

Spatial Labor Rigidity and Long Run Growth: the Case of Italian Regional Divide

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Abstract

We propose an endogenous growth model with public capital and an imperfect labor market to account for the long run regional development of the Italian economy. A stylized model of a monopolistic Union characterized by heterogeneity in its members' reservation wage creates a spatially rigid wage. We then include the above mechanism in a growth model where public investment is subject to installation costs and analyze the effects of policy changes in the period 1951-2004 on the long run growth and unemployment rate of the macro areas of Italy: Center-Northern and Southern.

The calibration exercise with parameters values grounded in the economic history literature is then performed. Our results indicate that two permanent institutional innovations deeply affected the long run dynamics of the Italian regional development, both in terms of growth and unemployment: the centralization of the wage bargaining and the decentralization of the governmental functions with the birth of the ordinary regions.

Keywords: *spatial labor rigidity, regional economic growth, regional unemployment, convergence, common national wage, decentralization, public investment, iceberg cost*

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In memory of Prof. Fabio Neri

Dear Fabio, you shared with us your love for economics, your enthusiasm and dedication have been always inspiring to us during all these years and will ever be.

Thanks Fabio

1. Labor market imperfections and long run Growth

The “classic dichotomy” (Lingens, 2004) between long run and short run typically implies that growth models do not analyze growth and unemployment simultaneously. In fact, the standard neoclassical growth model a’ la Solow-Cass-Koopmans with competitive markets based on the accumulation of physical capital with diminishing returns implies no link between long run growth and unemployment (Gordon, 1995). In steady state the economy grows at a constant exogenous growth rate and unemployment is null. Assuming some imperfection in the labor market implying an equilibrium unemployment would not change this conclusion. Two identical economies equal in all but for the labor market functioning would present different equilibrium unemployment rates and different levels of steady state per capita income. The economy with the worse labor market functioning (and with the highest equilibrium unemployment) would display the lower level of per capita income but the two economies will grow in steady state at the same exogenous growth rate without converging.

There is a caveat indeed. Along the transitional toward the steady state the economy shall display a relationship between growth and unemployment. Typically a permanent shock in the labor market spreads to the level as well as the transitional growth of income. To the extent that this transition is long lasting, the two dimensions can be linked, and even strongly. This has been shown both theoretically and empirically by Alonso et al. (2004) using a simple version of the Solow model with exogenous savings. Carmeci and Mauro

(2003) also using a neoclassical growth model but with endogenous savings show that labor market rigidity does indeed lower the output growth rate along the transitional path and the model implications are confirmed on a panel of 18 OECD countries for the period 1960-1990.

The issue is clearly the speed of convergence. To the extent that one is willing to accept a very low speed of convergence of economic systems toward the steady state, as recently re-stated by Barro (2012), the effects of labor market imperfections can have important growth effects and hence large welfare effects (economic growth being the most relevant welfare enhancing dimensions of all).

On the other hand, if the speed of convergence is rapid the growth effects of labor market imperfections will not last and the effects can be negligible.

Since the speed of convergence is still a controversial matter, it is not surprising that, when the scholars tried to account for the international evidence on long run trend in per capita income and unemployment rates, they turned their attention toward endogenous growth models that imply long run growth effects in response to permanent shock in the equilibrium unemployment.

Nevertheless, the implied links suggested by the literature are far from being clear-cut (Lingens, 2004).

An “inverted U” relationship between innovation and unemployment is derived in Aghion and Howitt (1991, 1992, 1994) where the authors consider both the re-allocation of jobs that accompanies the innovation processes as well as the positive effect on capital accumulation due to innovations.

Bean and Pissarides (1993) consider an overlapping generation growth model with an imperfect labor market where higher equilibrium unemployment lowers the pool of saving of the current generation that in turn lowers the growth rate of the economy. Daveri and Tabellini (2000), still in an overlapping generation context, consider a monopolistic union that is able to transfer all increases in labor taxes on firms. Firms observe decreasing returns to capital in trying to substitute costly labor factor and restrain capital investment lowering the growth rate of the economy. Saint Paul (1991), instead, in a stylized two sectors endogenous growth model inserts an “efficiency wage” mechanism that implies a positive relationship between unemployment and growth. The model by Bertola (1994) implies a negative link between growth and unemployment. Firms in his economy operate in a set up a’ la Grossman and Helpmann (1991) or Romer (1990) and they are subject to idiosyncratic shocks due to product innovations calling for labor force re-allocations. To the extent that rigidity of labor market prevents firms from adjusting their labor factor, labor market imperfections cause a lower innovation rate and a higher unemployment rate.

In Peretto (2000) model, pro-flexibility labor market reforms reduce entry costs, ease new entries and enlarge the scale of the economy, fostering growth and decreasing the unemployment further.

Carmeci and Mauro (2002) proposes a mechanism where unemployment affects a Mincerian human capital accumulation function. Under this assumption higher unemployment in a Lucas (1988)-Uzawa (1965) type of endogenous growth model implies less human capital accumulation and a negative long run relationship between growth and equilibrium unemployment.

As we have seen from the above short, and certainly partial, review of the literature the proposed links between growth and unemployment are different and frequently opposite in sign.

It is worth underlining however that the above contributions generally consider aggregate economies with aggregate imperfect labor markets. When dealing with dualistic economies such as the Italian economy this aggregate approach seems to be not very appropriate. In the proceeding, we therefore discuss the motivations that suggest an alternative approach and propose a simple institutional model for the labor market more suitable to account for the Italian case. Afterward this stylized labor market model is included in a standard neoclassical endogenous growth model with public capital and calibrated to mimic the Italian Dualistic history of unemployment and development from 1951 to 2004.

2. Spatial wage rigidity: a simple model

The standard approaches to account for equilibrium unemployment go under the taxonomy of: Search models, Efficiency wages and Unionized labor markets; all implying a rigidity of wage to unemployment. Which would it be the best suited to account for the Italian case?

The Italian labor market is, among the OECD, one of the most regulated and unionized. The wage bargaining is centralized and legally bounding all workers, unionized and non unionized, such that 82% of workers are covered by wages that are union contracts (Caponi, 2008). The bulk of unemployment is of a long run type and mainly concentrated in the Southern regions with the unemployment rates in the Northern regions in the median figures of the rest of Europe.

According to Brunello et al. (2001) the causes of the differences in Italian regional unemployment rates (and thus of Italian unemployment) are: a) Regional Demographic heterogeneity b) lack of labor mobility c) spatial wage rigidity d) centralized wage bargaining e) heterogeneous shock elasticity at re-

gional level. Therefore, it appears evident that one should dismiss the assumption of a nationally homogenous labor market and better define its rigidity or imperfections in a spatial sense.

It might be useful to start distinguishing two types of labor market rigidity: temporal rigidity and spatial rigidity. As for the first type, one could refer to those type of labor market imperfections that prevent the equilibrium wage to promptly adjust to shocks of different nature along time and in so creating unemployment. This is the type of unemployment typically linked to business cycle. Wages are more or less “temporally rigid” in the sense that react sluggishly to shocks so that unemployment adjusts instead. The time variations in unemployment do not cause the expected opposite time variation in wages reestablishing the pre shock equilibrium.

We could instead refer to the “spatial rigidity” of wages to define a situation where, within a country, regional unemployment rates differ and local wages do not adjust to local market conditions.

Blanchard and Katz (1992) were among the first to underline the importance of the interactions between the two. They found that in USA transitory idiosyncratic shocks at state level are absorbed mainly by migration instead of wage variation, suggesting a set up were the wage rigidity is coupled by some sort of sluggish labor mobility.

Still the Italian case seems to call for a mechanism more grounded on institutional mechanism and less so on temporary idiosyncratic shocks since the time path of Southern regions’ unemployment (see Figure 3) displays such an inertia to resemble a trend stationary variable more than a stationary one as it is expected for unemployment. Given the time profile of the Southern unemployment rate (see Figure 3), we are looking for shocks that are permanent in nature, which are thought to affect the equilibrium unemployment permanently and asymmetrically across regions.

Nevertheless, to account for the long run regional unemployment differentials we observe we need some extra ingredient: productive factor immobility. In facts, the assumption of a spatially rigid wage alone is not sufficient.

Clearly, integrated economies where capital and labor are perfectly mobile are expected to present a common wage rate and a unique capital return with no unemployment differentials.

It goes without saying that in a perfectly competitive set up with homogenous productive factors, wages adjust to local market conditions when they are spatially flexible, since in the medium run the wage differentials would foster migrations toward the economies with higher wages and capital investment in those regions with lower wages. In so doing, they would shift upward both the labor supply and demand in the economies with labor outflows. Whereas

the regions with higher wages would show specular movements in the supply and demand of labor.

However, even with the enforcement of a common national wage that initially would create regional unemployment differentials, migration would push the markets toward the equilibrium.

Therefore, in order to account for the large regional unemployment differentials that characterize the Italian case we must have a combination of productive factor immobility coupled with some spatial imperfection in the wage setting mechanism, bearing in mind that the two are reinforcing phenomena, since for example higher than equilibrium wage in a region will dampen migration and investment.

As for the lack of labor mobility scholars have underlined different causes besides a common national wage (see Faini et al., 1997; Cannari et al., 2000; Caponi, 2008): the presence of psychological costs of migration, the cost of housing, both of direct type and of opportunity type due to house ownership.

On the other hand, the physical capital flows in the “right” direction, are thought to be prevented by the lack of infrastructure, idiosyncratic local characteristics (e.g. geographical distance from the final markets), low level of human capital endowment, different levels of efficiency of the public administration, corruption and different levels of social capital.

While the presence of all these factors, causing frictions to factor mobility, are well established features of the Italian economy according to the literature¹, the existence of spatial wage rigidity remains to be explained. Is there a plausible explanation for the spatial wage rigidity since it implies such a large welfare loss? What mechanism prevents the real wage from lowering in the higher unemployment local markets, since it would favor the absorption of unemployment and foster the migration as well as physical capital investment towards those disadvantaged areas?

In the following, we build on Mauro et al. (2015) and present a stylized model of wage setting capable to produce a spatially rigid wage, a permanent type of distortion such that the wage might not respond to local labor market condition.

We consider a sub-national economy j that is part of an economic union that is populated by N infinitely-lived individuals, each endowed with one unit of time inelastically supplied to M firms. Private firms produce output (Y) using labor (L) and, private capital (K), taking the rival but non-excludable public capital (P/N) as given. The technology of the i -th firm is given by:

¹ See Caponi (2008) for a review.

$$(1) \quad Y_{i,j} = A_j K_{i,j}^\alpha L_{i,j}^{1-\alpha} (P_j / N_j)^{1-\alpha}$$

where all variables are implicitly a function of time.

The choice of a technology including public capital has been done to take into consideration the massive flow of public investment that since 1950 the birth of the Cassa del Mezzogiorno went to the development of the Southern regions, we will discuss that in the proceeding.

Normalizing N to one, the per capita output of region j can be defined as:

$$(2) \quad y = A k^\alpha l^{1-\alpha} p^{1-\alpha}$$

Firms operate in a competitive setup and are assumed to equalize marginal factor productivity to their factor costs, taking public capital as given. For the representative firm of a region:

$$(3) \quad w = (1 - \alpha) A (k / p)^\alpha p$$

$$(4) \quad r = \alpha A k^{\alpha-1} p^{1-\alpha}$$

where the first order conditions have been conveniently rewritten in per capita terms.

Our departure from perfect competition in the labor market is based on McDonald and Solow (1981), who considered a monopolistic and myopic labor union that maximizes the expected utility of its members:²

$$(5) \quad U(w)l(w) + (1 - l(w))U(\bar{w})$$

where barred w is the reservation wage net of taxation.

From equation (3):

$$(6) \quad l(w) = A^{1/\alpha} k (1 - \alpha)^{1/\alpha} p^{(1-\alpha)/\alpha} w^{-1/\alpha}$$

The utility of each member of the union is defined as:

$$(7) \quad U(w) = \frac{1}{1 - \theta} w^{1-\theta}$$

The standard result is that the union sets the wage in the region as a mark-up over the reservation wage:

$$(8) \quad w = (1 - \alpha(1 - \theta))^{1/(1-\theta)} \bar{w}$$

² We, in fact, use the simpler monopolistic union model presented in the first part of their contribution. The myopia of the union is an assumption that can be justified by the nature of the elective type of union we are considering, a common disease in elective institutions.

Following Bean (1994), the reservation wage \bar{w} , among other things, can be thought of as a linear function of the per capita consumption level. We now introduce an institutional assumption to model the spatial rigidity of the labor market. Building on Carmeci and Mauro (2002), we assume the labor union to be an elective institution in which elected workers' delegates display single-peaked preferences over wages. Therefore, equation (8) can be written as follows:

$$(9) \quad w = (1 - \alpha(1 - \theta))^{1/(1-\theta)} \bar{w}_m = \vartheta c_m$$

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 (9) as follows:

$$(10) \quad w = \vartheta c_m \frac{c}{c} = \varphi c$$

From Equation (10) and (9) the mark-up over the average consumption, φ is a function of technology parameters ϑ and the median voter delegate's consumption relative to the average per capita consumption. Let us analyze the two cases: centralized and decentralized wage bargaining. Under decentralized bargaining, the wage in each region is set by the unions' delegates, elected by workers of that same region, who display relative homogeneous per capita consumption levels. In terms of our model, the ratio c_m/c turns out to be equal or close to unity for all regions ($w/c = \vartheta$). Under decentralized bargaining, the regional wages differ, since the per capita regional consumption levels differ, and regions with higher (lower) c will display higher (lower) wages. Nevertheless the mark-ups over the average regional consumption is equal among regions since ϑ is a function of homogeneous parameters, and c_m/c is one for all regions. However, in a centralized bargaining setup, the delegates come from all regions and, thus, present heterogeneous per capita consumption levels. Assuming that they vote for their preferred wage on a majority basis, it is the median delegate's per capita consumption that matters. The mark-ups will now differ among regions for the c_m/c ratio is different from one since, now, its value depends on national c_m . In turn, the ratio w/c for the i^{th} region will be different, as it is now given by: $\vartheta \frac{c_{\text{national}_m}}{c}$. If the richer regions are overrepresented in the union, as in

the Italian case, the mark-up in the poorer regions will be set much higher than before the reform. As a consequence, in the less-advanced regions, wage turns out to be much higher than the value that would prevail under a

decentralized bargaining regime.³ In the long run, the higher wage with respect to productivity in the poor regions will lower investment and push unemployment up in those regions.

3. Spatial Rigidity and Growth

Given our simple model of wage setting of the elective type with median voter we can now turn on the dynamic general equilibrium, and model the savings.

Each agent in the sub-national economy is assumed to solve a standard inter-temporal maximization problem, where agents' preferences are proxied by an iso-elastic utility function of consumption (c):

$$(11) \quad \text{Max} \int_0^{\infty} \frac{1}{1-\theta} c^{1-\theta} e^{-\rho t} dt$$

subject to:

$$(12) \quad \dot{a} = (1-\tau)(ra+w) - c$$

$$(13) \quad \lim_{t \rightarrow \infty} e^{-\rho t} a = 0$$

where a is the cumulated asset; τ is the tax rate that is assumed homogenous among the regions.

Solving the problem yields the standard Euler condition:

$$(14) \quad \dot{c} = \frac{c}{\theta}((1-\tau)r - \rho)$$

After some algebra, we obtain the equation of motion of per capita private capital of the regional economy:

$$(15) \quad \dot{k} = Ak^\alpha l^{1-\alpha} p^{1-\alpha} (1-\tau) - c$$

As for the public sector, the only function of the government in the model is to invest in the public capital stock that provides a one to one public capital services without any additional costs.

³ The reverse is also possible when poor regions are overrepresented instead. In this case, the 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.

In order to obtain the public capital growth we now consider the regional government total purchase of capital goods denoted as I :

$$(16) \quad I = (\tau - \nu)(w + r a)$$

where τ is the tax rate assumed identical among the regions and ν is the transfer residual parameter that could be negative or positive depending on the region presenting a positive or negative fiscal residual. A positive ν implies that the region enjoy positive grants from the central governments and it can afford larger public investments.

However not all the flow of public investment are assumed to turn into actual public capital. Golden and Picci (2005) find that, in Italy, corruption accounts for the large difference between the actual public capital stock, as reported in surveys, and the hypothetical capital that the accumulation of public investment flows would imply in the long-run. They found, for example, that had a Southern region such as Calabria transformed all the flow of public investment into actual public infrastructure it would display a public infrastructure 40% above the Italian per capita average whereas it actually presents just 30% below it. There is therefore a large share of resources in the form of taxes and transfers that are wasted in a mix of corruption and inefficiencies. A possible way to capture this phenomena is to think of these inefficiencies as iceberg costs where only an amount S less than one of each unit of public investment is actually transformed into public capital and a fraction $1-S$ goes wasted.

The total government expenditure in the regional economy is just I . The actual increase in the public capital stock is I times the iceberg cost parameter S . Therefore after some algebra we obtain the law of motion of public capital with iceberg costs:

$$(17) \quad \dot{p} = S I = S k^\alpha p^{1-\alpha} l^{1-\alpha} (\tau + \nu) A$$

with $0 \leq \tau \leq 1$, $-1 \leq \nu \leq 1$.

Equations (6) and (10) define the equilibrium rate of employment implied by each level of private and public capital. Substituting into eq. (6) and taking into account taxation we find:

$$(18) \quad l = A^{1/\alpha} \hat{k} \left(\frac{1-\alpha}{\phi} \right)^{1/\alpha} (1-\tau)^{1/\alpha} c^{-1/\alpha}$$

where \hat{k} is the private-to-public-capital ratio, k/p , and \hat{c} is the consumption-to-public-capital ratio, c/p .

The whole dynamic of the model is defined by equations (17), (15) and the Euler equation. It is quite convenient to express the whole model using \hat{k} and \hat{c} . Using equation (4) the entire model is then summarized by the usual transversality condition and the following three differential equations:

$$(19) \quad \frac{\dot{p}}{p} = (\tau + \nu)AS\hat{k}^{\alpha}l^{1-\alpha}$$

$$(20) \quad \frac{\dot{\hat{c}}}{\hat{c}} = \frac{1}{\theta}(\alpha\hat{k}^{\alpha-1}l^{1-\alpha}(1-\tau)A - \rho) - \frac{\dot{p}}{p}$$

$$(21) \quad \frac{\dot{\hat{k}}}{\hat{k}} = \hat{k}^{\alpha-1}l^{1-\alpha}(1-\tau)A - \frac{\hat{c}}{\hat{k}} - \frac{\dot{p}}{p}$$

We then substituted for l and found the new conditions for balanced growth. The zero growth curves for \hat{k} and \hat{c} are :

$$(22) \quad \frac{\dot{\hat{k}}}{\hat{k}} = 0 \rightarrow \hat{c} = \left(\frac{1-\alpha}{\varphi}\right)^{\alpha(1-\alpha)} \hat{k}^{\alpha}A(1-\tau)^{1-\alpha} \left[(1-\tau) - (\tau + \nu)\hat{k}\right]^{\alpha}$$

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

and

$$(23) \quad \frac{\dot{\hat{c}}}{\hat{c}} = 0 \rightarrow \hat{c} = \left(\frac{1-\alpha}{\varphi}\right)^{\alpha(1-\alpha)} \hat{k}^{\alpha}A(1-\tau)^{1-\alpha} \left[(1-\tau) - (\tau + \nu)\hat{k}\right]^{\alpha}$$

$$\frac{\dot{\hat{c}}}{\hat{c}} = 0 \rightarrow \hat{c} = \left(\frac{\rho}{\theta}\right)^{\alpha/(\alpha-1)} \left(\frac{1-\alpha}{\varphi}\right) (1-\tau)A^{1/(1-\alpha)} \left[\frac{\alpha}{\theta}(1-\tau) - (\tau + \nu)S\hat{k}\right]^{\alpha/(1-\alpha)}$$

$$\text{with } \frac{\partial \hat{c}}{\partial \hat{k}} < 0; \quad \frac{\partial^2 \hat{c}}{\partial \hat{k}^2} > 0 \text{ if } \frac{\alpha}{\theta} - \frac{\tau}{1-\tau}S\hat{k} > 0.$$

We are now able to depict the implied phase diagram (Figure 1).

It is straightforward to show that a stable arm exists and also the steady state values \hat{k}^* and \hat{c}^* . Once the economy reaches the dynamic steady-state it grows at a constant rate that depends on the model parameters.

The balanced growth path of the region can be analyzed by inspecting the equation of motion of public capital, which, in this case, using equations (2), and (18), turns out to be as follows:

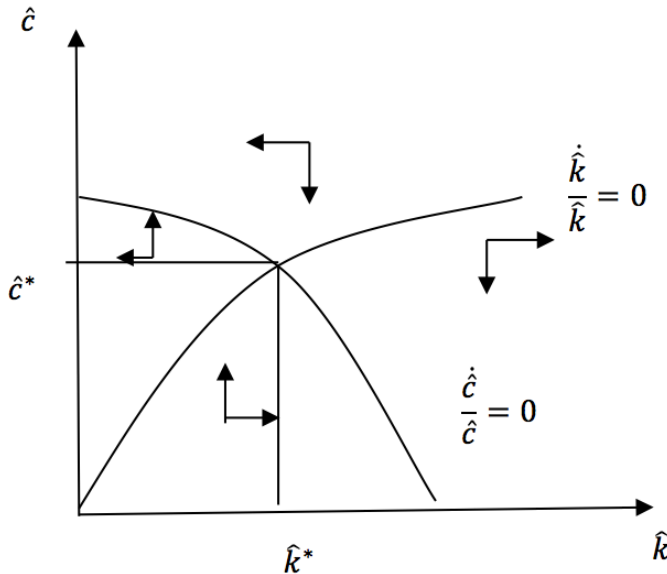
$$(24) \quad g = (\tau + \nu)AS\hat{k}^* \left(\frac{1-\alpha}{\varphi} \right)^{1/\alpha} \hat{c}^{*\frac{\alpha-1}{\alpha}} (1-\tau)^{\frac{1-\alpha}{\alpha}}.$$

Let us now analyze the growth effects associated to changes in the parameter values. A rise in the tax parameter τ on \hat{k}^* and \hat{c}^* shifts downward both zero growth curves. As a consequence, while \hat{c}^* univocally lowers as τ rises as in the case of a perfect labor market, \hat{k}^* can either rise or lower depending upon the relative downward shift of capital zero growth curve:

$$\frac{\partial \hat{c}^*}{\partial \tau} < 0; \quad \frac{\partial \hat{k}^*}{\partial \tau} \text{ greater or less than zero}$$

The signs of the derivatives with respect to φ , A and S are as expected. Moreover, the numerical simulations show that any increase in labor-market spatial rigidity, φ , lowers the long-run growth rate of the economy, whereas both a higher A and a higher S foster growth. Not surprisingly, an increase in the transfer rate is also positively linked to growth.

Figure 1. Phase diagram



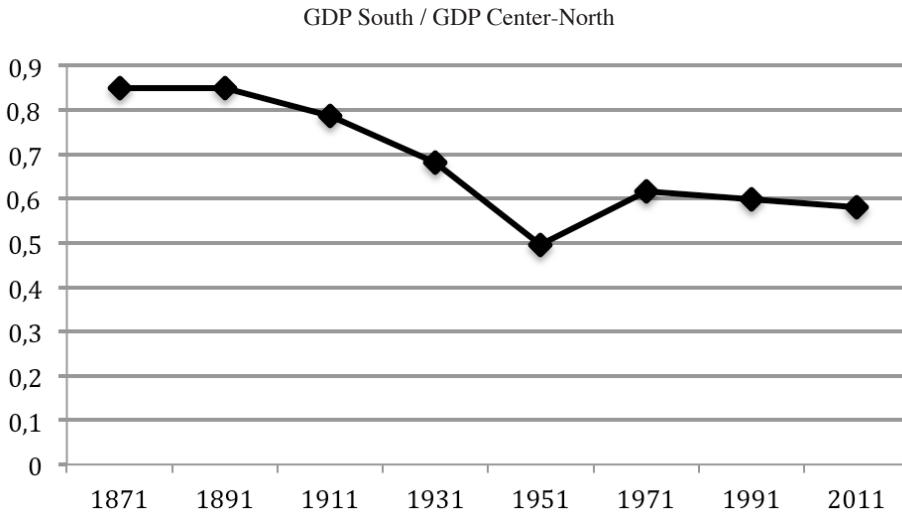
It is worth noticing that the model, at least in this version, assumes immobile capital. We decided to utilize the model in this version for the history of financial institutions of Italy show a very large and persistent dualism, with the Southern regions much more backward than the Northern ones (Giannola et al., 2012; Guiso et al., 2004). This dualism is so persistent and large that in year 2002 the Bank of Italy (Banca d'Italia, 2002) reported a 30% differential between the cost of credit in Northern (5.7%) and the Southern regions (8%), with some regions reaching 60% gap (Calabria with 9.4%). Therefore the assumption of a common national interest rate is hard to retain and the version of the model where capital is immobile seems more appropriate. In the calibration exercise, the iceberg costs will differ between the Southern and the Central-Northern regions after the devolution of 1970 and the values will be pinned down based on Golden and Picci (2005). In Mauro et al. (2015), the authors discussed the mobile capital and mobile labor cases. They also fully endogenized the inefficiency parameter S , assuming that public tenders are won by corrupted contractors which optimally chose the amount of illicit rents to seize, taking into consideration the probability of being caught, that in turn is linked to Social Capital.

4. Calibrating the model on the Italian economic history

In this section we shall go briefly through the main contributions of the economic literature on the Italian regional divide as well as the evolution of the Italian Labor market. This discussion is meant to provide background information for the calibration exercise reported in the next section.

Looking at the quantitative history of the North-South gap, it is not difficult to single out three main sub-periods (see Figure 2): 1861-1951, 1951-1971 and 1971-2004. The first sub-period is strongly characterized by divergence, although until 1881, the gap between the two areas was not so high (more on this in the proceedings). Things changed profoundly when industrialization of the Center-Northern started. Locally concentrated industrialization caused divergence worldwide, and Italy was no exception. This divergence process took place from 1881 to 1951. In 1951, two decades of convergence began as the result of the interaction between market and policy factors that we discuss afterward. The picture, however, changed again at the end of the 1960s. The convergence suddenly ended at the same time of two significant institutional changes: the centralization of wage bargaining and an important process of decentralization of governmental functions with the birth of regions.

Figure 2. The relative South/North divide, 1861-2011



Data from Felice (2015)

Let us now concentrate on the three main sub-periods -- namely, 1861-1951, 1951-1971 and 1971-2004. Two main features characterize the first sub-period. First, according to Daniele and Malanima (2007) a North-South dualism had not yet materialized in 1861. Other datasets say a rather different story. Felice (2015) states that the 1871 per-capita income of the South was 84.5% of the center-northern one. The issue of how large the initial gap was is therefore an important and still debated point among historians. Nevertheless, the dynamic pattern shown in Figure 2 is substantially similar among the proposed data sets. The growth rates for the three sub-periods on which our analysis focuses are very similar in the two available series.

In facts, all historians agree that from 1881 to 1951 a deep and prolonged process of divergence took place, mainly caused by the industrialization of the North of Italy. 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 educational public policy,⁴ and also to the demographic inertia, it was only after World War II that one could observe the literacy rate approaching around 60% in the South.

It is important to underline that during the 1861-1951 period, fiscal and regional policy were also likely to be biased against the Southern Italy. Since the fiscal system in place weighted in favor of indirect taxation, it implies *de facto* a higher average tax rate for the poorer Southern Italy, 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 (1900) maintained that resources were systematically drained from the South to finance public investment in the northern regions. The Fascist regime did not represent a radical change of the former policy with some exception for the metropolitan area of Naples (Castronovo, 1976).

As for the labor market, it was almost perfectly flexible in the period 1861 to 1891-1900 and no unions were allowed. Then wages were set at the local "Camere del lavoro" (the first was born in Milan in 1891) through a sort of local wage bargaining between employers and the newborn unions. 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.⁵ Nevertheless in the Southern Italy, this general process was enhanced by three factors. First, the gap of the Southern Italy's stock of human capital had significantly diminished in relative terms

⁴ One of the reasons for this difference is that up to 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.

⁵ 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 country level. Robust evidence that a similar mechanism has also worked within countries also exists: for Italy, see Paci and Pigliaru (1997).

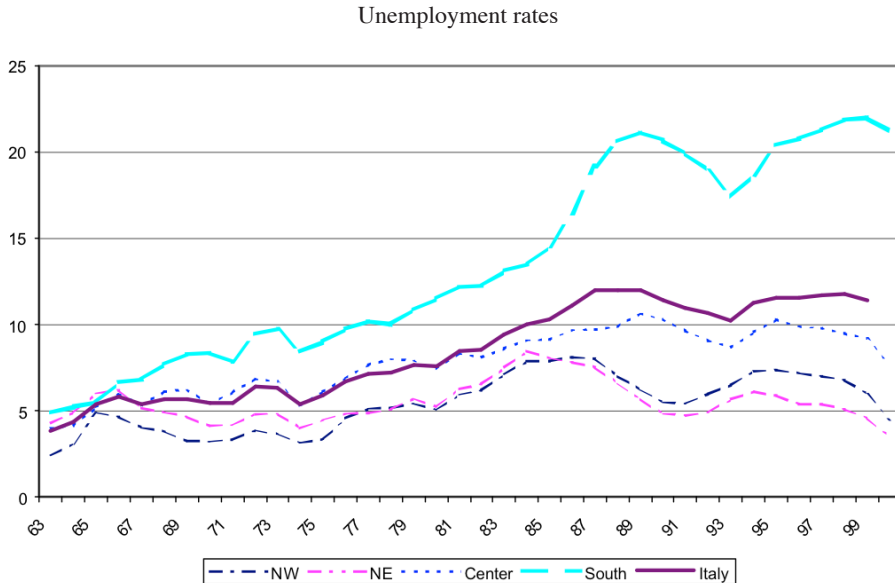
(Di Liberto, 2008). Second, wages were still allowed to be set at lower levels in the backward areas. In fact, after a short period of formal suspension, the “*tabelle salariali*” of the fascist era became the so-called “*gabbie salariali*” (wage cages) which allowed wage settings to reflect lower cost of living and, to some extent at least, local labor market conditions (see again CGIL, 2004). On average, during this period the Southern Italy’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 favor of the Southern Italy. 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.⁶ 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: 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 aforementioned significant institutional changes that took place. 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,⁷ whatever the dif-

⁶ The national bureau “*Cassa per il Mezzogiorno*” was responsible for the creation of a stock of public infrastructures in the Southern Italy.

⁷ 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) name this type of rigidity as the major cause of

Figure 3. The Divergence of Regional Unemployment rates in Italy



ferences 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 (Carmeci and Mauro, 2002). This was a large shock for the competitiveness of the industrial sector of the Southern Italy.⁸ Boltho *et al.* (1997) estimated that direct unit labor costs in the Southern area increased dramatically, from below 80% of the northern wage in 1970 to 95% ten years later.⁹ At the same time, migration flows from the Southern Italy to-

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.

⁸ 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 result, the Eastern regions entered a convergence path. See Carlin (2010).

⁹ Similar calculations are reported in Bodo and Sestito (1991), who also show that measures

wards the northern regions almost halted, partly as a consequence of the wage rate equalization across regions (Faini, 1994) and possibly because of housing price raise in the most developed areas. 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 that became net payers. As a consequence, public expenditure in the South increased significantly from 1970 onwards.¹⁰ In 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. For some reason, however, this did not happen and since then the Southern Italy's gap settled at the high level described above.¹¹ 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.

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 (1991) 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 Southern Italy's economy of the abolition of the “*gabbie salariali*”, see also Faini (1994), Daniele and Malanima (2007) and Iuzzolino (2009).

¹⁰ 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 lived. 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).

¹¹ In fact, things went wrong for the Southern Italy 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 Southern Italy problem was mainly due to 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).

Mauro et al. (2015) focused on the possibility that governmental 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 (Cassa del Mezzogiorno) 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.

5. Model calibration results

To assess the capacity of our model to mimic these major ups and downs in the North-South gap and the divergence dynamics of regional unemployment, we need to assign values, taken from the economic history of the Italian regional divide, to the following parameters: productivity (A), the index of labor market flexibility (ϕ), the tax rate (τ), the interregional transfers of public funds (ν), and the iceberg costs (S). The other parameters – namely α , θ and ρ – are given values in line with those widely used in the literature on economic growth (see Table 1). In Mauro et al. (2015), where the focus is the income divide dynamics more than unemployment dynamics, three sub-periods are considered. Hereby because of the focus and data unavailability for unemployment in the first sub-period, 1861-1951, we limit to the last two sub-periods (1951-1971, 1971-2004).

As regards A , we have parameterized it by relying on data on human capital. In particular, we have used the data on literacy rates from Gagliardi and Percoco (2010). Although in the period 1861-1951, we could have set the values of A in the Center-North about twice than that of the *Mezzogiorno*, in the period 1951-1970 the regional gap in literacy rates was virtually closed.¹²

¹² Similar values can be obtained from Table 2 in Di Liberto (2001).

As for the absolute values of the parameter, we calibrated 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.

As regards c , 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 τ 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 ν , but most historians agree with Nitti (1900) that the flow of transfers was from the South to the North rather the other way round,¹³ implying a small negative value of ν (-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 accruing from other regions. While again we do not have data on ν 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.¹⁴ 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 subsequent decades. In our simulation ν is set equal to 11% in the *Mezzogiorno* and to -3% in the Center-North, in 1951-1970;¹⁵ and to 18% and -7%, respectively, in 1971-2004.

As regards φ , our parameter for flexibility in the labor market, a number of significant changes have taken place between 1861 and today. As we have said the evolution of the labor market rigidity is captured by a rising value of φ . This parameter is defined by equation (10). Using the values we assigned to α and θ , ϑ turns out to be around one. Setting c_m/c , 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 φ 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

¹³ Not everybody agrees with Nitti, however. See for instance Cafagna (1965).

¹⁴ This estimate is based on data obtained from Staderini e Vadalà (2009), Table 2.

¹⁵ The Center-North's GDP is on average about three times larger than the South's GDP.

Northern delegates. Therefore, we set φ equal to 1.0, the value for maximum flexibility that would prevail in the time span 1861-1951, for both the South and the North in the first sub-period, to 1.75 in the period 1951-70, and 1.84 after 1970, when the abolition of the “wage cages” allowed for a highly centralized wage setting.

The values for the iceberg costs for the two regions and for Italy as a whole are taken from Golden and Picci (2005), a paper that 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.¹⁶ 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. We assume that iceberg costs are not zero even in the Center-North, and 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.

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

The use of historically grounded values for the parameters in equation (24) allows our model to generate the sequence of unemployment rates in the two periods as well as the progress and the halt in convergence observed in the *Mezzogiorno*’s relative performance after 1951.

The parameter values are shown in Table 1. 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

¹⁶ 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).

Table 1. Parameter values

Parameter	Values			
	1951-1971		1971-2004	
	M	CN	M	CN
α	0.25			
ρ	0.018			
θ	1.7			
φ	1.75	1.75	1.84	1.84
τ	0.23	0.32	0.30	0.34
ν	0.11	-0.03	0.18	-0.07
S	0.61	0.61	0.40	0.70
A	0.30	0.30	0.33	0.33

M: Mezzogiorno; CN: Center-North

policy. Among the latter ones are policy parameters in the strict sense, such as φ , τ and ν 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.

When we use Table 1 to parameterize our model, we obtain the steady-state per capita GDP growth rates shown in Table 2 below. In particular, the two rows at the top of the Table 2 show the actual growth rates of the *Mezzogiorno* relative to the Center-North and the simulated ones under our parameterization, for each of the two sub-periods.¹⁷

Table 2 shows that the estimated growth rates follow closely the pattern of the actual ones. In the sub-period 1951-70, 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 because of centralization) 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 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

¹⁷ 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 (24). The simulation results are available upon request.

Table 2. Actual and simulated outcomes: growth rates and unemployment

	Average values			
	1951-1971		1971-2004	
	M	CN	M	CN
Actual Growth	6.56	4.62	1.87	2.23
Simulated steady-state Growth	4.99	4.27	4.47	4.65
Actual Unemployment	6.7	4.6	14.6	6.6
Simulated Unemployment	6.52	4.76	15.0	7.47

M: Mezzogiorno; CN: Center-North.

international markets -- two factors known to have yielded additional support to the *Mezzogiorno's* performance in this sub-period.¹⁸

The sub-period 1971-2004 reflects a more complex scenario, with both the wage bargaining reform and decentralization entering the scene (while *S* in the previous sub-periods reflects the average Italian level of social capital, in this final sub-period *S* reflects -- due to decentralization -- the different levels of social capital in the two macro areas of the country). As expected, the 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 a result of this offsetting mechanism, convergence comes to a halt and divergence takes place again.

Our model is able to generate equilibrium unemployment values jointly to equilibrium growth rates. Our simulations do capture the 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.

While our simulation does generate 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 stems from the need

¹⁸ In particular, the growth-enhancing effect of changes in the sectoral mix has been quantified by Paci and Pigliaru (1997).

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 Italian economy largely specialized in mature and traditional productions and therefore more subject to global competition. Both factors played a role in lowering the two regions' growth rates and both of them are beyond the scope of our simplified model.

6. Conclusions

In this contribution we show how an endogenous growth model with public capital and imperfect labor market can account for the Italian divide both in income and unemployment. The calibration exercise on the regional Italian history 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 (the Southern and Center-Northern).

Our contribution indicates two permanent institutional shocks as the major causes which have killed the promising ongoing post war period of regional convergence in Italy: the centralization of wage bargaining and the successive process of decentralization of government expenditures without fiscal responsibility. Using a metaphor, according to our results, these two institutional innovations can well be regarded as the “perfect storm” that undermined the Italian post war development.

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