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FISCAL POLICY AND ECONOMIC GROWTH:
THE CASE OF THE ITALIAN REGIONS

MONICA AUTERI – MAURO COSTANTINI

Dipartimento di Teoria Economica e Metodi Quantitativi
Università degli Studi di Roma" La Sapienza"
Facoltà di Scienze Politiche

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Abstract: A relevant question dominates discussions of recent economic policy: assuming that economic growth is desirable for its own sake, what can be done to increase the average rate of economic growth? The aim of this paper is to asses the relationship between government spending, and economic growth. Though an endogenous growth model the influence of public investment and public transfers on the rate of economic growth is tested for the case of the Italian regions.

The theoretical implications of the model are tested with data from the 20 Italian regions between 1970 and 1995, and panel data results support the proposed influence of the public finance variables on economic growth. However we found that, specifically in the case of Italy, public transfer payments do not always enter as productive inputs in private production functions. Transfers are unproductive in that they do not raise the marginal product of private capital, especially when the analysis is restricted to the central southern Italian regions, where we believe, government transfers are used as redistributive devices.

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1 [•] Corresponding author: Monica Auteri mauteri@tiscali.it. Università di Roma "La Sapienza" Facoltà di Scienze Politiche. Dipartimento di Teoria Economica e Metodi Quantitativi per le Scelte Politiche. Piazzale Aldo Moro 5 - 00185Roma. While this paper is the result of a team production, in the light of their respective background, Monica Auteri is responsible for par 1 to 4. Mauro Costantini is responsible for the econometric analysis in 5. Both authors are equally responsible for the economic interpretation of the empirical findings in par 5 and 6.

1 Introduction.

In recent years Italian policymakers have enhanced their credibility by becoming a member of the EU. A strong commitment that confirms Italy's determination to 'catch-up' and converge towards the model of the more advanced economies of Europe.

Borrowing from some work on the effect of fiscal structure on national economic growth we aim to examine the determinants of economic growth starting from a theoretical model in which only those fiscal policy instruments such as public capital and transfers, are presumed to strictly influence the production process. We first present a critical review of both theoretical and empirical literature on this subject. We discuss then in a systematic way the existing literature on the impact of different instruments of fiscal policy. Next, we introduce the Bajo et al. [1999] growth model, which is the framework for the empirical analysis in this article.

Nothing the lack of robust results in the empirical literature on the growth effect of fiscal variables, this paper aims to add empirical evidence providing an investigation among Italian regions during the period 1975-1995. Panel data analysis is used in a attempt to accommodate structural differences between regions and across time. We offer a comparative analysis between the so called "two Italy", the north and the center-south, to investigate the economic situation of the poor part of the country in a economic growth environment, in attempt to add the literature with a regional dimension that has not been so extensively investigated. The empirical findings may help to derive advices for changes in the instruments of public finance in order to enhance growth.

2. Growth theories: a literature survey

Economic growth was a central interest of Adam Smith and many of the classical economists of the nineteenth century. However, during the first half of the twentieth century, the topic fell out of vogue, as microeconomic analysis increasingly came under the sway of partial and general equilibrium theory. With the Great Depression, macroeconomic analysis became obsessed with unemployment. After World War II, a number of economists again became interested in economic growth and as a result in the last half century there have been three waves of interest in growth theory. The first was stimulated by the work of Harrod [1939, 1948] and Domar [1946; 1947]. The second wave began in the mid-1950s with the development

by Solow [1956] and Swan [1956] of a neo-classical model of economic growth. The third wave was initiated in the mid-1980s by Romer [1986] and Lucas [1988].

The question posed by Harrod and Domar, using somewhat different terminology, was under what circumstances, is an economy capable of achieving steady state growth? In the Harrod-Domar view the long-run sustainable rate of growth is determined by the rate of growth of the labour force and the rate of growth of output per worker. This central proposition arises from the assumption that investment is both capacity creating and income generating. The Harrod-Domar model confirming that the transition from slow to rapid growth required a sustained rise in the rate of savings and investment[2], provided the conceptual foundation for the view that achieving sustained growth would be more difficult for capitalist economies than for economies where the central planning apparatus would have more direct access to the instruments needed to force a rise in the saving rate and to allocate investment to its most productive uses.

The second wave in the development of modern growth theory began with the model introduced by Robert M. Solow [1956] and Trevor W. Swan [1956]. The original neo-classical growth models focused on the translation of saving into physical capital formation. In his 1956 paper, Solow pointed out that his long run growth model "accepts all the Harrod-Domar assumptions except that of fixed proportions" [Solow, 1956: 66]. In fact in order to offer a more realistic representation of technology he substituted the fixed coefficient capital-output ratio of the Harrod-Domar model with a variable capital-output ratio [Solow, 1988]. The initial version of the Solow neo-classical model has been summarized by Prescott as follows: "the model has a constant returns to scale aggregate production function with substitution between two inputs, capital and labour. The model is completed by assuming that a constant fraction of output is invested" [Prescott, 1988: 7][3]. The Solow's empirical findings triggered a whirlwind of theoretical and empirical research that lasted well into the 1970s.

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[2] "it should be noticed that the value of warranted rate of growth […] is determined by certain fundamental conditions , namely the propensity to save and the state of technology, etc." Harrod, R.F., 1939, 'An Essay in Dynamic Theory', Economic Journal, Vol.49, March, p.17

[3] The model was employed in a 1957 paper in which an aggregate two factors production function was used in accounting for growth in the US economy. To Solow's surprise, and to the surprise of the profession generally, four-fifths of the growth in US output per worker over the 1909-49 period was accounted for by changes in the technology coefficient.

In the initial Solow-Swan neo-classical model, steady state growth can hardly be avoided. A country that succeeds in permanently increasing its savings (investment) rate will, after growing faster for a while, have a higher level of output than if it had not done so. But it will not achieve a permanently higher rate of growth of output [Solow, 1988]. The initial results of the Solow neoclassical growth theory seemed to completely reverse the earlier Harrod-Domar implications. Technological change replaced growth of capital equipment as the primary source of growth and it continued to outweigh growth of physical capital stock.

The third wave in the development of modem growth theory centred on *endogenous growth theories.* Growth theorists of the mid-1980s stressed the apparent inconsistency between the implications of the neoclassical theory and (a) lack of evidence of convergence toward steady state growth even among presently developed economies [Romer, 1994] and (b) by the inability to successfully account for differences in income growth rates or income levels across countries [Romer, 1994]. A basic limitation of the neoclassical growth model is due to the assumption of diminishing returns to capital in the production function that lead the model to predicts that per capita output growth declines in the long run.

In response to this shortcoming, exogenous technological progress is added to the model, so that long-term growth also becomes exogenous, determined by technological factors autonomous to the model. However "by assigning so great a role to 'technology' as a source of growth, the theory is obliged to assign correspondingly minor roles to everything else, and so has very little ability to account for the wide diversity in growth rates that we observe" [Lucas, 1988: 15]. The assumption that the marginal productivity is constant, rather than diminishing, is a key departure from the Solow growth model. Endogenous growth theorists provide a number of reasons to explain why, for the economy as a whole, the marginal productivity of capital may not be diminishing. As will see, rationalizations of a constant marginal productivity emphasize the role of human capital, or are based on the observation that undertaking R&D activities firms generate an increase in know-how, and the resulting productivity gains offset any tendency for the marginal productivity to capital to decline.

A primary goal of the new growth economics is then to build endogenous models where long run growth rate of income is determined by government policies such as fiscal policies, foreign trade policies, and population policies in addition to other

variables [Srinivasan, 1995]. The effect was to challenge the neoclassical assumption that policy can affect the level of economic activity but not the rate of economic growth.

Subsequent contributions pointed out that progress generated by the new ideas was the only way to avoid diminishing returns. Romer [1986] argues that investment in capital stock generates "learning by doing" [see Arrow 1962] and "spillovers" of knowledge and that, through these externalities, technology becomes a "public good." In this way, technological progress is made endogenous to the growth process. One implication of this approach is that investment in physical capital equipment is strongly correlated with, and causally related to growth [DeLong and Summers 1991]. Along this line of thought Romer argued that what is needed is "an equilibrium model of endogenous technical change in which long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit maximizing agents" [Romer, 1986:1003][4]. The production of new knowledge exhibits diminishing returns at the firm level. However, the creation of new knowledge by one firm is assumed to generate positive-external effects on the production technology of other firms. Furthermore, the production of consumption goods, which is a function of both the stock of knowledge and other inputs, exhibits increasing returns. The three elements, decreasing returns in the production of new knowledge, externalities associated with new knowledge, and increasing returns in the production of output insure that a competitive equilibrium with externalities will exist.[5]

The Romer model discards the neo-classical assumption of perfect competition and require either constant or increasing returns to capital. Only monopoly profits can provide individual incentive to carry out costly research. An important implication of the model is that the market equilibrium is suboptimal since the firm in making production decisions does not consider the external effects of the accumulation of

4 Romer and Lucas were not the firsts to attempt to endogenise the process of technical change. Kaldor [1957] advanced a Keynesian model with an endogenous 'technical progress function' [Palley,1996]. The early Romer [1986; 1990] and Lucas [1988; 1993] both acknowledge inspiration from Arrow [1962] and Uzawa [1965]. But neither Romer or Lucas refer to the Kaldor article. In the 1960s several attempts were made to rescue neoclassical growth economics from the limitations of exogenous technical change under the rubric of induced technical changes [Fellner, 1961; Kennedy, 1964; Ahmad: 1966]. For reviews see Nordhaus [1973].

5 The initial Romer model, and other closely related models, are frequently referred to as closed economy AK models after the assumed production function (Y = AK). In expanded versions of the model K can be thought of as a proxy for a composite of capital goods that includes physical and human components [Barno and Sali-i-Martin, 1995: 146]. Amable and Solow have pointed out that this initial Romer model has not been able to avoid the razor-edge balance of the older Harrod-Domar model. If the elasticity of production coefficients of the accumulated factors are greater than one the growth is explosive [Amable, 1994: 30; Solow, 1995, 1997].

knowledge. Another implication is that factor shares, typically employed as the elasticity coefficients in the neo-classical production function, can no longer be used to measure the contribution of capital and labour[6].

Lucas [1988], drawing on Uzawa [1965], proposed a second alternative to the neoclassical model. This so called *schooling model,* portrays technological progress as the result of research and education (R&E) and introduces human capital into the production function. Investment in human capital generates spillover effects which increase the productivity of both physical capital and the wider labor force [Lucas 1988]. It is assumed that human capital is acquired intentionally by individuals because it leads to higher real wages and that each generation of workers assimilates ideas passed on by the preceding generation so that there are no diminishing returns. The model thus explains income differentials between countries with national differences in investment in R&E [see Stokey 1991; Lucas 1993]. In short, the growth of human capital depends on how a worker allocates his or her time between current production and human capital accumulation.

The *learning-by-doing* is a variant to the *schooling model.* It that asserts that external increasing returns from human capital arise from on-the-job training or "learning by doing" in employment [Lucas 1988]. In this model, the growth of human capital is a positive function of the effort devoted to the production of new goods.

In both Lucas models there are, as in Romer, in addition to the "internal effects" on the workers own productivity, "external effects" that are the source of scale economies and that enhance the productivity of other factors of production.[7] In both cases the accumulation of human capital involves a sacrifice of current utility. In the first model this sacrifice takes the form of a decrease in current consumption. In the second it takes the form of a less desirable mix of current consumption goods than could be obtained with slower human capital growth [Lucas, 1988]. Lucas argues that

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6 Romer suggests that the typical capital coefficient (0.25) severely underestimates the contribution of capital and the labour coefficient (0.75) severely overestimates the contribution of labour. In his model the capital coefficients, adjusted to take into account the accumulation of knowledge (or of human capital), would have to be (implausabily) close to one in order to generate the extremely high growth rates of the East Asian NIC's [Romer, 1987].

7 "... the spillover effect of the average stock of human capital per worker in the Lucas model and of knowledge in the Romer model are externalities unperceived (and hence not internalised) by individual agents. However, for the economy as a whole they generate increasing scale economies even though the perceived production function for each agent exhibits constant returns to scale" [Srinivasan, 1995: 43]. Romer and Lucas have in this way substituted a new 'black box' - termed 'scale effects' - for the old black box of 'technical change' as a source of productivity change.

this deficiency could, in principle, be solved in the first case by subsidising schooling and in the second case by subsidising research and development.

In 1990 Romer advanced an alternative endogenous growth model in which he followed Lucas in emphasising the importance of human capital in the development of new knowledge and technology. He departed from Lucas, and from his own earlier work, by treating technical change as embodied in new producer durables. By developing a new product, firms can capture the rents hitherto enjoyed by the producers of previous generations of the product.

In short Romer model is one of the first contribution that incorporate R&D theories and imperfect competition into growth framework. Along with Romer other significant contribution in this framework are those by Aghion and Howitt [1992] and Grossman and Helpman [1991: ch.3-4]. In this setting technological progress result form R&D activity, and this activity is rewarded, following Schumpeter [1934], by some form of ex-post monopoly power. Rather than assuming technological progress to be exogenous or simply a side effect, these models seek to explain it. Typically, the incentive for firms to undertake research and development is the possibility that new products may earn temporary monopoly profits. According to this approach, imperfect competition allows firms to capture sufficient profits to cover the costs of R&D; the new product subsequently become the intermediate inputs to other firms, so that they determine the overall rate of growth.

The model economy has then three sectors: (a) a research sector; (b) an intermediate goods sector (c) a final goods sector The final output can be consumed or saved as new capital [Romer, 1990]. In general, growth depends on the balance of costs and benefits of research and is therefore influenced by the allocation of resources to innovation, by the size of markets, the productivity of labor involved in research, and the degree of market power enjoyed and expected by innovators.

The critical allocative decision is the share of human capital employed in research. As in his earlier model, and in the Lucas models, the optimum rate of growth exceeds the market rate since the externalities from knowledge creation are not considered by the firm making production decisions.

The implication of these endogenous innovation models is once again possible divergence in growth patterns. Writers in the endogenous innovation tradition argue[8]

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8 By contrast, in the traditional neoclassical growth model, technology was assumed to be universally available

that nations may fail to catch up leading countries, or to grow as fast as their peer group because of `idea gaps' rather than `object gaps' [Romer, 1993]. At its simplest, this might simply mean that flows of information are imperfect such that, the level of technology -that is often called total factor productivity-, varies and so, therefore, does the steady-state level of income per head. A corollary would be that if technological knowledge diffused more completely, initially backward countries would tend to catch up the leaders not just through factor convergence, as in the traditional or augmented-Solow models, but also via technology convergence. In a more sophisticated framework, it might be argued that technology transfer involves similar investments and incentives to those required by initial discovery and that, to be successful, countries need indigenous firms to develop this technological capability and/or to be open to and attractive to foreign direct investment [Teece, 1976]. Here, steady-state technology levels and growth rates may differ if local institutions, policies, or economic conditions create differences in the rate of endogenous technology transfer. Economic historians have indeed long stressed that catching-up is far from automatic and that the *social capability* effectively to assimilate new ideas varies greatly [Abramovitz, 1986]. If imitation is cheaper than innovation, however, as discoveries occur in the "leading edge" economy, relatively quickly, "follower" economies [Barro and Sala-i-Martin 1995b] will catch trough an imitation process. Thus, assuming technology transfer, endogenous innovation models, like augmented neoclassical models, can also generate patterns of conditional convergence [Gould and Ruffin 1993; Barro and Sala-i-Martin 1995b].

Thus, the new growth theory brings into play two new types of productive inputs[9] *ideas*, that are nonrival goods, and *things* that on the contrary are rival goods. According to Romer [1996], both, *ideas* and *things* are produced and distributed just as other goods are, however scale effects are important because ideas, as non-rival goods, are expensive to develop but are inexpensive to use[10]. Their value increases with the size of the market. This implies that large countries, with large internal markets, have a greater incentive to produce ideas than small countries. As a result large countries can be expected to grow more rapidly than small countries.

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9 These two inputs are fundamentally different from those used in neoclassical growth theories that explain growth in terms of interactions between basic types of factors such as technology and conventional inputs,
10There is, however, a large literature that suggests that ideas are much more expensive to transfer than implied by the literature that treats knowledge as a pure public good [Teese, 1977: 242-61; Hayami and Ruttan, 1985].

3. Fiscal Policy, Government Purchases, Government Transfers, and Growth Theories

Even more important than the results of their own research has been the stimulus that the Romer-Lucas work has provided for a new burst of theoretical and empirical research in this field. This literature has been complemented by efforts to analyse the effects of the impact of fiscal policies and public infrastructure on national growth [see, for example, Barro 1991; Rebelo 1991; Sala-i-Martin 1996b; Levine and Renelt 1992; Easterly and Rebelo 1993]

However the effect of fiscal settings on the long-run economic growth path can easily be lost sight of. In fact, these effects are not insignificant and deserve careful investigation. The impact of fiscal policies on growth has been studied both in the Neoclassical growth model [Kryzaniak, 1967; Sato, 1967], and in endogenous growth models [Rebelo, 1991; Barro, 1990; Jones et al., 1993].

Robert Barro [1990, 1991a] has extended the constant returns to capital, or AK growth model of Paul Romer [1986, 1989] and Robert Lucas [1988] to include government-provided goods and services as productive inputs. In Barro's model, the long-run rate of growth depends on the share of output allocated to government purchases. With government inputs assumed to be productive, an increase in government purchases as a proportion of output increases the long-run growth rate. However, if government finances its purchases via an income tax, an increase in government purchases requires an increase in the income tax rate. This reduces the return to investment, so long-run growth slows. Barro shows that an increase in government purchases increases long-run growth if the ratio of government purchases to output is small, but slows growth for sufficiently large government purchases ratios. Similarly, Shell[11] [1967] and Grossman and Helpman [1991, sec. 2.4] consider models of technological progress in which government collects taxes and uses the proceeds to purchase goods and services, which are used in an R&D process to create new knowledge. Since government goods generate technological progress, an increase in the government purchases ratio increases the long-run growth rate. Again, however, if government raises revenue via an income tax, increases in government purchases raise the income tax rate, so the return to investment and the long-run rate of growth fall. Grossman and Helpman found that an increase in government

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11 Shell, Karl, "A Model of Inventive Activity and Capital Accumulation," in Essays on the Theory of Optimal Economic Growth, Karl Shell, ed., MIT Press,Cambridge, Mass., 1967, 67-85.

purchases increases long-run growth if the government purchases ratio is small, but decreases long-run growth when it is sufficiently large.

In an `Ak' model, Rebelo [1991] shows that an increase in the income tax rate leads to a long run decline in the rate of growth of output. Barro [1990] and Jones et al. [1993] study optimal tax policies when government expenditure is a productive input, and find a well-defined optimal tax rate. In a related context, Trostel [1993] finds a significant negative effect of income taxation on human capital. In all of these models, government tax policy is used to raise revenues.

The relationship between taxes and economic growth has been investigated by a number of economists over the years, and the evidence has not conclusively found that high taxes discourage economic growth. One reason that there is not a clear relationship between taxes and growth is that some of the things that tax revenue is used to pay for, such as education, transportation infrastructure, and the protection of property rights, have been found to stimulate economic growth. Hence, statistical studies could very well find that higher taxes are positively correlated with higher growth as governments spend their tax revenues efficiently. In a recent article Padovano and Galli [2001], looked at marginal tax rates rather than average tax rates as most previous studies did and including in their analysis measures of average fiscal pressure, found that marginal tax rates turn out to be negatively correlated with economic growth. [12]

The implications of these results are several. First of all, Padovano and Galli essentially confirm that the *level* of taxation is not the real issue[13]. But the finding that the *marginal* rate of taxation is negatively correlated with economic growth also makes sense because, *ceteris paribus*, the marginal tax rate acts as a disincentive to produce and generate income. Padovano and Galli's findings clearly reflect incentives

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12Where most studies have taken the ratio of total tax revenue to GDP as an explanatory variable in the usual growth regressions, Padovano and Galli carefully calculate the marginal tax rates and examine how they affect countries' rates of economic growth. Padavano and Galli conclude their article as follows: "Our analysis of a cross-section time-series panel of 23 OECD countries for the 1950s-1980s decades show that high marginal tax rates and tax progressivity are negatively correlated with long-run economic growth. This finding contrasts the previous empirical literature, which concludes that there is no significant correlation between taxation and economic growth. We provide evidence that these results are due to a misspecification of the tax variables, which relied on average, rather than marginal, measures of fiscal pressure. In our model, when included with measures of average fiscal pressure, marginal tax rates turn out to be negatively correlated with the dependent variable [economic growth], while the other fiscal regressors show no significant correlation." (P. 50)." Fabio Padovano and Emma Galli (2001).

13 High levels of taxation are compatible with both slow economic growth and rapid economic growth. No doubt, it comes down to how well the tax revenue is spent.

better than did earlier studies of taxation and growth. They also seem to pose a dilemma: How can government collect enough taxes to perform all the needed tasks and yet maintain low marginal rates of taxation? The answer is not difficult if we take into consideration Anne Krueger's application of comparative advantage to government. The limitations to what government can do efficiently will probably tend to keep the overall need for tax revenue to a level where the marginal rates do not need to be very high either, even if taxes progressively place a higher burden on higher incomes.

The theoretical aspects of the role of productive government expenditure have been studied in Ramsey type economies by other authors, beginning with Arrow and Kurz [1970], and more recently by Aschauer [1988], Baxter and King [1993], and Turnovsky and Fisher [1995]. This issue has also begun to be studied in an endogenous growth context by authors besides Barro [1990], such as Futugami et al. [1993], and Turnovsky [1996], for instance, found that government financial policy has long-run macro effects[14], and Aschauer stressed the role of public investment as a factor enhancing private capital productivity.

We may find different analysis on the differential impacts of various types of government spending on long-run growth. For example, Barro's [1991a[15]] empirical analysis differentiates productive government purchases, government consumption purchases, and transfer payments. Devarajan et al. [1996[16]] distinguish different types of government purchases according to their marginal impact on private sector productivity. Miller and Russek [1997[17]] in their empirical analysis distinguish not only among different types of government purchases, but also between the use of taxes and borrowing to finance them. A large empirical literature, pioneered by Landau [1983] and Kormendi and Meguire [1985], and surveyed by Barro [1990] and Barro and Sala-i-Martin [1995], has tried to measure the impact of government purchases on long-run growth. We want to focus our empirical investigation specifically, among different government spending, on government transfer to local

14 Turnovsky, S. (1980), "Monetary and fiscal policy in a long run macroeconomic model", Economic Record 56(153), June, 158-70.

15 Barro, Robert J., "A Cross-Country Study of Growth, Saving, and Government Growth," in National Saving and Economic Performance, B. Douglas Beraheim and John B. Shoven, eds., University of Chicago Press, Chicago, 1991a, 269-301.

16 Devarajan, Shantayanan, Vinaya Swaroop, and Heng-fuZou, "The Composition of Public Expenditures and Economic Growth," Journal of Monetary Economics, 37:2,1996, 313-344.

17 Miller, Stephen M., and Frank S. Russek, "Fiscal Structures and Economic Growth: International Evidence," Economic Inquiry, 35:3, 1997, 603-613.

governments. Recent studies such as Sala-I-Martin [1996, 1997] found that public transfers are productive in that they raise the marginal product of private capital. However we found an inverse relationship in our empirical test due to the fact that, expecially in the south transfers are not used to raise marginal product of private capital.

In additions the relationship between redistributive policies and growth is the subject of a growing literature. Alesina and Rodrik [1994] discuss a model in which income distribution and redistributive politics affect growth, and conclude that there is a negative effect of a greater inequality in income distribution on growth rate. Several other articles have reached similar conclusions. Benabou [1996] provides an extensive survey of recent studies of the connection between inequality, redistributive policies, and growth.

Although most researches have focused on the sources of growth across countries, a number of recent studies such as Barro and Sala-i-Martin [1992], Razzolini and Shughart [1997], Jayaratne and Strahan [1996], have sought to explain variation in economic growth between U.S. states. They found support for the hypothesis that real income per capita between states converged[18]. Following Armstrong and Vickerman[19] we believe that "perhaps the greatest methodological challenge of all is to adapt the concepts and techniques of new growth theory to a regional context". As yet, there have been only few explicit attempts to formulate regional endogenous growth models [Benabou 1993, 1994; Bertola 1993; Cheshire and Carbonaro 1995; Sala-i-Martin 1996b].

Our aim in this paper, assuming that economic growth is desirable for its own sake is to provide an answer to a relevant question that dominate discussions of recent economic policies: what can be done to increase the average rate of economic growth in Italy, and in particular in some part of the country? Re-examining some of the above mentioned hypotheses, we empirically test a model that assess the effect of

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18 Barro and Sala-i-Martin (1992) estimated a model with cross-section data that related income growth to initial income and the sectoral composition of income in each state. Razzolini and Shughart (1997), using a considerably different model pooling cross-section and time series data, focused on the effects of state-level fiscal policies. They find that government size and, to a lesser extent, deficit financing produce negative and significant effects on economic growth. Jayaratne and Strahan (1996) also pooled cross-section and time series data to test for the growth effects of institutional arrangements concerning banking. They found evidence that the removal of restrictions on branch banking positively and significantly increased state-level economic growth during the time period covered by their analysis.
19 Armstrong H. and Vickerman R., 1995, p. 19.

government fiscal policies on economic growth in order to add to the debate on processes of regional cumulative causation in Italy.

4. The analytical framework

The model we use as a base to study the link between fiscal policy and the *rate of growth,* is the model used by Bajo et al. [1999] to empirical test the effect of fiscal policies on economic growth for the case of Spanish regions. The Spanish case offers important similarities with the Italian one. In Spain like in Italy there are autonomous regions, as well as ordinary regions. In Spain, since 1978, it has been introduced a territorial organization of the state that permits the institutional structure of government to vary across regions. To some degree this is the case of Italy too where there are four layers of government: state, regions, provinces, municipalities. Activity and fiscal power of regional governments as well as the system of their fiscal relations to the central government are framed by the Constitution and by ordinary legislation designed to implement constitutional principles. The Italian Constitution defines two different models of fiscal relations between regional and central governments. The first related to the Regioni a Statuto Ordinario, the second to Regioni a Statuto Speciale[20.] The set of decentralized governments consists in 15 regions with ordinary statute (OSR), 5 regions with special statute (SSR) [21,] one of which (Trentino- Alto Adige) divides into two Provinces, each with its own special statutes, 102 Provinces with ordinary statute, 8100 municipal governments (Comuni). Regions with special statute, by constitution and successive constitutional legislation, have a wider spectrum of public function to perform than the other 15 regions (OSR).

Another interesting parallel may be found in the devolution process that, with different degree characterizes, both countries. In Spanish, as in Italy, special regions have enjoyed legislative freedom (within the framework of the basic central legislation). In addition to the analogies in the distribution of powers between the different levels of government, we must also mention some common aspects of the distribution of resources at the regional level in the two countries. The annual flow of resources and public expenditure at the regional level, basically comes from two sources: central financial transfers, and funds raised by the regions themselves. In

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20 Regions differ very much in population size and per-capita income.

21 The Special Statute Regions are Sicilia, Trentino-Alto Adige , Valle d'Aosta; Sardegna and Friuli Venezia Giulia .

addition, in both countries, geographically the northern regions show an above–average concentration of infrastructures and funds, ultimately reflecting the historical pattern of industrialization, while the opposite is true in the traditionally agricultural regions in the south.

Given the similarities that characterize the two countries we believe that the model developed by Bajo et al. [1999] for Spain is well suited to investigate the Italian framework. Bajo et al. [1999] developed their model (hereafter BDM model) [22], according to Cashin [1995], who ultimately related this model to Barro's [1990] contribution. The BDM model emphasises the role of fiscal policy in influencing the rate of economic growth, with government spending directly affecting private production function. While public service are included as a productive input the BDM model departs from Barro in such it, following Cashin, includes into the production function private input such as labor, physical capital and human capital, together with fiscal policy instruments (such as transfer payment as an externality).

In assuming productive government spending, the BDM model departs from the traditional framework of analysis. In fact it explores the effects of taxation in the neoclassical growth model, where typically revenue raised from taxation is used to finance the provision of goods that neither enter into firms' production function nor affect the marginal utilities of agents's consumption [Feldstein [1974], Judd [1985]. In this model however public transfer payments enter as productive inputs in private production in that they raise the marginal product of private capital by *"improving the enforcement of private property rights in the economy, and by inducing relative unproductive agents to leave labor force"[23]* .

We study an economy in which the government raises taxes to finance its expenditures. These expenditures may be directed to enhancing the productive activities of the economy. In this respect, the government expenditure will play two roles. In the first place, it will impact directly on production conditions and enhance the productivity of the existing capital stock. This effect has received increasing attention in the literature, both with respect to its empirical relevance and its theoretical consequences. For example, Barro's [1991a] empirical analysis differentiates productive government purchases, government consumption purchases,

22 Bajo Oscar, Diaz Roldan Carmen, Montavez Maria Dolores, Fiscal Policy and Economic Growth: The Case Of Spanish Regions , 1999, ftp://ftp.econ.unavarra.es/pub/DocumentosTrab/DT9904:pdf
23 Cashin pag.239

and transfer payments. Devarajan et al. [1996] distinguish different types of government purchases according to their marginal impact on private sector productivity, and Miller and Russek [1997], in their empirical analysis, distinguish not only among different types of government purchases, but also between the use of taxes and borrowing to finance them.

We first assumed that a given population of identical economic agents maximizes a constant intertemporal elasticity of substitution utility function of the form:

$$U = \int_0^\infty U[c(t)] e^{-pt} dt \tag{I}$$

where:

$$u[c(t)] = \frac{[c(t)^{1-\sigma} - 1]}{1-\sigma} \tag{II}$$

The economy production function in the BDM model is assumed to be:

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

where Y denotes output, K, H, and L are the private inputs: physical capital, human capital, and labor, respectively; A is a labor augmenting factor. In addition KG and TR are defined to be the government-provided inputs respectively public physical capital (KG) and transfer payment (TR). Borrowing from Barro and Sala-i-Martin [1992b], in the BDM model is introduced a more realistic possibility of the congestion in the consumption of publicly provided goods (both physical capital and transfer payments) by individual household-producers (firms), because here (as is the case for a substantial share of government productive expenditures) public goods are rivalrous but not excludable[24]. In the production function above, it is assumed that α>γ+ θ, where γ>0, and according to Sala-i-Martin [1996a,1997], θ>0; otherwise (e.g., if higher transfer payment would discourage growth incentive s) the value of the externality would be negative so that θ<0.

The production function in *per capita* terms is:

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

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24 This is the nature of the congestion existing in the consumption of public capital. It can represent, for example, the miles of highways provided, the number and size of airports, and law and order. Barro and Sala-i-Martin (1992b) argue that national defense and domestic security services (police and prisons), which are often deemed to be prototypical nonrival and nonexcludable public goods, can also be considered to be subject to a form of congestion, using the argument set forward by Thompson (1974).

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 return to scale when all factor (i.e., $\bar{k}$, $\bar{h}$, KG/K and TR/K) are taken together"[25].

Next, the accumulation equations of the human ($\dot{H}$) physical ($\dot{K}$) public capital ($\dot{K}G$) are taken into account:

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

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

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

Where δ is the depreciation rate and it is assumed to be the same for the three input under consideration[26], and s_K, s_H and s_{KG} are respectively the output share of gross investment on private physical capital, human capital, and public capital.

Using then n as the rate of population growth and g_A as the rate of technical progress the following equations determine the rate of change of the previously considered factors:

$$g_k = \frac{\dot{K}}{K} - g_A - n \tag{6}$$

$$g_h = \frac{\dot{H}}{H} - g_A - n \tag{7}$$

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

By equating to zero g_K, g_H, g_{KG} the steady state value, $\bar{k}$, $\bar{h}$, $\bar{k}g$ is determined. Using s_{TR} to denote the output share of government transfers and an asterisk to symbolize steady state value, it is assumed, in addition, that:

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

$$A_t = A_0 e^{g_A t} \tag{10}$$

where A_0 is the initial value of the technological parameter A and t denotes time t. Replacing the obtained values into equation (2), the log of the steady-state per capita output ($\log y*$) is attained:

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25 Bajo et al. [1999] p.4

26 The dot over a variable denotes its time derivative.

$$\log y^* = \log A_0 + g_A t - \frac{\alpha + \beta - \theta}{1 - \alpha - \beta} \log(\delta + g_A + n) + \frac{\alpha - y - \theta}{1 - \alpha - \beta} \log s_K +$$

$$+ \frac{\beta}{1 - \alpha - \beta} \log s_H + \frac{y}{1 - \alpha - \beta} \log s_{KG} + \frac{\theta}{1 - \alpha - \beta} \log s_{TR} \qquad (11)$$

Then the following growth equation is obtained[27]:

$$\frac{d \log \bar{y}}{dt} = -\lambda(\log \bar{y} - \log \bar{y}^*) + \theta(g_{TR} - g_A - n)t \qquad (12)$$

where the speed of convergence is : $\lambda(1 - \alpha - \beta - \theta)(\delta + g_A - n)$ solving the differential equation the following is obtained:

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

which *in per capita terms* becomes:

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

where y_0 is the initial *per capita* output . Dividing by t and rearranging the following equation is achieved:

$$g_y = (1 - \theta)g_A + \frac{(1 - e^{-\lambda t})}{t}\left\{ \log A_0 - \frac{\alpha + \beta - \theta}{1 - \alpha - \beta} \log(\delta + g_A + n) + \right.$$

$$+ \frac{\alpha - y - \theta}{1 - \alpha - \beta} \log s_K + \frac{\beta}{1 - \alpha - \beta} \log s_H + \frac{y}{1 - \alpha - \beta} \log s_{KG} +$$

$$\left. + \frac{\theta}{1 - \alpha - \beta} \log s_{TR} - \log y_0 - \right\} + \theta(g_{TR} - n) \qquad (14)$$

where: $g_y = \dfrac{(\log y_t - \log y_0)}{t}$ denotes the average rate of growth of per capita GDP between 0 and t.

5. An empirical application to the Italian regions between 1970 and 1995

In this section we present an application of the model previously developed, using data for the Italian regions during the period 1970-1995. The empirical investigation has been carried out at two different level. First we included all 20 Italian regions. The exercise has been then carried out for the Center-Southern regions in order to

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27 The growth equation is obtained following Mankiw , Romer and Veil [1992]:

investigate the effect of government transfer on the economic growth in the poorer part of the country.

Our data are mainly from CRENoS with the exception of data on government transfers and rate of capital depreciation that are from ISTAT. The estimation method used is the Ordinary Least Square (hereafter OLS) with Dummy Variables to take into account the individual effects for each regions proxing the initial level of technology A0 and all the other differences in the steady states of the regions [Islam, 1995]. In this way we get rid of the hypothesis that all regions possess similar technology and similar preferences.

Econometric estimates of equation (14) are provided in Table 1 and 2, where 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 all the Italian regions, 1975-1995
(Dependent variable g_Y)

	coef	std. Err	t
$\log y_0$	-0.2887	0.1657	-1.74
$\text{Log}\left(\delta + g_A + n\right)$	-0.4144	0.3897	-1.06
$\log s_K$	0.0856	0.6416	1.34
$\log s_{KG}$	0.0043	0.0271	0.16
$\log s_H$	0.5502	0.1685	3.26
$\log s_{TR}$	.-0.0450	0.0141	-3.18
$\left(g_{TR} - n\right)$	.-0.0075	0.009	-0.82
R^2			0.4089

Table 1 gives estimates of the model (equation 14) for all Italian regions. The estimated coefficient is significantly negative for the initial level of per capita GDP indicating the presence of "conditional β -convergence in the sense of Sala-i-Martin [1996]. The neoclassical growth model predict that poor regions, if the only difference between economies lies in the level of per-worker capital stock[28,] will grow faster than rich ones. Regions with lower starting values of the capital-labor ratio will have higher income growth rate. The *convergence coefficient* [ly$_0$] implies, as specified in the table 1, that an increase in GDP by 10 percent reduce the growth rate on impact by 2.8 percent per year. A relevant channel to through which convergence

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28 Assuming that, following Solow[1956], unemployment is zero.

can occur is the redistribution of incomes from relatively rich regions to relatively poor regions by central government. This raises the following policy questions: have transfers from the central government to regions an important role and therefore helped to equalize per capita incomes across the different regions of Italy? The inverse relationship between transfer payments and growth rate has nothing to do with any distortions created by transfer payments. The transfer payments analyzed here are lump sum; by assumption, they do not affect relative prices. Increases in transfer payments reduce long-run growth because they crowd out government purchases of productive goods and services. While it might be worthwhile examining the impact of changes in distortionary transfer payments on long-run growth, adding such distortions will only increase the negative impact of transfer payments on growth, given that these transfer payments are often not productively used for investments in education (public education actually goes toward increasing human capital enhancing growth), human capital, transportation, infrastructures. The key implication of the analysis above is especially true in the central-southern part of Italy where the growth slowdown can be explained at least in part by the permanent increase in the ratio of government transfer payments to real GDP. The tables, in fact show a greater negative relation between transfers and growth in the case of center-southern regions

A large empirical literature surveyed by Gramlich [1994] suggests that policy makers should concentrate their efforts on increases in infrastructure spending if they want to stimulate growth. Although several empirical studies using cross-national data sets (e.g., Landau, 1983; Kormendi and Meguire, 1985; and Barro, 1991) found a negative or statistically insignificant relationship between government purchases and growth, the theoretical and empirical analyses above suggest reexamining these results by holding the total government spending ratio constant.

Two key roles of government are to provide public goods and to redistribute income across individuals and regions. Often these two functions overlap since public goods provision may also be used to compensate for geographical income imbalances. It is interesting to notice that in all the categories, public employment per capita is higher in the Center-Southern part of Italy. Opportunities in the private sector are better in the North and as a result, residents in the South seek more public employment in order to take advantage of a large income premium and a greater job security. The economy in the South is overly dependent on public jobs that are of the nature of

permanent welfare, since public employment has been used as a subsidy to the less wealthy South. The hiring process in the Italian local governments has been financed by a central government transfers. As a consequence the resources left over of productive investment were really low, in those regions were, like in the sud, public employment has been one of he most used way to create patronage for local politicians. This may explain way the variable transfer is negatively correlated with the growth rate.

But, if this government policy results in a decline in output growth, why is this redistributive system chosen? One answer may be that this is simply a by-product of a centralized fiscal system and centralized union bargaining. In addition redistribution through public employment is less visible than direct transfers[29], therefore it is politically less costly and may be more effective at creating patronage for local politicians[30].

Over time the South is caught in a equilibrium of dependency in which public jobs are a critical source of disposable income and in which private opportunities do not materialize. This creates a culture that discourages private activities and entrepreneurship in addition to the lack of enhancing growth investments. The problem that government spending is used in a unproductive and non enhancing growth environment, is compounded by the use (and misuse) of disability pensions, which are also concentrated in the South and are in many cases another source (in addition to pubic employment) of permanent unemployment compensation.

Closely related to the variable transfer are the other two relevant variables private physical capital investment (sk) and public physical capital investment (s_{KG}). Both have a low positive effect on the economic growth. With respect to (sk), we found a relatively positive stronger effect on economic growth when we consider the first

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[29]As pointed out by Alesina a model by Coate and Morris (1995), slightly modified by Alesina, Baqir, and Easterly (2000), clarifies this politico-economic argument. The idea is simple: suppose that a proposal that introduces a tax in region 1 (North) to finance a direct subsidy to region 2 (South) would not pass because it is opposed by voters in the North. Further assume that the government wants to redistribute toward the South and assume that, say, several new teachers are hired and disproportionately placed in the South. This second redistributive policy is less transparent (although perhaps less efficient) and may win approval even in the North because of the uncertainty about the real needs of the public school system.

[30] The regional differences in the distribution of public jobs are large. Public civilian employment per capita is higher in the South than in the North (about 61 public employees per thousand population in the South versus 51 in the North). As a share of total employment the difference is even more staggering: 12 percent of the employed in the North are in the public sector against 21 percent in the South. The comparison with the Center is clouded by the presence of the national capital in the Lazio region. Including this region, public employment is artificially high in the Center. For this reason we focus mostly on North-South comparisons.

environment including all Italian regions (Table 1) as expected. This can be explained with the fact that including the northern Italian regions we take into account the fact that those regions are characterized by a greater number of entrepreneurs with an higher propensity to invest. A more interesting case, from our prospective, is represented by the variable (sKG).The estimated coefficient (lsKG) is significantly greater when we consider only the Center-Southern regions (Table 2) since capital productivity is higher in the less developed regions.

TABLE 2. Economic growth in the Center-Northern Italian regions, 1975-1995
(Dependent variable gY)

	Coef	std. Err	t
$\log y_0$	-0.2565	0.2012	-1.27
$\mathrm{Log}(\delta + g_A + n)$	-0.7966	0.3736	-2.13
$\log s_K$	0.0299	0.070	0.43
$\log s_{KG}$	0.0346	0.030	1.15
$\log s_H$	0.0634	0.2279	0.28
$\log s_{TR}$	-0.0237	0.0123	-1.92
$(g_{TR} - n)$	-0.0041	0.008	-0.51
R^2			.4760

The variable (sH) proxies the role of human capital in enhancing growth; it has a significant positive effect as expected. The coefficient is greater when we consider all the Italian regions (table 1), due to the fact that, as pointed out by Barro [2001], "more human capital facilitates the absorption of superior technologies from leading" regions. Finally, The rate of population growth (n), augmented with the rates of depreciation (δ) and rate of technical progress (gA), is negatively related with the dependent variable.

6. Conclusion

A relevant question dominates discussions of recent economic policy: assuming that economic growth is desirable for its own sake, what can be done to increase the average rate of economic growth? This article in answer to the question, analizes the case of Italy that appear to be divided in two clusters. Geographically the northern regions show an above–average concentration of infrastructures and funds, ultimately reflecting the historical pattern of industrialization, while the opposite is true in the traditionally agricultural regions in the south.

The question then became what can be done to increase the average rate of economic growth in the center-southern part of Italy? If policy makers are serious about increasing the average rate of economic growth, they will have to think in terms of substantial increases in government purchases relative to GNP. To have the maximum impact on growth, these increases in government purchases should be financed by decreases in transfer payments, not by increases in tax rates. Also, a large empirical literature surveyed by Gramlich [1994] suggests that policy makers should concentrate their efforts on increases in infrastructure spending. We found that public transfer payments do not always enter as productive inputs in private production functions. Transfers are unproductive in that they do not raise the marginal product of private capital, especially when the analysis is restricted to the central southern regions, where they are used as a redistributive devices.

Another important contribution of the model tested, is to highlight the rivalrous nature of the consumption of the public capital stock by private individuals and firms, and of the consumption of transfer payments. This approach overcomes the need in earlier models of growth and public finance (such as Barro [1990]) for the goods provided by government to be essentially publicly provided private goods. The present model implies that many of the goods provided by government are rivalrous and nonexcludable in nature, thus explain the lack of a strong impact on growth, especially when we consider all Italian regions.

In addition in estimating the empirical relationship between public investment, transfers, and the rate of economic growth we improve previous empirical studies of the influence of fiscal policies on growth, which have predominantly concentrated on the effects of government consumption spending and have largely ignored the effects of government transfers. By using a panel data framework, this paper goes beyond the traditional empirical tests found in this literature, which most often use cross-sectional estimation alone. Levine and Renelt [1991] and [1992], and Levine and Zervos [1993] point out that such cross-sectional studies are prone to yield misleading results, given that they cannot account for persistent unobserved heterogeneity across regions.

Appendix: definitions and data sources

Our data come from two sources. First, we use information on nominal gross domestic product, population, working population, gross private and public investment which come from the CRENoS database. Second, we use information on government transfers from 1970 to 1995, which was compiled by the ISTAT and distributed in ISTAT STATISTICAL REPORT "Riepilogo regionale delle amministrazioni comunali".

We have used annual data for the period 1970-1995. The variables included in the tables are defined as follows:

g_y : rate of growth per working-age GDP at prices 1990 for each sub-period. Source: authors elaboration from CRENoS data

y_0 : initial value of per working-age person GDP at prices 1990 for the first year of every time span 1975, 1980, 1985, 1990, 1995). Source: CRENoS

δ : depreciation rate, equal to 11.0 per cent. Source: ISTAT

n : annual average of the rate of growth of working-age population for each sub-period. Source: authors elaboration from CRENoS data.

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

s_K : annual average of share of private physical capital investment in total GDP for each sub-period. Source: authors elaboration from CRENoS data.

s_{KG} : annual average of share of public physical capital investment in total GDP for each sub-period. Source: authors elaboration from CRENoS data.

s_H : initial value of share of working-age population with university studies, for the first year of every time span. Source: authors elaboration from CRENoS

s_{TR} : Annual average of the share of government transfers in total per capita GDP for each sub-period. Source: authors elaboration from ISTAT

g_{TR} : rate of growth of government transfers at price 1990 for each sub-period. Source: authors elaboration from ISTAT.

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