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

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Abstract

This paper presents an assessment of the effects of fiscal policy on economic growth. Starting from a theoretical model in which only those fiscal policy instruments presumed to strictly 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: Growth, fiscal policy, regions

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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 its 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 Barro’s (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 very clear using government consumption as a proxy of the whole public expenditure, since there would be other components more directly linked to growth.

In particular, from Aschauer’s (1989) influential contribution, the role of public investment has been stressed as a factor leading to a 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 its 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, their main findings being 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. 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 in which only those fiscal policy instruments presumed to strictly 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 fiscal policy 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, which make use of wide data sets including both industrial and developing countries, the regional dimension has not been so extensively investigated, and even more particularly when analyzing the role of fiscal policy.

Finally, the main conclusions are presented in Section 4.

2. A model of fiscal policy and growth

The model developed in this section is ultimately related to Barro's (1990) pioneering contribution, which includes public services as a productive input. Unlike Barro, and following Cashin (1995), our model will include into the production function, together with private inputs (labour, physical capital, and human capital), those fiscal policy instruments which could be thought *a priori* as strictly influencing the level of output, both directly (public physical capital) and indirectly, via externalities (transfer payments). 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, accumulate 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 now 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 equating (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):

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

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:

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

where

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

is the speed of convergence.

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

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

or, in *per capita* terms and rearranging:

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

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:

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

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 during the period 1967-1991. Our main data source will be that elaborated by the Banco de Bilbao, now 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 (1998), 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 the 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. Similarly, most of the data are available until just 1991, so this will be our ending 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) finds 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 is also obtained in Bajo-Rubio and Sosvilla-Rivero (1998) for the period 1964-93, although a positive effect on growth is also found for public investment and transfer payments (the three variables as a percentage of GDP). However, both papers use aggregate data for the whole Spanish economy, not considering regional issues.

Some econometric estimates of equation (14) are provided in Table 1, where the whole period of analysis has been divided into five-year spans in order to avoid the effect of cyclical fluctuations. The method of estimation is ordinary least squares including 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 (Islam, 1995).

As can be seen in column (1) of Table 1, we obtain the expected signs, together with significant coefficients, for the initial level of *per capita* GDP (which would indicate the presence of "conditional β-convergence" in the sense of Sala-i-Martin (1996b)), the rate of growth of population (augmented with the rates of depreciation and technical progress), and the shares of private and public physical capital investment in GDP; in particular, both private and public investment in physical capital would affect positively to *per capita* GDP growth. However, when the rest of variables are introduced in columns (2) to (4), we do not find any significant effect from human capital, and from both the share of transfers in GDP and the rate of growth of *per capita* transfers; actually, the result for human capital would be in line with the rather non clear-cut conclusions obtained for this variable in growth regressions. 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.

Next, we have divided regions into two groups, i. e., those with a *per capita* GDP above and below the Spanish average in 1967, and the results from estimating equation (14) for both groups of regions (defined in the Appendix) appear in Table 2. Regarding "rich" regions, the only significant coefficients are those on the initial *per capita* GDP and public investment; in particular, private investment does not appear to be significant. Somewhat better results are obtained for "poor" regions, where, in addition to the significant variables in Table 1, the share of transfers in GDP shows a positive association with growth. Also, the speed of convergence seems to be higher for “rich” than for “poor” regions.

Finally, in Table 3 we present the results from estimating equation (14) for three groups of regions (defined again in the Appendix): the four with a higher income, the six intermediate-income, and the seven with a lower income, in 1967. Our conclusions are not modified regarding poorer regions as compared to Table 2B, showing again a positive effect from the share of transfers in GDP. For richer regions the results are even worse as compared to Table 2A, since the only significant variable is the initial *per capita* GDP. Lastly, the results for the intermediate-income regions are mixed, since now the coefficient on human capital turns to be positive and significant, and the introduction of transfers (which are never significant) means the lack of significance of both the initial level of *per capita* GDP and the rate of growth of population. The implied speed of convergence is again higher for richer regions, being the lowest values those found for the intermediate-income regions.

4. Conclusions

We have presented in this paper an evaluation of the effects of fiscal policy on economic growth, for the case of the Spanish regions during the period 1967-1991. Among fiscal policy instruments, we have focused on public expenditure and, in particular, on the role of public investment 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 theoretical model of growth).

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 investment on growth, but not for the case of transfers (both as a share of GDP and as in growth terms). However, when we separated regions in groups according to their initial *per capita* GDP, a positive association for the share of transfers in GDP with growth was also found in the case of poorer regions.

The results of this paper would tend to confirm the important role played by an adequate public capital provision for 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 an stylized fact characterizing the growth process of the Spanish regions over 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 (1998).

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 (1998).

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 (1998).

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.

The regions appearing in Table 3A are: Madrid, País Vasco, Cataluña, and Baleares; in

Table 3B: Cantabria, Navarra, Asturias, La Rioja, Comunidad Valenciana, and Aragón; and in Table 3C: Castilla-León, Canarias, Murcia, Andalucía, Galicia, Castilla-La Mancha, and Extremadura.

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TABLE 1. Economic growth in the Spanish regions, 1967-1991

(Dependent variable: g_y)

	(1)	(2)	(3)	(4)
log y_0	-5.4857	-5.6781	-5.8859	-6.0210
log $(\delta+g_A+n)$	-7.5313	-7.6790	-7.7121	-7.9712
log s_K	1.9202	1.8306	2.1990	2.0925
log s_{KG}	2.2314	2.2824	2.1168	2.1712
log s_H	-	-0.6842	-	-0.6452
log s_{TR}	-	-	0.4307	0.3724
$(g_{TR}-n)$	-	-	-0.0053	-0.0074
Implied λ (%)	6.4119	6.6788	6.9711	7.1635
R^2	0.6401	0.6415	0.6415	0.6427

Note: *t*-statistics in parentheses

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	-8.1784	-8.6558	-8.1918	-8.8980
log $(\delta+g_A+n)$	-7.6762	-8.5331	-12.6104	-14.2749
log s_K	1.0036	0.8327	0.5131	0.3638
log s_{KG}	1.9113	2.0098	2.1380	2.2360
log s_H	-	-1.8850	-	-2.5074
log s_{TR}	-	-	-1.0261	-0.9646
$(g_{TR}-n)$	-	-	-0.0560	-0.0627
Implied λ (%)	10.5161	11.3405	10.5388	11.9368
R^2	0.5048	0.5101	0.5314	0.5406

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

	(1)	(2)	(3)	(4)
log y_0	-4.7024	-4.8697	-7.4742	-7.4324
log $(\delta+g_A+n)$	-13.7252	-13.7736	-15.8427	-15.7998
log s_K	2.8721	2.7868	3.4528	3.4864
log s_{KG}	3.4061	3.4614	3.4072	3.3876
log s_H	-	-0.4878	-	0.1932
log s_{TR}	-	-	2.6121	2.6369
$(g_{TR}$-$n)$	-	-	0.0012	0.0022
Implied λ (%)	5.3607	5.5806	9.3588	9.2922
R^2	0.7514	0.7525	0.7993	0.7995

Note: *t*-statistics in parentheses

TABLE 3. Economic growth in the Spanish regions, 1967-1991

(Dependent variable: g_y)

3A. The four richest regions in 1967

	(1)	(2)	(3)	(4)
log y_0	-8.3057	-8.5458	-10.8344	-11.0768
log $(\delta+g_A+n)$	-5.2495	-6.2773	-16.3818	-16.6230
log s_K	0.3632	0.2950	0.8376	1.0120
log s_{KG}	1.7731	1.8279	1.4838	1.3809
log s_H	-	-1.5943	-	-0.9309
log s_{TR}	-	-	-0.4425	-0.1294
$(g_{TR}$-$n)$	-	-	-0.1414	-0.1406
Implied λ (%)	10.7326	11.1475	15.6055	16.1416
R^2	0.3977	0.4018	0.4742	0.4754

3B. The six intermediate-income regions in 1967

	(1)	(2)	(3)	(4)
log y_0	-3.0696	-2.1079	-1.1304	0.6472
log $(\delta+g_A+n)$	-10.7621	-10.9362	-8.8208	-4.1908
log s_K	3.9294	4.3749	2.6700	3.2014
log s_{KG}	2.0569	1.8330	2.2763	1.9905
log s_H	-	2.8750	-	3.7108
log s_{TR}	-	-	-1.4826	-1.4915
$(g_{TR}-n)$	-	-	0.0110	0.0489
Implied λ (%)	3.3324	2.2274	1.1636	-
R^2	0.7537	0.7930	0.7723	0.8224

3C. The seven poorest regions in 1967

	(1)	(2)	(3)	(4)
log y_0	-5.7137	-6.3986	-8.6188	-8.6262
log $(\delta+g_A+n)$	-11.2518	-11.6140	-15.7881	-15.4771
log s_K	2.7055	2.3269	3.2757	3.1645
log s_{KG}	3.5706	3.7092	3.7584	3.7837
log s_H	-	-1.9320	-	-0.4069
log s_{TR}	-	-	3.5769	3.4119
$(g_{TR}-n)$	-	-	0.0248	0.0250
Implied λ (%)	6.7286	7.7111	11.2754	11.2884
R^2	0.7663	0.7785	0.8196	0.8200

Note: *t*-statistics in parentheses