UNIVERSITÀ DEGLI STUDI DI SIENA

QUADERNI DEL DIPARTIMENTO
DI ECONOMIA POLITICA

Emanuele Felice

Regional inequalities in Italy in the long run (1891-2001): the pattern and some ideas to explain it

n. 597 – Giugno 2010

Abstract - The article in the first instance aims to present the pattern of regional inequality in Italy over the long run, through benchmark years, for what regards per capita value added, but also human capital (education) and social capital. Secondly, the Italian case is discussed in view of the neoclassical approach, which incorporates human and social capital as conditioning variables in a long term production function, through both cross-section and dynamic panel regressions. The results are compared with those from descriptive statistics, concluding that the neoclassical modelling can hardly add something more to a mere correlation evidence. As a consequence, this paper explores the viability of alternative approaches, which should properly consider historical changes in technology, in institutions and in the production function, and briefly reviews the research to come in order to implement a dynamic model.

Jell Classification: E01,E10, N93, N94, R11

Early versions of this paper were presented at the Oxford University, Nuffield College, on November 2009, and at the University of Rome III, on February 2010. I wish to thank all the participants and in particular Brian A'Hearn, Fabrizio De Filippis, Ferdinando Giugliano, and Salvatore Monni for their useful comments. I am also in debt with Carlo D'Ippoliti, Giovanni Federico, Stefano Fenoaltea, Renato Giannetti, Michelangelo Vasta, and Vera Zamagni. The usual disclaimers apply.

Emanuele Felice, Dipartimento di Economia Politica, Università di Siena
emanuele.felice@gmail.com

...que defiendan la casualidad como principio
frente a la causalidad de los azares.

Luis Eduardo Aute, *El resto es humo* (2007)

1. Introduction

The pattern and the determinants of regional inequality in Italy have been debated since the late nineteenth century, and still are they the subject of an ever-growing literature with a remarkable international echo, not least for the very persistence of the North-South divide. At the present, however, results are still far from conclusive or convincing, in particular for what regards regional inequality over the long run: not only because historical estimates have been highly uncertain until a few years ago, and maybe still are they in part, but also because the prevailing neoclassical approach in economics and growth econometrics, being essentially static, is probably inadequate to account for historical change. This paper does not aim to resolve the big debate on Italy's regional inequality; more modestly, it intends to present some essential facts (in the form of estimates) and to clear up the path for a more profitable research about causal relations.

The article reviews the pattern of regional inequality in Italy since the end of the nineteenth century until our days, in the light of the most recent value added estimates as well as of data on human capital and social capital, in benchmark years. Its prime goal is to discuss whether and how, at the present stage of research, the available data can be employed in the 'conventional' econometric models in order to explain the historical pattern of Italy's regional inequality over the long run; indeed they can, provided we accept those models and their assumptions, yet both the assumptions and the following results appear to be far from satisfactory. As a consequence, we address the question whether neoclassical models are useful at all to account for what seems to be the most distinctive feature of Italian economic development, at least in comparison with other western European countries: its persistent historical dualism, or better the fact that regional convergence began but came to a halt during the last decades. On this, the answer is mainly negative, and this paper ends up with some notes on how the statistical coverage should be extended and dynamic models implemented.

Section §2 critically reviews the neoclassical approach about international and inter-regional convergence, then section §3 briefly presents the estimates of regional value added and outlines the long run pattern of regional inequality in Italy. Sections §4 and §5 are devoted to presenting and

testing two fundamental independent variables in growth models: human capital and social capital respectively; descriptive statistics and neoclassical growth regressions are compared, concluding that the latter do not add anything significant to the former. At last, section §6 explores the possibility of a dynamic time series approach, and outlines a research agenda to be undertaken in order to produce the required historical estimates. This dynamic approach, as well as descriptive statistics and the results from neoclassical models, should be integrated by qualitative and case-study analyses.

2. Convergence or divergence? An outline of the models and the worldwide debate

Neoclassical models of convergence are based on the assumption of diminishing returns to capital or, in other terms, of the downward sloping of the savings curve. In a closed economy, where savings are equal to gross investments, according to Solow (1956) and Swan (1956) the growth rate of the capital stock would be:

$$\gamma_k = s^*Af(k)/k - (\delta + n) \qquad (1)$$

where s is the constant saving rate, ranging from 0 to 1, k is the capital stock per person, $Af(k)$ is the production function in per capita terms, δ is the depreciation rate of the capital stock and n is the exogenous rate of the population growth. Thus $\delta + n$ is the depreciation curve, a horizontal line, and $s^*Af(k)/k$ is the savings curve, a downward-sloping line. The basic idea of convergence is that, given the diminishing returns to capital, each addition to the capital stocks generates higher returns when the capital stock is small. Of course, the capital stock determines per capita Gdp or income, via productivity. Thus output and income should grow faster in countries or regions with smaller capital, i.e. with smaller income.[1] Under the hypothesis of a Cobb-Douglas form of the production function, following Barro (1991), cross-country growth regressions may be expressed as

[1] In order to satisfy this condition, however, the neoclassical model needs of many collateral qualifications, maybe too many as Sylos Labini (1995) pointed out: the most important ones are that all economies must have a similar technology (considered in a broader sense including taxation, property rights and other institutional factors) as well as similar saving and population growth rates. Although these qualifications are less improbable in interregional comparisons within a national state – where exogenous factors are more likely to be common – neoclassical models have been used more frequently to test convergence across national states, due to the availability of data and maybe to the major relevance of the subject.

$$\gamma_i = \beta \log y_{i,0} + \psi X_i + \pi Z_i + \varepsilon_i \quad (2)$$

Where γ_i is the growth rate of a *i* country, $y_{i,0}$ is its initial level of per capita Gdp or value added (income), X_i represents other growth determinants suggested by the Solow model a part from the initial level of income, while πZ_i represents those determinants which are not accounted for by the Solow model.

We have unconditional β-convergence when

$$\gamma_i = \beta \log y_{i,0} + \varepsilon_i \quad (3)$$

with the negative sign of the coefficient β.

Otherwise we do not have *unconditional* convergence. We can still have *conditional* convergence, however, if after adding other variables to (3) the β coefficient gets negative (Barro and Sala-i-Martin, 1991 and 1992). The basic idea behind conditional convergence is that differences in per capita incomes are not permanent only because of cross-country (or cross regional) structural heterogeneity: that is, because the model does not satisfy collateral qualifications. This can be due to different resource endowments, institutions, migration rates as well as to human and social capital disparities, among the others. In the growth regressions each one of these factors can be a 'conditioning' variable, coming either from within the Solow model variable group X_i (i.e. human capital, institutions or social capital, if we consider technology in its broadest sense) or from outside the Solow model, from the Z_i variable group (think of climate, but usually variables of this kind are much less common in the literature while spanning through an impressive range of categories). Once we have checked for the effects of structural heterogeneity, there can still be convergence, yet not convergence to a single common steady state, but convergence of every country (or region) to its own steady state, given its own conditioning variables: that is *conditional* convergence. It has been called *convergence*, but truly this model does not measure convergence across regions or countries, since different regions or countries may have different steady states.[2]

[2] A major problem is the multiplicity of possible regressors: conditioning variables which can be run are practically countless. By 2005, Durlauf, Johnson and Temple (Durlauf et al., 2005) classified about 150 independent variables used in growth regressions (in almost 300 articles), plus about one hundred instrumental variables. In short, the number of possible regressors exceeds the number of cases, thus 'rendering the all-inclusive regression computationally impossible' (Sala-i-Martin et al., 2004, p. 814): this is true even in cross-country comparisons, not to mention cross-regional ones where the number of cases is usually reduced. One reason of the multiplicity problem may lie in the analytical and theoretical weakness of the Cobb-Douglas function, which as mentioned is valid only in the presence of a vast number of assumptions, and in the end is not empirically founded (Sylos Labini, 1995, pp. 264-5; Pasinetti, 2000; but also Ro-

There remains the hypothesis that countries do not converge because initial conditions are such as to determine long run different outcomes. That is the hypothesis that there are not decreasing returns to capital, for example because the production function has not a Cobb-Douglas form. A simple linear technology *AK*, instead of the neoclassical technology *Af(k)*, would transform equation (1) in

$$\gamma_k = s^*A - (\delta + n) \tag{4}$$

Where the savings curve is no longer downward sloping but a horizontal line, just like the depreciation curve. Thus two economies with different initial capital stock would not converge even all other conditions being equal. If technology or other parameters differ as well, these economies could still converge, but indeed they could also further diverge: they would converge if *A*, or *s* are systematically higher in the poorer economy, or if the depreciation line is systematically lower, or if other determinants of growth not included in the model are systematically higher as well; but, to quote Sala-i-Martin, 'there is no a priori reason why this should be the case' (1996, p. 1344). On the contrary, there is some evidence that the saving curve is not even horizontal, yet indeed upward sloping: for example because of economies of scale, which entail increasing returns to capital and have frequently been called into question to explain the rise of the US during the second half of the nineteenth century, or the rise of China in the last decades (see Crafts and Venables, 2001).

With the hypothesis of increasing returns to capital we enter the field of 'cumulative' approaches, which claim with Myrdal (1957) that growth is a spatially cumulative process, which requires a minimum threshold of resources in order to start and which is thus bound to increase regional disparities. These models can more easily explain the existence of 'convergence clubs' (Galor, 1996), countries with similar capital or income levels which exhibit similar long run outcomes. There are different schools which refer to the cumulative approaches, among which the most interesting to us are probably the endogenous growth models (Romer, 1986), which link economic growth to the levels of human capital (with a possible extension to social capital as well), and the new economic geography (Krugman, 1991a), where the key determinants are the economies of agglomeration or the costs of congestion, and thus the size of the market would play a central role.

---

mer, 1987; Solow, 2000), thus helping 'creative theorizing'. One way to cope with the multiplicity problem is to make profit of information from qualitative and case-study research, the alternative is to resort to econometrics in order to 'automatically' sort out the irrelevant regressors – as with the Bayesian Averaging of Classical Estimates (BACE) proposed by Sala-i-Martin, Doppelhofer and Miller (Sala-i-Martin et al., 2004). At the moment, results from BACE models are not entirely convincing (cfr. ibid., p. 829); furthermore, in historical analyses the lack of data ultimately frustrates the use of BACE techniques.

The new economic geography can radically diverge from the neoclassical approach but, so far, theoretical and empirical studies have not been able to resolve the debate. Indeed, in the last years apparently some tendency has emerged to reconcile the two strands, yet at the cost of some confusion. In short, it is not easy to distinguish the increasing returns from the other source of divergence, i.e. the lack of collateral conditions of the neoclassical models: when there is not convergence, it may be difficult to conclude that the neoclassical model can still be valid yet with some qualifications to be satisfied, or that, on the contrary, cumulative (static) models should be regarded as more effective – all the more in historical analyses, where crucial data, such as estimates of capital, are often lacking or unreliable. Furthermore, the models of increasing returns can easily be extended to predict convergence as well, for example on equation (4) by endogeneizing the saving rate on the assumption that it would be decreasing with higher levels of capital (see Uzawa, 1968 and Sala-i-Martin, 1996): this is not an implausible hypothesis in macroeconomic terms, think of the opposite cases of China and the US today. Thus, an unified long term production function based on increasing returns could still be valid also in the case of convergence.[3]

The search for convergence within national states, across regions, should be simplified by the fact that here structural heterogeneity plays a minor role, given the usually common macroeconomic and institutional context. Yet this does not mean that convergence is the rule. For example, as Pollard pointed out (1981), from the second half of the nineteenth century industrialization and economic development spread across Europe disregarding national boundaries, a process responsible of a probable increase in regional disparities at least within the main late comers (Italy, Austria-Hungary, maybe others). Analyses for the European regions in the nineteenth century, however, are seriously hampered by the lack or the scarce reliability of historical regional estimates.[4]

---

[3] On the other hand, some conditioning variables, such as the stocks of human or of social capital, can be seen alternatively as initial conditions in the endogenous growth models: for example, by decomposing K into physical and human capital (see Mankiw et al., 1992). In growth econometrics, endogeneity is usually tested by way of instrumental variables, which should check for the conditioning variables (that is structural heterogeneity) not being in turn correlated with initial conditions. However, to find proper instrumental variables may be a daunting task, especially at a regional (sub-national) level and for more distant historical periods.

[4] More accurate regional estimates are in progress for many countries: a research team coordinated by Joan R. Rosés and Nikolaus Wolf and funded by the European Science Foundation – ESF is at work in order to produce regional Gdp estimates for the European regions at Nuts II, in benchmark years approximately from the end of the nineteenth century. For the UK, see Crafts (2004). It is worth noticing that the historical estimates for Italy's regions used in this paper follow similar methods and assumptions, and rely upon a highly detailed sectoral breakdown (see the next paragraph). Concerning the period after world war II, the literature is much richer, with no surprise: see among the others Leonardi (1995), Sala-i-Martin (1996), Petrakos et al. (2005).

The situation is better for the United States: here evidence indicates divergence between the late nineteenth and early twentieth century, as industrialization increased in the North-East and spread mainly to the northern and central regions, whereas in the second half of the twentieth century the southern and western states industrialized as well and so converged (Kim, 1998). Jeffrey Williamson in a pioneering work (1965) had already depicted a double movement, of divergence and then convergence, and thus he had proposed to extend the Kuznets' inverted U-shaped function to the relationship between income and regional disparities (rising in the first phase, then decreasing).[5] Indeed, both neoclassical and cumulative theories can be reconciled with this model, and in fact both have been called upon to explain the pattern of regional disparities in the US during the last decades.[6] Williamson himself argued that convergence could occur because of either increasing integration (neoclassical) or economies/diseconomies of agglomeration (cumulative).

Although the shift from divergence to convergence is often considered and widely accepted, economic literature has mostly neglected the possibility of a further reversal of fortune: i.e. that convergence is again followed by divergence. A recent paper by Robert Lucas may be taken as paradigmatic: the basic idea behind Lucas' model is that soon or later, although at different times (no matter for which reason), a region or a country will start industrial development and then converge. The problem is only to establish when, not even if. However, once a region has embarked upon economic growth, the process of convergence (on the long run) can not be reversed (Lucas, 2000).

As we are going to illustrate, Italy's figures show as over the long run the story can be more complicated than what neoclassical and also the 'reconciling' approaches predict. Divergence may be followed by convergence, and then again by divergence. To properly account for these changes, perhaps we should consider different production functions according to the different historical periods, that is we should move from a static to a truly dynamic long term approach. But this would require more historical data than what are now available and thus, at least at the present, is out of our reach.

[5] As known, Kuznets built this model in order to account for the pattern of household income inequality (Kuznets, 1955).

[6] See Kim (1998) for the neoclassical explanation, Krugman (1991b) and Krugman and Venables (1995) for the cumulative one.

3. The overall picture: Italian regional disparities in the long run

Table 1 presents regional per capita value added from 1891 to 2001, in benchmark years. Direct accounting estimates are available only from the 1970s onwards, whereas the estimates for the previous years (1891, 1911, 1938 and 1951) have been calculated from a number of different sources, mainly the reconstruction of national value added edited by Guido Maria Rey (1992; 2000) and regional employment and wage data.[7]

Table 1. *Per capita value added in Italy's regions, 1891-2001 (Italy=1)*

	1891	1911	1938	1951	1971	1981	2001
Piedmont	1.08	1.15	1.39	1.47	1.21	1.14	1.15
Aosta Valley				1.58	1.35	1.30	1.24
Liguria	1.44	1.54	1.68	1.62	1.16	1.11	1.09
Lombardy	1.15	1.19	1.39	1.53	1.34	1.28	1.30
North-west	*1.16*	*1.22*	*1.43*	*1.52*	*1.28*	*1.22*	*1.24*
Trentino-Alto A.	-	-	0.95	1.06	1.01	1.12	1.29
Veneto	0.80	0.86	0.84	0.98	0.99	1.08	1.13
Friuli	-	-	1.19	1.11	1.00	1.09	1.12
Emilia	1.06	1.08	1.04	1.12	1.14	1.29	1.23
Tuscany	1.03	0.97	1.01	1.05	1.05	1.11	1.09
The Marches	0.88	0.81	0.79	0.86	0.91	1.05	0.99
Umbria	1.02	0.92	0.96	0.90	0.93	0.98	0.96
Latium	1.57	1.49	1.19	1.08	1.07	1.05	1.13
Center/north-east	*1.01*	*1.00*	*0.99*	*1.04*	*1.04*	*1.11*	*1.13*
Abruzzi	0.66	0.68	0.58	0.58	0.80	0.84	0.84
Campania	0.97	0.94	0.82	0.69	0.71	0.67	0.65
Apulia	1.02	0.85	0.72	0.65	0.75	0.72	0.67
Lucania	0.74	0.73	0.57	0.47	0.75	0.68	0.73
Calabria	0.67	0.70	0.49	0.47	0.67	0.65	0.64
Sicily	0.93	0.85	0.72	0.58	0.70	0.71	0.66
Sardinia	0.94	0.92	0.83	0.63	0.85	0.72	0.76
South and islands	*0.88*	*0.84*	*0.70*	*0.61*	*0.73*	*0.70*	*0.68*
Italy (2001 euros)	1,313	2,064	2,596	2,940	10,027	13,199	19,928
Yearly growth rate (%)	-	*2.29*	*0.85*	*0.96*	*6.33*	*2.79*	*2.08*

Notes: based on the borders of the time and on current population. 2001 constant prices are obtained via deflating benchmark current prices from the official (Istat) index of consumer prices.

Source: Felice, 2009.

[7] For 1938 and 1951, see Felice (2005a); for 1891 and 1911, see Felice (2005b) and then Felice (2009) which for many industrial sectors incorporates published and unpublished estimates by Ciccarelli and Fenoaltea (e.g. 2009). In Felice, agricultural value added at the regional level is derived from the gross saleable production, as estimated by Federico (2003a).

Not remarkable at the beginning, North-South differences increased over the 1891-1951 period, although at different rates. During the 1891-1911 years – roughly the first globalization period – divergence was slow, whereas from 1911 to 1951 – during the two world wars, the fascist dictatorship and the reconstruction after world war II – Southern Italy fell back remarkably. Conversely, the 1951-1971 economic 'miracle' saw convergence of the South, at quite a speedy rate. But this came to a halt during the 1970s, the decade of the stagflation crisis, and the *Mezzogiorno* slightly fell back also in the last two decades of the twentieth century.

These trends are confirmed by the indices of regional disparities (table 2), which are based on the Williamson's formula:

$$D = \sqrt{\sum_{i=1}^{n} \left(\frac{y_i}{y_m} - 1 \right)^2 \cdot \frac{p_i}{p_m}} \qquad (6)$$

where y is per capita Gdp, p stays for population and i and m refer to the i-region and to the national total respectively (Williamson, 1965).

On the whole, regional disparities in Italy increased up to 1951, then decreased during the 1950s and 1960s; but in the last thirty years they slightly increased again. It is worth noticing that there was convergence within the three macro-areas, which thus should be regarded as an ex-post construct, at least in terms of per capita value added: they took shape in the inter-war years, well after Unification. In short, convergence interested the North-West and the Nec regions and, to a relevant degree, the regional economies within all the three macro-areas (North-West, Nec and Southern Italy). The problem is that on the whole the Southern regions, the poorest ones, kept on falling behind the Italian average over most of the 1891-2001 period, with the exception of the 1951-1971 years.

Table 2. *Indices of regional inequality, 1891-2001*

	1891	1911	1938	1951	1971	1981	2001
Italy	0.194	0.208	0.302	0.362	0.226	0.231	0.250
North-west	0.094	0.101	0.070	0.031	0.057	0.061	0.067
Center/north-east	0.214	0.193	0.126	0.074	0.063	0.081	0.067
South and islands	0.149	0.108	0.156	0.118	0.066	0.066	0.082

Notes and source: see the text.

Williamson's formula has a rationale similar to the variance or the standard deviation, and thus it can be taken as a measure of sigma convergence (the decrease of dispersion), quite efficacious since it weights deviations with the share of population (small regions have a minor impact). The lack of sigma convergence does not invalidate the possibility of beta convergence, i.e. that the most

backward regions grew faster than the most advanced ones: beta convergence is a necessary condition of sigma convergence, not viceversa, and of course it can be measured by unconditional convergence models.

Table 3 shows the results of the unconditional convergence regressions, as from equation (3) of § 2, both in cross-sections and in two dynamic panel data (DPD) models. The 1951-1971 years are the only period when unconditional convergence took place. It may be noticed that for the 1891-1911 period the coefficient of the cross-section regression is negative (although insignificant), whereas according to the Williamson's formula (table 2) there was sigma divergence. This latter measure is more reliable, since the former does not allow for the different size of each region, its relative importance: during the 1891-1911 years some small regions of Southern Italy converged and this has had an impact on the regression results. Another problem with growth regressions is that the choice of time periods may heavily affect the results. If we had taken the 1951-2001 interval, for example, we would have found convergence, yet ignoring the divergence of the last three decades. On the contrary, we would have had divergence if we had considered all the 1891-1971 interval, regardless of the 1951-1971 convergence. If we had split up the twentieth century into two halves (1901-1951 and 1951-2001) we would still have found the inverted U-shaped figure proposed by Williamson: but that choice would have omitted an important part of the story.

Table 3. *Unconditional convergence of the Italian regions, 1891-2001*

	Cross-section linear regressions						Dynamic panel data (DPD), linear regression			
							Fixed effects			GMM
	1891-1911	1911-1938	1938-1951	1951-1971	1971-1981	1981-2001	SE	Robust	Cluster year (robust)	Robust
Constant	0.026	-0.074	-0.061	0.131	-0.016	0.010	0.0016	0.0016	0.0016	0.0199
Standard error	0.021	0.035*	0.050	0.008***	0.066	0.019	0.0122	0.0103	0.0351	0.0010***
B_1	-0.001	0.010	0.009	-0.011	0.004	0.001	0.0022	0.0022	0.0022	-0.0237
B_1 standard error	0.003	0.005**	0.006	0.000***	0.007	0.002	0.0015	0.0011*	0.0037	0.0443
R^2	0.011	0.264	0.101	0.892	0.022	0.009	0.020	0.020	0.020	0.29(1)
N	16	16	18	19	19	19	107	107	107	104

Dependent variable: Ln value added growth rates by sub-period ($t_1 - t_0$). Independent variable: Ln value added in t_0. (1) Wald Chi2.

In the GMM DPD, the independent variable is the Ln of value added growth rates by sub-period ($t_0 - t_{-1}$), instrumented using Ln value added in t_{-1}; the robust option was preferred because GMM two-step standard errors are biased, indicating heteroschedasticity.

* Significant at the 0.1 level. ** Significant at the 0.05 level. *** Significant at the 0.01 level.

Source: elaborations from table 1.

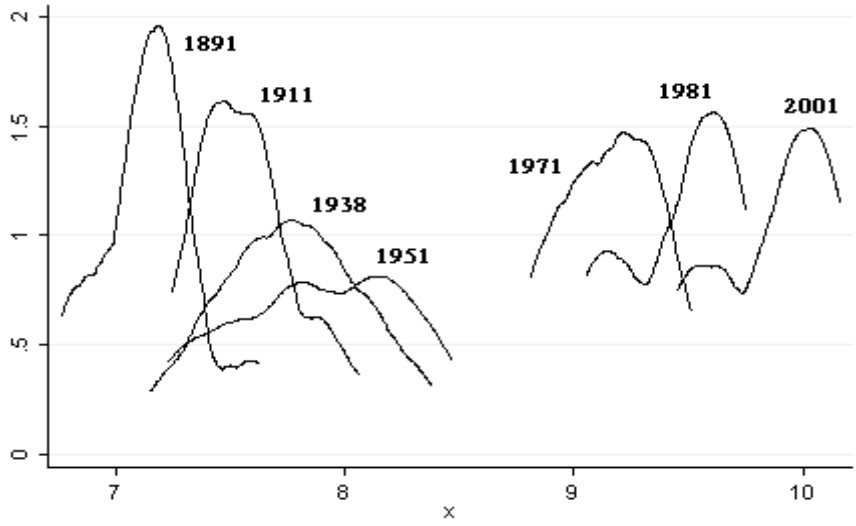
Neither there was beta convergence over the whole period, as indicated by the results of the panels. But we cannot even say that there was divergence: in the fixed effects model the positive coefficient of the independent variable is insignificant, whereas in the GMM model the coefficient

is negative, but insignificant too. The GMM estimator is more appropriate when the panel is relatively small (in particular with a limited number of years),[8] such as in this case. The fixed effects model remains of some interest,[9] because here the cluster option worsens the significance of the coefficient: this finding indicates the existence of co-movements in Italy's regions, according to the different historical periods (regional economies performed better when the national economy performed better, and viceversa). A truly dynamic approach, which would highlight the specificity of each historical period, seems all the more profitable.

To sum up, for Italy's regions the neoclassical model of unconditional convergence is not valid. These models neither have a satisfactory descriptive capacity. The weighted index of regional disparities, as from table 2, is more precise in many aspects, and can be integrated with descriptive statistics in order to properly present the basic facts, as we are now going to do.

Figure 1 shows the Kernel densities of per capita value added: at just one glance, it gives the idea of what was going on during the twentieth century. Regional differences increased in the first half: the industrial triangle was already apparent by 1911, and the three-fold macro-regional classification was clearly visible by 1951 (corresponding to the three bell-shaped curves). Between 1951 and 1971 regional differences considerably reduced, yet in 1981 the situation had changed once again: some Italian regions still converged, some others were left behind and practically cut-off from the bulk. These latter were the southern regions. Significantly enough, by 2001 the snapshot was still approximately the same as by 1981.

Figure 1. *Kernel densities of per capita value added in Italy's regions, 1891-2001*

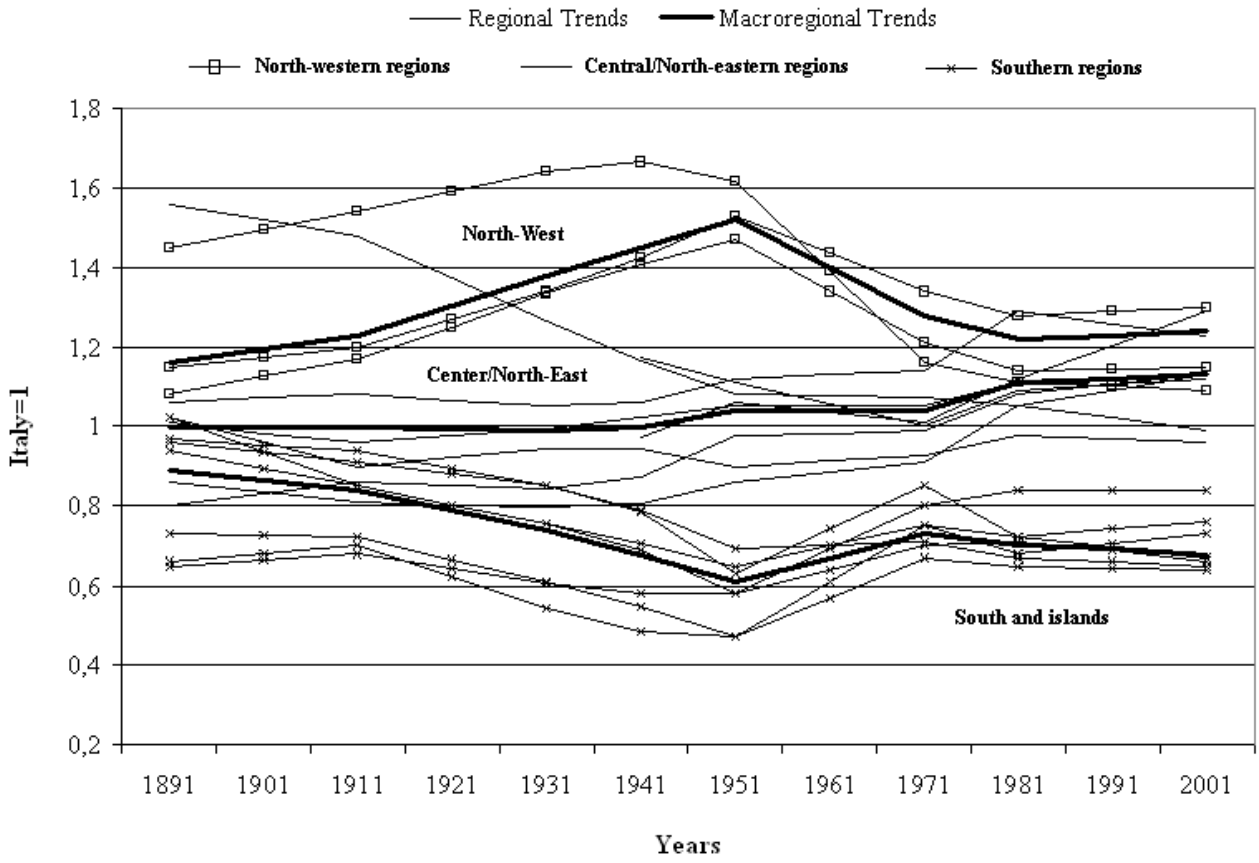


Legend: x is the logarithm of per capita value added (2001 euros) in benchmark years.

[8] See Blundell and Boll, 1998.

[9] For a review of this approach, see Islam, 1995.

Figure 2. *Regional and macroregional trends of per capita value added in the long run (1891-2001)*



Source and legend: see table 1.

Note: 1901, 1921, 1931, 1941, and 1961 benchmarks are linearly interpolated; the 1938 benchmark is omitted, but it has been used to create 1921, 1931, and 1941 interpolations.

Figure 2 is more straightforward, but also eloquent. It displays the process of (un-weighted) sigma convergence within the three macro-areas, as well as the lack of it for Italy's regions over the long run. We can observe the forging ahead of the North-West in the first half of the twentieth century, the convergence of the South and the Center/North-East since the 1950s and which came to a halt for the South in the 1970s, while continuing for the Center/North-East.

In the next two paragraphs, we will explore two variables, human and social capital, which could be called upon to explain the pattern of regional inequality in Italy. They are not the only ones which could have played a role: among the other determinants, there may be natural resources (Cafagna, 1965 and 1989; Fenoaltea, 2006), or the geographical position.[10] Yet the first two have been

[10] This was also referred to in order to explain the recent rise of some southern regions, in particular Abruzzi and Molise: but see Carboni (1998) for a critique based on the role of social capital. Geographical position could even be-

preferred for three reasons. First, they – the so-called intangible factors of production (D'Antonio, Flora, Scarlato, 2002, pp. 24-9; Marini, 2000) – are more linked to the human element (knowledge, ethics and value, policy), and thus more rich of implications for a policy maker and maybe more challenging for historians and economists. Secondly, they seem more appropriate to account for the South's disappointing performance of the last decades – the big discrepancy over the long run – when the characteristics of the economic system were such as natural resources and geographical position counted less; it is worth adding that they are also very popular in the neoclassical literature: to make an example, the quoted BACE article by Sala-i-Martin et al. (2004) finds primary school enrollment as the most powerful variable, after the mentioned East Asian dummy (from this perspective, it could be argued that we somehow allow for the multiplicity of regressors). Lastly, in this case estimates for Italy's regions were available or easy to reconstruct for the same benchmark years as with per capita value added, thus making irresistible the temptation of comparing the data.

4. On the role of human capital

From Carlo Maria Cipolla (1969), at least, economic historians have regarded human capital, usually measured as education, as one of the preconditions for economic growth (Easterlin, 1981; Nuñez, 1990), thus paving the way to the formal modelling of the new growth economists (Romer, 1986; Lucas, 1988; then Ram, 1990 and 1991, who first used conditional convergence). By this regard, Italy can be a profitable field of analysis, due to its remarkable education regional disparities at the time of Unification (see Felice, 2007a, pp. 144-50). Estimates of human capital at the regional level, in benchmark years, are shown in table 4. It is worth noting that in this case the Italian regions converged over the long-run, although the process of convergence was significantly slower in the first decades following Unification, due to the faults of the early compulsory education laws.[11] Admittedly, we are considering a composite index, whose criteria are arguably arbitrary:[12] however,

---

come favourable to the southernmost regions in the near future, since they are now closer to the soaring Asia (Rossi, 2005).

[11] Cfr. Vasta (1996, 1999). If we limited to literacy, we would observe indeed (population-weighted) sigma divergence from 1871 to 1891; convergence increased significantly only after a more effective law, *Daneo-Credaro*, was issued in 1911 (Felice, 2007b).

[12] The index is made up of literacy and either enrolment rate or years of schooling, with variable weights according to the different historical periods, as from Felice (2007a and 2007b). Literacy is given a share of 3/3 in 1871, 2/3 in 1891 and 1911, 55% in 1938, 50% in 1951; since then, every ten years it is reduced by 5 percentage points, so that by 2001 it

the single components of the index (literacy, enrolment, per capita years of education) have been tested in a previous article (Felice, 2008), and neither the results of cross-section linear regressions (panel models were not tested), neither the broader picture of regional disparities displayed in table 4, change significantly, and often do not change at all. This suggests that the evidence we are going to detail is quite reliable.

Table 4. *Regional inequality in human capital, 1871-2001 (Italy=1)*

	1871	1891	1911	1938	1951	1971	1981	2001
Piedmont	1.849	1.662	1.389	1.094	1.145	1.055	1.027	1.005
Aosta Valley					1.106	1.036	1.023	1.007
Liguria	1.401	1.376	1.322	1.146	1.140	1.098	1.066	1.040
Lombardy	1.756	1.523	1.357	1.111	1.155	1.072	1.052	1.030
North-west	*1.753*	*1.559*	*1.365*	*1.111*	*1.149*	*1.070*	*1.046*	*1.024*
Trentino-Alto Ad.	-	-	-	1.262	1.154	1.088	1.047	1.021
Veneto	1.131	1.234	1.222	1.088	1.067	1.029	1.010	1.002
Friuli	-	-	-	1.188	1.152	1.083	1.047	1.035
Emilia	0.901	1.019	1.144	1.041	1.060	1.019	1.015	1.013
Tuscany	1.022	0.932	1.005	1.057	1.016	1.005	1.002	1.000
The Marches	0.673	0.727	0.844	0.989	0.983	0.961	0.983	0.996
Umbria	0.638	0.776	0.864	0.971	0.970	0.970	0.995	1.011
Latium	1.035	1.088	1.098	1.056	1.066	1.088	1.079	1.072
Center/north-east	*0.968*	*1.027*	*1.042*	*1.069*	*1.055*	*1.035*	*1.027*	*1.023*
Abruzzi	0.487	0.599	0.733	0.917	0.899	0.925	0.951	0.988
Campania	0.641	0.712	0.756	0.904	0.861	0.925	0.955	0.968
Abulia	0.497	0.580	0.691	0.809	0.834	0.904	0.926	0.946
Lucania	0.385	0.495	0.587	0.758	0.766	0.845	0.891	0.950
Calabria	0.417	0.449	0.537	0.735	0.731	0.850	0.903	0.953
Sicily	0.471	0.576	0.709	0.841	0.839	0.901	0.927	0.949
Sardinia	0.446	0.627	0.719	0.885	0.838	0.921	0.945	0.965
South and islands	*0.510*	*0.599*	*0.700*	*0.846*	*0.835*	*0.904*	*0.934*	*0.958*

Source: Felice 2007a.

As mentioned, according to the neoclassical approach the contribution of human capital to value added convergence may be tested via the model of conditional regression, where human capital is the conditioning variable, as from equation (2) in § 2.[13] In table 5, we present the results of conditional convergence tests both in the cross-section and in the dynamic panel data regressions (to control for endogeneity, human capital has been instrumented using its lag). In order to be correctly understood, these results must be considered jointly with those of table 3.

Human capital was significant in particular from 1891 to 1951, when the coefficient of per capita value added, the other independent variable, has a negative sign and in some periods is even significant, unlike in the unconditional convergence model of table 3: thus we have convergence, but

has fallen to 25%. The remaining share is assigned to the enrolment ratio in 1891, 1911 and 1938, to the per capita years of schooling from 1951 onwards, when this indicator is available.

[13] For an overview of the debate about the role of human capital in conditional regressions, see Felice (2008, pp. 59-63).

conditional on human capital.[14] As expected, human capital is insignificant in the 1951-1971 years of convergence, when there are no changes in the value added coefficient; it resumes significance in the last decades, when convergence has come to a halt, but now it looks much weaker than in the pre-1951 years, and the conditional value added coefficient is practically insignificant. In short, human capital may have played some role in the pre-1951 years, hardly a one in the second half of the twentieth century.[15] This finding begs for a dynamic approach.

Table 5. *Conditional convergence of the Italian regions (1891-2001): adding human capital*

	Cross-section linear regressions						DPD, linear regression (robust)	
	1891-1911	1911-1938	1938-1951	1951-1971	1971-1981	1981-2001	Fixed effects	GMM
Constant	0.059	0.018	0.130	0.131	0.198	0.040	-0.0018	-0.4277
Standard error	0.018***	0.037	0.052**	0.012***	0.097*	0.022*	0.0125	0.1303***
B_1	-0.006	-0.004	-0.032	-0.011	-0.030	-0.006	0.0016	-0.2659
B_1 standard error	0.003**	0.005	0.009***	0.002***	0.014*	0.004	0.0015	0.1527*
B_2	0.006	0.016	0.127	0.000	0.103	0.034	0.0082	0.4587
B_2 standard error	0.002***	0.005***	0.026***	0.006	0.038**	0.016*	0.0069	0.1276***
R^2	0.486	0.631	0.682	0.892	0.329	0.225	0.334	15.28(1)
N	16	16	18	19	19	19	107	104

Dependent variable: Ln value added growth rates by sub-period ($t_1 - t_0$). (1) Wald Chi2.

Independent variables: Ln value added (B_1) and human capital (B_2) in t_0.

In the GMM DPD, the independent variables are the Ln of value added growth rates by sub-period ($t_0 - t_{-1}$), instrumented using Ln value added in t_{-1}, and human capital in t_1; the robust option was preferred because GMM two-step standard errors are biased, indicating heteroschedasticity.

In all the regressions human capital is instrumented using its lag (OLS method).

* Significant at the 0.1 level. ** Significant at the 0.05 level. *** Significant at the 0.01 level.

Source: elaborations from tables 1 and 4.

Neoclassical economists use to regard the panel approach as dynamic, but truly it is not. On the contrary, it is the most static-inspired one, provided we get out of the framework which makes us accept one single long term production function: the panel dynamic approach, in fact, incorporates time variation into one single function. If we have some (*a-priori*?) belief into this long term production function, then of course the panel approach may be considered dynamic, merely in the

[14] For a confirm of the positive role of education in the North-Western take-off during the liberal age (1861-1913), and thus of its negative role for southern Italy in the same period, see Zamagni (1978a).

[15] Zamagni (1993) found a positive role of human capital in the 1951-1987 years, but the different results may be explained by the choice of a larger time interval. For the 1963-1994 years, see also Di Liberto (2001), where the scarce role of human capital for the most advanced regions is confirmed, but also its (negative) importance for the most backward ones.

sense that it allows for changes in the observations over time.[16] It is only after this premise that we can properly discuss the somehow puzzling results of the dynamic panel: according to the fixed effect model, human capital is irrelevant; conversely, according to the GMM model human capital is relevant and the conditional convergence approach would work. We can regard the GMM estimator as more reliable, for the reasons exposed in the previous paragraph, but we must point out that the discrepancy between the two models seriously undermines the reliability of both. The lack of reliability may be due to misspecification, yet an alternative explanation should also be considered: a 'dynamic' approach based on one single production function is not the right way to explore growth in the long run, i.e. it is not a satisfactory solution to account for parameter changes over time. Paradoxically, but no so surprisingly after what we said, the cross-section linear regressions seem more useful to this scope: human capital may have been relevant in some periods – roughly in the first half – not in others.

Unless we do not empirically verify the Cobb-Douglas function, of course over the long run, what all these models – both cross section and panel – indicate is a simple correlation.[17] They add few more, or maybe nothing, to what descriptive statistics may tell. For example, a mere sequence of scatter/dot graphs, as from figure 3, can be as much eloquent. In the figure, the slope of the fit line and the value of R^2 increased until 1951, indicating a growing correlation between per capita value added and human capital, whereas they decreased in the following two decades and remained approximately unchanged from 1971 to 2001. Over the long run, the movement of the fit line from right to left (lower in 1891, higher in 2001) shows that regional differences in human capital became progressively less relevant than those in per capita value added. Furthermore, figure 3 illustrates as the formation of the three macro-areas (North-West, Center/North-East and the Mezzogiorno) took place in both per capita value added and human capital. Around 1891, in fact, many central regions were closer to the South than to the North-West, whereas by 1951 the three macro-areas had become clearly visible. In the following three decades, the macro-areas became two, the Center/North-East catching-up with the North-West, while the South (with the exception of the Abruzzi) was falling behind. Finally, figure 3 shows also which regions scored a level of per capita value added higher than their level of human capital, as compared to the Italian average (those above the fit line), and which on the contrary had a lower level of value added, given their rank in

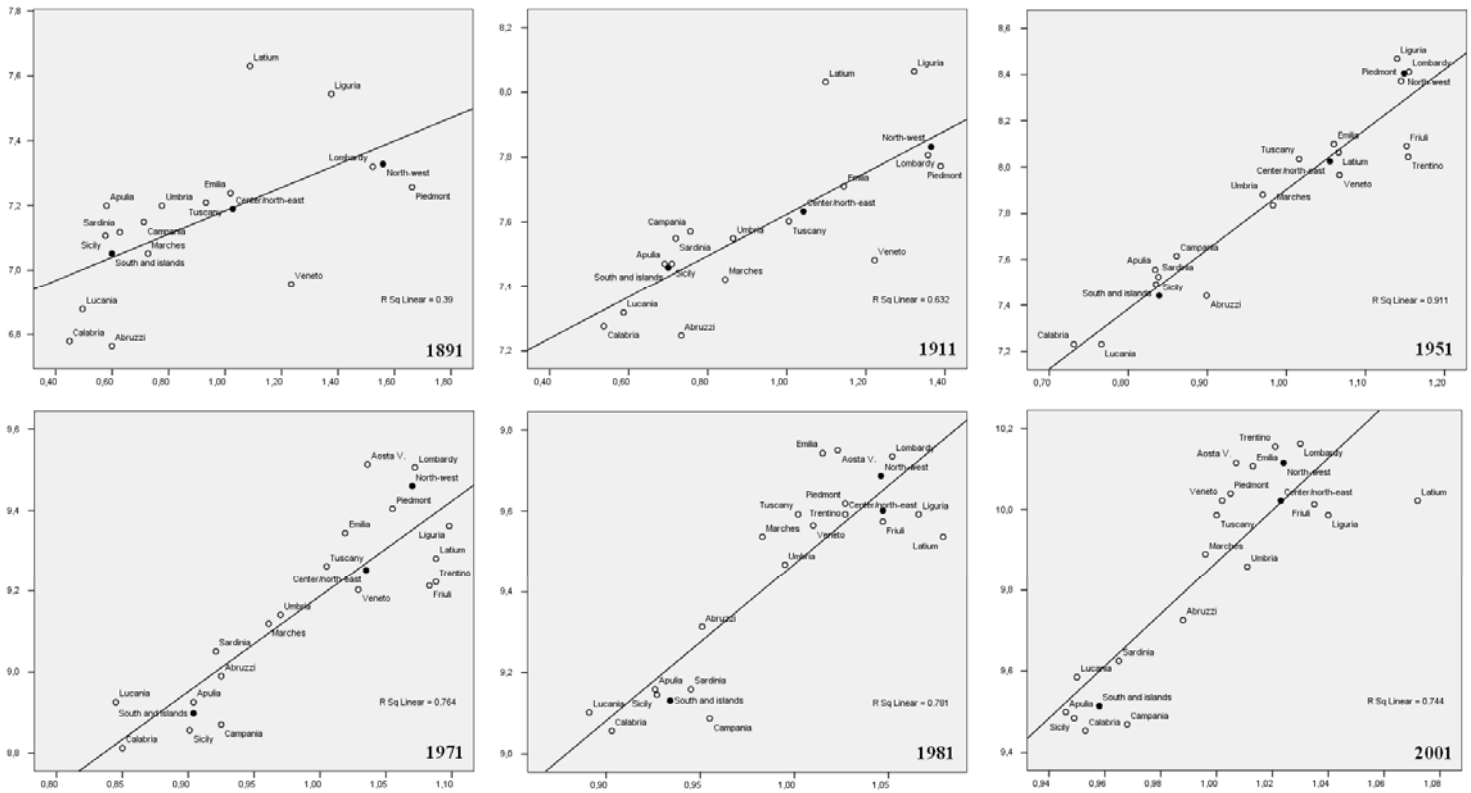
[16] It must be recognized that economists have usually employed panel data for relatively short periods, usually not exceeding four decades, although this was due mainly to data constraints: cfr. the sentence by Durlauf et al., "Now that more recent data are available, there is more scope for estimating panels with a longer time dimension" (2005, p. 628).

[17] Needless to say, between 1891 and 1951 there were other factors at stake, such as natural resources, geographical position, the very forces of agglomeration and increasing returns of the cumulative approaches which may have involved physical capital (Rossi and Toniolo, 1994), as well as social capital (see the next paragraph).

human capital (those below the fit line); and how these ranks changed over more than a century. Veneto, for example, passed from the second group (until 1971) to the first one (in the last three decades): at the end of the nineteenth century it was a poor region with a relatively high level of human capital; by the end of the twentieth century, a rich region with relatively low education. Latium followed the opposite path, changing position from 1911 to 1951.

This mere evidence begs for further investigation on how human capital affected the growth of each and every region, and on how and why the correlation between human capital and economic growth changed over time. These should be important questions for growth economists and economic historians – from which a profitable comparative analysis could follow – but at the moment a neoclassical convergence model seems inadequate to answer them.

Figure 3. *Per capita value added and human capital in Italy's regions, 1891-2001*



Note: per capita value added in Ln 2001 euros (y-axis), human capital on Italy=1 (x-axis). Elaborations from tables 1 and 4.

5. The search for social capital

Social capital is an elusive concept, since it was introduced and gained momentum between the end of the 1970s and the 1980s (Coleman, 1988),[18] probably more elusive and problematic than human capital. The well-known definition by Putnam (1993, p. 167), which was proposed with respect to the Italian regions,[19] refers to it as 'features of social organization, such as trust, norms and networks that can improve the efficiency of society': it is a combination of formal and informal rules, which involves somehow also institutional performance, another recently successful explanatory variable of long term economic performance (see Acemoglu *et al.*, 2005).

For our purposes, we can avail of a recent work by Giorgio Nuzzo (2006), who adopts a definition similar to that of Putnam and offers a reconstruction of social capital for the Italian regions from 1901 to 2001, in benchmark years. Nuzzo's index is a simple mean of social participation, political participation and trust: the first is measured by the average of the densities of different no profit institutions; political participation is measured by the average of the densities of political no profit institutions, of the shares of voters out of total population at different elections, and of an informal indicator based on polls drawn from 1993 to 2003 about political engagement; trust is measured by the inverse of an average of estimates of violent criminality, of court proceedings, as well as of the share of perceived criminality as resulting from polls conducted in 1995 and 2003. To my knowledge, up to now this is the only work which gives a century-long view of social capital for the Italian regions through a coherent methodology, although still many qualifications could be made to the estimates. In order to render them comparable with the figures on value added and human capital, I have reconstructed two more benchmarks, 1871 and 1891, through a methodology which directly associates my results to the Nuzzo's ones.[20] The estimates of social capital for Italys' regions are shown in table 6.

---

[18] For an overview of the studies with reference to economic growth, see Durlauf and Fafchamps (2005).

[19] See also Helliwell and Putnam (1995); see Felice (2007a, pp. 54-64), for some elaborations on institutions and social capital from Putnam data.

[20] More precisely, social participation is estimated via the total members of friendly societies, as a ratio of population: first, data for 1904, 1895 and 1873 have been used to create 1871, 1891 and 1901 benchmarks, via linear interpolation with the continuous compounding yearly rate; secondly, for 1901 the linear correlation between the number of members and the Nuzzo's index of social participation (the dependent variable) has been tested, resulting very high (R^2 0.706, F 33.671 and significant at the 0.001 level, beta coefficient of the number of members 0.892 and significant at the 0.001 level); thirdly, 1891 figures have been estimated by maintaining for every region the 1901 ratio social participation / number of members, then re-proportioning figures with the regional population; lastly, this procedure has been repeated

Table 6. *Regional inequality in social capital, 1871-2001 (Italy=1)*

	1871	1891	1911	1938	1951	1971	1981	2001
Piedmont	1.163	1.405	1.451	1.229	1.210	1.098	1.128	1.048
Aosta Valley	-	-	-	-	1.668	1.763	1.514	1.493
Liguria	1.337	1.306	1.189	1.091	1.040	1.022	1.091	1.050
Lombardy	1.313	1.449	1.364	1.196	1.179	1.087	1.067	1.096
North-west	*1.255*	*1.414*	*1.373*	*1.195*	*1.174*	*1.087*	*1.091*	*1.081*
Trentino-Alto Ad.	-	-	-	4.519	3.979	3.626	3.134	2.057
Veneto	0.725	0.971	1.113	1.055	1.055	1.128	1.257	1.255
Friuli	-	-	-	1.285	1.288	1.384	1.552	1.349
Emilia	1.239	1.120	1.231	1.131	1.206	1.093	1.297	1.272
Tuscany	1.669	1.437	1.359	1.309	1.334	1.169	1.303	1.247
The Marches	0.626	0.687	0.834	0.997	1.125	1.051	1.205	1.239
Umbria	1.292	1.166	1.198	1.115	1.112	1.125	1.331	1.366
Latium	1.627	1.306	0.919	0.798	0.812	0.867	0.796	0.804
Center/north-east	*1.169*	*1.130*	*1.152*	*1.228*	*1.231*	*1.181*	*1.260*	*1.193*
Abruzzi	0.417	0.621	0.629	0.665	0.661	0.726	0.887	1.131
Campania	0.560	0.476	0.505	0.514	0.542	0.659	0.374	0.430
Apulia	0.846	0.734	0.586	0.650	0.682	0.711	0.548	0.748
Lucania	0.454	0.596	0.697	0.573	0.557	0.789	0.785	0.830
Calabria	0.421	0.351	0.483	0.548	0.541	0.738	0.817	0.654
Sicily	0.982	0.741	0.722	0.680	0.669	0.806	0.733	0.823
Sardinia	0.695	0.669	0.510	0.632	0.799	0.914	1.045	1.095
South and islands	*0.673*	*0.605*	*0.596*	*0.613*	*0.630*	*0.743*	*0.646*	*0.728*

Source: elaborations from Nuzzo (2006). For 1871 and 1891, see the text. 1938 figures are linearly interpolated between 1921 and 1951 with the continuous compounding yearly rate.

It is worth noticing that, unlike human capital, and much like per capita value added, in this case there was not convergence between the southern regions and the rest of the country, over the

for 1871, using the 1891 new estimate of social participation; the number of friendly societies and the total amount of deposits of the *banche popolari* have been tested too, alone or in combination (also with the number of members), but resulted uncorrelated with Nuzzo's figures. Political participation is estimated via the number of political journal and newspapers published in 1880, 1891, 1895 and 1905, which, as a ratio of population, have been used to create 1871, 1891 and 1901 benchmarks (for 1901, my benchmark is weakly correlated with the Nuzzo's index of political participation, the dependent variable: R^2 0.327, F 6.311 and significant at the 0.05 level, beta coefficient of the number of political newspapers 0.219 and significant at the 0.05 level; excluding Sardinia which was an outlier in Nuzzo's figures); the estimating procedure is analogous to that used for social participation, and of course in this case data have been re-proportioned over the Nuzzo's index of political participation. Trust is approximated through the inverse of an average of criminal and civil court proceedings in 1901-04, 1891 and (only criminal) 1871 (for 1901, my benchmark was highly correlated with the Nuzzo's index of trust: R^2 0.819, F 58.757 and significant at the 0.001 level, beta coefficient of our indicator 0.845 and significant at the 0.001 level; excluding the Marches which was an outlier in Nuzzo's figures); the estimation procedure is analogous to that used for the other two dimensions, in this case the data being correlated with the Nuzzo's index of trust; since for 1871 only criminal statistics were available, these were in turn correlated with criminal statistics in 1891. All data are from Ministero di agricoltura, industria e commercio (1878; 1881; 1893; 1900; 1908).

long run. Southern Italy was considerably behind the Centre-North in the second half of the nineteenth century – after all it was the homeland of what Banfield (1958) had named 'amoral familism' – and on the whole differences remained high throughout the twentieth century: they slightly reduced between 1951 and 1971, but later increased again.

The reliability of Nuzzo's estimates may be questioned, *idem* for some of the proxies here used to extend the benchmarks,[21] yet both the conventional wisdom and the well-known Putnam's essay with Leonardi and Nanetti (1993) support the idea that disparities in social capital are entrenched into the Italian history. According to Putnam, they date since the Middle Ages. According to Tabellini (2005), sharp institutional regional differences between North and South (correlated with social capital, as from Putnam) were already present in the seventeenth century. The works by Brian A'Hearn (1998 and 2000) share the view that social capital was lower in the South during the liberal age, and that this affected economic performance. For what concerns the persistence of social capital disparities, Nuzzo takes indeed an optimistic hold, since he argues that regional levels did change through time, with some improvement in the South during the second half of the twentieth century: yet this is true only for some smaller Southern regions, Sardinia and Abruzzi in particular, maybe for Lucania or for the Marches in the Nec, not for the *Mezzogiorno* as a whole. Concerning the last decades, Putnam's estimates of regional civicness show higher regional disparities then Nuzzo (Putnam 1993), and the same can be said for other measures of social capital referring to recent years, such as those by Cartocci (2007).

In the first instance, the correlations of human capital and of social capital with per capita value added can be compared by replicating the exercise made with human capital (table 5) for social capital (table 7). In the same growth regressions, social capital seems to perform worse, in particular in the 1891-1911 years. For the other periods, the results are very similar. On the whole, social capital does not seem to be relevant in the dynamic panel models (whose results are again contradictory), unlike human capital. From this evidence, it should be concluded that human capital was

[21] Arguably the most problematic is the proxy for political participation (political journals and newspapers), which maybe not by chance is the less correlated with Nuzzo's figures. Although the distribution of political newspapers broadly reflects the well-known regional differences in political participation we can observe today (half of the about 800 political journal and newspapers were published in Emilia, Tuscany and the North-West), further research is needed in order to verify and integrate the extant measure with more information. For example, for political journal and newspapers we don't even know how many copies were printed. It must be added that in this case good proxies are hard to find, mostly because of the absence of universal suffrage in liberal Italy; alternative sources such as the distribution of public libraries can be useful, but their combination with more traditional proxies of political participation is far from obvious. However, we do not think that possible refinements would alter the overall picture (lower social capital in the South during the liberal age), indeed they would probably reinforce it.

more important, although this would be at odds with most of the literature available on the falling back of Southern Italy in the last decades.[22]

Table 7. *Conditional convergence of the Italian regions (1891-2001): adding social capital*

	Cross-section linear regressions						DPD, linear regression (robust)	
	1891-1911	1911-1938	1938-1951	1951-1971	1971-1981	1981-2001	Fixed effects	GMM
Constant	0.027	0.021	0.070	0.131	0.027	0.029	0.0025	-0.0328
Standard error	0.036	0.040	0.056	0.008***	0.069	0.018	0.0102	0.0621
B_1	-0.001	-0.004	-0.012	-0.011	-0.001	-0.001	0.0017	-0.0611
B_1 standard error	0.005	0.006	0.008	0.001***	0.008	0.002	0.0011	0.1223
B_2	1.61E-005	0.014	0.035	5.66E-005	0.004	0.002	0.0031	0.0483
B_2 standard error	0.004	0.004***	0.010***	0.001	0.003	0.001**	0.0018*	0.0635
R^2	0.011	0.593	0.529	0.892	0.162	0.295	0.039	0.58(1)
N	16	16	18	19	19	19	107	104

Dependent variable: Ln value added growth rates by sub-period ($t_1 - t_0$). (1) Wald Chi2.

Independent variables: Ln value added (B_1) and social capital (B_2) in t_0.

In the GMM DPD, the independent variables are the Ln of value added growth rates by sub-period ($t_0 - t_{-1}$), instrumented using Ln value added in t_{-1}, and social capital in t_1; the robust option was preferred because GMM two-step standard errors are biased, indicating heteroschedasticity.

In all the regressions social capital is instrumented using its lag (OLS method).

* Significant at the 0.1 level. ** Significant at the 0.05 level. *** Significant at the 0.01 level.

Source: elaborations from tables 1 and 6.

Of course, social capital could be just a redundant variable after human capital (or after something else), and viceversa. This possibility can be investigated by running together human and social capital in the growth regressions. The results suggest that social capital was the redundant variable for all the 1891-1951 period. But in the last two decades the redundant variable is human capital. In short, we have a first and longer phase (1891-1951) when human capital was more correlated with value added growth, followed by a second one (1951-1971) when both human and social capital are uncorrelated with economic growth, and a final phase (the last decades) when is social capital more correlated. From these premises, unsurprisingly the results of the dynamic panel are inconclusive. Cautiousness is warranted in all the regression models, because the independent variables are highly correlated and thus the results very sensitive to small changes in the observations. And because, needless to say, historical (and present) estimates for such an elusive concept as social capital are not above criticism.

[22] From an European perspective, for example, Robert Leonardi (1995 and 2005) regarded social capital, institutional performance and organized crime – which are correlated – as the determinants of the South's falling back.

Table 8. *Conditional convergence of the Italian regions: adding human and social capital (1891-2001)*

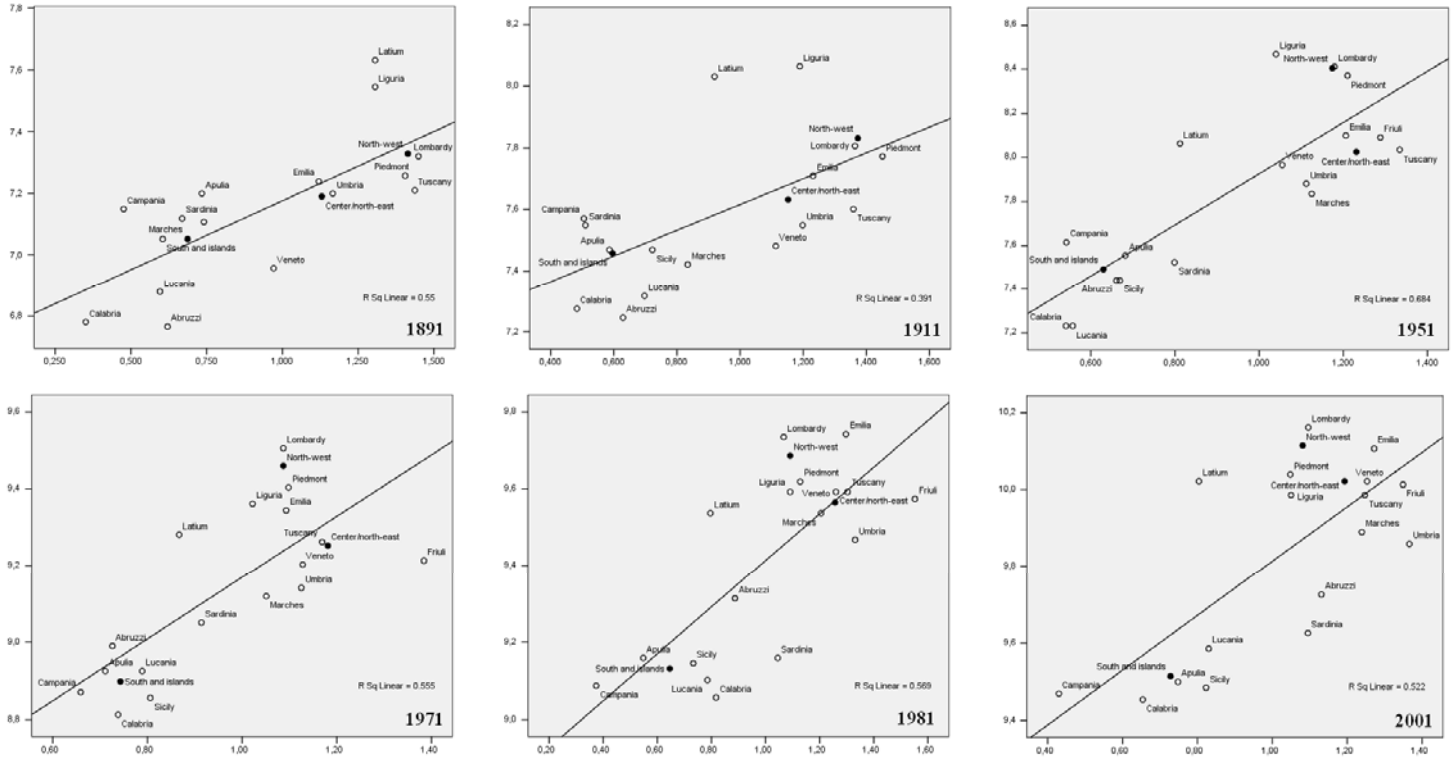
	Cross-section linear regressions						DPD, linear regression (robust)	
	1891-1911	1911-1938	1938-1951	1951-1971	1971-1981	1981-2001	Fixed effects	GMM
Constant	0.041	0.043	0.147	.0131	0.188	0.048	0.0003	-0.4273
Standard error	0.026	0.037	0.050	0.014***	0.101*	0.020**	0.0110	0.3407
B_1	-0.004	-0.007	-0.032	-0.011	-0.028	-0.006	0.0014	-0.2570
B_1 standard error	0.004	0.005	0.009***	0.003***	0.015*	0.003*	0.0010	0.1658
B_2	0.006	0.011	0.097	0.000	0.091	0.026	0.0049	0.4547
B_2 standard error	0.002***	0.005*	0.031***	0.009	0.045*	0.015	0.0049	0.3643
B_3	-0.003	0.008	0.017	6.79E-005	0.001	0.002	0.0025	0.0020
B_3 standard error	0.003	0.005	0.010	0.001	0.003	0.001**	0.0019	0.0395
R^2	0.522	0.701	0.741	0.892	0.341	0.413	0.043	6.77(1)
N	16	16	18	19	19	19	107	104

Notes and source: see tables 5 and 7. B_2 is human capital, B_3 social capital.

For sure, one reason to keep on investigating on social capital is that, according to the available data, in this case the Italian regions did not converge: unlike human capital, but similarly to per capita value added.

Figure 4 is a sequence of scatter/dot graphs analogous to figure 3, with social capital in place of human capital. There are some differences between the two charts. In figure 4 correlation is on the whole lower, yet regional gaps in social capital remain higher as compared to those in value added. Regional patterns are different too. In figure 4, we never have a three-fold repartition, but a two-fold one: Center-North and the *Mezzogiorno*. These two groups were already visible by the early twentieth century, when Veneto and Latium ranked in a middle position and the Marches belonged to the lower group. In the first half of the century, Latium got closer to the *Mezzogiorno*, but Veneto and the Marches joined the Center-North, whereas on average the Center/North-East overtook the North-West. The primacy of the Center/North-East is an important discrepancy with the trend of per capita value added, and probably the ultimate reason why in the interwar years economic growth is more correlated with human capital than with social capital. During the second half of the twentieth century, other regions left the group of the *Mezzogiorno*, in particular Abruzzi and Sardinia which have reached an intermediate position. By the last two decades, in the group with lower social capital only six regions have remained, whose five are also those with the lowest per capita value added (the other is Latium).

Figure 4. *Per capita value added and social capital in Italy's regions, 1891-2001*



Note: per capita value added in Ln 2001 euros (y-axis), social capital on Italy=1 (x-axis). Elaborations from tables 1 and 6. Aosta Valley and Trentino-Alto A. have been excluded, being outliers.

6. The road ahead

The neoclassical approach to convergence relies upon two basic assumptions, both derived from statics mechanics. The first (and usually implicit) one is staticity, i.e. the idea that economic performance can be accounted for by a single long term production function. The second assumption is that this production function has a Cobb-Douglas form, which involves diminishing returns to capital. Consequently, the basic idea behind all the neoclassical models is that there is a long term equilibrium, to which countries or regions should converge. Even when some of these models are called dynamic, since they incorporate changes in the observations over time, they are still static in their basic assumption: they may allow for cycles around the equilibrium point, they may even allow for 'progress', as a sequence of equilibrium points when technology improves (with an upward shift in the production function), but they do not consider structural change in the production function. This static framework, which still is the pillar of the dominant economic paradigma, has also been extended to the new economic geography, which explicitly violates the second assumption of the neoclassical approach, that of diminishing returns to capital, but can be remodelled within the marginalist analysis nonetheless, as we have seen.[23] One of the consequences is that at the present the international literature on regional convergence is dramatically inconclusive, and does not seem to fit with the evidence from Italy's regions.

The new economic geography, however, may also lay the groundwork for a truly dynamic approach which would allow for structural change in the production function, by recognizing for example that according to the historical periods the increasing returns can be followed by decreasing returns, then again by increasing ones (thus with rising divergence followed by convergence, and then again by divergence). Structural change is what often occurs with economic and technological progress over the long run, thus it should be preferred (or at least properly considered) at least in historical analyses.

Given their assumption of staticity, cross-section and panel data regressions have become the most popular methods in mainstream growth econometrics, and thus they have been employed also in this paper. These methods may still retain some utility, on the strict condition that they are considered as a first approximation, their implications reviewed as general indications: usually highlighting no more than a simple correlation, unless the validity of the Cobb-Douglas function over the long run can be verified. In this article, the results from these models suggest the presence of some structural change in the production function, as well as in the role of the different (possible)

[23] Similarly to what happened with Keynesian economics (e.g. Sylos Labini, 1993, pp. 52-7; Roncaglia, 1999, pp. 24-30 and 63-8).

conditioning variables. Whereas estimates at the provincial level (i.e. an increase in the number of cases) would allow us to test for stronger correlations, a data envelopment analysis (DEA) based on estimates of labour and physical capital and thus of total factor productivity, possibly incorporating as well human capital (see Henderson and Russell, 2005), would allow us to relax the assumptions about the production function.[24]

The alternative (or complementary) line of investigation should go towards a dynamic approach based on time-series. This will involve some time and a lot of work in order to be properly implemented, but is not at all out of reach. For what concerns Italy's regions, we are now going to briefly review some steps and opportunities along this path.

First, it must be stressed that a time series approach would have more chances to properly address and understand transformation (a qualitative change) over the long run. Mainstream economists recognize that 'at first glance, the most natural way to understand growth would be to examine time series data' (Durlauf et al., 2005, p. 624). However, according to Durlauf, Johnson and Temple there are two problems with the time series approach. The first one is that 'the hypotheses of most interest to growth theorists are mainly about the evolution of potential output, not deviations from potential output such as business cycles and output collapse' (ibid., p. 625). This statement arises form the very idea of a long term production function, whose shape would determine not only 'potential output', such a vague concept already, but its 'evolution' over time – neoclassical economics has been stigmatized as the physics of the society, but here it may look indeed as the metaphysics. In turn, this idea is based on the assumption that demand and offer are static curves, their intersection determining the point (and the price) of equilibrium. But this was not at all the view of classical economists, from Smith to Ricardo: demand and offer are instead flows, which reproduce and change over time. As convincingly pointed out by Garegnani (e.g. 1959), the difference is not a nuisance and the two strands are not at all reconcilable. Over the course of the twentieth century, the approach from the classics was revived and improved by the work, among the others, of Piero Sraffa (e.g. 1960). In the Sraffa's model, a new technology leads to the production of a new 'standard commodity' and to an entirely new price system; and thus technological progress may result in significant changes in the shape of the production functions (in the methods of production) over time. There are no a-priori reasons to easily dismiss the 'classical' dynamic approach, on the contrary: at the present, are the mainstream 'neoclassical' models which have proved themselves inadequate to cope with the problems of underdevelopment, i.e. maybe with the most important issues in contemporary economy (Sylos Labini, 2005, p. 183; 2006).[25] If the components of the

[24] With reference to the Italian regions, DEA has been successfully applied by Maffezzoli (2006), yet limitedly to the 1980-2001 years. To be extended back to 1891, DEA would require regional estimates of labour and physical capital.
[25] For an overview with a focus on Southern Italy, see Scarlato (1996) and D'Antonio, Flora, Scarlato (2002).

economic system must be regarded in terms of flows which reproduce themselves every *t* period, thus a time series approach looks as a more appropriate way in order to describe and understand the evolution of this system. And the main question would not be about potential output and the equilibrium, but on the determinants of the flows, the logic and sources of their reproduction and change over time, in the short run (with the same technology) and in the long one (when technology changes).

The second problem with the use of time series would be a merely empirical one: the lack of data (cfr. Durlauf et al., 2005, p. 625). For most of the developing countries, but also for many advanced ones, annual time series are not available for periods prior the 1960s (not to speak of monthly or seasonal time series); moreover, even when there are time series these are often based on interpolation, thus practically of no use for a dynamic approach. Yet this is an apparent problem. Rather, it should be regarded as a challenge for further research and in particular for closer collaboration between economic historians, economics statisticians and growth economists. Economic historians all over the world are reconstructing an extensive historical database of Gdp annual series from the nineteenth century (GGDC, 2009), although still many gaps have to be filled. If we want to make progress in our understanding of the sources of economic growth, it is in this direction that our efforts must go, i.e. towards the search for historical and statistical evidence and data and then towards the construction of empirically founded models, rather than towards a mere refinement of static (and precarious) econometric models often thoughtless of historical evidence.

By this regard, Italy is one of the countries where most progress has been done in the last decades, thanks to economic historians. The remarkable work by Stefano Fenoaltea, which took four decades to be completed, has yielded an annual series of industrial Gdp for liberal Italy (1861-1913), divided into hundred of branches (for an overview, see Fenoaltea, 2006). For the same period, an annual series of the agricultural production has been estimated by Giovanni Federico (2003b), whereas there are on-going researches in order to reconstruct the tertiary sector and to extend estimates to the 1913-1951 years. For what concerns regional figures, Stefano Fenoaltea and Carlo Ciccarelli are reconstructing the annual series of industrial value added for liberal Italy (e.g. Ciccarelli and Fenoaltea, 2009), and their results have been incorporated in the present benchmark estimates. In the future, this work could be extended to services and agriculture and replicated for the interwar period. In short, the goal of having Gdp annual series for Italy's regions from Unification until our days, which would be reasonably reliable and detailed, does not seem unattainable: whether and when this goal will be achieved depends mainly on the number, the efforts and the capacity of those engaged with the task. In the meantime, Vittorio Daniele and Paolo Malanima (2007) have produced annual estimates of regional Gdp covering the 1891-1951 years, although

their results should be regarded as very preliminary, since the authors simply extend the benchmarks by supposing that the national sectoral cycles had the same impact on every region, proportionally to each regional sectoral share (of course, as the authors note, sectoral cycles may also have a specific regional component). This is a short-cut, but far better than a simple linear interpolation; and often even a time series short-cut is preferable to a cross-section approach, although the cycle variation across regions remains to be investigated. It is worth adding that the available statistical sources would make possible to produce regional time series also for what concerns human and social capital, approximately from Unification until our days; maybe also regional series of capital and labour. Again, the achievement of this goal is conditional mostly on the efforts devoted to it.

The consequent dynamic approach could begin by separating the share of Gdp variation referable to per worker productivity, from that referable to the activity rates, as well as by highlighting the contributions of the different economic sectors, for example through a shift-share analysis. The correlation between human and social capital (or other variables) on the one side, and per worker productivity and activity rates on the other should be discussed with different hypotheses according to the main historical periods, and later possibly recomposed into an overall picture. It is worth noticing that Daniele and Malanima (2007) have already estimated the different contributions of per worker productivity and the activity rates to per capita Gdp, although limitedly to the Centre-North and the South: what determined the South's falling back until 1951 and then its rise in the 1951-1971 years was per worker productivity, whereas the divergence of the last decade was driven by declining activity rates; these results are confirmed by a cross-section analysis at the regional level (Felice 2009). Concerning the last decades (1980-2004), when much more data are available, we also have an analysis on the determinants of per worker productivity which extends the production function by Sylos Labini, and thus investigates and compares different sources of productivity gains: in particular the 'Smith' effect estimated through per capita income (after checking for endogeneity), the organization effect estimated through the ratio between the cost of labour and the average price level, the 'Ricardo' effect estimated through the ratio between the cost of labour and the cost of machinery, and past and present investments. Results suggest the concurrence of these effects, while underlining significant regional differences (Guarini 2007).

Within a dynamic approach, social capital could be modelled and tested as a determinant of per worker productivity, just as it has been done within the neoclassical approach,[26] and as a source of lower activity rates (for example, because the illegal economy contributes to keep down the official employment figures); human capital too could be modelled and properly tested, probably with better results in the case of per worker productivity, as usually recognized. A logical-historical method,

[26] See Lyon (2005) for the Italian regions.

such as the one adopted by classic economists which verifies logical hypotheses by the light of historical evidence,[27] could provide the historical backbone for economic analysis.

This historical framework has been recently outlined and is here briefly resumed. Following Fenoaltea (2006, pp. 264-6) and then Felice (forthcoming 2010), a distinction should be made between fixed and mobile resources: among the former, which are local, we have natural resources in the first industrial revolution (approximately 1830–80), human capital in the second one (1880-1970), social capital in the post-fordist age; mobile resources are mainly technical and financial capital, which tends to concentrate where the fixed resources are. The one century and a half from Unification until our days should be divided into (at least) four different periods. The first one is the liberal age (1861-1913), when in Italy there was a concurrence between the first and the second industrial revolution and both natural resources (hydraulic power) and human capital were important; in the last two-three decades, the growing number of emigrants mostly from the southern regions and from Veneto, and more in general international openness, should also be considered as a source of possible convergence/divergence. The second period (1914-1951) is characterized by international turbulence and rising protectionism, by lower Gdp growth rates, as well as by a further expansion of the second industrial revolution, with a relative decline of traditional industrial activities from the late 1920s: in these decades human capital, R&D activities and more in general endogenous growth may have had an important role in determining regional divergence. The third period (1951-1973) is that of the economic miracle, when exports became more and more important and a significant interregional migration took place; in these years, a massive regional policy was carried out in the South, probably quite effective in temporarily raising per worker productivity via distorting the flows of mobile resources – and thus determining the convergence of the South, its lack of fixed resources notwithstanding (Felice, forthcoming 2010). The last decades (1973-2001) are those of post-fordism: the Gdp growth rate slowed down, industry declined in comparison to services, regional policies in the South became ineffective if not harmful, but the export-led growth continued and was now based on the industrial districts; human capital has become relatively mobile, and social capital may well result as the key fixed resource, not least because local institutions were charged with growing political power. Within this general framework, thanks to a time series approach some relevant shocks could also be modelled and receive closer attention: such as the changes in the tariff policy, the completion of some key infrastructures, or the introduction of a territorial wage scale (*gabbie salariali*) proportional to the cost of living between 1945 and 1954, and its abolition between 1969 and 1972 (with consequent higher real wages in the South). Over the

[27] Cfr. Sylos Labini (2006, p. 118).

long run, the opposite causation, i.e. the effects of economic growth on human capital and above all social capital, could also be more properly discussed.

7. Conclusions

This paper had three main goals: 1) to present the pattern of regional inequality in Italy over the long run, in benchmark years, for what regards per capita value added, but also human capital (education) and social capital; 2) to discuss the Italian case in the light of the neoclassical convergence models, where human capital and social capital may be treated as conditioning variable of a long term production function; 3) to highlight the limits of those models and to outline future strands of research in order to build a dynamic approach which would consider historical changes in technology, in the institutional framework and in the production functions.

From the onset of industrialization until the 1970s, at a first glance the pattern of regional inequality in Italy appears to be in line with the inverted U-shaped function predicted by the literature on regional convergence: rising inequalities in the first stages, until the mid of the twentieth century, then convergence. The problem is that in the last three decades most of southern Italy reverted its process of catching-up, while the central and northeastern regions accelerated it. As a consequence, over the long run the pattern of regional inequality in Italy looks uneven, with divergence followed by convergence and then again by divergence: this may seriously hamper the reliability of the convergence models based on a long term production function, even when the role of possible conditional variables is considered, as the results from a dynamic panel extended to the whole period (1891-2001) indicate. Cross-section regressions for shorter intervals may still retain some utility: they show that the growth of per capita value added was more correlated with human capital in the first half of the twentieth century, whereas it was more correlated with social capital in the last two decades. These results are precarious because of the high collinearity between the two variables and furthermore they denote nothing more than correlation, not causation. Descriptive statistics are as much effective in synthesizing the above mentioned evidence.

More solid knowledge could come from a dynamic approach which would allow for technological and institutional change, for example via modelling and running time series regressions instead than cross-year ones. With some exceptions, reliable time series for Italy's regions are not available for the period prior to the 1970s, but researchers are at work and hopefully we could avail of a much more rich and complete historical dataset in the near future. Meantime, results from benchmark year regressions should be regarded as no more than general indications, probably worthy as long as they

highlight topics which deserve further research, in the same way as descriptive statistics. The historical framework and the steps to come for a dynamic time series approach have been sketched out in the last paragraph. After all, this approach would go in the direction proposed by Durlauf, Johnson and Temple (Durlauf et al., 2005, pp. 646-7), when discussing the 'future of growth econometrics': future strands of research should aim to integrate structural growth econometrics, case studies and a major attention to the historical and institutional context. It should be added that within the neoclassical approach these topics can hardly receive the attention they deserve.

References

ACEMOGLU, D., JOHNSON, S. and ROBINSON, J.A. (2005). Institutions as a fundamental cause of long run growth. In P. Aghion and S.N. Durlauf (eds), *Handbook of Economic Growth, Volume 1A*. Amsterdam: Elsevier, 385-472.

A'HEARN, B. (1998). Institutions, Externalities, and Economic Growth in Southern Italy: Evidence from the Cotton Textile Industry, 1861-1914. *Economic History Review* 51, 734-62.

A'HEARN, B. (2000). Could Southern Italians Cooperate? *Banche Popolari* in the Mezzogiorno. *The Journal of Economic History* 60, 67-93.

BANFIELD, E. (1958). *The moral basis of a backward society*. New York: Free Press.

BARRO, R. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics* 106, 407-43.

BARRO, R.J. and SALA-I-MARTIN, X. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity* 1, 107-82.

BARRO, R.J. and SALA-I-MARTIN, X. (1992). Convergence. *Journal of Political Economy* 100, 223-51.

BLUNDELL, R. and BOND, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87, 115-43.

CAFAGNA, L. (1965). Intorno alle origini del dualismo economico in Italia. In A. Caracciolo (ed.) *Problemi storici dell'industrializzazione e dello sviluppo*. Urbino: Argalia, 103-50.

CAFAGNA, L. (1989). *Dualismo e sviluppo nella storia d'Italia*. Venezia: Marsilio.

CARBONI, C. (1998). L'Abruzzo, regione cerniera o modello di sviluppo per il Mezzogiorno? *Il Mulino* 47, 46-52.

CARRERAS, A. (1990). Fuentes y datos para el análisis regional de la industrialización española. In A. Carreras and J. Nadal Oller (eds), *Pautas regionales de la industrialización española (siglo XIX y XX)*. Barcelona: Ariel, 3-20.

CARTOCCI, R. (2007). *Mappe del tesoro. Atlante del capitale sociale in Italia*. Bologna: il Mulino.

CICCARELLI, C. and FENOALTEA, S. (2009). *La produzione industriale delle regioni d'Italia, 1861-1913: una ricostruzione quantitativa. 1. Le industrie non manifatturiere*. Rome: Bank of Italy.

CIPOLLA, C.M. (1969). *Literacy and Development in the West*. London: Penguin.

COLEMAN, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology* 94, s95-s121.

CRAFTS, N. (2004). *Regional Gdp in Britain 1871-1911: some Estimates*. LSE Department of Economic History WP 03/04.

CRAFTS, N. and VENABLES, A.J. (2001). *Globalization in History: a Geographical Perspective*. CEPR Discussion Paper No. 3079.

DANIELE, V. and MALANIMA, P. (2007). Il prodotto delle regioni e il divario Nord-Sud in Italia (1861-2004), *Rivista di Politica Economica* 67, 267-315.

D'ANTONIO, M., FLORA, A. and SCARLATO, M. (2002). *Economia dello sviluppo*. Bologna: Zanichelli.

DI LIBERTO, A. (2001). "Stock" di capitale umano e crescita nelle regioni italiane: un approccio "panel". *Politica economica* 17, 159-84.

DURLAUF, S.N. and FAFCHAMPS, M. (2005). Social capital. In P. Aghion and S.N. Durlauf (eds), *Handbook of Economic Growth, Volume 1B*. Amsterdam: Elsevier, 1639-99.

DURLAUF, S.N., JOHNSON, P.A. and TEMPLE, J.R.W. (2005). Growth Econometrics. In P. Aghion and S.N. Durlauf (eds), *Handbook of Economic Growth, Volume 1A*. Amsterdam: Elsevier, 555-677.

EASTERLIN, R.A. (1981). Why Isn't the Whole World Developed? *Journal of Economic History* 61, 1-19.

ESPOSTO, A.G. (1997). Estimating Regional per Capita Income: Italy, 1861-1914. *Journal of European Economic History* 26, 585-604.

FEDERICO, G. (2003a). L'agricoltura italiana: successo o fallimento? In P. Ciocca and G. Toniolo (eds), *Storia economica d'Italia*, vol. III. *Industrie, mercati, istituzioni*. 1. *Le strutture dell'economia*. Rome: Laterza, 99-136.

FEDERICO, G. (2003b). Le nuove stime della produzione agricola italiana, 1860-1910: primi risultati e implicazioni. *Rivista di Storia Economica*, 19, 359-81.

FELICE, E. (2005a). Il reddito delle regioni italiane nel 1938 e nel 1951. Una stima basata sul costo del lavoro. *Rivista di Storia Economica* 21, 3-30.

FELICE, E. (2005b). Il valore aggiunto regionale. Una stima per il 1891 e per il 1911 e alcune elaborazioni di lungo periodo (1891-1971). *Rivista di Storia Economica* 21, 273-314.

FELICE, E. (2007a). *Divari regionali e intervento pubblico. Per una rilettura dello sviluppo in Italia*. Bologna: il Mulino.

FELICE, E. (2007b). I divari regionali in Italia sulla base degli indicatori sociali (1871-2001). *Rivista di Politica Economica* 67, 359-405.

FELICE, E. (2008). The correlation between human capital and economic performance. Historical evidence and some hypotheses for the Italian regions (1871-2001). *Il Risparmio* 56, 55-93.

FELICE, E. (2009). *Regional value added in Italy (1891-2001): estimates, elaborations*. Universidad Carlos III de Madrid. Departamento de Historia Económica e Instituciones. Working Papers in Economic History 09-08 [available at: http://e-archivo.uc3m.es/dspace/handle/10016/5332].

FELICE, E. (forthcoming 2010). Regional Development: Reviewing the Italian Mosaic. *Journal of Modern Italian Studies*.

FENOALTEA, S. (2006). *L'economia italiana dall'Unità alla Grande guerra*. Rome-Bari: Laterza.

GALOR, O. (1996). Convergence? Inferences from theoretical models. *Economic Journal* 106, 1056-69.

GAREGNANI, P. (1959). *Il capitale nelle teorie della distribuzione*. Milan: Giuffrè.

GGDC, GRONINGEN GROWTH AND DEVELOPMENT CENTRE (2009). *Historical National Accounts Database* [available at: http://www.ggdc.net/].

GUARINI, G. (2007). La funzione di produttività di Sylos Labini tra mercato e territorio: un'analisi econometrica per le regioni italiane. *Moneta e Credito* 60, pp. 173-98.

HELLIWELL, J.F. and PUTNAM, R. (1995). Economic growth and social capital in Italy. *Eastern Economic Journal* 21, 295-307.

HENDERSON, D. J. and RUSSELL, R.R. (2005). Human Capital and Convergence: A Production-Frontier Approach. *International Economic Review* 46 (4), pp. 1167-205.

ISLAM, N. (1995). Growth Empirics: A Panel Data Approach. *Quarterly Journal of Economics* 110, 1127-70.

KIM, S. (1998). Economic integration and convergence: U.S. regions, 1840-1987. *The Journal of Economic History* 58, 659-83.

KRUGMAN, P. (1991a). Increasing returns and economic geography. *Journal of Political Economy* 99, 483-99.

KRUGMAN, P. (1991b). *Geography and Trade*. Cambridge MA: MIT Press.

KRUGMAN, P. and VENABLES, A.J. (1995). Globalization and the inequality of nations. *The Quarterly Journal of Economics* 110, 857-80.

KUZNETS, S. (1955). Economic growth and income inequalities. *American Economic Review* 45, 1-28.

LEONARDI, R. (1995). *Convergence, cohesion and integration in the European Union*. Houndmills: Macmillan.

LEONARDI, R. (2005). *Cohesion policy in the European Union. The building of Europe*. Haundmills: Palgrave Macmillan.

LUCAS, R. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics* 22, 3-42.

LUCAS, R. (2000). Some Macroeconomics for the 21st Century. *The Journal of Economic Perspectives* 14, 159-68.

LYON, T. P. (2005). *Making Capitalism Work: Social Capital and Economic Growth in Italy, 1970-1995*. FEEM Working Paper No. 70.05 [available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=726201.

MAFFEZZOLI, M. (2006). Convergence Across Italian Regions and the Role of Technological Catch-Up. *The B.E. Journal of Macroeconomics* 6, Iss. 1 (Topics), Article 15.

MANKIW, N.G, ROMER, D. and WEIL, D.N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics* 107, 407-37.

MARINI, M. (2000). *Le risorse immateriali. I fattori culturali dello sviluppo economico*. Carocci: Rome.

MINISTERO DI AGRICOLTURA, INDUSTRIA E COMMERCIO (1878). *Annuario Statistico Italiano, 1878*. Rome.

MINISTERO DI AGRICOLTURA, INDUSTRIA E COMMERCIO (1881). *Annuario Statistico Italiano, 1881*. Rome.

MINISTERO DI AGRICOLTURA, INDUSTRIA E COMMERCIO (1893). *Annuario Statistico Italiano, 1892*. Rome.

MINISTERO DI AGRICOLTURA, INDUSTRIA E COMMERCIO (1900). *Annuario Statistico Italiano, 1900*. Rome.

MINISTERO DI AGRICOLTURA, INDUSTRIA E COMMERCIO (1908). *Annuario Statistico Italiano, 1905-07*. Rome.

MOKYR, J. (2002). *The gifts of Athena. Historical origins of the knowledge economy*. Princeton: Princeton University Press.

MYRDAL, G. (1957). *Economic Theory and Underdeveloped Regions*. London: Hutchinson.

NUÑEZ, C.E. (1990). Literacy and Economic Growth in Spain 1860-1977. In G. Tortella (ed.), *Education and Economic Development since the Industrial Revolution*. Valenza: Generalitat Valenciana, 29-41.

NUZZO, G. (2006). Un secolo di statistiche sociali: persistenza o convergenza tra le regioni italiane? *Banca d'Italia – Quaderni dell'Ufficio Ricerche Storiche* 11.

PASINETTI, L. (2000). Critica della teoria neoclassica della crescita e della distribuzione. *Moneta e credito* 54, pp. 187-232.

PETRAKOS, G., RODRÍGUEZ-POSE, A. and ROVOLIS, A. (2005). Growth, integration, and regional disparities in the European Union. *Environment and Planning* 37, 1837-55.

POLLARD, S. (1981). *Peaceful conquest: the industrialization of Europe 1760-1970*. Oxford: Oxford University Press.

PUTNAM, R.D. (1993). *Making democracy work: civic traditions in modern Italy*. Princeton: Princeton University Press, with R. Leonardi and R.Y. Nanetti.

RAM, R. (1990). Educational expansion and schooling inequality: international evidence and some implications. *Review of Economics and Statistics* 72, 266-73.

RAM, R. (1991). Education and the convergence hypothesis: additional cross-country evidence. *Economia Internazionale* 44, 244-53.

REY, G.M. (ed.) (1992). *I conti economici dell'Italia*. 2. *Una stima del valore aggiunto per il 1911*. Rome-Bari: Laterza.

REY, G.M. (ed.) (2000). *I conti economici dell'Italia*. 3**. *Il valore aggiunto per gli anni 1891, 1938, 1951*. Rome-Bari: Laterza.

ROMER, P. (1986). Increasing returns and long run growth. *Journal of Political Economy* 94, 1002-37.

ROMER, P. (1987). Crazy Explanation for the Productivity Slowdown. In S. Fischer (ed.), *Macroeconomics Annual*. Cambridge MA: MIT Press, 163-201.

RONCAGLIA, A. (1999). *Sraffa. La biografia, l'opera, le scuole*. Rome-Bari: Laterza.

ROSSI, N. and TONIOLO, G. (1994). Un secolo di sviluppo economico. In P. Ciocca (ed.), *Il progresso economico dell'Italia. Permanenze, discontinuità, limiti*. Bologna: il Mulino, 15-46.

ROSSI, N. (2005). *Mediterraneo del Nord. Un'altra idea del Mezzogiorno*. Rome-Bari: Laterza.

SALA-I-MARTIN, X. (1996). Regional cohesion: evidence and theories of regional growth and convergence. *European Economic Review* 40, 1325-52.

SALA-I-MARTIN, X., DOPPELHOFER, G. and MILLER, R.I (2004). Determinants of Long term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach. *The American Economic Review* 94, 813-35.

SCARLATO, M. (1996*). Internazionalizzazione, istituzioni e sviluppo economico. Il caso del Mezzogiorno*. Milan: Franco Angeli.

SHANKAR, R. and SHAH, A. (2003). Bridging the economic divide within countries. A scorecard on the performance of regional policies in reducing regional income disparities. *World Development* 31, 1421-41.

SOLOW, R.M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics* 70, 65-94.

SOLOW, R.M. (2000). La teoria neoclassica della crescita e della distribuzione. *Moneta e credito* 54, 149-85.

SRAFFA, P. (1960). *Production of Commodities by Means of Commodities, Prelude to a Critique of Economic Theory*. Cambridge: Cambridge University Press.

SWAN, T. (1956). Economic growth and capital accumulation. *Economic Record* 32, 334-61.

SYLOS LABINI, P. (1993). *Progresso tecnico e sviluppo ciclico*. Rome-Bari: Laterza.

SYLOS LABINI, P. (1995). Why the interpretation of the Cobb Douglas production function must be radically changed. *Structural Change and Economic Dynamics* 6, 485-504.

SYLOS LABINI, P. (2005). Storia e teoria economica: due casi degni di riflessione. *Rivista di Storia Economica* 21, 181-9.

SYLOS LABINI, P. (2006). *Torniamo ai classici. Produttività del lavoro, progresso tecnico e sviluppo economico*. Rome-Bari: Laterza.

TABELLINI, G. (2005). *Culture and institutions: economic development in the regions of Europe*. I-gier working paper n. 292, June.

THEIL, H. (1967). *Economics and Information Theory*. Amsterdam: North-Holland Publishing Company.

UZAWA, H. (1968). Time preference, the consumption function and optimal asset holdings. In J.N. Wolfe (ed.), *Value, Capital and Growth: Papers in Honour of Sir John Hicks*. Edinburgh: University of Edinburgh Press, 485-504.

VASTA, M. (1996), *Innovative capabilities in the Italian take-off: The electrical and chemical industries (1880-1914)*, D.Phil thesis, University of Oxford.

VASTA, M. (1999), Capitale umano e ricerca scientifica e tecnologica. In F. Amatori, D. Bigazzi, R. Giannetti, and L. Segreto (eds.), *Storia d'Italia. L'industria*. Turin: Einaudi, 1041-124.

WILLIAMSON, J. (1965). Regional inequality and the process of national development: a description of the pattern. *Economic Development and Cultural Change* 13, 3-84.

ZAMAGNI, V. (1978a). Istruzione e sviluppo economico. Il caso italiano 1861-1913. In G. Toniolo (ed.), *L'economia italiana 1861-1940*. Bari: Laterza, 137-78.

ZAMAGNI, V. (1993). *L'offerta di istruzione in Italia 1861-1987: un fattore guida dello sviluppo o un ostacolo?* Working Paper of the Economics Department of the University of Cassino, n. 4.