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## Decentralization, Social Capital and Regional Convergence

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#### Summary

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**Keywords:** Social Capital, Convergence, Economic Growth

**JEL Classification:** O4, N9, R5

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# Decentralization, social capital and regional convergence

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## Abstract

By studying the interaction between social capital and decentralization, we show that political decentralization can be a source of divergence across heterogeneous regions. In particular, we claim that since the local endowments of social capital display their effect on the economy mainly through the functioning of local institutions, decentralization enhances (hampers) growth wherever social capital is high (low). We define our hypothesis within a growth model with public capital, and use the North-South divide in Italy to assess the quantitative plausibility of our model. A calibration exercise shows that it accounts for the major swings in the Italian regional divide since 1861.

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## 1. Introduction and motivations

As suggested by the traditional literature on fiscal federalism, better knowledge of local preferences and increased accountability give decentralized governments a comparative advantage in the provision of public goods (Tilbot, 1956; Lockwood, 2006). Since public goods are typically underprovided in lagging regions, this theory implies that, *ceteris paribus*, their economic performance should be especially enhanced by political decentralization, i.e. the devolution of the authority of policy-making to local layers of the government.<sup>1</sup> However, evidence in favor of this hypothesis is hard to find in cross-country or cross-region data (Asatryan and Feld, 2011; Rodriguez-Pose and Ezcurra, 2011). This lack of positive effects from decentralization is not surprising according to other explanations of why a territory may persistently lag behind. In the literature on the economic effects of social capital, for instance, formally identical institutions may perform very differently at the local level, due to the presence of some persistent heterogeneity in values and beliefs across different areas (e.g. Tabellini, 2010). In this view, a territory's persistent cultural traits held by the population may affect the functioning of local institutions irrespective of whether these institutions simply act as administrative branches of a central government (administrative decentralization), or whether they are part of local governments as the result of a process of political decentralization.

In these approaches, therefore, the effect of political decentralization on lagging-behind economies ranges from potentially very positive to irrelevant. We regard both these conclusions as too optimistic. By studying the interaction between social capital endowments and decentralization, we show that while the latter may strongly affect local economies, as postulated by the theory on fiscal federalism, the channels involved and their effects may be significantly different from those identified by that theory: in fact decentralization can be harmful for the economic performance of lagging-behind territories. More generally, decentralization may be a source of regional divergence in countries or in economic unions characterized by a highly heterogeneous distribution of social capital.

Our idea is rooted in the literature that identifies social capital<sup>2</sup> as a determinant of economic performance through the influence it exerts on the functioning of institutions, and in particular of the government institutions in charge with providing public goods (Putnam, 1993).<sup>3</sup> As Boix and Posner (1998) have summed up, several channels link social capital to the functioning of government institutions. In particular, when social capital is high (i) citizens are more actively involved in community life, making governmental accountability easier and stronger, and rent seeking practices

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<sup>1</sup> Political decentralization implies that powers and responsibilities are devolved from elected central governments to local ones. It is distinct from administrative decentralization, i.e. the simple "administrative delegation of functions of the central government to local branches" (see Bardhan, 2002).

<sup>2</sup> In this paper we adopt the definition of social capital as "those persistent and shared beliefs and values that help a group overcome the free rider problem in the pursuit of socially valuable activities.", given by Guiso et al. (2010). On the critical role played by trust in economic performance, Arrow (1972).

<sup>3</sup> For a recent contribution on why social capital encourages the provision of public goods rather than of clientelistic benefits, see Nannicini et al. (2012).

more costly politically;<sup>4</sup> (ii) citizen's preferences may depend on social capital, hence with high social capital policies that benefit everybody are preferred to policies that benefit some groups at the expenses of others; (iii) individual workers in the government institutions are less likely to act opportunistically.

In our view, each one of these links are likely to become stronger in the presence of political decentralization.<sup>5</sup> First, a territorial community can exert a more systematic control on the functioning of a government whose components are all elected locally, rather than of a central government. For the same reason, the preferences of a territory's citizens also have a stronger influence on a local level of government, as postulated by the classical literature on fiscal federalism.<sup>6</sup> Finally, the social capital prevailing in a community is typically "embedded"<sup>7</sup> in that territory's political representatives, and this characteristic is again more strongly reflected in a local government than in a central one. All in all, devolution of political decision-making is likely to make the provision of public goods more permeable to a territory's endowment of social capital. As a consequence, the degree of political decentralization and its interaction with the local endowments of social capital may turn out to be an important -- while often overlooked -- determinant of economic divergence across territories of a country or a political union.

We analyze this macroeconomic effect of devolution, and assess its quantitative plausibility, using an endogenous-growth framework in which, as in Futagami *et al.* (1993), public capital and its formation are the key factors to trigger convergence in lagging regions.

We develop a model in which social capital exerts a strong influence on the formation of public capital by means of a simple mechanism -- namely, transforming tax revenues into new public capital implies the possibility that part of the resources are captured by corruption and rent-seeking activities, and this possibility is inversely proportional to the level of social capital. In our model this dispersion of resources caused by low social capital takes the form of iceberg costs. While we do not analyze a specific mechanism of political accountability, the way we model how social capital affects the provision of public goods is fully consistent with models that analyze how the government can capture rents under various institutional and voting regimes (Tabellini and Persson, 2000).<sup>8</sup>

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<sup>4</sup> See also (Knack, 2002). More recent research has strengthen this viewpoint. Nannicini et al. (2012) show that when limited morality prevails in a population, the electoral punishment for rents grabbed by a politician is weaker and the waste of resources by politicians (and by the institutions they control or influence) is higher.

<sup>5</sup> An exception is Helliwell and Putnam (1995), in which the authors maintain that decentralization may be a source of temporary regional divergence in Italy.

<sup>6</sup> Oates (1972). More recently, Lookwood (2002) and Besley and Coate (2003) also show that local government are more responsive to local preferences. As a consequence, as Rémy Prud'homme (1995) maintains, in low SC territories "local politicians and bureaucrats are likely to be more subject to pressing demands from local interest groups (whose money and votes count)".

<sup>7</sup> Nannicini et al. (2012).

<sup>8</sup> For instance, Nannicini *et al.* (2012) develop a model in which as the share of civic voters increases, the rents captured by the government decreases and the provision of public goods increases as a consequence.

In our model devolution takes the form of a shift in the iceberg costs: when decision-making on public investment is in the hands of the central level of the government, the process (and the associated iceberg costs) is assumed to be influenced by the *average* level of social capital of the whole country. With devolution decision-making is attributed to institutions more permeable to the local context, so that the iceberg costs are determined by the *local* endowments of social capital. Since devolution makes the iceberg costs decrease in territories with higher than average social capital, and increase in low social capital areas, it therefore becomes a source of economic divergence in the presence of heterogeneous social capital.

To obtain a first, quantitative assessment of our hypothesis, we use the data of the Italian regions, a case characterized by both a persistently high cross-region heterogeneity of social capital and by a significant process of devolution that started in 1970. Italy was in fact the very case that inspired Putnam's classical study of how social capital can have an economic impact through the functioning of local institutions (Putnam, 1993).<sup>9</sup>

We calibrate our model using values taken from the Italian economic history, from 1861 to 2004. For the aim of our calibration exercise, our model is extended to account for another institutional change that took place along with political decentralization -- namely, the adoption of a uniform national wage rate and the significant sudden rise in labor cost that it caused in the South of the country.<sup>10</sup> The results of our model simulations closely mimic the sequence of divergence, convergence and again divergence that has characterized the time path of the economic divide between the Center-North and the South of Italy from 1861 onwards. Crucially for our proposed explanation, our simulations support the idea that decentralization and its interaction with social capital play a central role in reversing a twenty-year long convergence process between 1950-1971.

A few papers have dealt with the effects of political decentralization on growth and convergence. For instance, Rodriguez-Pose and Ezcurra (2010) find that decentralization can cause a significant rise in regional inequalities in low income countries with high territorial imbalances, but the role of social capital heterogeneity is not addressed in their paper. A strand of literature that emphasizes the risk of "community" or "civil society failure" as a factor that might offset the classical benefits attributed to decentralization exists (for instance Bardhan, 2002),<sup>11</sup> but with no explicit analysis of its effects on aggregate growth and convergence. Helliwell and Putnam (1995), Leonardi (1995) and Felice (2007a,b) have all deal with the economic effect of social capital scarcity on the South. However, to

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<sup>9</sup> See also the classical study by Banfield (1958). The Italian regional divide is still widely regarded as a crucial case study in recent papers on how social capital can cause economic outcomes. See for instance Nannicini et al. (2012), Tabellini (2010), De Blasio and Nuzzo (2009), Guiso et al. (2008), Ichino and Maggi (2000).

<sup>10</sup> To account for this second institutional change, the labour market in our model is imperfect and combines the monopolistic union model of McDonald and Solow (1981) with a median voter mechanism for the union delegates to define common national wage (Carmeci and Mauro, 2002).

<sup>11</sup> See also Mansuri and Rao (2012) and the literature reviewed there.

our knowledge, this paper is the first systematic attempt to define (and to assess the quantitative plausibility of) a mechanism by which decentralization can reverse an established process of convergence. Our paper is also related to the recent literature on formal and informal institutions. As in Tabellini (2010), institutions function differently in different contexts. However, in our model the economic effect of such a different functioning is significantly enhanced by (and crucially linked to) political decentralization. Finally, our results are also relevant for the literature in which the persistence of social capital endowments is a key channel through which long-past historical episodes influence current economic outcomes.<sup>12</sup> Taken as a whole, this line of research tends to imply that accumulating social capital is the difficult but essential undertaking in order to improve the territory's relative performance. Our model implies that this view may be too deterministic: the growth-damaging effect of a *given* low level of social capital may be significantly limited by adopting an appropriate allocation of authority between different government levels.

The paper is organized as follows. In Section 2 we first present the model in its simpler version and discuss how decentralization with social capital heterogeneity can generate divergence, and then we extend it to include an imperfect labor market in which the growth effects of centralized/decentralized wage-setting rules are analyzed. In Section 3 we discuss and use data from the Italian regional divide to calibrate the model and assess its quantitative plausibility. Conclusions are in Section 4.

## 2. The model

In this section the basic mechanism described above – decentralization and its interaction with social capital – and its macroeconomic effects are analyzed within an endogenous growth model that builds on Futagami *et al.* (1993). We extend their model in two ways. First, we allow social capital to have an effect on the process that transforms public money into public capital. Later on in this section we will introduce, as a second extension, an imperfect labour market. As we explain later, this extension is needed to assess the quantitative plausibility of our model within the context of the Italian regional divide. We will show that the mechanism by which decentralization can cause divergence in the presence of a perfect labor market is also valid when the labor market is assumed to be imperfect.

Consider an economy that is part of a country or of an economic union, populated by  $N$  infinitely-lived individuals, each endowed with one unit of time inelastically supplied to  $N$  firms. Output is produced using labor, private and public capital services and an efficiency parameter  $A$ :

$$(1) \quad y = Ak^\alpha l^{1-\alpha} p^{1-\alpha}$$

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<sup>12</sup> See among many others Guiso *et al.* (2008) and De Blasio and Nuzzo (2009). Tabellini (2010) is based on a sample of 69 regions from 8 European countries within which Italy still matters a lot: "the correlation [between output and culture] is weaker without Italy ... because differences in economic development and in culture are much less pronounced within the other European countries" (p. 690).

where all variables are implicitly a function of time. Normalizing  $N$  to one, equation (1) is to be interpreted as a technology linking per capita output to the employment rate and to per capita private and public capital. In this formulation, public capital  $p$  is "labor augmenting", and the sum of the coefficients of the two forms of capital  $k$  and  $p$  (private and public, respectively) is equal to one, as in Barro (1990).<sup>13</sup> In order to focus on the effect on growth of social capital in the presence of decentralization, we start by analysing our model under full employment ( $l = 1$ ). This assumption will be dropped later in this section. Equation (1) is also characterized by the role assigned to public capital, the productivity of which is assumed to be high enough to allow endogenous growth. Public intervention is therefore a crucial determinant of growth.

Tax revenues accruing from activities located both within and outside the economy are used to increase public capital  $p$  according to the following technology:

$$(2) \quad \dot{p} = (\tau + v)Sy, \quad 0 \leq \tau \leq 1, \quad -1 \leq v \leq 1, \quad 0 \leq S \leq 1.$$

In equation (2)  $\tau$  is the tax rate applied to income  $y$  and is assumed to be exogenously determined. In addition to the internal source of public resources  $\tau$ , we allow for the possibility that the economy can make use of resources financed by tax revenues collected elsewhere within the country or the economic union ( $v$ ) by a central government willing to sustain the development of a backward region. For the sake of simplicity we assume that these resources too are proportional to the region's GDP.

The process of accumulation of public capital described by eq. (2) also depends on a parameter  $S$  -- a measure of social capital. As in the iceberg costs approach, an  $S$  equal to one implies maximum efficiency so that all taxation and transfers are transformed into net public capital investment, while a lower  $S$  would imply that some inefficiency does exist in that process. The formulation adopted in equation (2) has two implications that deserve further discussion. The first is that -- consistently with Putnam (1993) -- social capital affects economic performance *mainly* through the influence it exerts on the functioning of the institutions in charge with the provision of public capital. Of course social capital can also affect the economy through other and perhaps equally important channels. For instance, low social capital may keep productivity low by making cooperation among private firms difficult. Clearly, channels of this type could be easily reflected in our model by the value taken by the TFP parameter of our production function ( $A$  in eq. (1)), but in this section we ignore these additional effects for the sake of simplicity.<sup>14</sup>

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<sup>13</sup> With full employment equation (1) would match the formulation used both in Barro (1990) and in Futagami et al. (1993), namely  $y = Ak^\alpha p^{1-\alpha}$ .

<sup>14</sup> The idea that aggregate economic outcomes are affected by social capital mainly through the channel of governmental performance has an implication worth underlining -- namely, that under this assumption exogenous changes in the governmental organization can improve economic performance even in the presence of unchanged (low) endowment of social capital.



The second feature worth mentioning is that when social capital is scarce, the iceberg costs are high. The rationale behind this formulation is that when social capital is low, it is easier for corruption and rent-seeking activities to capture a significant part of the tax revenue meant to finance public investment. While we do not explore analytically what specific mechanisms may be capable to generate such an inverse relationship between social capital and the effectiveness of public investment, it is worth noticing that the formulation adopted in equation (2) is fully consistent with well-known economic models of political accountability in which the government can capture rents under various institutional and voting regimes (e.g. Tabellini and Persson, 2000). For instance, Nannicini *et al.* (2012) have recently shown that those rents decrease (and the provision of public goods increases) as the share of civic voters in the population increases.<sup>15</sup> Empirically, the inverse relationship between social capital and iceberg costs associated to the accumulation of public capital is a well documented phenomenon (e.g. Golden and Picci, 2005).<sup>16</sup>

Let us now turn to the factor market of our economy. Firms operating in a competitive set up are assumed to equalize after tax marginal factor productivity to their cost:

$$(3) \quad w = y_l(1 - \tau)$$

$$(4) \quad r = y_k(1 - \tau)$$

As we said, for the time being full employment is assumed. As far as the savings-investment decision of agents is concerned, each agent is assumed to solve a standard intertemporal maximization problem where agents' preferences are proxied by a standard isoelastic utility function:

$$(5) \quad \text{Max} \int_0^{\infty} \frac{1}{1-\theta} c^{1-\theta} e^{-\rho t} dt$$

subject to:

$$(6) \quad \dot{k} = (1 - \tau)(rk + wl) - c = (1 - \tau)y - c .$$

Solving the problem yields the standard Euler condition

$$(7) \quad \dot{c} = \frac{c}{\theta} (r - \rho) .$$

The whole dynamics of the model is defined by equations (2), (6) and (7). It is quite convenient to express the model using private to public capital ratio,  $k'$  and consumption to public capital ratio,  $c'$ . Using equation (4) the entire model is summarized by:

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<sup>15</sup> The reason for this is that uncivic voters reward a corrupt politician as long as they obtain targeted benefits, so that the threat of electoral punishment is weaker for incumbent politicians (and rents, or iceberg costs, higher) when social capital is low.

<sup>16</sup> More on this in section 3 below.

$$(8) \quad \frac{\dot{p}}{p} = (\tau + v)ASk'^{\alpha}$$

$$(9) \quad \frac{\dot{c}'}{c'} = \frac{1}{\theta}(\alpha Ak'^{\alpha-1}(1 - \tau) - \rho) - \frac{\dot{p}}{p}$$

$$(10) \quad \frac{\dot{k}'}{k'} = (1 - \tau)Ak'^{\alpha-1} - \frac{c'}{k'} - \frac{\dot{p}}{p}$$

After substituting for the growth rate of  $p$  it is possible to analyze the dynamic system qualitatively using the phase diagram in the plane  $k'$  and  $c'$ . The zero growth curves for  $k'$  and  $c'$  are:

$$(11) \quad \frac{\dot{k}'}{k'} = 0, \quad c' = (1 - \tau)Ak'^{\alpha} - (\tau + v)ASk'^{\alpha+1}$$

with  $\frac{\partial c'}{\partial k'} \gtrless 0$  if  $\frac{\alpha(1-\tau)}{(\alpha+1)(\tau+v)S} \gtrless k'$ , and

$$(12) \quad \frac{\dot{c}'}{c'} = 0, \quad \alpha Ak'^{\alpha-1}(1 - \tau) - \rho - (\tau + v)\theta ASk'^{\alpha} = 0.$$

As Figure 1 shows, the system is a simple one with a stable arm and steady state values of  $\tilde{c}'$  and  $\tilde{k}'$ . In this system,  $\tilde{k}'$  depends only on equation (12). By differentiating it we can determine how  $\tilde{k}'$  changes with  $\tau$  and  $S$ . As regards the tax rate,

$$(13) \quad \frac{\partial \tilde{k}'}{\partial \tau} = -\frac{-[\alpha \tilde{k}'^{\alpha-1} + \theta S]}{\alpha \tilde{k}'^{\alpha-1}[(\alpha-1)(1-\tau)\tilde{k}'^{\alpha-1} - (\tau+v)\theta S]} < 0 \quad \text{since } \alpha < 1, \tau \leq 1.$$

Therefore, increases of  $\tau$  shift the  $c$  zero-growth locus to the left and lower the steady state values of  $\tilde{k}'$ . In words, agents lower private investment when the net returns of private capital decrease due to a higher tax rate. Similarly,  $\partial \tilde{k}' / \partial S < 0$  so that as  $S$  increases the  $\dot{c}'/c' = 0$  locus moves again to the left and the value of  $\tilde{k}'$  decreases. As regards the  $\dot{k}'/k' = 0$  curve, increases of  $\tau$  and  $S$  shift it downwards.

In Futagami *et al.* (1993) the authors, following Barro (1990), analyze the normative implication of their model with respect to tax policy. In the present model, instead, we will follow a more a positive approach, since we are mainly interested in the long-run growth effects of changes in  $\tau$  and especially in  $S$ . We focus therefore on the balanced growth path of this economy. In steady state  $c$ ,  $k$  and  $p$  grow at the same rate since  $\tilde{c}'$  and  $\tilde{k}'$  are constant, so that the long run growth rate of the economy can be analyzed using the equation of motion of public capital only:

$$(14) \quad \frac{\dot{p}}{p} = (\tau + v)AS\tilde{k}'^{\alpha}$$

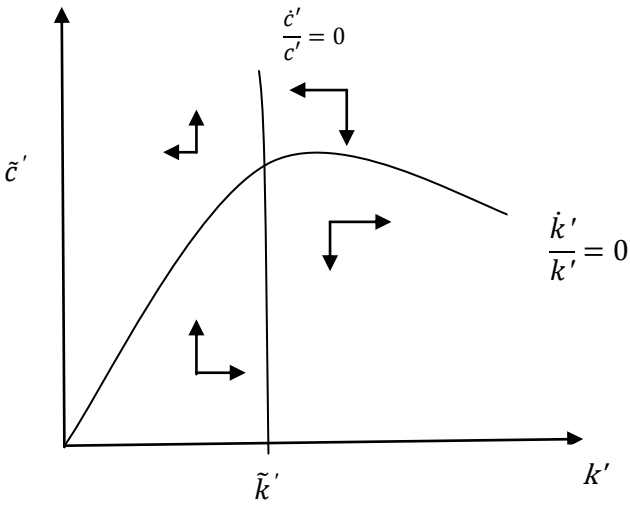
The effect of changes in  $\tau$  and  $S$  on the balanced growth path depends on a direct, positive effect and on the indirect one associated with the changes they induce in  $\tilde{k}'$ , as quoted above (see eq. (12)).

The derivative of (14) with respect to  $\tau$  can be written as follows

$$(15) \quad \frac{\partial \dot{p}/p}{\partial \tau} = AS\tilde{k}'^\alpha \left[ 1 + \alpha(\tau + v)\tilde{k}'^{-1} \frac{\partial \tilde{k}'}{\partial \tau} \right],$$

where as we know  $\partial \tilde{k}'/\partial \tau < 0$ . For small values of  $\tau$ , and the implied high values of  $\tilde{k}'$  (eq. (13) above), the second term in the brackets is less than one so that  $\partial \dot{p}/p/\partial \tau > 0$ : raising taxes is good for growth. The opposite is true at higher values of  $\tau$  (namely,  $\tau > -k[\alpha \partial \tilde{k}'/\partial \tau]^{-1} - v$ ): raising taxes further hampers growth. The inverted U relationship between the tax rate and growth revealed by this analysis is a standard result in the growth literature. As regards the relationship between social capital and balanced growth, as  $S$  approaches zero the derivative of eq. (14) w.r.t  $S$  is positive, while it becomes negative for  $S > -k[\alpha \partial \tilde{k}'/\partial S]^{-1}$ . Numerically, we find that the relationship between  $\tau$  and balanced growth is positive for values of the tax rate in the range  $0 < \tau < 0.7$ , and that the relationship between social capital and growth is also positive for values of  $S$  within the whole admissible range<sup>17</sup>  $0 \leq S \leq 1$ .

**Figure 1. Phase diagram**



In this simple setting, devolution plays a central role. When decision-making about a public project is in the hands of the local level of the government, the social capital of that region exercises its maximum influence on the process: the pressure exerted by a territorial community's on the decision process can be hardly ignored at that level of government. On the contrary, when decision-making is in the hands of a central government, the decision process is farther away from the territorial community and therefore is less likely to be strongly influenced by that territory's social capital. So in our model we assume that the iceberg costs associated to public investment are proportional to a territory's social capital when decision-making is attributed to the local level of the government, and

<sup>17</sup> See equation (2) above.

to the *average* level of social capital of the whole country when decision-making is centralized.<sup>18</sup> Under this assumption, devolution makes the iceberg costs decrease in territories with higher than average social capital and increase in low social capital areas. Since, as we have seen,  $\frac{\partial \dot{p}/p}{\partial s} > 0$ , devolution turns out to be a potentially important source of regional divergence in the presence of heterogeneous social capital.

**An extension: centralized and decentralized wage-setting rules .** To assess the quantitative plausibility of our hypothesis on why decentralization may spur divergence, in Section 3 below we will make use of data from the Italian regional divide. As we shall see later in greater detail, currently with the political decentralization, a reform of the labor market was also implemented, which went in the opposite direction of making wage-setting a more centralized process. Thus a uniform wage rate was *de facto* imposed across all Italian regions, irrespective to the conditions of the local economies. This reform may have had a significant impact on the process of regional convergence and controlling for it in order to better identify the growth effect of political decentralization becomes imperative.

Hence, we need to extend our model to take into account the consequences of different wage-setting rules in an imperfect labor market. Our departure from perfect competition in the labor market ( $l < 1$ ) is based on McDonald and Solow (1981). A monopolistic and myopic labor union is assumed to maximize the expected utility of its members:<sup>19</sup>

$$(16) \quad U(w)l(w) + (1 - l(w))U(\bar{w}),$$

where barred  $w$  is the reservation wage. The employment rate, from (1) and (3) is:

$$(17) \quad l(w) = A^{\frac{1}{\alpha}} k (1 - \alpha) p^{\frac{1-\alpha}{\alpha}} w^{-\frac{1}{\alpha}} (1 - \tau)^{\frac{1}{\alpha}}.$$

The utility of each union's member is defined as:

$$(18) \quad U(w) = \frac{1}{1-\theta} w^{1-\theta}.$$

The labor union sets the wage as a mark-up over the reservation wage :

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<sup>18</sup> Strictly speaking, our assumption implies that a centrally designed project has the same efficiency whenever it is located, irrespective to the social capital of the targeted territory. In other words, we are ignoring the effect of administrative decentralization in order to concentrate on political decentralization (see footnote 1 above). This unrealistic implication could be avoided by allowing a territory's TFP to reflect the local endowments of social capital, a possibility that we ignore for the sake of simplicity. However, even with  $A$  as a function of  $S$  our main conclusion would still hold: decentralization of authority to the local level would still have a significant (additional, in this case) impact on growth for regions whose social capital differs from the country's average.

<sup>19</sup> In alternative to the myopic assumption, the union can be depicted as very ideological, as it has been the case in Italy up to the eighties. In those years wages were thought to be a social variable not a market variable; in that context high mark-ups over reservation wage were perfectly justified by "class struggle" and not linked to supply and demand of labor.

$$(19) \quad w = [1 - \alpha(1 - \theta)]^{\frac{-1}{1-\theta}} \bar{w} = \varphi' \bar{w}.$$

Following Bean (1994),<sup>20</sup> the reservation wage can be thought to be a function of per capita consumption level. Therefore equation (19) becomes:

$$(20) \quad w = \vartheta c.$$

Following Mauro and Carmeci (2002), the labor union is assumed to be an elective institution where elected delegates display single peaked preferences on wage thus equation (19) can be written as follows:

$$(21) \quad w = (1 - \alpha(1 - \theta))^{\frac{-1}{1-\theta}} \bar{w}_m = \vartheta' \bar{w}_m,$$

where the subscript  $m$  stands for the median voter. In order to allow for the possibility of relaxing the assumption of homogeneity of agents, it is convenient to modify equation (20) as follows:

$$(22) \quad w = \vartheta' c_m = \vartheta' \frac{c_m}{c} c = \varphi c.$$

Equation (22) models the mark-up  $\varphi$  as a function of the median voter delegate consumption relative to the average per capita consumption.

Under decentralized bargaining the wage in each region is set by the delegates of that same region. In terms of our model (and its underlying assumptions), a likely outcome is that in this case  $c_m/c$  will turn out to be equal or close to unity. In a centralized bargaining set up, delegates come from several regions with heterogeneous per capita consumption levels. In this case, the resulting  $c_m/c$  ratio is likely to be different from one, and its value will depend on the distribution of the delegates' per capita consumption levels. If the richer regions are over-represented, the mark-up as well as the wage will be set high. As a consequence, in the less advanced regions both are higher than the (equilibrium) values that would prevail under a decentralized bargaining regime.<sup>21</sup>

Equations (17) and (22) define the equilibrium rate of employment/unemployment implied by each level of private and public capital and by the level of the tax rate. Substituting into eq. (17) we find:

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<sup>20</sup> In Bean (1994) the reservation wage should include not only the unemployment benefits but also the marginal utility of leisure. The author shows that assuming a standard isoelastic utility function that includes leisure and consumption, the reservation wage becomes a linear function of the level of per capita consumption (see Bean, 1994), footnote 2, p. 527). As an example, using a Cobb-Douglas utility function of the kind:  $c^\alpha (\bar{h} - h)^{1-\alpha}$  where  $\bar{h}$  is the time endowment and  $h$  the labor time, the standard equilibrium condition ( $U_c / P_c = U_{(\bar{h}-h)} / w$ ) implies that  $\bar{w} = (1 - \alpha)c / \alpha \bar{h}$  (Bean, 1994, footnote 2, pg. 527). In the model we retain Bean's insights without considering explicitly the labor leisure choice.

<sup>21</sup>The reverse is also possible when poor regions are overrepresented instead. In this case poor regions would moderate the wage rate in the richer regions boosting private investment and growth in the latter ones. Thus the growth effect of centralized bargaining is not univocally defined in sign but depends on the political equilibrium and the type of institutions regulating regional unions.

$$(23) \quad l = A^{\frac{1}{\alpha}} \left( \frac{1-\alpha}{\varphi} \right)^{\frac{1}{\alpha}} k' c'^{-\frac{1}{\alpha}} (1-\tau)^{\frac{1}{\alpha}},$$

where  $k'$  is the private to public capital ratio,  $k/p$  and  $c'$  is the consumption to public capital ratio,  $c/p$ .

By re-writing eq. (8)-(10) for the case of  $l < 1$  and then substituting for  $l$  we find the new conditions for balanced growth corresponding to those defined by eq. (11) and (12) above. The formal derivation of these conditions and the relevant phase diagram are shown and discussed in Appendix 1.

Again, the balanced growth path of the economy can be analyzed by inspecting the equation of motion of public capital, that in this case turns out to be as follows:

$$(24) \quad \frac{\dot{p}}{p} = (\tau + v) A S \tilde{k}'^{\alpha} \tilde{l}^{1-\alpha} = (\tau + v) A^{1-\alpha} S \tilde{k}' \left( \frac{1-\alpha}{\varphi} \right)^{\frac{1}{\alpha}} \tilde{c}'^{\frac{\alpha-1}{\alpha}} (1-\tau)^{\frac{1-\alpha}{\alpha}}$$

where  $\tilde{k}'$  and  $\tilde{c}'$  are the steady-state values of  $k'$  and  $c'$  defined in Appendix 1.

**Table 1. Numerical simulation of long run growth rates<sup>22</sup>**

	$\varphi$	$\alpha$	$\tau$	$S$	$\rho$	$\theta$	$A$	$v$
Range	1-3	0.3-0.5	0.1-0.4	0.1-1	.01-.04	1-3	0.1-2	(-0.1)-0.2
$\frac{\partial \dot{p}/p}{\partial .}$	-	+	+	+	-	-	+	+

The analysis presented above for the case of a perfect labor market still holds here. Table 1 shows that there is a positive relationship between  $\tau$  and long run growth up to a value of the tax rate amounting to about 40%. For greater values the two zero growth lines of the phase diagram do not cross each other and there is no solution. The signs of the derivatives with respect to  $\varphi, A, S$  are as expected (see Table 1 for all the intervals of plausible values). Moreover, the numerical simulations show that any increase in labor market rigidity,  $\varphi$ , lowers the long run growth rate of the economy whereas both a higher  $A$  and a higher  $S$  foster growth. Not surprisingly an increase of  $v$ , the transfer rate, is also positively linked to growth.

<sup>22</sup> The simulations are performed using the program *Mathematica* 8. Results and programs are available upon request.

### 3. Calibration and model results

To assess the quantitative plausibility of our model, in this section we focus on the well-known historical case of the North-South regional divide in Italy. Data from 1861 onwards have been made available recently. In the following we discuss the main occurrences that characterize this long time span and how it can be divided in sub-periods for the sake of our calibration exercise. In Appendix 2 we give additional information on the economic history of the North-South divide and on the references in the economic literature on which the parameter values used in our calibration for each subperiod are based.

Looking at the quantitative history of the North-South gap, it is not difficult to single out three main sub-periods (see Figure 2) -- namely, 1861-1951, 1951-1971 and 1971-2004.<sup>23</sup> The first sub-period is strongly characterized by divergence, although until 1881 the gap between the two areas was negligible. Things changed profoundly with industrialization. Industrialization caused divergence worldwide and Italy was no exception. Divergence took place from 1881 to 1951. In 1951 two decades of convergence began as the result of the interaction between market and policy factors. In fact a mix of relative flexible labor market institutions, enhanced human capital levels and the adoption of (centrally managed) regional policies in favour of the backward Mezzogiorno appeared to advance convergence between North and South.<sup>24</sup> The picture, however, changed again at the end of the Sixties, when convergence suddenly ended as two significant institutional changes were introduced: wage determination became independent from the conditions of the local labor markets and a number of governmental functions were decentralized.

In the following, our model is simulated in order to assess its capacity to mimic these major shifts in the North-South gap, and to assess whether decentralization was a cause of the reversal of convergence in the 1970s.<sup>25</sup> To this aim we need to calibrate the following parameters using values based on the economic history of the Italian regional divide: productivity ( $A$ ), the index of labor market flexibility ( $\varphi$ ), the tax rate ( $\tau$ ), the interregional transfers of public funds ( $\hat{t}$ ), and the endowments of social capital ( $S$ ). The other parameters-- namely,  $\alpha$ ,  $\theta$  and  $\rho$  -- are given values in line with those widely used in the literature on economic growth (see Table 2 below).

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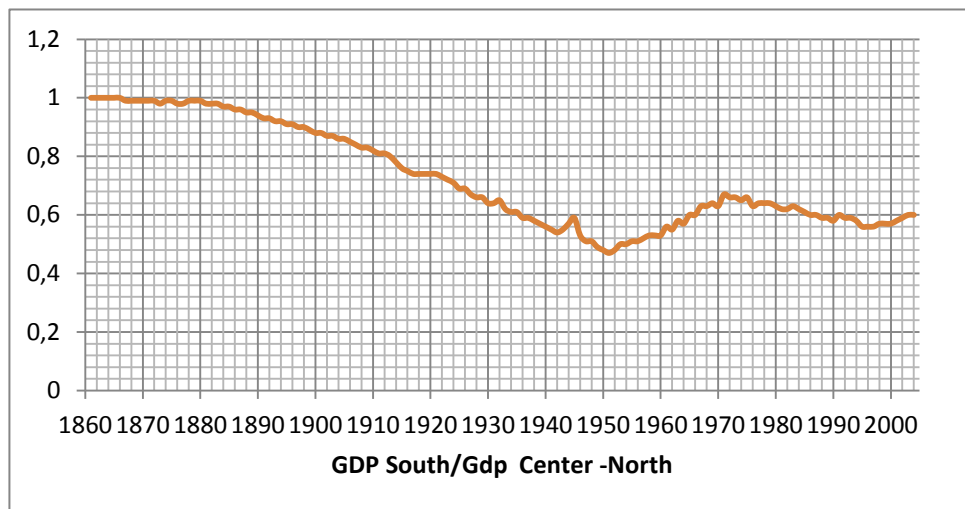
<sup>23</sup> The issue of how large the initial gap was is an important and still debated point. Nevertheless the dynamic pattern shown in Figure 1 is substantially confirmed by new data recently made available by Brunetti *et al.* (2011). The growth rates for the three sub-periods on which our analysis focuses are very similar in the two available series. Therefore, in the following we use the Daniele-Malanima series with no loss of generality. The two series do differ in the initial levels. While in Daniele-Malanima the gap between the South and the Center-North is virtually zero, in the more recent data the 1871 per-capita income of the South turns out to be 84.5% of the Center-Northern one.

<sup>24</sup> Some convergence had materialized not only in per capita GDP, but also in TFP, as Di Liberto *et al.* (2008) have recently shown.

<sup>25</sup> Similar views are not new in the literature on the Mezzogiorno: see for instance Helliwell and Putnam (1995), Felice (2007a,b), and Leonardi (1995), among others. However, to our knowledge, this paper is the first systematic attempt to offer an explanation of the dynamics of the Mezzogiorno's gap based on the interaction between high public spending in the area and the continuous presence of low local endowments of social capital in the same area, in conjunction with an increased "spatial" rigidity of the labor market. For recent, detailed evidence on regional heterogeneities in the functioning of local governments, see the studies by Banca d'Italia discussed in Cannari *et al.* (2009).

We parameterize  $A$  by relying on data on human capital. In particular, we use the data on literacy rates from Gagliardi and Percoco (2010). In the first sub-period, 1861-1951, the value of  $A$  in the Center-North was about twice that of the Mezzogiorno. In 1951-1970 the regional gap in literacy rates was virtually closed.<sup>26</sup> As for the absolute values of the parameter, we calibrate its initial value for the Mezzogiorno using as our target the area's average growth rate in that period (0.49%). The implied value is 0.09, so that the initial value for the Center-North is set to 0.18. In the subsequent periods, the values of  $A$  are set taking account of the North-South ratios defined above.

**Figure 2. Per capita GDP, Mezzogiorno/Center-North, 1861-2004**



Source: Daniele and Malanima (2007)

As regards  $\tau$ , values for the initial period are taken from Zamagni (1998), who reports a value of 14% for both areas. For the two other sub-periods, the values increase constantly and are higher in the Center-North due to the growing weight of the progressive income tax (Ceriani *et al.*, 1992). We set  $\tau$  equal to 0.23 and 0.30 for the South in the two periods, and to 0.32 and 0.34 for the Center-North).

We do not have direct estimates of  $\nu$ , but most historians agree with Nitti (1900) that the flow of transfers was from the South to the North rather than the other way round,<sup>27</sup> implying a small negative value of  $\nu$  (-0.03) for the Mezzogiorno. From 1951 onwards things changed significantly and the South became for the first time the beneficiary of large flows of public funds from other regions. While again we do not have data on  $\nu$  for this second sub-period, recent data on interregional flows of public funds estimate at around 16-18% of the Mezzogiorno's GDP the total value of the public resources transferred to the area in 2004-2006 and not funded with tax revenues raised in the Southern regions.<sup>28</sup> Moreover, we know from Cannari *et al.* (2009) that the funds for regional policy available in the South increased significantly, as a percentage of the Italian GDP, between the 1960s and the two

<sup>26</sup> Similar values can be obtained from Table 2 in Di Liberto (2001).

<sup>27</sup> Note everybody agrees with Nitti, however. See for instance Cafagna (1965).

<sup>28</sup> This estimate is based on data obtained from Staderini e Vadalà (2009), Table 2.



subsequent decades. In our simulation  $v$  is set equal to 11% in the Mezzogiorno and to -3% in the Center-North, in 1951-1970;<sup>29</sup> and to 18% and -7%, respectively, in 1971-2004.

As regards  $\varphi$ , our parameter for flexibility in the labor market, a number of significant changes took place between 1861 and today. In our model, the evolution of the labor market rigidity is captured by a rising value of  $\varphi$ . This parameter is defined by equation (22). Using the values we assigned to  $\alpha$  and  $\theta$ ,  $\varphi'$  turns out to be around one. Setting the  $c_m/c$  the median to the mean consumption ratio in the range of 1-1.5 (with the latter value referring to the centralized system in which the workers from the richer regions set the wage rate for the whole country), the range for the  $\varphi$  values is defined: one is its minimum value, with maximum territorial flexibility, and 1.9 is its maximum value obtained in the presence of centralized bargaining dominated by the Northern delegates. Therefore, we set  $\varphi$  equal to 1.0, the value for maximum flexibility, for both the South and the North in the first sub-period, to 1.75 in the second one, and 1.84 after 1970, when the abolition of the "wage cages" allowed for a highly centralized wage setting.

Following Putnam (1993) and the large literature that points to the high persistence in time of the initial differences in the local stocks of social capital, we use a unique estimate of social capital and assume that its Northern/Southern ratio is constant for the whole period.<sup>30</sup> The values for the iceberg costs in the two regions and for Italy as a whole are taken from Golden and Picci (2005), a paper which yields a direct estimate of those costs at the regional level. In particular, the authors compute the difference between the actual regional public capital levels measured in 2000 by an empirical survey and the capital that one gets with the standard method of permanent inventory. The results of this exercise are remarkable. All Southern regions present a gap between the public capital implied by the investment flows and the actual public capital. Had the Mezzogiorno not wasted the public resources, its stock of public capital would now be far above the Italian average.<sup>31</sup> Moreover, the index computed by Golden and Picci (2005) turns out to be strongly correlated with Putnam's indexes of social capital. Their calculations imply that, setting the Italian average equal to 1, the index in the Center-North is about twice the one recorded in the South. Being an iceberg cost,  $S$  in our model ranges within the zero-one interval. Assuming that iceberg costs are non-zero even in the Center-North, we pin down the value for  $S$  in this area at 0.7 and at 0.4 in the South whereas its value for Italy as a whole is set to 0.6.

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<sup>29</sup> The Center-North's GDP is on average about three times larger than the South's GDP.

<sup>30</sup> Estimates of regional social capital in different periods of time are rare even for the Italian case. Nuzzo (2006) is an exception. As Felice (2012) points out, Nuzzo's estimates confirms that the regional differences in social capital are rather stable over time.

<sup>31</sup> As Leonardi (1995) puts it, "It is clear that when large amounts of funds are made available without operative oversight, accounting, and evaluation criteria the opportunities for abuse and corruption are great. In the case of Southern Italy the criminal organizations were able to operate under conditions where controls were lax and the tolerance of corruption high." (p. 174).

We use these restrictions on the parameter values of equation (24) in order to compute steady-state growth rates for each of the three sub-periods. Since the information we have about  $A$  concerns its relative (Center-North/South) rather than absolute value, we choose those absolute values that allow us to get as close as possible to the actual growth rates observed in the first sub-period.

The parameter values on which our simulations are based are shown in Table 2. In this table, the parameters under the label "technology/utility" are those assumed to be unaffected by regional policy, so that their values are kept constant across time and geography. "Policy" parameters are those that in our model are influenced by regional policy. Among them are policy parameters in the strict sense, such as  $\varphi$ ,  $\tau$  and  $\nu$ , as well as  $A$ , assumed to depend on investment in education, and  $S$ , assumed to depend on the level of decentralization adopted by the State.

**Table 2. Parameter values**

	Parameter	Values					
		1861-1951		1951-1971		1971-2004	
		M	CN	M	CN	M	CN
Tecnology/Utility							
	$\alpha$				0.25		
	$\rho$				0.018		
	$\theta$				1.7		
Policy							
	$\varphi$	1.0	1.0	1.75	1.75	1.84	1.84
	$\tau$	0.14	0.14	0.23	0.32	0.30	0.34
	$\nu$	-0.03	0.014	0.11	-0.03	0.18	-0.07
	$S$	0.61	0.61	0.61	0.61	0.40	0.70
	$A$	0.09	0.18	0.30	0.30	0.33	0.33

*M: Mezzogiorno; CN: Center-North.*

**Results.** When we use Table 2 to parameterize our model, we obtain the steady-state per capita GDP growth rates shown in Table 3 below. In particular, the two bottom rows in Table 3 show the actual growth rates of the Mezzogiorno relative to the Center-North and the simulated ones under our parameterization, for each of the three sub-periods (as noticed above, the South's growth rate for 1861-1951 is our calibration target).<sup>32</sup>

Table 3 shows that the estimated growth rates follow closely the pattern of the actual ones. In the first sub-period, the Center-North grows faster due to the significant difference in productivity uncompensated by fiscal policy. In the second sub-period, our model does generate the Mezzogiorno's strong convergence observed in the real data, with the main role in this process taken by the large amount of resources transferred to the South by the central State and used (with relative efficiency) to foster public investment. In the model, convergence is based on growth rates smaller than those actually observed. This is perhaps not surprising, since we do not allow for changes in the number of

<sup>32</sup> The simulation is performed using *Mathematica* 8. The program first finds the solution for  $c'$  and  $k'$ , then solves for the balanced growth rate defined by equation (22). The simulation results are available upon request.

people actively participating in the labor market, nor for the fast migration from agriculture to higher productivity sectors in a context characterized by the opening up of international markets -- two factors known to have yielded additional support to the Mezzogiorno's performance in this sub-period.<sup>33</sup>

**Table 3. Actual and simulated outcomes: growth rates and unemployment**

	Average annual growth rates, %					
	1861-1951		1951-1971		1971-2004	
	M	CN	M	CN	M	CN
Actual Growth	0.49	1.35	6.56	4.62	1.87	2.23
Simulated steady-state Growth	0.49	1.38	4.99	4.27	4.47	4.65
Actual Unemployment	n.a.	n.a.	6.7	4.6	14.6	6.6
Simulated Unemployment	17.3	16.3	6.52	4.76	15.0	7.47

*M: Mezzogiorno; CN: Center-North.*

The third sub-period reflects a more complex scenario, with both the wage bargaining reform and decentralization entering the scene (while  $S$  in the previous subperiods reflects the average Italian level of social capital, due to decentralization in this final subperiod  $S$  reflects the different levels of social capital in the two macro areas of the country). As expected, their combined effect of the two reforms offsets the positive impact exerted on the Mezzogiorno's growth rate by the *increased* amount of public resources (as we have seen in section 3,  $d\dot{p}/p/d\tau > 0$  for the range of values taken by  $\tau$  in our calibration exercise). This offsetting mechanism brings convergence comes to a halt.

Interestingly, our simulation shows that, in terms of our model, the wage bargaining reform by itself would not have been enough to halt convergence: in the absence of the decentralization effect, convergence – although weakened – would have taken place anyway. To offset the strong growth-enhancing effect of taxation implied by the steady-state solutions of our model, the gap in the regional endowments of social capital turns out to be the only one with the appropriate magnitude (in the presence of decentralization) to reverse the process of convergence.<sup>34</sup>

The model is also able to generate equilibrium unemployment values together with equilibrium growth rates. Even though the working of the labor market was not the main focus of our analysis (for instance, the imperfect labor market depicted in our formal model is a very simplified one), the calibration exercise does imply plausible results for unemployment in the two areas. While in terms of absolute values only the simulated results for the 1951-71 period are close to the real ones (for 1861-1951 the actual labor market data are not available),<sup>35</sup> nevertheless our simulations do capture the

<sup>33</sup> In particular, the growth-enhancing effect of changes in the sectoral mix has been quantified by Paci and Pigliaru (1997).

<sup>34</sup> As regards the assumption of no capital mobility, the latter would be a problem for our results if it yielded an alternative explanation of why convergence came to a halt after 1971. However, in our simulations (i) returns on capital turns out to be higher in the South than in the Center-North in 1951-71; and (ii), this gap further increases after 1971 once we control for the process of decentralization. So, in the absence of decentralization, we would expect capital still flowing from Center-North to South even after 1971 and this of course would not yield an explanation for the halt of convergence.

<sup>35</sup> Besides data availability, a word of caution is necessary. The model does not allow any change in the labor force participation rate since population and labor forces coincide. Nevertheless, the activity rate changed significantly and

long run trend of relative unemployment, with unemployment in the South growing -- as expected -- much higher than in the Center-North as the result of the post-1971 increased rigidity in wage bargaining.

Overall, our model generates quantitatively plausible results. In particular, the divergence-convergence-divergence sequence observed in the actual data is clearly mirrored by the simulated pattern of growth, as well as the time pattern of unemployment in the two areas.

Finally, a note of caution. While our simulations do replicate the reversal of convergence that took place after 1971, the simulated growth rates of the two areas are however significantly larger than the observed ones. This problem arises from the need to keep our analysis simple. In particular, the model we have developed is a closed-economy one, in which taxation has a strong positive effect on steady-state growth, and shocks from the international marketplace are not accounted for. From the Nineties onward, two important growth-hampering factors took place in Italy. The first was the need to use part of the national tax revenue to cut the high public debt in order to join the Euro area, rather than funding further public investment. The second was the shock caused by globalization on the Italian exports. Both factors played a role in lowering the two regions' growth rates and both of them are beyond the reach of our simplified model.

More generally, our results suggest that decentralization or even a stricter fiscal federalism (i.e.,  $v = 0$ ) could have uncertain consequences in terms of growth, depending on the degree of heterogeneity of the levels of social capital across the territories involved in the process of decentralization. In this respect, the model we develop in this paper can be relevant also for the debate about the growth effects of decentralization and fiscal federalism. Although many authors underlined the positive effects of empowering local institutions (Tiebout, 1956, Musgrave, 1959, Oates, 1972), some recent empirical contributions are less optimistic (for instance, Davvodi and Zou, 1998; Feld, Zimmermann and Döring, 2004; Rodriguez-Pose and Ezcurra, 2011). Our model provides a possible reason for these empirical findings, in that it suggests an important additional conditional variable: social capital. A low level of social capital has a negative impact on the functioning of local government institutions, and the existence of this link can offset the theoretical positive effects attributed to decentralization..

#### 4. Conclusions

In this paper we have focused on how political decentralization can modify the relationship between social capital and within-country growth rates. In particular, we describe a mechanism by which a low endowment of social capital of a lagging region may become a binding constraint for economic growth mainly *as a consequence* of the process of decentralization of governmental functions.

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asymmetrically among regions in the period and the impact of discouraged workers has been relevant in the Southern regions, again affecting the activity rate. These caveats suggest that simulated unemployment rates and actual ones should be compared with care and more emphasis should be put on the path of the unemployment differentials between the two regions.

Our hypothesis is set up formally by means of a growth model in which social capital affects the economy through its influence on the effectiveness of government institutions in providing public capital. We have modelled this latter channel as iceberg costs attached to the process by which tax revenues and grants are transformed into new public capital. In particular, since social capital exerts its influence mainly on local institutions, decentralization amplifies the negative effect of a low local endowment of social capital on the provision of public capital and, consequently on growth.

To assess the quantitative plausibility of our main hypothesis, we have focused on the Italian regional divide, an often-quoted case which is supposed to yield strong support to the idea that social capital exerts a persistent effect on economic outcomes. We have used the vast empirical literature on the Italian economic history to restrict the values of the parameters in our model. Our model calibration yields results that are consistent with the observed pattern of long-run regional growth in Italy and unemployment rates. Moreover, they strongly support the idea that decentralization has been the key determinant of the halt of convergence. Our results suggest that the adoption of traditional growth-enhancing fiscal policy together with decentralization of governmental institutions may lead – in the presence of large heterogeneity of social capital – to unfavourable outcomes for the weaker territories. From a policy viewpoint, our results point out that not all territories may be ready to profit from devolution at the same time. In order to maximize a country's growth rate decentralization might therefore proceed at different speed across different territories.

Finally, our results have implications for the debate on growth and fiscal, political and administrative decentralization. In particular, our model has the clear-cut implication that decentralization can be the source of within-country economic divergence in the presence of large heterogeneity of social capital. Less clear-cut are the implications concerning the effect of decentralization on the whole country's growth rate. While additional research is clearly needed here,<sup>36</sup> one interesting possibility is that by adequately controlling for social capital, some light might be shed to explain the ambiguous empirical results recently reported on the effects of fiscal federalism on cross-country growth rates (Feld, Zimmermann and Döring, 2004; Rodriguez-Pose and Ezcurra, 2011).

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<sup>36</sup> Using a panel dataset from waves of international PISA tests in 42 countries, Hanushek et al. (2011) find that "decentralization of decision-making ... may be conducive to student achievement in well-developed systems but detrimental in low-performing systems". The mechanism proposed in the present paper, with its emphasis on the within-country distribution of social capital as a key factor to shape the aggregate effects of decentralization, could help explain this interesting cross-country evidence on schooling achievements.

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## Appendix 1. Balanced growth with an imperfect labor market

We re-write equations (8)-(10) for the case of  $l < 1$ :

$$(A1) \quad \frac{\dot{p}}{p} = (\tau + v)ASk'^\alpha l^{1-\alpha}$$

$$(A2) \quad \frac{\dot{c}'}{c'} = \frac{1}{\theta}(\alpha k'^{\alpha-1} l^{1-\alpha}(1-\tau)A - \rho) - \frac{\dot{p}}{p}$$

$$(A3) \quad \frac{\dot{k}'}{k'} = k'^{\alpha-1} l^{1-\alpha}(1-\tau)A - \frac{c'}{k'} - \frac{\dot{p}}{p}$$

We then substitute for  $l$  using eq. (21) in the text and find the new conditions for balanced growth. The zero growth curves for  $k'$  and  $c'$  now are:

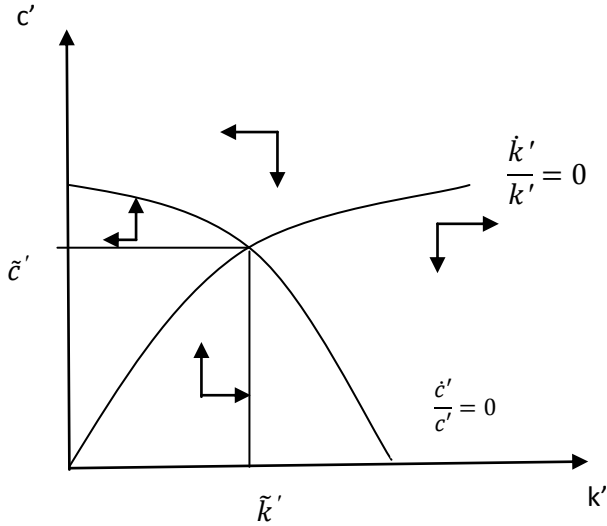
$$(A4) \quad \frac{\dot{k}'}{k'} = 0, \quad c' = \left(\frac{1-\alpha}{\varphi}\right)^{\alpha(1-\alpha)} k'^\alpha A(1-\tau)^{1-\alpha} [(1-\tau) - (\tau+v)Sk]^\alpha$$

$$\text{with } \frac{\partial c'}{\partial k'} > 0; \frac{\partial^2 c'}{\partial k'^2} < 0 \text{ if } k' > \frac{\tau}{1-\tau} S$$

$$(A5) \quad \frac{\dot{c}'}{c'} = 0, \quad c' = \left(\frac{\rho}{\theta}\right)^{\frac{\alpha}{\alpha-1}} \left(\frac{1-\alpha}{\varphi}\right) (1-\tau) A^{\frac{1}{1-\alpha}} \left[\frac{\alpha}{\theta}(1-\tau) - (\tau+v)Sk'\right]^{\frac{\alpha}{1-\alpha}}$$

$$\text{with } \frac{\partial c'}{\partial k'} < 0; \frac{\partial^2 c'}{\partial k'^2} > 0 \text{ if } \left(\frac{\alpha}{\theta} - \frac{\tau}{1-\tau} Sk'\right) > 0$$

Figure A1. Phase diagram



It is straightforward to show that a stable arm exists and also the steady state values of  $\tilde{c}'$  and  $\tilde{k}'$ . Let us now analyze the growth effects associated to changes in the parameter values. A rise in the tax parameter  $\tau$  on  $\tilde{c}'$  and  $\tilde{k}'$  shifts downward both zero growth curves. As a consequence, while  $\tilde{c}'$  univocally lowers as  $\tau$  rises as in the case of a perfect labor market,  $\tilde{k}'$  can either rise or decline depending upon the relative downward shift of the capital zero growth curve. Therefore,  $\frac{\partial \tilde{c}'}{\partial \tau} < 0$ ;  $\frac{\partial \tilde{k}'}{\partial \tau} \leq 0$ . However, for a plausible range of the parameters

identifying the model, the numerical analysis shows that  $\tilde{k}'$  lowers in response of tax rate increases, implying again, as in the previous simpler case, that agents lower private investment when the net returns of private capital decrease as expected.

## Appendix 2. The economic literature on the Italian regional divide: a brief overview

In this section we go briefly through the main contributions of the economic literature on the Italian regional divide. This discussion is meant to provide background information for the model developed in section 3 and for the calibration exercise in section 4.

Since the late 1950s the wide economic gap of Italy's Southern regions has attracted a large amount of research from all over the world, especially from development economists (for instance, Chenery, 1962). Researchers were mainly interested in the remarkable magnitude and persistence of the Italian case within the more advanced countries: both characteristics are now well documented by Iuzzolino (2009). For a while, a strong process of convergence between 1951 and 1971 suggested that there was no real persistence, since the area seemed to be following the traditional path leading to a positive steady-state implied by a standard neoclassical model of growth.<sup>37</sup> Several contributions eventually discarded this optimistic view.<sup>38</sup> As the data recently computed by Daniele and Malanima (2007) make clear (Figure 2 above), convergence was a relatively short-lived process.

Two main features characterize the first of the three sub-periods used in the text -- namely, 1861-1951, 1951-1971 and 1971-2004. First, according to Daniele and Malanima (2007) a North-South divide had not yet materialized in 1861. Other datasets say a rather different story. In new data made available recently (Brunetti *et al.*, 2011), the 1871 per-capita income of the South turns out to be 84.5% of the Center-Northern one. The issue of how large the initial gap was is therefore an important and still debated point. Nevertheless, the dynamic pattern shown in Figure 2 is substantially confirmed by the new data. The growth rates for the three sub-periods on which our analysis focuses are very similar in the two available series. Therefore, in this paper we use the Daniele-Malanima series with no loss of generality.

The second feature is that from 1881 to 1951 a deep and prolonged process of divergence took place, mainly caused by the industrialization of the North. The difference in the regional stocks of human capital was then likely to be among the major sources of divergence: see Gagliardi and Percoco (2010). This important initial divide -- with the Southern literacy rate at roughly 50% of the Center-Northern one -- does characterize a large part of the period 1861-1951, with some slow improvement for the Mezzogiorno after 1911. Due to the

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<sup>37</sup>As Lucas (2000) shows, divergence is a necessary phase before a process of generalized convergence can materialize. Up to the seventies the Italian regional divide seemed to follow Lucas's prediction. Similarly, Barro and Sala-i-Martin (1991) optimistically concluded that "there is *nothing surprising* in the relative performances of the regions of Northern and Southern Italy. The South of Italy has not yet caught up because it started far behind the north, and the rate of convergence is only about 2 percent a year" (Barro and Sala-i-Martin, 1991, p. 151).

<sup>38</sup> See Iuzzolino (2009) for the relevant references.

educational public policy,<sup>39</sup> and also to the demographic inertia, it was only after World War II that one could observe the literacy rate approaching a value around 60% in the South.

It is important to underline that in the 1861-1951 period, fiscal and regional policy were also biased against the Mezzogiorno. Since the fiscal system in place weighted in favor of indirect taxation, it implies *de facto* a higher average tax rate for the poorer Mezzogiorno, as Parravicini (1986) shows. According to other estimates, up to one third of the national tax revenues originated in the South, whose GDP represented, however, only one fourth of the Italian one (Felice, 2007b, p. 30). Despite this large fiscal contribution, the South was not linked to any systematic regional policy aimed at favoring the region's economic development: see Castronovo (1976) and Zamagni (1981). In a classical study on the Italian fiscal policy at the beginning of the XIX Century, Nitti maintained that resources were systematically drained from the South to finance public investment in the Northern regions (Nitti, 1900). The Fascist regime did not represent a radical change of the former policy with the exception of the metropolitan area of Napoli (Castronovo, 1976).

As for the labor market, it was almost perfectly flexible in the period 1861 to 1900. From 1900 to around 1920, excluding wartime, the Unions' power increased but the labor market was still spatially flexible. Then Fascism rose to power and with it a rigid control over wages took place. The mechanism in place, the so called "tabelle salariali" (wage tables), entailed specific and detailed wage differentiations by sector, geographic area, sex and age. In these tables, wages were up to 50% lower in the South: see CGIL (2004).

In 1951, the long phase of divergence came to an end and convergence began as the result of the interaction between market and policy factors, as elsewhere in Europe in the same period.<sup>40</sup> Nevertheless in the Mezzogiorno, this general process was enhanced by three factors. First, the gap of the Mezzogiorno's stock of human capital had significantly diminished in relative terms (Di Liberto, 2008). Second, wages were still allowed to be set at lower levels in the backward areas. In fact, after a short period of formal suspension, the "tabelle salariali" of the fascist era became known as "gabbie salariali" (wage cages) which allowed wage settings to reflect lower cost of living and, to some extent at least, local labor market conditions (see again CGIL, 2004). On average, during this period the Mezzogiorno's unit labor cost in the industrial sector was estimated to be around 80% of the Center-North's, while in other sectors differentials were larger (Boltho *et al.*, 1997). Third, fiscal policy changed, at last, in favour of the Mezzogiorno. In fact, after World War II, for the first time the Southern regions became the beneficiaries of large flows of public funds from other regions. These flows were used and managed by the central State mainly to improve the locally available stocks of physical infrastructures.<sup>41</sup> A central role was initially played by the national special Agency "Cassa per il Mezzogiorno" (Felice, 2010; Zamagni, 1981). This central Agency was initially designed to be independent from political influences at all levels of government. During its initial phase of activity (1950-1958), the Agency focused on augmenting the stock of public infrastructures in the Southern regions. This phase is generally regarded as a successful one:

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<sup>39</sup> One of the reason for this difference is that until 1911 schools were financed by municipalities and consequently the paucity of resources for Southern schools was extreme (Felice, 2007b). After 1911 schooling started to be financed by the central government, but the coming of World War I set up other budget priorities.

<sup>40</sup> Temple (2001) identifies the period 1950-1973 as the "Golden Age" of economic growth in Europe, based on what the author defines as "the TFP bonus of structural change". Temple's evidence is based on data at the country level. Robust evidence that a similar mechanism has also worked within countries also exists: for Italy, see Paci and Pigliaru (1997).

<sup>41</sup> The national bureau "Cassa per il Mezzogiorno" was responsible for the creation of a stock of public infrastructures in the Mezzogiorno.

Felice (2007a), D'Antone (2001). Immediately afterward, the Italian Parliament adopted a sequence of laws aimed at significantly weakening the independence of the Agency (Felice, 2007a). At the same time, the emphasis was shifted from building infrastructures to more active intervention aimed at favoring industrialization in the area (1958-1965). To this aim, the State imposed a large part of the new investments undertaken by large State-controlled manufacturing firms to be located in the South: in 1970 the share in investment and machinery in GDP was 30% higher in the South than in the rest of the country (Del Monte and Giannola, 1978; Boltho *et al.*, 1997).

This mix of labor market institutions and regional policies, centrally managed, appeared to favor convergence between North and South: see Di Liberto *et al.* (2008). The picture, however, changed again at the end of the Sixties, when convergence suddenly ended. A number of permanent changes characterized this phase, especially the two significant institutional changes mentioned above that took place after 1970. The first major change concerned the wage-setting institution: the “gabbie salariali” were abolished and new labor legislation, the “Statuto dei Lavoratori”, was adopted. The new rules dictated the sudden equalization of wage levels across areas and regions,<sup>42</sup> whatever the differences in the cost of living and local labor market conditions.

The impact of this institutional change was remarkable for the Mezzogiorno's economy. Since the majority of highly unionized workers lived in the North of Italy, the North was overrepresented in the resulting bargaining process. The set of rules and rights were suited to the more advanced North and the minimum national wage was set too high with respect to the labor market condition of the less developed regions (Mauro and Carmeci, 2002). This was a large shock for the competitiveness of the industrial sector of the Mezzogiorno.<sup>43</sup> Boltho *et al.* (1997) estimated that direct unit labor costs in the Southern area increased dramatically, from less than 80% of the Northern wage in 1970 to 95% ten years later.<sup>44</sup> At the same time, migration flows from the Mezzogiorno towards the Northern regions almost halted, partly as a consequence of the wage rate equalization across regions (Faini, 1994). All in all it is not very surprising that the regional unemployment rates started to diverge dramatically, from 8.2% in 1969 to 19.6 thirty years later (compared with a shift from 4.8% to 6.7% in the Center-North) (Svimez, 2011, Tab. 7, 466-469).

Regional policy was then intensively used to fight this increased unemployment. Transfers and subsidies to foster private investments were generously funded, this time with tax revenues collected in the Center-Northern regions. As a consequence, public expenditure in the South increased significantly from 1970 onwards.<sup>45</sup> In

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<sup>42</sup>The new set of rules has been blamed for introducing a lot of rigidity in the firing-hiring costs. In fact many economists (Bertola, 2006, for instance) holds this type of rigidity as the major cause of Italian unemployment. We believe that although these types of rigidity are indeed important, the bulk of Italian unemployment is caused by spatial rigidity as suggested by its extraordinary spatial heterogeneity.

<sup>43</sup> Interestingly, Germany is another case in which the adoption of a nation-wide wage-setting institution was detrimental to the convergence of the poorer (Eastern) regions. This initial choice was later partially abandoned and a higher degree of flexibility in the labor market was allowed. As a consequence, the Eastern regions entered a convergence path. See Carlin (2010).

<sup>44</sup> Similar calculations are reported in Bodo and Sestito (1991), who also show that measures designed by the State to limit the impact of the new collective bargaining rules on labor costs in the South were rather ineffective. In particular, Bodo and Sestito calculate that the increase in unit labor cost was only partially offset by the law that allowed – in the Southern regions – for the reduction of the social security costs that fall on the employer. On the impact on the Mezzogiorno's economy of the abolition of the “gabbie salariali” see also Faini (1994); Daniele and Malanima (2007); Iuzzolino (2009).

<sup>45</sup> These increased, large transfers of public money in favor of the South were made possible by an important reform in the Italian tax system. In 1973, taxation became more direct and progressive – a shift that created a large North-South divide in the “fiscal capacity” of the Italian regions. As a result, large transfers from North to South were regarded as necessary in order to offer a uniform quantity of essential public goods (health, education, security) to all Italian citizens, wherever they

particular, the funds made available by the central State for regional policy in the Southern regions increased, as a percentage of the Italian GDP, from an average of 0.70% before 1970 to an average of 0.90% in the 1971-1980 decade: see Cannari *et al.* (2009).

In theory, such an increase in public spending should have helped the South to overcome the shock created by the suddenly imposed rigidity in the local labor markets. However, this did not happen and since then the Mezzogiorno's gap settled at the high level described above.<sup>46</sup> Clearly the lack of effectiveness from the 70's onward of fiscal policies -- which had been growth enhancing in the 50's and 60's -- calls for an explanation. In this paper we have focused on the possibility that decentralization was responsible for this diminished capacity of public investment to foster aggregate growth. Until 1970 the local regional governments were not major players in the implementation of regional policies, with the relevant but limited exception of the "Statuto Speciale" regions (Valle d'Aosta, Trentino-Alto Adige, Sardinia and Sicily). As we have seen, in the 1951-70 period the central government and national bureau were strictly in charge of development policies and public investments. This setting changed significantly in the 1970s. As Helliwell and Putnam (1995) (see also Felice, 2007b) maintain, "in mid-1975 ... a law [was passed] authorizing the decentralization of important new functions to the regions. By mid-1977 agreements were reached that '... dismantled and transferred to the regions 20,000 offices from the national bureaucracy ... as well as hundreds of semi-public social agencies' " (p. 296). Decentralization, in other words, was a key feature of regional policy from 1970 onwards and a significant institutional difference with respect to the previous period. On this see Felice (2007a,b), and Leonardi (1995), among others.

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live. The poor growth performance of the South implied a stable "fiscal dependence" which has had an important role in the accumulation of Italian National Debt (Mauro, 2004)

<sup>46</sup>In fact, things went wrong for the Mezzogiorno well beyond what one can see in Figure 2. What Figure 1 does not show is the post-1970 relative performance of productivity (i.e., per worker GDP). The path of aggregate productivity differs significantly from the path of per capita GDP, in that productivity kept on converging. This evidence has been often interpreted as showing that the Mezzogiorno problem was mainly due the malfunctioning of the labor market, rather than to a wider problem concerning the determinants of productivity. However this view neglects the heavy weight of the public sector in the South, which biases the GDP per worker as a measure of productivity. When only the private sector is considered, its productivity time path reveals that here too divergence has been occurring since 1980. Optimistic views about the Italian divide are therefore out of place (Mauro, 2004).

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