076</b><br>(-4,162)                     | <b>-0,059</b><br>(-3,45)  | <b>-0,047</b><br>(-2,76)  | <b>-0,028</b><br>(-1,70)  |
| Dummy for Andalucía              | <b>-0,074</b><br>(-13,07)                     | <b>-0,103</b><br>(-19,49) | <b>-0,108</b><br>(-20,70) | <b>-0,104</b><br>(-20,32) |
| Dummy for Asturias               | <b>0,005</b><br>(0,889)                       | <b>0,008</b><br>(1,48)    | <b>0,019</b><br>(3,68)    | <b>0,022</b><br>(4,22)    |
| Dummy for Canarias               | <b>-0,064</b><br>(-11,28)                     | <b>-0,023</b><br>(-4,38)  | <b>-0,026</b><br>(-5,02)  | <b>-0,023</b><br>(-4,44)  |
| Dummy for Cantabria              | <b>0,018</b><br>(3,14)                        | <b>0,044</b><br>(8,37)    | <b>0,058</b><br>(11,18)   | <b>0,055</b><br>(10,77)   |
| Dummy for Castilla-León          | <b>-0,002</b><br>(-0,32)                      | <b>0,015</b><br>(2,86)    | <b>0,031</b><br>(5,90)    | <b>0,029</b><br>(5,58)    |
| Dummy for Castilla-La Mancha     | <b>-0,028</b><br>(-4,91)                      | <b>-0,038</b><br>(-7,17)  | <b>-0,036</b><br>(-6,93)  | <b>-0,042</b><br>(-8,24)  |
| Dummy for Com. Valenciana        | <b>-0,029</b><br>(-5,15)                      | <b>0,023</b><br>(4,25)    | <b>0,031</b><br>(6,0)     | <b>0,029</b><br>(5,64)    |
| Dummy for Extremadura            | <b>-0,053</b><br>(-9,38)                      | <b>-0,112</b><br>(-21,08) | <b>-0,113</b><br>(-21,58) | <b>-0,115</b><br>(-22,31) |
| Dummy for Galicia                | <b>-0,066</b><br>(-11,62)                     | <b>-0,082</b><br>(-15,39) | <b>-0,076</b><br>(-14,56) | <b>-0,074</b><br>(-14,41) |

|                                     |                           |                            |                            |                            |
|-------------------------------------|---------------------------|----------------------------|----------------------------|----------------------------|
| <b>Dummy for 1992</b>               | <b>0,003</b><br>(0,59)    | <b>-0,004</b><br>(-0,92)   | <b>-0,005</b><br>(-1,24)   | <b>-0,003</b><br>(-0,85)   |
| <b>Dummy for 1993</b>               | <b>-0,017</b><br>(-4,03)  | <b>-0,021</b><br>(-5,22)   | <b>-0,022</b><br>(-5,50)   | <b>-0,02</b><br>(-5,24)    |
| <b>Dummy for 1994</b>               | <b>-0,043</b><br>(-10,24) | <b>-0,038</b><br>(-9,5)    | <b>-0,037</b><br>(-9,48)   | <b>-0,039</b><br>(-10,1)   |
| <b>Dummy for 1995</b>               | <b>-0,001</b><br>(-0,22)  | <b>-0,0001</b><br>(-0,07)  | <b>-0,005</b><br>(-1,32)   | <b>-0,01</b><br>(-2,67)    |
| <b>Initial per capita GDP</b>       |                           | <b>-0,0001</b><br>(-23,71) | <b>-0,0001</b><br>(-27,75) | <b>-0,0001</b><br>(-27,36) |
| <b>Population growth</b>            |                           |                            | <b>0,829</b><br>(3,97)     | <b>0,597</b><br>(2,9)      |
| <b>Real Investment share of GDP</b> |                           |                            |                            | <b>0,188</b><br>(3,37)     |
| Adjusted-R squared                  | <b>0,408</b>              | <b>0,468</b>               | <b>0,482</b>               | <b>0,493</b>               |
| Degrees of freedom                  | 34                        | 33                         | 32                         | 31                         |
| F value                             | 7,47                      | 8,31                       | 8,20                       | 8,08                       |

Note: t-statistics in parentheses.

These tables show that there is a negative relationship between our definition of fiscal revenue decentralization and economic growth for all the samples: for the total national, for rich and poor regions, and with and without the set of additional variables. It suggests that higher fiscal revenues decentralization may be associated with lower economic growth. In addition, the t-statistics for the estimates are all highly significant in a two-tail test, at a 90% significance level, being more significant for the “rich regions” grouping than for the “poor regions”. On the basis of our theoretical growth-maximizing model it is expected that a negative and significant coefficient on the share of regionally collected revenues in total regional revenues indicates that this level of revenues decentralization is relatively too large. Therefore, the results of our estimations show that further decentralization in regional revenues than that existing in the period 1.991-1.996 may be harmful for growth.

Nevertheless, this result has to be taken very cautiously, since the point estimate of fiscal revenue decentralization presents a low value in all samples: though significant and negative, it is not of an important absolute value for determining growth, as can be seen in the tables. For example, a 1 percentage point increase in fiscal revenue decentralization is associated with a reduction in the growth rate of between 0,086-0,124 percentage points for the national sample. The negative effect of further revenues decentralization is higher in rich regions (where the effect of 1% increase in fiscal revenues decentralization leads to 0,172-0,244 reduction in their growth rate) than in poor regions (where the effect of 1% increase in fiscal decentralization leads to 0,028-0,076 reduction in their growth rate). As a benchmark comparison to see the limited effects of fiscal revenues decentralization on growth, consider another growth-reducing policy case: an equivalent reduction in the total subcentral authorities’ public expenditure-regional GDP ratio of 1% points will lead to larger reduction in growth rate (0,729 and 1,13 percentage points in the total national and rich regions samples, respectively).

To sum up, regression results in these tables show that over the period 1.991-1.996 there was (i) a negative relationship between fiscal revenues decentralization and growth in all Spanish regions –suggesting that further revenue decentralization might be a disadvantage for economic growth- , and (ii) the negative relationship is in all cases very limited in absolute and relative values –suggesting that efficiency consequences in growth from fiscal decentralization are only marginal.

For the “other variables”, the tables show that the estimated coefficients are not always consistent with general theoretical and empirical studies on economic growth:

- (i) Lower growth is associated with higher per capita income (rich regions grow slower than poor regions, other things being equal, a result broadly accepted in convergence studies): the associated coefficient is negative, and highly significant.
- (ii) Population growth is also a significant variable in explaining economic growth and in all cases with a positive sign (a result contradictory with other empirical studies).
- (iii) Growth is higher in rich regions with lower investment rate over GDP and in poor regions with higher investment rate, being positive the coefficient for the total national.

The explanatory power of the regressions is relatively high (adjusted  $R^2$  between 0,40 and 0,64) and the critical F values would lead us to accept the general fixed-effect model of the explanatory variables on growth. The Reset test has also been carried out with a results for acceptance of the specification of the model.

#### 4. CONCLUSIONS

This paper develops a convenient framework to study new areas of regional finance: the effects on regional long-run equilibrium growth rates of different instruments for financing decentralized governments. The theoretical model shows that central grants and regional taxes can be integrated in a model that links economic growth with fiscal variables that represent the degree of fiscal revenues decentralization in regional budgets. Using this model, several expressions are derived that allow us to characterize which should be the optimal growth-maximizing shares of each level of government’s contribution to total regional revenues. The optimal shares depend crucially on the productivity with which each type of funding is used by the productive sector, along with the amount of central transfers to the regional government ( $\theta_i$ ). This parameter has been considered exogenous in this paper, but as a possible extension it can be thought to consider a broader model in which the central government decides endogenously the optimal  $\theta_i$ ’s for all regions, as part of a national growth-maximizing policy. The paper finishes with a detailed empirical examination of the

relationship between fiscal revenues decentralization and regions' economic growth for the Spanish case. With the empirical study we have been successful to substantiate the argument of potential contribution of fiscal revenues decentralization to economic growth, given the significance of this variable as an explanatory variable for economic growth. We have found a slightly negative association between output growth and revenues decentralization in our study, that suggest that further decentralization of revenues to subnational authorities would not be growth-enhancing.

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