FISCAL POLICY AND GROWTH REVISITED: THE CASE OF THE SPANISH REGIONS*

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ABSTRACT

In this paper we present an assessment of the effects of fiscal policy on economic growth, focusing on the role of public expenditure. Starting from a theoretical model where only those public expenditure items strictly presumed to influence the production process (i. e., public capital and transfers) are incorporated into the production function, we provide an empirical application for the case of the Spanish regions during the period 1967-1991. The results confirm the positive effect of public investment on growth, together with a positive effect of transfers but only for poorer regions.

Key words: Economic growth, public investment, public transfers, regions.

JEL Classification: E62, O23, O40.

1. INTRODUCTION

Last years have witnessed a renewed interest on economic growth. The emergence of endogenous growth models has led to a surge of both theoretical and empirical research (mainly through cross-country regressions) aimed to discuss a broad range of issues related to the growth experience of countries, such as the convergence of income levels along time, or the influence of many different factors presumably influencing growth. Among them, the role of public policies, and in particular fiscal policy, has attracted the role of a number of studies analysing the subject from different perspectives. This literature has been recently surveyed, among others, in Slemrod (1995), Agell, Lindh and Ohlsson (1997), and Tanzi and Zee (1997).

In general, the conclusions of this literature are rather inconclusive on the influence of fiscal policy on growth, which might be related to the fact that different fiscal policy instruments could lead to opposite effects on growth: on the one hand, a greater involvement of the public sector in the economy would tend to promote growth (directly through the aggregate production function, and indirectly through its effects on private sector productivity); but, on the other hand, higher taxes and regulation would affect growth negatively. This, in turn, would point to the relevance of the composition of the public budget, rather than its size (Tanzi and Zee, 1997).

Among empirical studies, the standard result is that of Barro (1991), who finds a negative and significant effect of the level of public consumption as a percentage of GDP (which would proxy government size), on the growth rate of a cross section of countries. This is justified on the grounds that a greater government intervention would distort the incentives systems, so that a higher government size would be associated with a lower productivity, and hence a lower growth. However, this effect did not appear robust to changes in the conditioning variables in the influential study of Levine and Renelt (1992). In addition, and more importantly, it does not seem too appropriate using government consumption as a proxy of the whole public expenditure, since there should be other components of it that are more directly linked to growth.

In particular, from Aschauer's (1989) influential contribution, the role of public investment has been stressed as a crucial factor leading to higher private capital productivity. Also, the effects of public transfers on the incentives to accumulation and growth have been also emphasized, since they would allow to reinforce property rights (on raising the opportunity cost of criminal activities), as well as retiring from the labour force those people with a lower level of human capital (Sala-i-Martin, 1996a,1997). Finally, a recent line of research stresses the unfavourable effects of a greater inequality in income distribution on growth rates, since it would lead to a higher demand of redistributive policies, which in turn would reduce the incentives towards accumulation and growth [see, among others, Alesina and Rodrik (1994) or Persson and Tabellini (1994)].

The difficulty of properly testing the complex links between fiscal policy (and, in general, any other policy measures) and growth by means of cross-country regressions is even more evident if one considers the high correlations found in practice among regressors, and between them and the initial level of income. Take, for instance, the detailed empirical study of Easterly and Rebelo (1993). They collect a broad data set for a number of countries and years, but their main findings are just that the share of public investment in transport and communication is robustly correlated with growth, and that the effects of taxation are difficult to isolate empirically, due to multicollinearity problems.

Our aim in this paper will be to provide a new assessment of the effects of fiscal policy on economic growth, focusing on the role of public expenditure. Since most of the empirical literature on fiscal policy and growth is not based on an explicit theoretical framework, only adding a proxy of the size of the public sector to an otherwise *ad hoc* equation of convergence, we will first develop in Section 2 a theoretical model where only those public expenditure items strictly presumed to influence the production process (i. e., public capital and transfers) will be incorporated into the production function. By taking an approximation around the steady state, the model will lead to a growth equation in terms of the shares of private factors and public expenditure instruments.

Next, we will offer an empirical application of the model in Section 3, for the case of the Spanish regions during the period 1967-1991. Notice that, unlike most of the studies available on the empirics of growth (which make use of wide data sets including both industrial and developing countries), and as far as we know, the regional dimension has not been hardly investigated, especially regarding the role of fiscal policy. On the other hand, the Spanish economy can provide an interesting case of study, since it has experienced a sustained period of growth in the last forty years, which has been accompanied by a strong process of structural change. So, the growing role of the public sector coupled with the establishment of new regional governments after the restoration of democracy, as well as the increasing GDP shares of both personal transfers (in the context of the building of a modern Welfare State) and public investment, are all of them elements that can justify the interest of the Spanish case for the objectives of this paper.

Finally, the main conclusions are presented in Section 4.

2. A MODEL OF FISCAL POLICY AND GROWTH

The model presented in this section is a particular case of Bajo-Rubio (2000), where the pioneering theoretical results of Barro (1990) are generalized to the case in which returns to scale to private factors are not constant. The model is an augmented version of the standard Solow growth model, including government expenditure variables. To this end, the production function is extended to incorporate, together with private inputs, those public inputs strictly presumed to influence the level of output. One is a reproducible factor, entering directly into the production function: public physical capital. The other is assumed to influence indirectly, via externalities, the incentives to accumulation and growth; following Cashin (1995), this input will be called transfer payments. The inclusion of transfers may be justified since they would allow to reinforce property rights (on raising the opportunity cost of criminal activities), as well as retiring from the labour force those people with a lower level of human capital (Sala-i-Martin, 1996a,1997).

Hence, we postulate a production function such as:

$$Y = K^{\alpha} H^{\beta} (AL)^{1-\alpha-\beta} \left(\frac{KG}{K}\right)^{\gamma} \left(\frac{TR}{K}\right)^{\theta} \tag{1}$$

where Y denotes output; K, H, and L are the private inputs: physical capital, human capital, and labour, respectively; A is a labour-augmenting factor; and KG and TR are the government-provided inputs: public physical capital and transfer payments, respectively.

Notice that our formulation allows for congestion of the public services, so that they would be rival but non excludable goods: every producer benefits from the provision of public inputs but, for a given level of the latter, the quantity available to each producer declines as other producers raise their levels of private inputs (Barro and Sala-i-Martin, 1992). In the production function above, it is assumed that $\alpha > \gamma + \theta$, where $\gamma > 0$, and, according to Sala-i-Martin (1996a,1997), $\theta > 0$; otherwise (e.g., if higher transfer payments would discourage growth incentives), the value of the externality would be negative so that $\theta < 0$.

Writing, as usual, the production function in *per capita* terms we have:

$$y = A\bar{k}^{\alpha}\bar{h}^{\beta} \left(\frac{KG}{K}\right)^{\gamma} \left(\frac{TR}{K}\right)^{\theta} \tag{2}$$

where small letters denote per capita variables, and small letters with a bar indicate per capita variables in efficiency units (i. e., for any variable $X : x = X/L, \bar{x} = X/AL$). Notice that the *per capita* production function (2) exhibits decreasing returns to scale in both private capital and all private inputs, for a given state of congestion in the use of public capital and transfers; being ambiguous the degree of returns to scale when all factors (i.e., $\bar{k}, \bar{h}, KG/K$, and TR/K) are taken together.

Next, we turn to the accumulation equations. We assume that private reproducible factors, i. e., physical and human capital, are accumulated according to the following equations:

$$\dot{K} = s_K Y - \delta K \tag{3}$$

$$\dot{H} = s_H Y - \delta H \tag{4}$$

where s_K and s_H are the output shares of gross investment on private physical and human capital, respectively; δ is the depreciation rate (assumed to be the same for both types of capital); and a dot over a variable denotes its time derivative. In a similar way, public capital would accumulate according to:

$$\dot{KG} = s_{KG} Y - \delta KG \tag{5}$$

where s_{KG} is the output share of gross public investment, and the depreciation rate is again assumed to be the same than for private inputs.

From here, the rates of change in the stocks of the three reproducible factors, in efficiency terms, would be given by:

$$g_{\bar{k}} = \frac{\dot{K}}{K} - g_A - n \tag{6}$$

$$g_{\bar{h}} = \frac{\dot{H}}{H} - g_A - n \tag{7}$$

$$g_{\overline{kg}} = \frac{\dot{KG}}{KG} - g_A - n \tag{8}$$

where g_x denotes the rate of growth of variable X, and n is the rate of population growth (i. e., $n = g_L$); in particular, g_A is the rate of technical progress. By equalizing (6), (7), and (8) to zero, we can find the steady-state values of $\bar{k}$, $\bar{h}$, and $\overline{kg}$; and, assuming further that:

$$\overline{tr}^* = \frac{s_{TR} y^*}{A} \tag{9}$$

where s_{TR} is the output share of transfers, and asterisks denote steady-state values, we can obtain the (log of the) steady-state *per capita* output by replacing these values in equation (2):

$$\begin{aligned} \log y^* = {} & \log A_0 + g_A t - \frac{(\alpha+\beta-\theta)}{1-\alpha-\beta}\log(\delta + g_A + n) + \frac{(\alpha-\gamma-\theta)}{1-\alpha-\beta}\log s_K + \\ & + \frac{\beta}{1-\alpha-\beta}\log s_H + \frac{\gamma}{1-\alpha-\beta}\log s_{KG} + \frac{\theta}{1-\alpha-\beta}\log s_{TR} \end{aligned} \tag{10}$$

where A_0 is the initial value of the technological parameter *A*, i. e., $A_t = A_0 e^{g_A t}$, with t denoting time.

To derive a growth equation, and following Mankiw, Romer and Weil (1992), we make an approximation around the steady state, so that, in efficiency terms, we can write:

$$\frac{d \log \bar{y}}{dt} = -\lambda\left(\log \bar{y} - \log \bar{y}^*\right) + \theta(g_{TR} - g_A - n)t \tag{11}$$

where

$$\lambda = (1-\alpha-\beta+\theta)(\delta+g_A+n)$$

is the speed of convergence.

Solving the differential equation given by (11) we have:

$$\log \bar{y}_t = e^{-\lambda t} \log \bar{y}_0 + (1- e^{-\lambda t}) \log \bar{y}^* + \theta\,(g_{TR} - g_A - n)\, t \qquad (12)$$

or, in *per capita* terms and rearranging:

$$(\log y_t - \log y_0) = e^{-\lambda t} g_A t + (1-e^{-\lambda t})(\log y^* - \log y_0) + \theta(g_{TR} - g_A - n)t \qquad (13)$$

where y_0 is the initial *per capita* output. Replacing in (13) the determinants of the steady state given by equation (10), dividing by t, and rearranging, we obtain the final expression for the rate of growth of *per capita* output:

$$\begin{aligned} g_y = (1-\theta)g_A + \frac{(1-e^{-\lambda t})}{t}\{\log A_0 - \frac{\alpha+\beta-\theta}{1-\alpha-\beta}\log(\delta+g_A+n) + \\ + \frac{\alpha-\gamma-\theta}{1-\alpha-\beta}\log s_K + \frac{\beta}{1-\alpha-\beta}\log s_H + \frac{\gamma}{1-\alpha-\beta}\log s_{KG} + \\ + \frac{\theta}{1-\alpha-\beta}\log s_{TR} - \log y_0\} + \theta(g_{TR} - n) \end{aligned} \qquad (14)$$

where

$$g_y = \frac{(\log y_t - \log y_0)}{t}$$

denotes the average rate of growth of *per capita* GDP between 0 and t.

3. AN EMPIRICAL APPLICATION TO THE SPANISH REGIONS, 1967-1991

In this section we will present an empirical application of the model developed in Section 2, using data for the Spanish regions along the period 1967-1991. Our main data source will be that elaborated by the Banco de Bilbao, later Banco Bilbao-Vizcaya (BBV, various years), which provides estimations of the Gross Domestic Product (GDP) at factor cost, as well as of other variables, for the Spanish provinces starting at the year 1955. The data have been aggregated from provinces to the 17 regions ("comunidades autónomas") established after the approval of the current Constitution in 1978, and the subsequent new territorial organization of the Spanish State.

The BBV series, however, are valued at current prices, which has obliged to most of the researchers to employ Spanish overall price indices in order to obtain series in real terms. We have been able to avoid this problem thanks to the series recently elaborated by Doménech, Escribá and Murgui (1999), who use the (national) deflators for the four main sectors (agriculture, industry, construction, and services) to provide a version of the GDP series elaborated by BBV in real terms, by taking account of the different sectoral composition of the economic activity in the various regions.

On the other hand, the data on physical capital investment (both private and public) have been taken from Mas, Pérez and Uriel (1995), while those on human capital and population come from Mas, Pérez, Uriel and Serrano (1995); finally, the data on transfers are from the BBV series. Notice that, despite the GDP figures are available from 1955 on, the data on physical and human capital start at 1964, and the data on transfers at 1967, so we have been obliged to begin our sample period at this year. The exact definition of the data can be found in the Appendix.

Looking at the available evidence on the relationship between fiscal policy and growth for the Spanish case, the favourable effect of the public capital stock on the productivity of private capital has been documented, both with aggregate data (e.g., Bajo-Rubio and Sosvilla-Rivero, 1993), and with regional data (e.g., Mas, Maudos, Pérez and Uriel, 1996).

Regarding the evidence specifically addressed to the study of growth, Raymond (1992) found a negative effect of a greater public consumption (as a percentage of GDP) on the growth of the Spanish economy during the period 1971-91. The same result was obtained for public consumption in Bajo-Rubio and Sosvilla-Rivero (1998) for the period 1964-93, but a positive effect on growth was found for both public investment and transfer payments (the three variables as a percentage of GDP). However, the last two papers used aggregate data for the whole Spanish economy, not considering regional issues.

Finally, a recent paper by Gorostiaga (1999) takes a related approach to that followed here, analyzing the influence of public and human capital on growth, for the case of the Spanish regions during the period 1969-1991; unlike this paper, the role of public transfers was not considered. In the empirical results, she found no significant effect of public investment on the growth of the Spanish regions. On the contrary, human capital showed a significant influence, but the estimated coefficient had a negative sign.

In Table 1 we provide some econometric estimates of equation (14), which has been re-specified as follows:

$$\begin{aligned} g_y = (1-\theta)g_A + \frac{\left(1-e^{-\lambda t}\right)}{t}\{\log A_0 &+ \frac{\alpha-\gamma-\theta}{1-\alpha-\beta}[\log s_K - \log(\delta+g_A+n)] + \\ &+ \frac{\beta}{1-\alpha-\beta}[\log s_H - \log(\delta+g_A+n)] + \\ &+ \frac{\gamma}{1-\alpha-\beta}[\log s_{KG} - \log(\delta+g_A+n)] + \\ &+ \frac{\theta}{1-\alpha-\beta}\log s_{TR} - \log y_0\} + \theta(g_{TR}-n) \end{aligned} \qquad (14')$$

Because some of our explanatory variables could be endogenous, we have estimated the above equation using the Generalized Method of Moments, which might be thought as a generalization of the Instrumental Variables estimator. This method derives linear transformations of the original disturbances and instruments that are orthogonal, using these orthogonality conditions to estimate the parameters optimally; useful summaries can be found in Pagan and Wickens (1989) or Greene (2000). Individual effects for each region, which would proxy the initial level of technology A_0 as well as any other factor leading to differences in the steady states of the regions, have been included (Islam, 1995). In addition, the whole period of analysis has been divided into five-year spans in order to avoid the effect of cyclical fluctuations.

Table 1

ECONOMIC GROWTH IN THE SPANISH REGIONS, 1967-1991

(Dependent variable: g_y)

	(1)	**(2)**	**(3)**	**(4)**
$\log y_0$	-5.6647 (-7.5805)	-5.5459 (-6.2131)	-6.0581 (-5.3223)	-5.9720 (-4.9244)
$\log s_K - \log(\delta + g_A + n)$	1.6140 (1.7014)	1.6979 (1.7207)	1.9294 (1.8379)	2.0150 (1.8123)
$\log s_{KG} - \log(\delta + g_A + n)$	2.0161 (4.1422)	2.0183 (4.1618)	1.9855 (4.1614)	1.9774 (4.1411)
$\log s_H - \log(\delta + g_A + n)$	—	0.3407 (0.3634)	—	0.3027 (0.3178)
$\log s_{TR}$	—	—	0.5205 (0.6988)	0.5360 (0.7090)
$(g_{TR}\text{-}n)$	—	—	0.0108 (0.5273)	0.0970 (0.4712)
Implied λ (%)	6.6601	6.3752	7.2167	7.0935
R^2	0.6307	0.6312	0.6343	0.6347

Note: t-statistics in parentheses.

As can be seen in Table 1, we obtain the expected signs for all the variables included in the regression. First, the initial level of *per capita* GDP would affect with a negative and significant coefficient (which would indicate the presence of "conditional β-convergence" in the sense of Sala-i-Martin (1996b)). The shares of private and public physical capital investment in GDP would affect positively to *per capita* GDP growth, although private investment would be significant only between 6 and 9 per cent levels of significance. However, when the rest of variables are introduced, we do not find any significant effect from either human capital, or the share of transfers in GDP and the rate of growth of *per capita* transfers. The positive effect found for the role of public investment would confirm, at the regional level, the previous result of Bajo-Rubio and Sosvilla-Rivero (1998), unlike Gorostiaga (1999) where this effect was not significant. Regarding human capital, our result would be in line with the rather non clear-cut conclusions obtained for this variable in growth regressions; for example, in Gorostiaga (1999) the coefficient on human capital was significant, but with a negative sign.

Finally, we also show in the table the implied speeds of convergence computed from the coefficient on the initial level of *per capita* GDP, which are between 6 and 7 per cent. These values are higher than the 2 per cent reported in the classical literature on convergence (Sala-i-Martin, 1996b), but in the line of those found when fixed effects are added to the regression [see, e. g., Islam (1995) or de la Fuente (1996)]. Comparing the four different specifications appearing in the table, we can observe that the speed of convergence would fall when human capital is included, and increase when transfers are added.

Next, in order to analyze whether regional disparities could potentially affect the results, we have divided the whole set of regions in two groups, i. e., those with a *per capita* GDP above and below the Spanish average in 1967. The results from estimating equation (14') for both groups of regions (defined in the Appendix) appear in Table 2.

Table 2

ECONOMIC GROWTH IN THE SPANISH REGIONS, 1967-1991

(Dependent variable: g_y)

2A. Regions with *per capita* GDP above Spanish average in 1967

	(1)	(2)	(3)	(4)
$\log y_0$	-7.2921 (-3.6589)	-7.3078 (-3.6788)	-6.6149 (-1.9674)	-6.5578 (-1.9347)
$\log s_K - \log(\delta + g_A + n)$	0.7520 (0.5672)	0.8606 (0.6070)	0.2263 (0.1371)	0.3467 (0.1937)
$\log s_{KG} - \log(\delta + g_A + n)$	1.6205 (2.4869)	1.6454 (2.5827)	1.7654 (2.2072)	1.7920 (2.3292)
$\log s_H - \log(\delta + g_A + n)$	—	0.6402 (0.3468)	—	1.1140 (0.5488)
$\log s_{TR}$	—	—	-0.6774 (-0.3697)	-0.7705 (-0.4142)
$(g_{TR}\text{-}n)$	—	—	-0.0651 (-0.2295)	-0.0128 (-0.3693)
Implied λ (%)	9.0702	9.0949	8.0318	7.9467
R^2	0.4896	0.4080	0.4926	0.4958

2B. Regions with *per capita* GDP below Spanish average in 1967

	(1)	(2)	(3)	(4)
log y_0	-5.2350 (-7.4743)	-4.9389 (-5.6646)	-7.2428 (-5.7656)	-6.9857 (-5.5060)
$\log s_K - \log(\delta + g_A + n)$	2.5069 (1.9919)	2.6680 (2.1688)	2.7467 (2.5043)	3.1333 (2.8800)
$\log s_{KG} - \log(\delta + g_A + n)$	2.7665 (3.5719)	2.7569 (3.6674)	2.8853 (4.6112)	2.8481 (4.4857)
$\log s_H - \log(\delta + g_A + n)$	—	0.6952 (0.6568)	—	1.4048 (1.3402)
log s_{TR}	—	—	1.9802 (2.3346)	2.2878 (2.5538)
$(g_{TR}$-n)	—	—	0.0373 (1.4702)	0.0370 (1.5365)
Implied λ (%)	6.0695	5.6723	8.9927	8.5937
R^2	0.7140	0.7166	0.7565	0.7662

Note: t-statistics in parentheses.

Beginning with the case of “rich” regions, shown in Table 2A, the results worsen as compared to those in Table 1. Together with the initial level of *per capita* GDP, the only significant effect is that of public capital. In particular, and somewhat surprisingly, private capital, although with a positive coefficient, is no longer significant at the conventional levels. Human capital again appears with a positive sign, but the sign of transfers (both as a GDP share and in growth terms) is now negative; in any case, their coefficients are not significant. Notice also that the implied speeds of convergence, which are between 8 and 9 per cent, decline when transfers are included.

All this would imply that transfer payments would have no favourable effects on growth and convergence for “rich” regions, unlike the case of “poor” regions, where the speed of convergence increases when transfers are included (see below). This might raise doubts on the role played by transfers, since it would not be very clear if the speed of convergence decreases because transfers discourage growth or because “rich” regions are closer to their steady state than “poor” regions.

The unclear results obtained for “rich” regions might be related to the heterogeneity of the set of regions classified as “rich” in 1967. This includes, for instance, declining regions in the Cantabric coast with a strong presence of traditional industries (such as coal and steel) that now would be even classified as “poor” regions; or a region like the Balearic Islands, which has experienced a spectacular growth based on services activities (mainly tourism), becoming in recent years the richest Spanish region. On the other hand, regarding private capital, some authors have questioned the role of capital accumulation in economic growth, arguing that it would not be a fundamental cause of growth, but rather an important feature of that process [see King and Levine (1994)].

Finally, the overall results for "poor" regions, shown in Table 2B, are considerably better than those for the "rich" regions. Notice that "poor" regions in 1967 conform in principle a more homogenous set of regions than "rich" regions in that year. Now the role of private capital is clearly significant, but not in the case of human capital, despite the expected (positive) sign of its coefficient. Regarding fiscal policy variables, both public capital and the share of transfers in GDP show a positive and significant effect on growth; in turn, the rate of growth of *per capita* transfers also appears with a positive sign and its coefficient is close to significance.

The implied speed of convergence for this set of regions would be between 5 and 9 per cent. As in Table 1, the speed of convergence increases when transfers are included in the regression, but now the effect is quantitatively stronger.

To conclude, our results would suggest that public expenditure might play an important role on regional growth and convergence. In particular, according to the results of this paper, public investment would have favourably influenced the growth of the Spanish regions between 1967 and 1991. In addition, personal transfers would have provided an additional contribution in the case of the poorest regions, supporting their growth process and helping to increase the speed of convergence for this set of regions.

4. CONCLUSIONS

We have presented in this paper an evaluation of the effects of fiscal policy on economic growth, focusing on the role of public expenditure, for the case of the Spanish regions during the period 1967-1991. In particular, we have analyzed the role of public capital and personal transfers, assumed to be those expenditure items strictly influencing the production process (as an additional production factor and as an externality, respectively), through the production function in a specifically designed theoretical model of growth. This would be in contrast with most of the empirical literature on fiscal policy and growth, which simply adds a proxy of the size of the public sector to an otherwise *ad hoc* equation of convergence.

The theoretical model was applied to the case of the Spanish regions during the period 1967-1991. The model was first estimated for all regions and dividing the whole period into five-year spans, obtaining favourable results regarding the effect of public capital on growth, but not for the case of transfers (both as a share of GDP and in growth terms). However, when the regions where divided in two groups according to their initial *per capita* GDP, a positive association with growth was found, as well as for public capital, for the share of transfers in GDP in the case of the poorest regions.

The results of this paper would tend to confirm the important role played by an adequate public capital provision in order to promote economic growth. Also, our evidence would not support the hypothesis that raising personal transfers, in the context of an expansion of the Welfare State, would have an unfavourable effect on growth, and even the opposed effect was obtained in the case of the initially poorer regions. Needless to say, this would not imply expecting a permanent growth in those regions, together with a reduction in relative inequalities, following exclusively from increasing transfers, since the substantial growth experienced by such regions has been compatible with a stagnation in the convergence process (Cuadrado-Roura, 1998).

In any case, the results of this paper should be taken with the additional amount of caution due to any empirical study on growth. In fact, the difficulty of obtaining clear-cut results for different policy variables is surely due to the high correlation found in practice among them (Sala-i-Martin, 1994), so that cross-country regressions might be useful if their results are “viewed as suggestive empirical regularities, not as behavioral relationships on which to measure responses to policy changes” (Levine and Zervos, 1993, p. 427). Therefore, we prefer to take the positive association found between some fiscal policy instruments and growth not as much as literally supporting a causal relationship from these fiscal policy instruments to the growth of the Spanish regions during the period 1967-1991, but rather as an indication of a stylized fact characterizing the growth process of the Spanish regions along the above mentioned period.

APPENDIX: DEFINITIONS AND DATA SOURCES

We have used annual data for the period 1967-1991. The variables included in the tables are defined as follows:

g_y: rate of growth of per working-age person GDP at factor cost, at 1980 prices, for each subperiod. Source: Doménech, Escribá and Murgui (1999).

y_0: initial value of the per working-age person GDP at factor cost, at 1980 prices, for the first year of every time span (1967, 1972, 1977, 1982, 1987). Source: Doménech, Escribá and Murgui (1999).

δ: rate of depreciation, equal to 8.28 per cent, the average of those used in Mas, Pérez and Uriel (1995).

n: annual average of the rate of growth of working-age population for each subperiod. Source: Mas, Pérez, Uriel and Serrano (1995).

g_A: rate of technical progress, equal to 2 per cent as in Mankiw, Romer and Weil (1992).

s_K: annual average of the share of private physical capital investment in total GDP for each subperiod. Source: Mas, Pérez and Uriel (1995).

s_{KG}: annual average of the share of public physical capital investment in total GDP for each subperiod. Source: Mas, Pérez and Uriel (1995).

s_H: initial value of the share of working-age population with university studies, for the first year of every time span (1967, 1972, 1977, 1982, 1987). Source: Mas, Pérez, Uriel and Serrano (1995).

s_{TR}: annual average of the share of personal transfers in total GDP for each subperiod. Source: BBV (various years).

g_{TR}: rate of growth of personal transfers, at 1980 prices, for each subperiod. Source: BBV (various years) and Doménech, Escribá and Murgui (1999).

The regions appearing in Table 2A are: Madrid, País Vasco, Cataluña, Baleares, Cantabria, Navarra, and Asturias; and in Table 2B: La Rioja, Comunidad Valenciana, Aragón, Castilla-León, Canarias, Murcia, Andalucía, Galicia, Castilla-La Mancha, and Extremadura.

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