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A Comparative Perspective
on Italy's Human Capital Accumulation

by Giuseppe Bertola and Paolo Sestito

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A Comparative Perspective on Italy's Human Capital Accumulation

Giuseppe Bertola* and Paolo Sestito**

Abstract

This paper reviews the evolution of educational institutions and outcomes over the 150 years since Italy's unification, and discusses their interaction with national and regional growth patterns. While initial educational conditions contributed to differentiate across regions the early industrial take off in the late 19th century, and formal education does not appear to have played a major role in the post-war economic boom, the slowdown of Italy's economy since the 1990s may be partly due to interactions between its traditionally low human capital intensity and new comparative advantage patterns, and to the deterioration since the 1970s of the educational system's organization.

JEL Classification: N30

Keywords: Education systems, tracking, economic growth, regional convergence.

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1. Introduction ¹

Aiming to characterize the role of the educational system's role in different historical phases of Italy's development, we compare its structure and performance over time to those of a group of countries with common European historical roots, and influenced by broadly similar external shocks. We also examine regional differences within Italy, as the country's unification was itself an important economic integration experiment.

Like all other aspects of Italy's economic development, interactions between human capital accumulation and economic development were shaped by the country's location at the boundaries of Western Europe's industrialization process, and by the interplay of National rules and reforms with heterogeneous regional characteristics. Human capital accumulation, while a key determinant of economic growth, is determined by policies and institutions shaped by broader social and distributional objectives. Educational institutions can be effective tool for the purpose of fostering cultural as well as economic convergence. Across regions within Italy, however, different initial conditions had long-lasting dynamic implications, and variation across regions as well as over time of education's structure and effectiveness casts useful light on the mechanisms linking human capital accumulation and economic performance.

Section 2 summarizes the evolution of Italy's education system, in terms of relevant legislation as well as of details of practical organization of the schooling system, as regards the organizational aspects (funding, regulation and implementation, access criteria and selectivity, tracking) that bear on a schooling system's ability efficiently to produce suitable human capital. Section 3 reports broad trends over time, relative to comparable countries and across Italy's regions, of the educational system's inputs (enrollment and expenditure) and effectiveness (as measured by standardized test scores), and interprets this evidence in light of the frequent and often only partially implemented reforms that shaped the Italian education systems and were driven in turn by politico-economic mechanisms. Section 4 discusses the role of the resulting human capital stock's dynamics and regional heterogeneity as a determinant of Italy's economic performance. Section 5 concludes outlining how the paper's historical perspective may link some aspects of the Italian economy's recent stagnation to its education system's structure and performance.

2. Structure and evolution of Italy's education system

Over its 150 years, Italy's educational system has featured an evolving mix of features from pre-existing regional states, and influences from developments and reforms in neighbor Nation States. This section offers a necessarily brief and incomplete history of its structure and evolution, sketching also some relevant features of other European nations' experience,

¹ This paper was prepared for the Bank of Italy "Italy in the International Economy, 1861-2011" research project. Helpful comments are gratefully acknowledged from Gianni Toniolo, Daniele Checchi, and from the discussant Cormac Ó Gráda and other participants at the project's mid-term conference (Perugia, December 10-11, 2010). Federico Giorgi provided excellent research assistance in the treatment of census data. G.Bertola worked on this paper before taking unpaid extended leave from Università di Torino. Only the authors are responsible for any errors and opinions.

and emphasizing key discrepancies between the letter of the National law and its actual implementation, which was often highly heterogeneous across the country's regions.

Organizational and funding aspects are directly relevant to education's impact on economic productivity through provision of specific skills, or of general skills that ease on-the-job training, and to our purpose of assessing the role of human capital accumulation in the relative performance of Italy. But education, especially at the primary level, also fosters inclusion of individuals in a rule-based society with extensive division of labor, and plays an essential role in ensuring the political sustainability of national entities, where schooling can allow patriotic values to replace family and village solidarity. More broadly, schooling may contribute to social capital and to the acquisition of a set of common values and shared communication tools. This type of education lubricates social and economic interactions: mandatory, free, and largely uniform elementary education is a key tool of any Nation-building endeavor. Later in life, routing youths to different tracks may help develop specialized skills, and allow the best performers to access elite education, but generally increases the persistence of inequality, because the children of low-income households cannot afford the risk of failure in more demanding tracks (Checchi, 2006).² Such distributional implications have to be kept in mind when interpreting the evolution of educational institutions in political and social terms.

2.1 *The situation in 1860*

Two features of educational institutions in Italy's constituent States shaped the new country's evolution in the following periods. The first is that, overall, they were much less developed than in most other Western countries (Lindert, 2004). The second is the presence of wide regional gaps (see D'Amico, 2010). Only in Austrian-ruled Lombardy and Veneto, in Tuscany, and in the Piedmont and Liguria parts of the Savoy Kingdom primary education was anywhere nearing the standards of Prussia, where eight years of primary education had been made compulsory in 1763, the Netherlands (where primary education was already under State control as early as 1806), and Scandinavian countries that soon followed suit. Austria had brought elementary schools under State control in 1774, even though it would wait until 1869 to effectively provide eight years of elementary education. The other regional States were much behind in terms of elementary school provision.

Regional differences were less pronounced at the secondary school level. "Licei" had been introduced throughout the peninsula at the beginning of the 19th century, during the Napoleonic domination; in the North, Austrian-type "Ginnasi" were also present, not only in Lombardy and Veneto but also in the North-West regions ruled by the Savoy king. Some heterogeneity could however be observed as regards the more or less academic orientation of these and other secondary schools' curricula (see D'Amico, 2010 and Genovesi, 2010). In the Kingdom of Naples, secondary schools were mostly run for the elites by the Jesuit order, whose prerogatives had been restored in 1814; in Tuscany, and in Piedmont, the government

² Tracking of students across different schooling options is related to the broader issue of whether and how grouping of students according to their initial ability may improve or worsen educational outcomes, through peer effects or specialized teaching. Duflo et al. (2011) find that, in randomized trials, segregation by ability appears to benefit also below-median students.

had a stronger grip on the system and relied for outsourcing on less ideological and more practically oriented religious orders, such as the Scolopians (see D'Amico, 2010, and Francescaglia-Valentini, undated, on the different pedagogical orientation of religious orders).

At the tertiary level, Italy was home to some of the western world's most ancient and prestigious Universities, albeit only one (in Naples) existed in the continental South (but three were active in Sicily).

2.2 *The origins of Italy's education system (1860-1900)*

The Casati law, issued in November 1859 (when Lombardy, Parma, and Modena had already voted in favor of annexation to the Savoy Kingdom) was meant as a blueprint for a new Nation's educational institutions, rather than as a regional State's reform, and indeed became applicable in March 1861 to all territories of the newly established Kingdom of Italy. Its wide ranging scope shaped Italy's education system for a very long time, and it was explicitly inspired by the German system of nationally directed education (Canestri and Recuperati, 1976; Zamagni, 2002). As a matter of principle, and in contrast to the British system of no government involvement in education or the Belgian system of public-private competition, privately organized establishments would be allowed to coexist with public ones, but all would be subject to a common regulatory framework.

At the primary level, the law envisioned two years of entirely free and compulsory education. This was fully consistent with Italy's new National ambitions and with the need to provide at least some knowledge of the new Nation's official language, the version of Tuscan that had not many decades before been put in print by Manzoni's *Promessi Sposi*.³ The role of primary schooling in fostering national cohesion is vividly illustrated in Edmondo De Amicis's *Cuore*, a fictional diary by a Turin elementary school pupil picturing strong class divisions bridged by solidarity and memories of the mid-1800s independence wars. The book appeared in 1888, when the 1877 Coppino law had extended compulsory schooling to three years (with provisions for enforcement and fines for non-compliant parents) and introduced a 5-year elementary school curriculum. It was widely read in elementary schools well into the 1960s, along with *Promessi Sposi*, which remains a keystone of Italian secondary education to this day.

In practice, however, Italy did not develop a truly common and mandatory primary education system over this period. Funding of primary education was almost entirely left to municipalities; even formally, rural municipalities (those with less than 4000 inhabitants) were only mandated to organize the first two years. This resulted in huge differences in the quality and even the existence of primary schools, which depended on local resources, as well as on the local socio-political propensity to devote resources to general education (A'Hearn et al, 2011). For the first half century of life of the new state, this crystallized the huge regional differences inherited from the pre unitary period.

At the secondary level, education was envisioned to be fully regulated and to a larger extent funded by the new nation's central power. State control was meant to foster cohesion,

³ In 1861, less than three per cent of the new country's citizens were Italian speakers (Scotto di Luzio, 2007).

as well as to diminish the role in higher education of the Catholic Church, hostile to a new nation that had removed the Papal States from its control.⁴ The new State focused attention mostly on the academic *Licei* track, whose antecedents (and remaining competitors) were the Jesuit schools' Latin-based curricula. *Licei* were established and run by the State in all Provinces.⁵ With 5 years of *Gymnasium* and 3 of *Liceo classico*, they offered an academic curriculum meant to shape the culture of the new Nation's elite. In keeping with its German inspiration, the Casati Law also provided for a less academic middle-and-high-school parallel track. Despite its "*Scuole Tecniche*" denomination, it aimed to supplying students with general human capital rather than practical techniques; in 1872, 4-year "*Istituti tecnici*" were introduced at the high-school level, and one of their four curricula was centered on mathematics and physics. Unlike *Licei*, *Scuole Tecniche* offered some financial help to students, were largely funded by private or local sources and administered by the Ministry of Agriculture, Industry, and Commerce (MAIC) rather than by the ministry of Education. A more clearly vocational track was organized in the form of "*Scuole Professionali*", which remained under MAIC control even after the Ministry of Education was put in charge of technical schools and institutes in 1878. Supply and demand of practical secondary-level education was much more influenced by local cultural and socio-economic features and funding sources, and *Scuole Professionali* were very differently relevant across regions and sectors (Zamagni, 1996). In urban areas, working-class youths could also enroll in new religious schools, such as those run by the Salesiani, that offered some practical as well as cultural education.

As to tertiary education, the Casati law tasked the new Nation's ancient and reputable academic institutions both to transmission of specific, practical, professional knowledge, and to the maintenance and advancement of culture; no universities were closed, and Naples remained the only University in the South of the peninsula. The law provided again for an applied educational track, parallel to traditional university-level education, instituting "*Scuole tecniche superiori*" engineering schools; "*Scuole Commerciali*" for business studies were also instituted in 1868, a tertiary-level Agriculture school opened in Portici in 1872, and others followed.

The educational system built in the new Nation's institutional structure, and its uneven implementation, arguably reflects the "elite democracy" social and political texture of the new Nation. As lower classes had little or no political voice and power, the State's public funds were mostly devoted to secondary and tertiary academic education, while education was mostly funded and organized locally at the elementary level and in applied fields.

⁴ The Italian peculiarity of Catholicism as a mass religion with political connotations made it difficult for the new National State to fund religious schools, as was and remains commonplace in Central and Northern European countries, where privately managed school contribute to foster accountability and autonomy. Italy's republican Constitution stipulates that private schools may be organized freely but must not draw public funds; in Italy, a diverse array of mostly Catholic privately run schools tends to draw students who are relatively richer and less capable than those attending more selective public schools (Bertola, Checchi, and Oppedisano, 2007).

⁵ State-run *Licei* numbered 63 in the early 1860; by 1892, 96 comprehensive *Ginnasio-Liceo* institutes were spread throughout Italy (Scotto di Luzio, 2007).

2.3 *Broadening and tracking (1900-1970)*

In the early 1890s, the political climate shifted in more progressive directions. The 1904 Orlando law widened the scope of primary education (in terms of years of mandatory schooling and tasks assigned to all municipalities) and further enlarged the financial support from the State to the municipalities. After the results of the influential 1908 Corradini enquiry, the 1911 Daneo-Credaro law finally fully shifted the cost of all personnel and materials for primary education to the central State budget, leaving local governments in charge only of providing adequate buildings (which remains their obligation to this day).

The cultural shift that produced this important reform of the Italian educational system's funding also spurred debates regarding its organization and syllabus. After the war, modernization tendencies eventually resulted in the Gentile reform enacted in 1923 by the newly established fascist regime. Many aspects of the new design were similar to those originating from the Casati law; others instead aimed (rather controversially, also because of Minister Gentile's strong personality) at strengthening the role of the central State, the early tracking features of the Italian system, and the pivotal role in it of Liceo Classico as an elite track characterized by a difficult syllabus and tough assessment standards (Scotto di Luzio, 2007). The elementary school curriculum was shortened to five years, and the State role was extended beyond funding with the institution of administrative teacher control and adoption of a common syllabus. These new features aimed at fostering political loyalty as well as national homogeneity. Mandatory schooling was extended to age 14 but, after elementary school, the tracked structure of the system was strengthened by instituting a dead-end "Scuola complementare" track, which did not allow its students to proceed beyond lower secondary school, alongside an academic "Scuola media" that made it possible to enroll in upper-secondary institutions (including Istituti Tecnici, which were again brought under control of the Ministry of the Economy). Possibly also with the aim of strengthening the elite connotation of "Liceo Classico", the reform introduced new types of secondary schools, notably a four-year "Liceo scientifico" (a diluted version of "Liceo classico" that would in time become the most popular upper secondary track) and a Liceo for female students (that would disappear). The standards (not only of the elite academic track, but of all schools) were enforced by central controls, as performance was monitored and certified by State-run examinations at the end of elementary, middle, and high school cycles.

The resulting system was thus strongly segmented at very early ages. Strictly ranked secondary school alternatives were meant to maintain the high quality and purity of Liceo Classico and University students who, in Gentile's words, were supposed to be "few but good". The Gentile reforms also aimed at segmenting tertiary education, distinguishing the elite academic University degrees from professionally oriented education where qualifications were to be assessed by State-run "Esame di Stato" examinations.

The timing and sharpness of tracking proved very controversial, even under Fascism. Already in 1928 a new minister, Belluzzo, replaced Scuola complementare with an "Avviamento al lavoro" lower secondary school that made it possible for students to access technical schools. Further reforms were envisioned by the Bottai plan, which included tracked education in the Fascist "Corporatismo" blueprint for Italian society, but had not been implemented as the war brought an end to the totalitarian regime.

After the war, accordingly, the Italian education system was essentially still shaped by the Casati law's blueprint of a centrally managed, mildly tracked structure. That structure had been stiffened in the interwar period, however: on the one hand, by stronger administrative tools, such as the definition and central enforcement of primary school teacher qualifications ("Ruolo unico nazionale dei maestri" law 1942/675); on the other, and especially, by the institution of State exams at the end of each course of study.

The structure envisioned by legal provisions, however, was still far from being fully and effectively implemented. Schooling was supposedly mandatory until age 14, but was effectively provided up to that level only when, in 1962, the lower secondary level was unified in a "Scuola media unica" after the 5 year primary education cycle. In 1968 the State also introduced "Scuola materna" at the pre-school level, where education had until then been provided privately or, in some cases, at the Municipality level.

The relationship between the new Scuola Media and the unreformed elementary and upper secondary segments of the resulting educational system was not made explicit by the 1962 reform: while different unions lobbied for or against allowing teachers qualified for the elementary level to teach in the new lower secondary program, legislators (and Italian society) remained ambivalent as regards the preferred degree and character of tracking. At the upper secondary level, academic Licei and mildly less demanding Istituti Tecnici continued to coexist with a variety of Professional institutes, intertwined with local (and national) industry, as well as with schools organized internally by such large firms as Olivetti from the 1950s, patterned on American corporate training institutions.

2.4 *Maturity and deterioration (1970s-present)*

The transition to a fourth period of institutional evolution is marked by the period of student revolts and worker strikes that began in 1969. By 1973, sweeping reforms had allowed free access by any secondary school graduate to any tertiary degree program.⁶ University enrolment boomed. In a few years, so did the inflow of University graduates in Italy's labor market, despite the high drop-out rates and long degree completion times resulting from the fact that the traditional Italian Universities were poorly equipped to educate large masses of unscreened students.⁷ While free access to Universities was legislated on a notionally temporary basis, in the expectation of further reforms, the structure of Universities was reorganized only in 1980, replacing the previous German-style Chair professors and assistants with departments and faculties organizing peers in a three-step academic career. A mass of faculty who had been awarded temporary teaching and research positions during the previous decade was tenured without proper screening, and this made it

⁶ Previously, Licei degree holders could enroll in any University degree program, while Istituto Tecnico degrees allowed enrolment only to programs in the same subject area, offered not only by Universities but also by Politecnici and other technical and commercial tertiary institutions.

⁷ Barbagli (1974) viewed the enrollment boom in terms of a constant tendency to over-education in Italian society. Such a view is however at odds with the comparative evidence we report in Section 3, where we show that Italy has always remained a laggard country in terms of educational attainment vis-à-vis countries at comparable GDP per capita level. As also emphasized by Barbagli, educational attainment does appear to have been driven in Italy more by a desire for social advancement and access to public sector jobs, rather than by private labor market forces.

difficult for younger cohorts to start University careers.⁸ The administration of university personnel and the structure of degree programs remained fully centralized until the 1990s, when many new Universities were established all over Italy. Around 2000, Universities were finally granted broad and uncontrolled freedom to hire and (more frequently, because of obvious evaluation biases and smaller budgetary costs) promote their faculty, and to design new courses in the three-plus-two harmonized European format.

At the upper secondary level, the system based on *Licei* and *Istituti Tecnici* kept its pre-war configuration throughout decades while their role was changing drastically. Comprehensive reform of the upper secondary tracks remained pending (and hotly debated) for about 50 years. Since the early 1990s school-level “*Sperimentazioni*” were allowed to introduce fairly substantial changes in the admittedly obsolete upper secondary school curriculum. Despite their name, these innovations were neither introduced in a properly experimental setting, nor evaluated. They did not substantially change the academic orientation of upper secondary schools, which was increasingly unsuitable to their wider and less selected population of students. While until the 1980s the rise in high school enrollment had been driven by technical and (initially) professional tracks, since the 1990s enrolment has favored *Licei*, perceived as more prestigious and a better gateway to University. A new simplified, and less expensive, structure has only recently been introduced, and has begun to be implemented in 2010.

The fact that all upper secondary schools would have to prepare students for potential University access further complicated the inconclusive debates that followed the 1962 “*Scuola media unica*” reform of lower secondary schools. Lower secondary schools moved from being preparatory schools (to different tracks) to provision of a universal and mandatory education, but it was unclear whether they should serve as completion of the primary segment,⁹ or as an introduction to the upper secondary level that was also gradually becoming almost universal.¹⁰ This may explain why teachers who work in lower secondary schools appear to fare worse in job satisfaction surveys (Argentin and Cavalli, 2010).

In the primary segment, where teachers up to very recently were not required to have a tertiary degree, teacher numbers increased faster than enrolment with the introduction (in 1971) of full-time sections and the assignment (in 1977) of additional teachers to help the problematic students that were previously confined in remedial sections; between 1985 and 1990, the elementary school curriculum was reformed assigning multiple teachers to each

⁸ In 2010 the average age of all Italian university faculty was 51.6, and their most frequent ages were those around 63, corresponding to the cohort that was granted tenure in bulk at about 30 years of age in 1980 (source: CNVSU, *Undicesimo Rapporto sullo Stato del Sistema Universitario*, 2011).

⁹ In many provinces lower secondary schools and primary schools have been merged, as mandated by a reform that should have been implemented nationally from 2001 but was repealed by the next government.

¹⁰ Currently, more than 90% of youth enroll in upper secondary schools but many of them drop out before obtaining a degree; thus, over 20% of the 20-24 age group have not completed secondary school (Cipollone et al., 2011). Schooling is mandatory up to 15 years of age: all students have to complete lower secondary school, and should remain in education – either in the upper secondary school segment, or in training related activities – until they turn 16. In absence of grade repetitions, 15 year old students should be completing the second grade of upper secondary school, which does not fulfill any degree requirements.

class. As a baby boost followed the baby-boom's peak reached in 1964, the pupils-to-teacher ratio declined along with enrolment rates.¹¹

Not only the mismatch between unreformed curricula of different school levels and mass school attendance, but also administrative and legislative innovations may have reduced the effectiveness of Italian schools' organization and operation. Hiring and retention of teachers gradually lost any remaining selective feature, and the lack of selectivity at the access gate may have been further compounded by the self-selection implications of the erosion in the social prestige and the economic appeal of the teacher profession. Increasingly rare and crowded official competitions for permanent teaching positions (kept below the numbers required by current enrollment in order to avoid longer run budgetary costs) implied that the many would-be teachers who had earned degrees in the newly accessible Universities could only obtain temporary employment. Since access to tenured position could result from accumulation of seniority in such positions, rather than official competitions, teaching became an occupation for individuals who either are very motivated and willing to wait for a long period of time before getting a permanent position, or lack alternative employment opportunities.¹² The job satisfaction of Italian teachers is quite low, but few of them declare that they are willing to move to another career track (Argentin and Cavalli, 2010).

Even after temporary job assignments finally lead to a permanent position, tenured teachers continue to move towards schools they prefer in terms of geographical location (which often means from the North to the South) and other characteristics. Also as a result of internal mobility and local labor market conditions, teachers are more senior (hence better paid) in the South where student/teacher ratios are lower than elsewhere not only because of an often more fragmented territory, but also because of social pressures to accommodate teachers' labor supply.¹³ Mobility rights are based only on seniority, with no role for schools and no assessment of teachers' actual behavior, as such mostly unchecked both before and after the attainment of a tenured position. The schools located in the worst environment, in terms of the socio-economic characteristics of their catchment area, are the ones whose teachers are more likely to request in a transfer application (Barbieri, Rossetti and Sestito, 2011). Thus, many teachers are just waiting to move to somewhere else, and poorly motivated to supply any additional effort, precisely where teaching duties would be most pressing.

Such perverse allocation mechanisms were compounded by changes in student assessment procedures in the direction of weaker standards and reduced comparability of exam results. The process began with the reform of the Esami di Maturità in the early 1970s and possibly peaked between 1995 and 2006, when students who failed only a few subjects

¹¹ In the Brunello and Checchi (2005) dataset, the student/teacher ratio in Italian public elementary schools was 27.3 in 1950, 22.2 in 1960, 21.4 in 1970, and 15.7 in 1980; the OECD International Indicators Project reports a value of 10.8 for 1992, the lowest across all member countries.

¹² Barbieri, Esposito and Sestito (2011) report that around 2008 the median age of those obtaining a permanent position, after 10-15 years of previous temporary work experience, was about 40.

¹³ Regionally heterogeneous dynamics are documented by Brunello and Checchi (2005) in the context of their analysis of the role of background factors and resources as determinants of education achievement in Italy.

were no longer required to make up their shortcomings during the summer break. Already in June, teachers had to decide either to have them repeat the grade, or to pass them to the next grade; the latter was the more agreeable option for teachers in an environment where anxious parents, rather than Ministry inspectors, would be questioning their choices. From 1997, and until 2005, the Esame di Stato that replaced Maturità at the end of high school was administered by the students' own teachers, with only one Ministry-appointed external examiner.

Even more than in the interwar and post war periods, the evolution of the Italian educational system since 1970 has resulted from a patchwork of partial and often not fully spelled out compromises between supporters of an egalitarian single track, and those who stressed the possible efficiency implications of early tracking. The system was not only increasingly unable to define its own broad orientation and goals, but also plagued by a gradual relaxation of de facto standards of quality, stringency of monitoring, and comparability of results. So, to the extent that egalitarian pressures were effective, some equalization resulted in the grades attained by students, but not very much (if any) as regards the actual competencies associated to those grades.

3. Dynamics and relative performance

Italy's institutional evolution offers a very rich setting for evaluating the determinants and effects of education quantity, quality, and funding modes. In this section, we first examine the behavior over time and across regions of indicators of the Italian education system's input and output, aiming to detect the implications of the institutional features reviewed above. Then, we compare them to those observed in other countries, preparing the ground for the next section's analysis of education's role in explaining Italy's economic development.

3.1 *Input dynamics in the long run*

Data on expenditure, demographics, and enrolment are shown in **Figure 1**, drawn from the Checchi (1997) dataset, and disaggregated by levels of government, and by elementary, middle, and high school age groups. The consequences of the institutional developments briefly reviewed above are readily apparent. The overall level of public expenditure remained low until primary schools shifted from local to State funding; enrolment in primary schools took off only after the provision of State funding, and approached 100% only in the 1930s. Furthermore, attendance stayed even lower and, even though enrolment increased continuously, actually declined between 1881 and 1893 and between 1926 and 1936 (A'Hearn, Auria, and Vecchi, 2011; Toniolo and Vecchi, 2007, discuss the related incidence of child work). The resulting low effectiveness of primary school provision is apparent in literacy rates which, as discussed in A'Hearn, Auria, and Vecchi (2011) and below, were low on average and very heterogeneous across regions.

In the case of males, the military draft (introduced with much opposition and dodged by many, particularly in the Southern regions) was also an additional instrument in order to provide basic literacy and numeracy, as well as discipline and National cohesion. Since the very poor implementation of elementary school mandates implied that many recruits were illiterate, part of the military budget was used for educational purposes, at "Scuole

reggimentali” founded in the 1830s in Piedmont, and expanded throughout the Independence Wars period.¹⁴

Only after the Second World War new entrants in the Italian labor force had almost universally enrolled in a modern primary segment. Secondary education was much less prevalent than in other European countries. The establishment of a lower secondary segment with an employment-oriented track led it to begin growing in the 1930s, booming after the Second World War, especially in the North West, but also in the Eastern and Central Adriatic regions that caught up with the traditional industrial triangle (Zamagni, 1996). The high school graduates, while few, were typically trained by high-quality secondary institutions. Classical studies were privileged but technical schools were quite diffused. As a result of the interwar period reforms, the system as a whole was characterized by different level tracks and not as a system of differently specialized tracks. Since the 1970s, despite the haphazard positioning of traditional upper secondary schools between Scuola Media Unica and Universities, enrolment in them has been continuously rising. Initially, the rise was concentrated in the more vocationally oriented tracks; the last two decades have seen a progressive rise of the more academic track, especially Liceo Scientifico.

Over time, public spending in education, as a ratio to GDP, increases with GDP per capita throughout the sample. This unsurprisingly reflects not only the country’s increasing standard of living, and its increasing propensity to invest in a rich-country’s educational system, but also the effect on per capita income of declines in the youth dependency ratio as birth rates decrease, and of the slow productivity growth that characterizes education everywhere, and especially in Italy’s case (where the institutional changes reviewed above tended to over-staff schools when student numbers started to decline). The simple regressions reported in **Table 1** show that the relevance of economic and demographic factors varies across the different periods considered. Per capita GDP is positively associated to the share of public education expenditure in 1900-15, 1947-70, and less significantly in 1970-1990. In other periods, education expenditure responds more to demographic factors.

In discussing the evolution of Italy’s human capital a reference has also to be made to in- and out-migrations. Until the last quarter of 1900s Italy was an out-migration country. As migrant individuals were on average less educated than those who remained in Italy (as well as than residents of destination countries), migrations in all likelihood tended to decrease Italy’s education gap vis-à-vis the other Western countries. This phenomenon was particularly intense in the decades before the first and after the second World Wars. While migrants were relatively uneducated persons, they were among the most entrepreneurial in their cohorts and the acquisition of a minimum threshold level of education was very often a trigger factor allowing them to migrate (see Ó Gráda and Gomellini, 2011, for a more detailed analysis).

In the more recent decades Italy has become an immigration country, and migratory flows no longer reduce Italian education gap vis-à-vis other developed countries: not only

¹⁴ Della Torre (2010) reports data indicating that education absorbed a significant proportion of regimental budgets, and that youth’s illiteracy was reduced by at least 43% and up to 90% during military service until 1882, when literacy was no longer a condition for discharge. Regimental schools were abolished in 1892.

because immigrants to Italy are less educated than Italian natives and the relatively few but well educated Italian emigrants, but also because they are less educated than immigrants to other developed destination countries (Cingano and Rosolia, 2010). The Italian socio-economic system appears less able than other developed countries to attract qualified (and legal) immigrants; most immigrants in Italy are initially irregular and working in the black economy (until they are regularized by amnesties, taking place every 3-5 years in recent experience).

3.2 *Geographic heterogeneity*

Table 2a summarizes the long run evolution of regional differences over the unitary Italian history across four broad areas.¹⁵ We consider different indicators for different periods. Up to 1951 we report data for the overall illiteracy rate (as computed in the population censuses¹⁶) and the primary enrollment rate as a fraction of population in the 6-14 age bracket. For the subsequent period (starting in 1951) we report the average number of schools-years implicit in the highest educational title attained as evaluated in the population censuses (and in the labor force survey for 2010, the 2011 population census still being pending).¹⁷ **Table 2b** repeats the exercise over the period until 1951 focusing on the gender gap, defined as the difference in those same indicators between females and males.

The Southern gap and other regional differentials persisted almost unchanged until the early 1900s. While primary enrollment caught up quickly by 1921 and was more or less uniform by the 1950s, differences in illiteracy rates in the overall population and, more broadly, in the average years of schooling of adult population, were quite wide still in 1951. The convergence beyond primary enrollment – for what concerns higher grades and the overall adult population – to a large extent is a post-war phenomenon.

The gender gap remained fairly constant until 1951 for Italy as a whole. At the regional level, Northern regions actually started with a gender gap larger than the national average: remedial education courses during military service help explain why regions in the Savoy Kingdom, the cradle of the new Nation's military draft, had the highest literacy rates, but also an especially large female gap. Since males also had a prominent role in formal economic activities, such a more pronounced gender bias in the Northern regions may have further enlarged the relevant human capital advantage of those regions.

The lack of convergence in primary schooling until the early 1900s is largely explained by local funding of primary schooling. Lindert (2004) argues that local funding

¹⁵ It is worth mentioning that the persistence of initial conditions is remarkable at more disaggregated levels: Sardinia, while geographically Southern, appears in many respects to benefit until recently from the early strength of the Savoy Kingdom's educational system. Tabellini (2010) documents a similar persistence of pre-National conditions in other European countries as well as in Italy.

¹⁶ A'Hearn et al (2011) show that, albeit possibly affected by self-reporting bias, the population census definition of literacy tracks quite well the underlying evolution of the actual capability to read in the overall population, while the data on enrollment are likely to be less informative, as many of those enrolled did not attend school (particularly in some seasons and some areas).

¹⁷ This measure neglects both the years spent in education by individuals who drop out without a formal diploma and the years of schooling in excess accumulated in conjunction with grade repetition (a phenomenon quite common in the Italian context).

has been a halting factor of primary schooling expansion in the late 1800s restricted democracy polity of most European countries. The land-owning classes endowed with political power in the late 1800s were not much interested in raising literacy of their prospective salaried workers; their propensity to fund education was even lower at the local level, where it could have increased wage demands and out-migration.

While these factors were likely relevant across the whole country, in the South local resources (as measured by GDP per capita) were already slightly lower than elsewhere. This naturally reduced municipalities' propensity to fund education if it was seen as a relative luxury: A'Hearn, Auria, and Vecchi (2011) show that in regions with better-funded primary education a higher share of municipal tax receipts were spent on education, and note that regional diversity was likely rooted in cultural and political as well as economic differences. The demand for literacy and numeracy skills was related to the presence of modern industrial firms, hence much weaker in the South, where the dominance of landlords in local politics was possibly stronger; the stronger presence of Catholics and their fears vis-à-vis public schools may also have played a role.

We further explore the extent and convergence of geographic differences for the most recent period by exploiting the 1971 to 2001 censuses data, available at the level of the about 8000 municipalities, regarding educational attainment of “established adults”, the 35-64 years old, and “young adults”, the 25-34 years old.¹⁸ **Figure 2a** illustrates their joint distribution displaying, for each census, the across-municipalities quintiles of educational attainment for the 35-64 years old, and those of the 25-34 years old in those same municipalities. Joining the dots across the different decades, we are able to show how the whole geographical distribution has moved over time and the driving role of young adults, systematically with an education advantage vis-à-vis the elder individuals living in the same area. The broad message is that geographical dispersion has considerably shrunk over time: the difference between the top and the bottom municipalities quintile in the adults educational attainment fell from about 4 (2 to 6) to about 3 (7 to 10) years, and the difference among the young adults in those same municipalities fell from more than 3 (4 to 7) to less than 2 (9 to 11) years. The relationship between the educational attainment of adults and young adults, while remaining positive, flattened considerably, indicating that geographical differences have decreased more strongly among young adults. Over time, the big jump among young adults occurred in the 1970s, and the latest data show a tapering off the process.

In **Figure 2b** we again focus only on the first and last years of our data (1971 and 2001) but distinguishing between Centre-North (the aggregate of North-West, North-East and Centre) and South. Comparing the two macro-areas to each other, the central quintiles that were farther apart in 1971 appear to be rather close to each other in 2001. **Figure 2c** looks only at young adults, i.e. the 25-34 years old, considering the 1971 to 2001 evolution of its distribution across municipalities and the associated gender gap (in the same age

¹⁸ This somewhat non standard definition of established and young adults aims to focus upon individuals who have almost surely completed their education.

group).¹⁹ Focusing on the central quintile, it is apparent that the gender gap has actually reversed its sign since already 1991. As to the relationship in each given year between the overall educational attainment and the gender gap, while there is always a mostly positive relationship between overall educational attainment and the female advantage, such a relationship had a reversal in 1971 – when the males advantage was larger in the top quintile of the overall educational attainment distribution than in the previous ones – which has disappeared in the latest data. While males were still at the forefront of the rise in education some decades ago, now such a role is overwhelmingly played by females.

A quantitative assessment of the convergence which took place in educational attainment is provided in **Table 3**, where we regress ten year changes in the educational attainment of young adults (the 25-34 years old) on their starting level and a set of time dummies (the first 3 columns, respectively for the total, males and females). The following three columns also add as a control the level of schooling of the (likely) parents of the current young adults, i.e. the average educational attainment of the 35-64 years old at the starting date. While this latter effect is positive, somehow capturing the presence of intergenerational spillovers tending to maintain across generations the advantage of the past history, the sizable coefficient of the lagged dependent variable testifies of the strength of the convergence process taking place. Notice that both the convergence process and the across the board positive trend are stronger among females than males. The positive trend among females has strengthened over time, while for males the growth in the educational attainment of young adults is close to tapering off.

As to migration, the last two decades have seen a reversal of trends that previously contributed to regional convergence in human capital. Before the First World War, relatively uneducated migrants were leaving the less developed and least endowed (in terms of human capital) regions in the Mezzogiorno and the North-East (individuals from the North-Western regions were likely to migrate only temporarily in France and Switzerland). While both external and internal migrations were blocked during the fascist period, migrations boomed again in the 1950s and 1960s, with less educated individuals leaving the Mezzogiorno and settling either in Northern Europe or in the North-West (in order to work as blue-collars in the booming manufacturing sector). These flows decreased in later decades, and their composition changed: since the 1980s individuals leaving the Mezzogiorno are among the most educated ones (see Cannari, Nucci and Sestito, 1997; Mocetti and Porello, 2010), and internal migration contributes to maintain the regional gap in human capital endowment.

To investigate whether local economic developments have had any impact on the accumulation of human capital, in **Table 4** we aggregate our observations at the level of the about 700 local labor market areas identified by Istat.²⁰ The first column of the table just replicates the specification used in Table 3 (for sake of simplicity we stick to the simplest convergence equation there used and we restrict our attention to the total population, without

¹⁹ The gender gap is here defined as the difference between females and males, so it is positive when females are more educated than males.

²⁰ Each local labor market area is defined as a group of municipalities within which most individuals both live and work. We have used the mapping defined by Istat with respect to the 2001 census.

distinguishing among males and females).²¹ The second column excludes the 1971 to 1981 change, as for some of the local economy variables we do not have the 1971 information. The third column includes a few variables characterizing the structure and performance of the local economy at the time when currently 15-24 year old individuals were making most of their schooling choices: the share of the total adult population (defined as the 25-64 years old) employed in the “made in Italy”, agriculture and “high tech” sectors,²² and the share of total employment represented by public sectors workers.²³ High tech employment opportunities are negatively correlated to the rise in educational attainment, but insignificantly so (like agricultural employment). On the contrary both the public sector and, to a smaller extent, the made in Italy are positively associated with human capital accumulation. The result for the public sector is unsurprising, as it is the most prominent prospective employer of the most educated individuals in Italy.²⁴ As income is not available in the data set, the positive association of education with the “made in Italy” strength may simply capture an income effect upon schooling choices, as the areas stronger in those activities are among the economically more successful ones. At face value it however shows how economic success in the most export oriented industries has been begetting human capital accumulation, notwithstanding the fact that human capital endowments does not appear to be much connected with such an export orientation (see Section 4).

3.3 *International comparisons*

Figure 3 offers a comparative perspective on Italy’s education attainment, plotting the average years of education of the working age population in a group of comparable Western European countries. The data, drawn from the Morrisson and Murtin (2009) database, are built by perpetual inventory methods before 1960, and include the Cohen and Soto (2007) data for more recent years. Italy is clearly a laggard in this group, which is otherwise rather homogeneous apart from Finland, initially at the bottom of the pack. In quantity terms Italy’s human capital intensity is always lower than the average, consistently with the relatively low level of Italy’s income. It does catch up rather steadily (albeit not as quickly as Finland’s, that overtakes Italy in 1950); even between 1990 and 2000 the relative education intensity of Italy’s potential labor force is still growing fast, if not as fast as in the 19th century.²⁵

Not only the quantitative size of the Italian educational system (in terms of financial resources, students, teachers), but also its quality needs to be compared to that of other

²¹ Aggregating from many small municipalities to larger local labor market areas weakens the strength of the convergence process. To a large extent this may be due to the measurement error bias likely to emerge at the (smaller) municipal level.

²² These ratios may capture both the sector specialization and the degree of economic success of the relevant sectors.

²³ This indicator is more variable across the country than the public sector employment to population ratio, which is rather uniform outside Rome. Its variation may capture both the specialization of a given area and (negatively) the buoyancy of the local private economy.

²⁴ Cipollone, Montanaro and Sestito (2011) and Schivardi and Torrini (2011) however show that over the last 15 years the demand for graduate workers in the public sector has been low; the private sector has absorbed most of the large rise in university degree holders.

²⁵ Of course part of the rise is due to demographic factors, with the young adults of the previous decades replacing the relatively uneducated eldest cohorts.

countries, and across different historical periods. Before 1900, the quality of the enrolment and expenditure inputs was not high, as attendance was not enforced, and elementary teachers' qualifications were not defined and monitored effectively.²⁶ The changes since 1970 of the organization of teacher careers and student assessments may also have had negative implications for the extent to which formal educational attainment translated in actual competencies. Theory and empirical evidence, in fact, suggest that efficient use of schooling resources is fostered by autonomous accountable choices made by individual schools (see Woessmann, 2007), and that standardized students assessments, at least at some stage, are an essential ingredient of accountability. Thus, the evolving institutional and organizational features discussed in the previous section are potentially much more important than the number of years spent in school as a determinant of the skills and competencies that are measured by standardized tests, and that may in turn determine economic productivity.

International surveys of student competencies (PISA for the 15 years old students, PIRLS and TIMSS for the 4th and 8th grade students) show wide differences across countries (and within countries) in the actual skills of individuals with similar formal education. Italian students fare poorly in the lower and upper secondary schools covered by the TIMSS and PISA surveys, while being well placed at the primary school level covered by TIMSS and PIRLS.²⁷ **Figure 4** displays the standardized average of all available tests, reported in Hanushek and Woessmann (2009), for a set of comparable Western European countries (in the complete data set, only Luxembourg, Greece, and Portugal do uniformly worse than Italy, while Japan is the best performer).

Most of the available evidence on the quality of students' competencies refers to the most recent years. In order to examine whether such a gap has been a constant of the Italian history we looked at the admittedly more sparse evidence coming from the earliest international comparison exercises. **Table 5** focuses on data from 1971, when three different grades were tested, and 1991, when only two of those three were covered. Only a few tables of aggregate results were made available to us, and relatively few countries were participating in both exercises. Accordingly Table 5 reports both Italy's scores in the original metric (relative to a bunch of different countries) and Italy's scores rescaled in comparison to either the EU countries participating in each exercises or to the subgroup of 5 EU countries (including Italy) participating in both. The table shows that the above mentioned characterization of Italian students as gradually losing ground over subsequent grades (see Cipollone, Montanaro and Sestito, 2011) was already present in 1971. Notice that the result is quite striking given that the expansion of upper secondary schools had only recently begun and, at that time, Italian upper secondary students were a relatively selected group. More importantly as regards the evolution over time of Italy's relative scores, the most recent

²⁶ A'Hearn et al (2011) report De Mauro's observation that Southern pre-unification laws explicitly allowed elementary school teachers to be illiterate; even as funding of primary education was moved to the State budget, the education ministry did not develop administration and control structures until the interwar period, and official recognition of elementary teacher qualifications was only introduced in 1942.

²⁷ Cipollone, Montanaro and Sestito (2011) confirm the presence of such deterioration over the life cycle also when restricting the comparison to the same cohort (for instance those participating in PIRLS 2001 and then in PISA 2006 or those participating in TIMSS 4th grade 2003 and then in TIMSS 8th grade 2007).

survey administered in 1991 shows a deterioration in the performance particularly pronounced among the 14 years old students (the ones at the end of the lower secondary school).

Another piece of evidence concerning the possible deterioration in the quality of the output of Italy's education system may be drawn from the International Adult Literacy Survey (IALS). The information, collected in 1994, 1996, and 1998, traces the education (in terms of number of years of formal schooling) and skills (in terms of performance on a literacy test) of adult individuals whose schooling experience dates back to many years in the past. This makes it possible for Meschi and Scervini (2010) to report summary statistics along these dimensions for the cohorts that, in each country, are adequately represented in the sample, and were born at various times over the last century. We focus on a comparison of Italy to the other Western European countries represented in the IALS sample: Denmark, Finland, Norway; Germany, the Netherlands, Switzerland and the United Kingdom.

The data plotted in **Figure 5** confirms that Italian cohorts lag behind their contemporaries from other countries in terms of years of education, and shows that literacy is higher elsewhere than in Italy at almost all average durations of education. The slope of the relationship between average test scores and the average time spent in education is similar in Italy to that of other countries (if much lower than in Norway), indicating that the education system's effectiveness is not substantially different. Strikingly, however, in Italy the cohorts born in 1955-59 achieve more years of education, but are not more competent than those born in 1950-55. The direction and even the size of this apparent drop in the quality of additional education are similar to those observed in the United Kingdom, at about the same level of quantity and quality, for the 1930s generations presumably affected by war-time disruptions. This type of evidence can only be suggestive, but does offer intriguing indications that some of the institutional developments reviewed above had substantive quality implications. The educational experience of children who went to school in the aftermath of the 1969-70 unrest and reforms at least superficially resembles that of British school-boys during the Blitz. The relationship between years of education and literacy scores remains shifted down in Italy, at the lowest level observed outside wartime Britain, and only shows a hopeful back-to-trend increase for the generations born in 1965-69 and 1970-74 (the last observation in the Meschi-Scervini dataset).

International comparisons are also useful in order to verify the equity implications of the Italian education system. As some of the factors behind the institutional evolution described in Section 2 were driven by equity concerns, the sacrifice of the pursuit of excellence to more equitable results in education might have been a reasonable and deliberate choice. Unfortunately, Italy's education system appears to fare rather poorly also in terms of equity.²⁸ Cipollone, Montanaro and Sestito (2011) document that achievements –

²⁸ The within-country dispersion statistics reported by Meschi and Scervini (2010) indicate that mean test scores are negatively correlated across countries with their within-country dispersion, indicating that (as in the PISA data examined by Freeman et al. 2010) different countries' schooling systems are not bound by a common efficiency/equity frontier. Interestingly, the length of education experiences is more variable within Italy than in other countries and more strongly than would be implied mechanically by a low and increasing average length of upper-bounded education careers: in regressions of years-of-education coefficients of

as measured by actual competencies assessed either in the mentioned international exercises or in the similar domestic surveys carried out by INVALSI – vary widely within Italy, along both regional lines and across schools within each region. Southern regions have almost completely caught up in terms of years of education (see Section 3.2), but show a sizeable gap in terms of their students’ actual competencies.²⁹ While some of the geographical test score variation is related to observable characteristics of the parental background and to schooling inputs (Bratti, Checchi, and Filippin. 2007), much of the variability is not explained by observable factors.³⁰ Cipollone, Montanaro and Sestito (2010) argue that motivational factors may play a role, as in Southern regions parents are keener to obtain a formal grade to be spent in order to get access to public sector jobs than to push for schooling quality at large. In the Southern regions, not only are scores lower on average, but also more variable. Throughout the country, and especially in the South, a large fraction of test score variation is explained by school- and class-specific effects, already at the lower secondary level that should have been uniform across the country since about 50 years ago.

4. Human capital and economic development in Italy

So far, we have reviewed institutional developments, and examined evidence regarding Italy’s checkered history as regards the resources, size, and quality of education. This section proceeds to discuss whether and how education may have played a role in the 1861-1896 and 1995-present periods of very slow growth, and in the 1901-15 and 1950-1980 periods of extraordinarily strong growth, vividly illustrated in **Figure 6** by the dynamics of income level relative to that of Western European countries with similar historical roots, and similar experiences as regards exposure to international trade and technological trends.

There is no doubt that education-based skills are a major determinant of economic growth, as well as of individual incomes, and that many relevant features of Italy’s education system have changed over the 150 years since the country’s unification. Of course, it is difficult to disentangle their economic effects from those of social, structural, and technological changes. The relevant mechanisms certainly work with long lags, as schooling institutions take about a generation to affect the human capital endowment of an economy. Thus, the situation before 1861 and the uneven early implementation of the Casati law may have influenced the uneven developments of Italian regions at the end of 19th century, when the industrial take-off was concentrated in the North-West. Similarly, the timing of the major subsequent policy events (in the 1920s and since the late 1960s) is superficially consistent with the changes in economic performance occurring some 25 years later in both cases. And while satisfactory primary education and some developments of middle education may have

variation on their mean, with cohort and country dummies, only the Netherlands dummy attracts a larger coefficient than Italy’s. This is yet another indication of Italy’s internal heterogeneity and of the strongly tracked character of its education system for much of the period covered by these statistics.

²⁹ The gap grows when moving from the lower to the upper grades, particularly for numeracy skills. For reading skills a sizable gap is present also at the earliest education stages, and may well impair learning capabilities.

³⁰ Cipollone, Montanaro, and Sestito (2010bis), document that in some fields Southern high-schools provide on average for less value added (i.e. rise in competencies over time) than schools elsewhere.

helped Italy's economy to grow in the postwar boom years, the 1970s relaxation of educational standards and the lack of coherent and comprehensive reforms might have contributed to the recent productivity stagnation.

Over such long periods, however, education interacts with broad social and structural changes which influence the economic impact of different types of formal schooling. Primary schools, providing for basic literacy and numeracy and common national values, were the most relevant ones when the modern industrial organization of production required general skills provided by primary and secondary schools, replacing traditional socialization processes fostered by family and on the job training. At further stages of development, a specialized economy can take advantage of the technical and vocational schooling provided by a tracked system. When an economy finds itself close to the world technological frontier, conversely, academic and tertiary education are needed to foster indigenous innovation, and develop the problem solving and original thinking skills that an innovation-based economy privileges over rote learning of more or less technical or academic knowledge. Of course, primary and secondary schooling provide the foundations of advanced learning: theory and empirical evidence indicate that the returns to human capital investment are much larger when undertaken over the very first years of the life cycle. Thus, early schooling remains important at all stages of development. Good universities need good students. In the absence of high-quality primary and secondary education, strength in tertiary education can be maintained only through inflows of foreign-trained students. This may be possible for the United States and the United Kingdom, not for a culturally and geographically peripheral country.

To assess the extent to which the country's educational system was suitably configured to exploit the country's economic structure and changing comparative advantage, therefore, it is important to focus on how its features interacted at various stages of economic development and in different regions with economic integration and technological progress patterns, rather than only on the development of the educational system itself.

4.1. Education and localized growth in early Italy

The better performance of North-West Italy starting in the 1890s may be partly traced to human capital. The regions that led Italy's industrial revolution were also those with the highest pre-unification literacy rates, and this is not a coincidence. Some evidence along these lines is in Felice (2011), who reports the results of conditional convergence growth equations estimated across 16 Italian regions over different time periods: human capital differentials have a positive and statistically significant role over the 1891-1911 and 1911-1938 sub periods, as well as when all periods are pooled together.³¹

³¹ Human capital is measured as a weighted average (with variables weights over time) of the indicators shown in Table 2 above: growth is measured in terms of changes in the value added per capita (relative to the overall Italian mean) as constructed by Felice (2007) from countrywide GDP estimates at a detailed sector level and information about the structural composition and different wage levels (used as proxies of labor productivity) of each region at or about the initial and final year of each period under examination. The resulting regional GDP data are consistent with, but not identical to, the macro area estimates provided by Daniele and Malanima (2007). In both cases the regional income differentials widen during the late 1800s-early 1900s take off; the

The human capital differentials inherited from the past, and affected by the uneven implementation of the Casati law, are likely to have interacted with broader developments: political unification in 1861 slashed tariffs across regions and, temporarily, vis-à-vis international partners, possibly making industrialization easier in the slightly more developed and better endowed North-western regions (A'Hearn and Venables, 2011) that would later also benefit from external trade protection since the late 1870s, and from availability of cheap hydroelectric power. All these possibly small advantages were widened in their impact by the presence of sufficient human capital in the North western regions (Gagliardi and Percoco, 2011), while other regions specialized in agriculture for the internal market.³² As a result, Italy's industrial revolution not only generated the 1900-15 growth acceleration, but also widened previously shallow regional differences in the level and sector composition of income and production (Fenoaltea, 2003).

While within the country human capital may have contributed to the unevenness of Italy's take off, the country as a whole had peculiarly low education/output ratio in comparison to other Western countries. **Figure 7** shows the relationship between the average years of schooling of the working age population and domestic production across all the countries and periods covered by the Morrisson and Murin (2009) data. The relationship is steep between 1870 and 1900, and is located on the bottom-right boundary of the data cloud, indicating that Italy was typically producing more than should have been implied by its workers' human capital.

4.2. *Education and the post-war boom*

High output despite relatively low human capital intensity is also apparent in the data, drawn from the Barro and Lee (2010) database, displayed in **Figure 8**. Italy's quantity of education, measured by years of education of labor market participants, is generally lower than that of countries with comparable real income levels, and rather mildly related to its per capita output over time.³³ In **Figure 9** we plot, for the post-war period covered by the Barro and Lee database, the relationship between per capita income and the prevalence of different education levels.³⁴ The data show that Italy's shortage of education within the 12 Western European countries listed in the legend of Figure 6 is particularly pronounced at the tertiary

South loses much ground during the fascist period and experiences some catching up only during the 1950s and 1960s (and early 1970s).

³² Some Southern regions, like Campania and Sicily, actually moved back as several export oriented and labor intensive modern cultivations were losing ground vis-à-vis the production of cereals for the internal market (see Cohen and Federico, 2001).

³³ In this and the next figure real output is measured in terms of chain-linked constant price GDP per worker (estimated on the basis of interpolated active population census data). The message is very similar if other measures available in the PWT database are used instead, such as per capita real Laspeyres GDP or current international dollars per capita GDP.

³⁴ The Cohen-Soto (2007) data displayed in Figure 7 are also available for various levels of education. Barro and Lee (2010) claim that their revised data are better, for example because Cohen-Soto do not consider the difference in mortality rates by educational levels nor the change in durations over time; for our purposes, however, the message of all data sources is consistent, and clear: Italy has peculiarly low levels of (especially) higher education achievement.

level, where demand and supply meet at much lower level than in countries with comparable income levels, despite the growth of University education that began in the 1970s, and boomed with the further reforms in the 2000s.

Finding that Italy stands out as peculiarly poorly educated among its industrialized peers, we need to wonder what may explain the country's relatively high and (until the 1980s) fast-growing standard of living. As mentioned above, of course, formal education need not contribute useful human capital to all production structures. Italy's specialization in relatively low-skill manufacturing might have relied on physical capital, as well as on interwar expansion and improvement of primary and secondary education, to its 1950s-1960s economic boom. While only scattered and incomplete data are available, but what data exist do not indicate that Italy's capital-output ratio was or remains high.³⁵ It does not stand out for capital intensity among those reported by Nehru and Dhareshwar (1993) for the 1950-1990 period, and plotted in **Figure 10** for the Western European comparison group of countries listed in the legend of Figure 6. **Figure 11** plots the capital/output ratios implied by the capital per worker and GDP per worker series compiled from survey data for some countries, and included in the 5.6 release of the Penn World Tables: these also suggest that until 1990 the capital intensity of Italy's production was not higher (and mostly lower) than that of other Western European countries.

If not to physical capital intensity, Italy's high income/education ratio has to be related to some other, maybe unmeasured, factors of production. A clue is offered by the fact that, in Figure 8, only resource-rich countries lie below Italy's recent path (and some, like Libya, catch up to it). Just like that of oil-producing countries, Italy's production may have flown from an endowment that was not produced by formal schooling, and was for a time strongly demanded by the global economy. In Italy's case, the diffused knowledge and habits accumulated in centuries of civilization may well have been an important source of current economic prosperity: not only did cultural heritages contribute to the success of "Made in Italy" products, but they also made it possible to set up informal and flexible organizational arrangements, for instance in the so called Industrial Districts, that fostered high productivity despite scarce formal human capital.³⁶

An indication of the small role of formal education in Italy's post-war success story is shown in **Figure 12**, which focuses upon differences across Italian provinces. The lowest incidence of university education at the province level is in Biella and Prato, where the highly successful textile industry was organized in tight "Distretto" clusters of small firms.

³⁵ Computations on data from the Penn World Tables, with the formula that Barro and Lee (2010) use to control for human capital when estimating the growth implications of education, yield even higher estimates of Italy's capital/output ratios (as the Penn World Tables include data for Germany only from 1970, it is not possible to estimate that country's capital stock reliably by perpetual-inventory methods). This is an unsurprising implication of Italy's high investment rates (reported by the Penn World Tables to be in the region of 40% of a low income base in the 1950s and early 1960s) and inclusion of residential investment.

³⁶ The ability to organize and transmit knowledge informally may be related to the "social capital" concept, which however most often refers to generalized trust and respect of the spirit of the law (Guiso and Pinotti, 2011). Relatively to other countries, generalized trust is lower and informal arrangements more prevalent in Italy; within the country, however, the durability and strength of informal arrangements and generalized trust appear to be positively correlated.

The data shown in Figure 12 cover all the population in 2001, and highlight the relevance in each province of the officially identified Distretti (producing not only textiles but also furniture, shoes, and other “light” premium quality manufactures). In the earlier boom decades, youth who could easily obtain employment and on-the-job training had little reason to enroll in secondary and tertiary schooling: in fact, the provinces where “Distretto” firms account for a large proportion of total employment fall in the low-education north-west quadrant of the diagram.

While industrial organization might in principle itself be endogenous to the lack of formal education, more plausibly it makes it redundant by providing alternative and more effective channels of intergenerational knowledge transmission. These include apprenticeship and on-the-job training, as well as the less-than-high schools vocational track which, as discussed in Zamagni (1996), followed much the same time trajectory and regional pattern as the manufacturing sectors that fuelled Italy’s post-war boom.

Formal education, of course, was not always and everywhere irrelevant in Italy’s experience. In order to better gauge the low relevance of human capital as a determinant of Italy’s post-war success story, we return to the data already analyzed in Section 3.2 to assess the relationship between local economic features and educational attainment among young adults in earlier decades. Reading that evidence in reverse, we ask the data whether and how the subsequent performance of “Made in Italy” sectors was affected by the initial human capital endowment in each local area.

Table 6 presents the results of a very simple regression exercise in which the ratio of employment in the “Made in Italy” sectors to adult population is regressed on its 10-year lag and on two human capital indicators measured 10 years earlier: the average educational attainment among the 25-64 years old individuals and the (generally positive) gap between the educational attainment of the young adults (the 25-34 years old) vis-à-vis all adults. The first column looks at the local labor market areas pooling three different decades (1971 to 1981, 1981 to 1991 and 1991 to 2001, suitably introducing period dummies as well). The regression coefficients in the first column confirm that that educational attainment in the total adult population tends to be negatively related to the “Made in Italy” sectors’ growth, which however is very positively associated with youths’ educational attainment advantage.

The second column replicates the same exercise at the provincial level, and the results are similar. The next two columns extend the province-level analysis to the most recent 2001-2010 decade, using labor force survey data instead of census data (not yet available, since the census is to take place in 2011): in the third column, the new decade is pooled with previous ones; in the fourth column, it is analyzed in isolation. Interestingly, the inclusion of the last decade tends to reverse the sign of local human capital endowment from negative to positive, albeit with no statistical significance, and to detect a larger positive impact of the young adults’ endowment. So, while it is true that broad (formal) human capital was not a driving factor behind the success of Italian districts, upgrading the formal human capital of those areas seems to be, particularly more recently, a relevant growth factor.

5. Education, growth, and stagnation

To foster economic growth, formal education needs to be available in suitable quantity and quality, and its production should be organized so efficiently as to minimize its cost. In all phases of Italy's educational system's evolution, the quantity, quality, and cost of its human capital production was shaped by more or less confused and controversial views as regards the desirability of equal outcomes in a setting where opportunities were far from equalized, and the tightness of linkages between efforts and results. As the same socio-political tensions that shaped production of human capital in schools and universities also influenced the organization of factories and offices, it is not easy to conclusively disentangle the specific role of human capital accumulation processes.

What evidence exists, however, indicates that scarce human capital was a key success factor in the early 20th century infant-industry growth and facilitated the post-war economic miracle, even though Italy's comparative advantage was then rooted in practical and informal rather than academic or scientific knowledge. In spite of relatively low levels of formal education, for quite a long time Italy proved able to sustain a high and increasing, if geographically unequal, standard of living. This apparent gravity-defying process may, as we have argued in the previous section, be explained by the role of less formal mechanisms of information transmission and training, including the Scuole Professionali vocational track that, in some local contexts, provided suitable skills to the population of highly specialized industrial districts. The evidence we have reviewed also indicated that, at the turn of the millennium, the quality of Italy's human capital is suffering from the implications of institutional developments since the 1970s, including the bad implementation of potentially beneficial reforms at the secondary and tertiary levels.

Whatever kept Italy growing without education ceased to be effective since the early 1990s. For the period after 1990, detailed growth-accounting estimates are available from the Groningen/Conference Board data set. The panels of **Figure 13** cumulate the yearly contributions to per capita productivity growth of the factors considered in that data base. As shown in **Figure 14**, Italy's overall growth performance over the 1990-2009 period was, at less than 1% yearly average, the second slowest (only ahead of Switzerland) in the 12-countries comparison group of Figure 6. The contribution of labor composition (measured in terms of years of education) was the third smallest (again ahead of Switzerland and Germany). Capital deepening in information and communication technology and, especially, TFP (negative by almost 5% over the period) make the most notable contribution to Italy's poor performance.

While many factors that lie beyond this paper's scope may have determined the dismal performance of the Italian economy, the evidence and mechanisms we have reviewed does suggest that the role of education may have been important, in two related respects.

First, Italy's formal education gap vis-à-vis other Western countries may have become more relevant than in the past. Over the last twenty years, expansion of trade opportunities between Western Europe and emerging countries has reduced Italy's comparative advantage in low-skill sectors, and information and communication advances have highlighted Italy's difficulties in even adopting (let alone introducing) new technologies (Rossi, 2003). These phenomena may have increased the productivity of suitable formal education relative to that of the informal, apprenticeship-based processes of skill accumulation and transmission

exemplified by Distretti, and the related vocational schooling provided by Scuole Professionali. The regressions reported in Table 6 in fact suggest that formal human capital accumulation has become increasingly important as a determinant of growth in the Made in Italy sectors.³⁷

Second, Italy's education has increasingly suffered from a qualitative gap. In Section 2.4 we discussed how various institutional and organizational developments may have worsened the effectiveness of the country's schooling system since the 1970s, and in Section 3.3 we have seen that even as Italy's education quantity has continued to catch up, its quality appears to be poorer than in other countries, both in terms of standardized student tests and of adult skills per year of completed schooling. Since the generations that attended school after the mid 1970s came of age just as growth ceased in the 1990s, the two phenomena may be related; even as education kept on growing in terms of the years-in-school measure used in the growth accounting estimates of Figure 13, some of the residual TFP estimate may reflect its declining quality.

While quality is harder to measure than quantity, it is very interesting to find that Italy displays not only the lowest standardized test scores, but also one of the most negative among the 1975-2000 test-score trends that Hanushek and Woessmann (2009) show to be significantly associated with changes in per capita GDP growth.³⁸ Thus, some of the recent marked slowdown of TFP growth may stem from its education sector and in particular from mechanisms linking organizational features to cognitive skills (Woessmann, 2003). The lack of comprehensive reforms of the secondary sector, where many new differentiated curricula have proved expensive and confusing, may have deprived that segment of the selective orientation that would have maintained quality as student numbers increased. The progressive weakening of assessment standards, rooted in turn in the lobbying power of underemployed teachers, was facilitated by the progressive dismantling of ministry-based inspective services, and by the suppression or dilution of external examinations at the end of each schooling cycle.

It is hard to deny that more and better human capital would make a useful contribution in Italy's current conditions. In the late 20th century globalization, low education may again be an obstacle to socio-economic progress in a country that appears to be poorly equipped to increase the quantity and quality of its human capital, and that may see resilient regional heterogeneity grow higher as a federalist reform of the Constitution introduces shared competence in education, backtracking over the single most important educational milestone

³⁷ Additional consistent evidence is reported in Schivardi and Torrini (2011), who look at the possible impact of the broader access to tertiary education triggered by the new organization implemented in the 1990s and 2000s. While such a rise is too late to influence the growth experience we are here analyzing, Schivardi and Torrini (2010) find, on the basis of firm-level information available in the Bank of Italy INVIND survey, that the reform-related variation of university graduates covaries positively with firm-level productivity and restructuring indicators, indicating that formal education may indeed have become a more productive factor in Italy's current economic situation.

³⁸ Only Norway's scores decrease faster, and the only other decreasing trend is Germany's. Individual data points are not available and would not be reliable, since the standardization procedure introduces considerable noise.

of the country's 150 years of history: national funding and administration of primary education.

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Table 1
Time-series correlations of demographic and economic factors with public education expenditure, various periods

Dependent variable: Share of public education expenditure in GDP, Italy

	1890-1900	1900-1915	1920-1941	1947-1970	1970-1990
Share of population between 6 and 13 years of age	0.04*	-0.19	0.13**	-0.11	0.10
Log of real per capita GDP	-0.88**	1.67**	0.00	3.05***	1.98
r ²	0.78	0.81	0.36	0.97	0.39
N	10	15	20	23	20

Legend: * p<0.05; ** p<0.01; *** p<0.001.

Table 2a
Schooling and illiteracy across regions and over time

Regions	1871		1901		1921		1951		1951	1971	2001	2010
	Illiteracy	Primary Enrollment	Illiteracy	Primary Enrollment	Illiteracy	Primary Enrollment	Illiteracy	Primary Enrollment	Average years of schooling among 25-64 years old individuals			
North-West	42.4	63.3	21.0	67.5	8.2	71.1	2.9	68.7	5.2	5.7	8.9	11.0
North-East	68.2	41.1	40.7	58.7	18.0	72.7	6.3	72.2	4.6	5.3	8.6	11.0
Centre	70.5	31.8	49.3	48.2	28.8	61.0	11.3	70.0	4.4	5.3	8.8	11.3
South	83.9	22.2	69.6	33.4	47.2	45.0	24.2	68.3	3.1	4.1	7.4	10.2
ITALY	68.8	38.5	48.5	49	27.4	57.6	12.9	68.3	4.1	5.0	8.3	10.8

Illiteracy rate: share (in %) of total illiterate individuals in the over 6 years old population

Primary schooling enrollment: share (in %) of kids enrolled to primary schools in the 6-14 years old population (in schooling year t/t+1).

The average years of schooling refer to the minimum number of years needed in order to attain the highest educational title held.

The regional indicator from Felice (2007) have been aggregated using the fixed weights of the population structure in 1971 census. The 1951 data for the average years of schooling in Felice, computed with respect to the total adult population) has been rescaled in order to make them comparable to the post 1971 data.

Source: our elaborations on Felice (2007) -up to 1951, population census - from 1971 to 2001- and Labour force survey - for 2010.

Table 2b
Gender gap in primary schooling and (il)literacy in the population across regions and over time: (females–males)

Regions	1871		1901		1921		1951	
	Illiteracy	Primary Enrolment	Illiteracy	Primary Enrolment	Illiteracy	Primary Enrolment	Illiteracy	Primary Enrolment
North-West	18,8	-7,7	4,8	-2,7	1,7	-1,8	0,5	-3,0
North-East	16,2	-14,4	11,8	-6,4	4,8	-7,1	2,3	-5,0
Centre	12,4	-3,2	13,5	-2,1	9,6	-3,9	6,6	-5,2
South	12,9	-5,0	14,5	-3,0	8,0	-3,3	8,0	-5,8
ITALY	14,0	-7,5	11,9	-3,4	6,0	-3,6	4,7	-5,0

Illiteracy rate: share (in %) of total illiterate individuals in the over 6 years old population.

Primary schooling enrollment: share (in %) of kids enrolled to primary schools in the 6-14 years old population (in schooling year $t/t+1$).

The regional indicator from Felice have been aggregated using the fixed weights of the population structure in 1971 census.

Source: our own elaborations on Felice (2007).

Table 3
Determinants of the decadal change in average years of schooling at the municipal level
among 25-34 years old individuals: 1971 to 2001 census data

Regressors	Total	Males	Females	Total	Males	Females
	-0,349	-0,383	-0,428	-0,364	-0,419	-0,488
Own group years of schooling at start date	0.004**	0.005**	0.005**	0.006**	0.006**	0.006**
	-0,162	-0,364	0,345	-0,147	-0,347	0,402
Dummy 1991 and 2001	0.014**	0.015**	0.016**	0.014**	0.015**	0.017**
	0,366	0,418	0,484	0,359	0,374	0,469
Dummy 2001	0.011**	0.011**	0.014**	0.011**	0.012**	0.014**
				0,02	0,054	0,082
Average years of schooling of parents (35-64 years old at start date)				0.005**	0.005**	0.006**
	4,369	4,588	4,754	4,384	4,601	4,758
Constant	0.025**	0.029**	0.025**	0.025**	0.029**	0.025**
Observations	24168	24168	24162	24168	24168	24162
R-squared	0,51	0,52	0,43	0,51	0,53	0,43

Sources: our elaboration on census data.

Table 4
Determinants of the decadal change in average years of schooling at the local labor market level among 25-34 years old individuals: 1981 to 2001 census data

Regressors (1)	1981 to 2001	1991 to 2001	1991 to 2001
	-0,248	-0,214	-0,219
Own group years of schooling at start date	0.009**	0.010**	0.011**
High tech employment rate at start date			-0,001
			0,004
Agriculture employment rate at start date			0,001
			0,001
Made in Italy employment rate at start date			0,003
			0.001**
Share of public sector employment at start date			0,007
			0.002**
	3,921	3,121	3,036
Constant	0.054**	0.083**	0.101**
Observations	2057	1372	1372
R-squared	0,77	0,27	0,28

The model also includes dummies for each relevant decade.

Sources: our elaboration on census data.

“Made in Italy” sectors: Manufacture of textiles, wearing apparel, leather and related products, furniture, machinery and equipment (other than transport vehicles).

Table 5
Earlier surveys on student reading comprehension – Italy scores

Age group/grade covered	1971 survey (a)				1991 survey			
	Italy Score	All partic. Mean-median	Italy (EU =100)	Italy (5EU =100) (b)	Italy Score	All Partic. Mean-median	Italy (EU =100)	Italy (5EU =100) (b)
10 years old	19.9	17.6	104.1	103.4	529	500	103.5	100.6
14 years old	27.9	25.5	105.3	105.9	515	500	99.0	98.4
Last upper secondary schools	23.9	25.2	83.0	86.2	-	-	-	-

(a) overall text comprehension

(b) the five EU countries participating in both 1971 and 1991 surveys are: Finland, Sweden, Netherlands, Belgium (Flemish regions in 1991; all regions in 1971) and Italy.

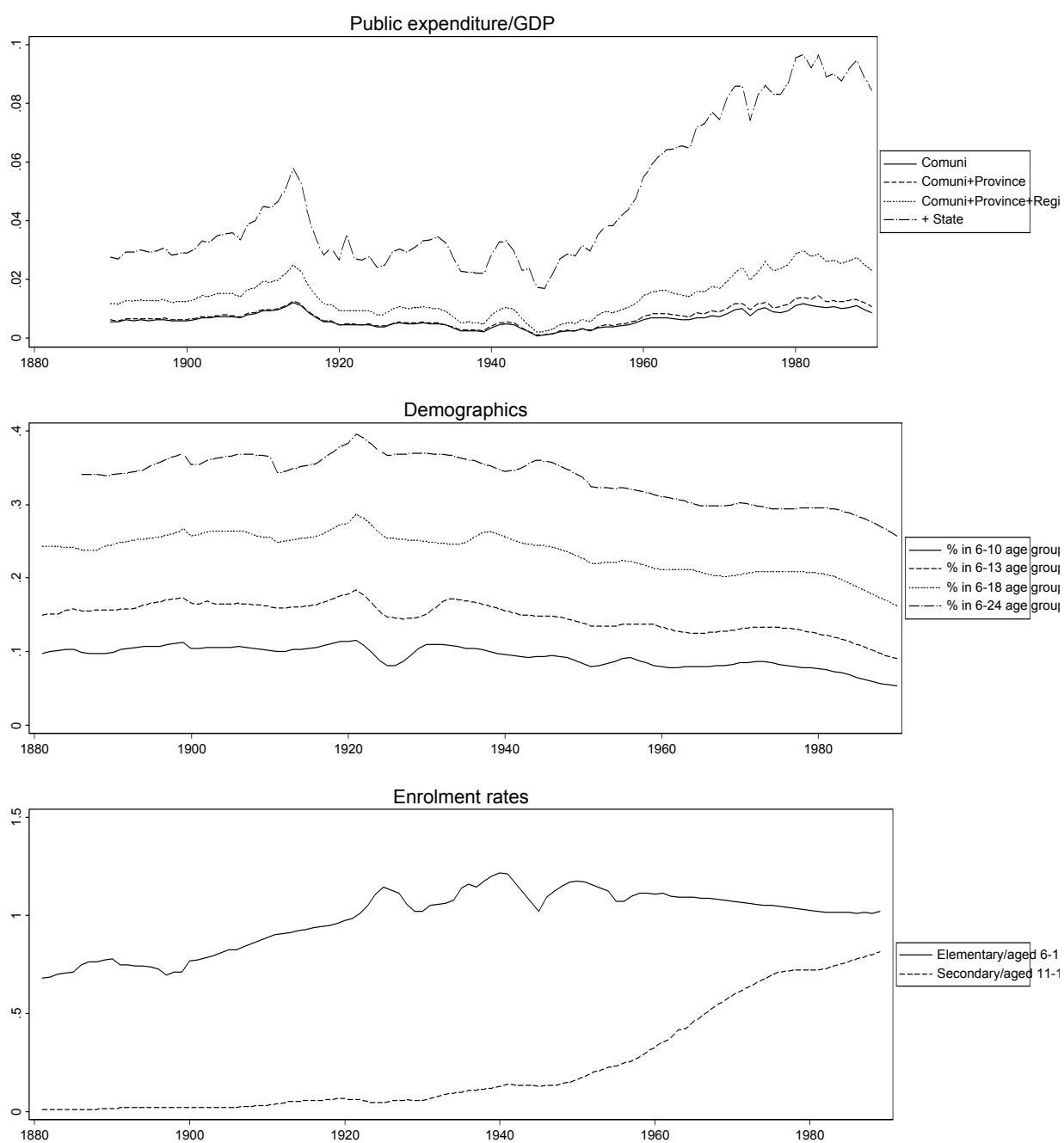
Sources: our elaborations on data reported in Thorndike (1973) and Elley (1994).

Table 6
Growth performance of the made in Italy sectors (LLM=local labor market areas): role of educational attainment at the start date

Regressors	Pool 1981-2001 LLM	Pool 1981-2001 Provinces	Pool 1981-2010 Provinces	2001-2010 Provinces
Made in Italy employment rate at beginning of period	0.866	0.858 0.025**	0.850 0.022**	0.603 0.028**
	0.014**			
Educational attainment of adults at beginning of period	-0,172	-0.18 ,139	0.061 .153	.539 .304
	0.068*			
Young adults advantage in educational attainment at beginning of period	0.652	1,096 0.247**	.743 .281**	1.901 .904*
	0.126**			
Observations	2057	285	380	95
R-squared	0.90	0.95	0.91	0.86

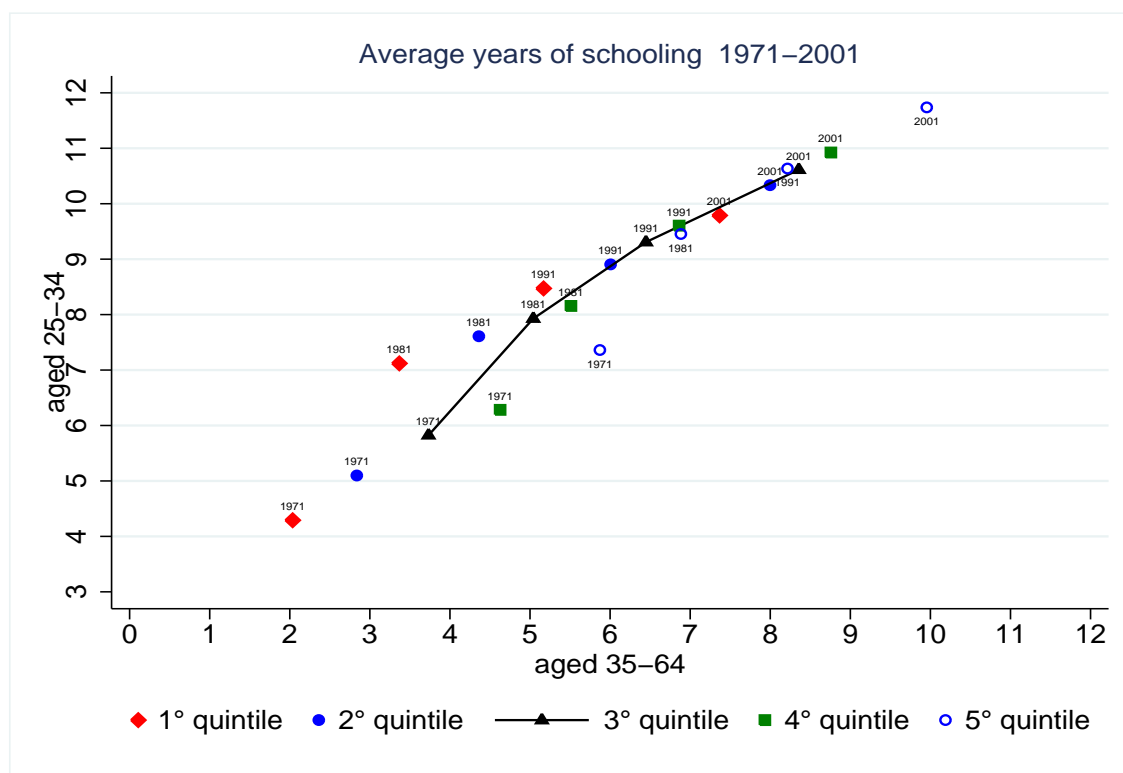
All equations have also a constant term and, where relevant, period dummies as such and interacted with the lagged dependent variable. See the note to Table 4 for the list of “Made in Italy” sectors.

Figure 1



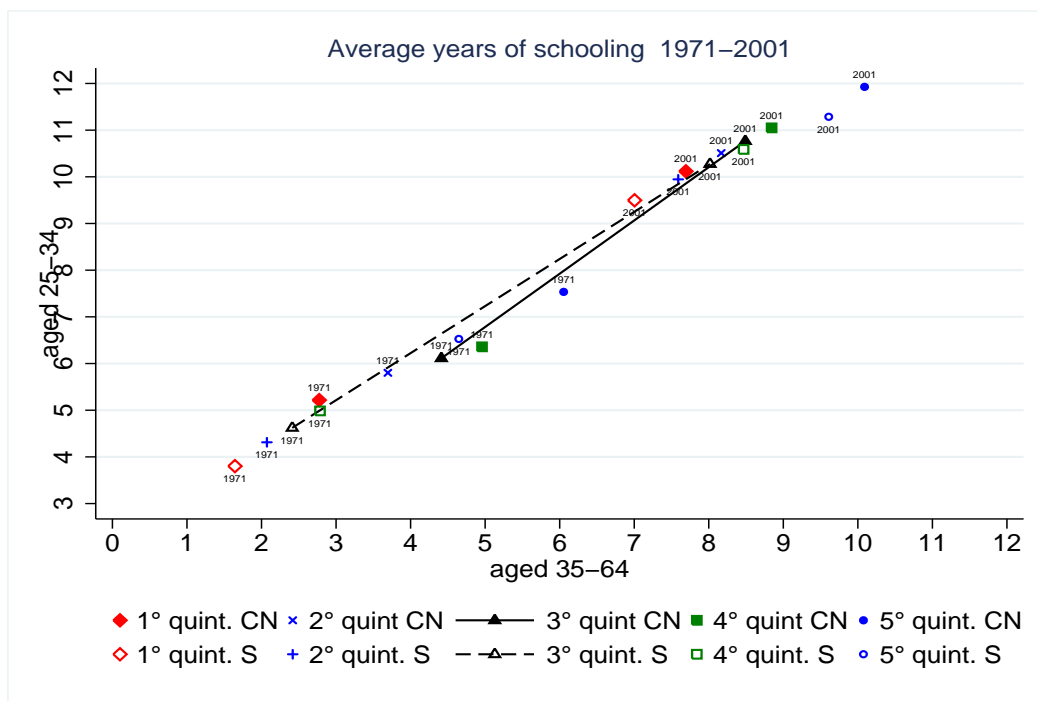
Source: Checchi, 1997; population data from Maddison database.

Figure 2a
Distribution across municipalities of educational attainment



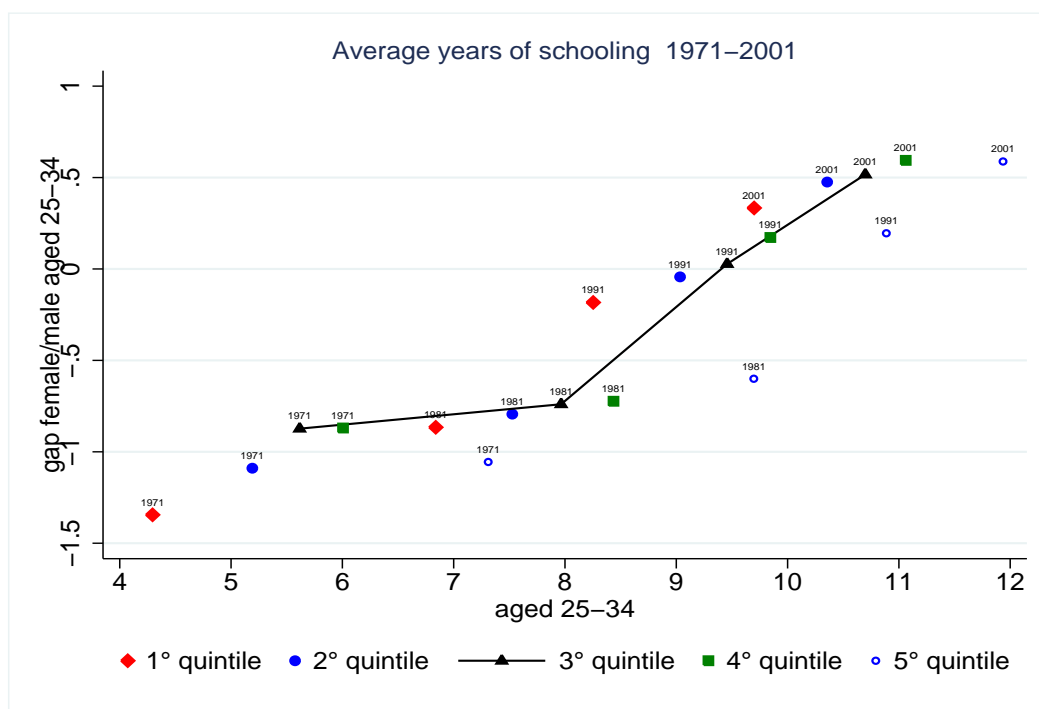
Sources: own elaborations on census (1971-2001).

Figure 2b
Distribution across municipalities of educational attainment, by Centre-North and South macro regions



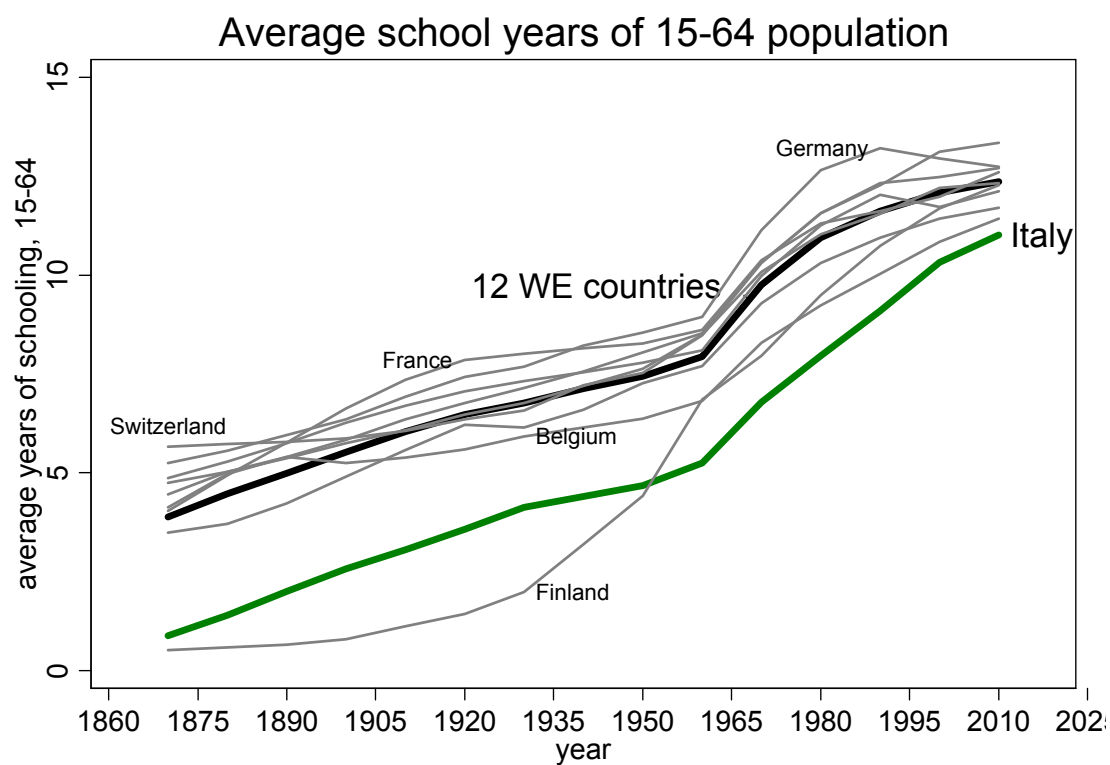
Sources: own elaborations on census (1971–2001).

Figure 2c
Distribution across municipalities of average years of schooling and gender gap



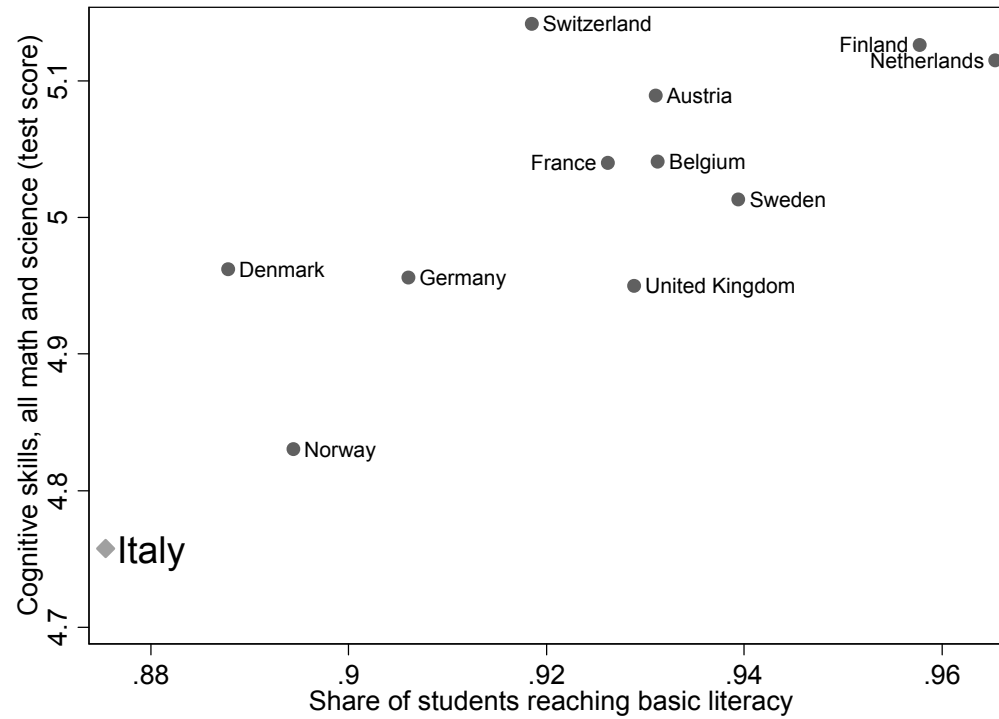
Sources: own elaborations on census (1971–2001).

Figure 3



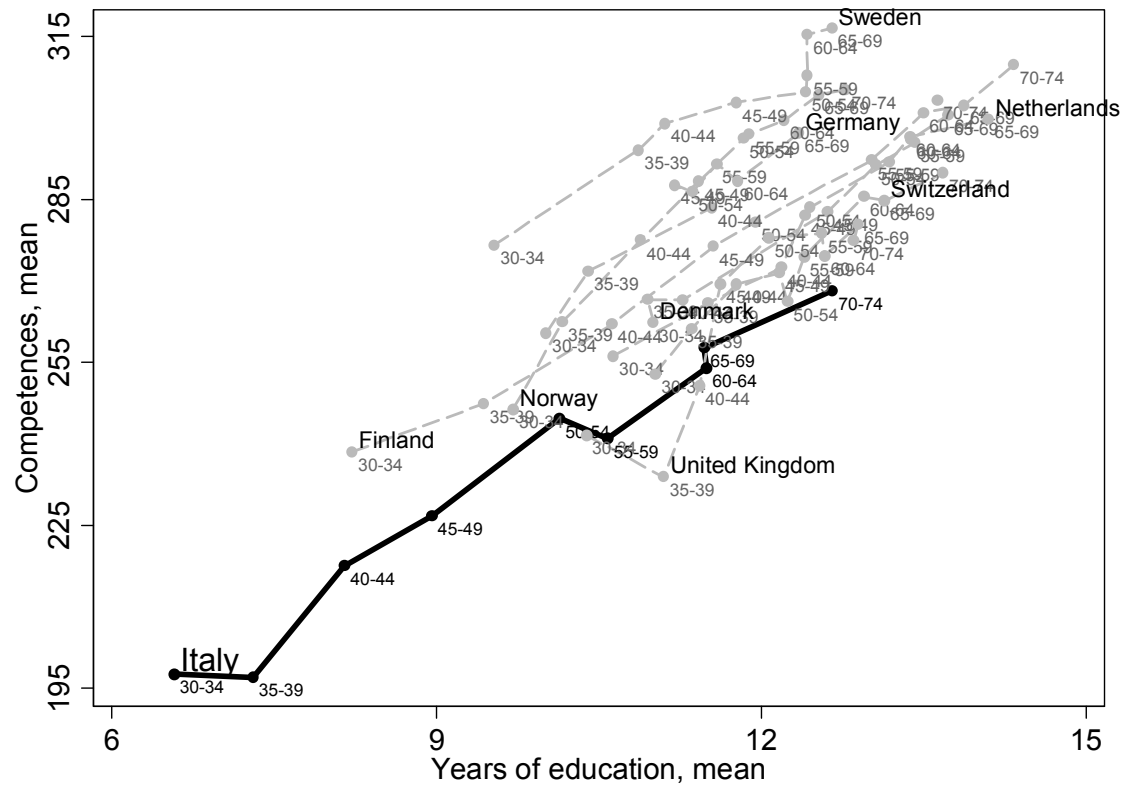
Source: Morrisson and Murtin (2009); population-weighted aggregation uses population data from the Maddison database.

Figure 4
Standardized statistics (average score and fraction over basic literacy) from all tests
available (in various years) for each country



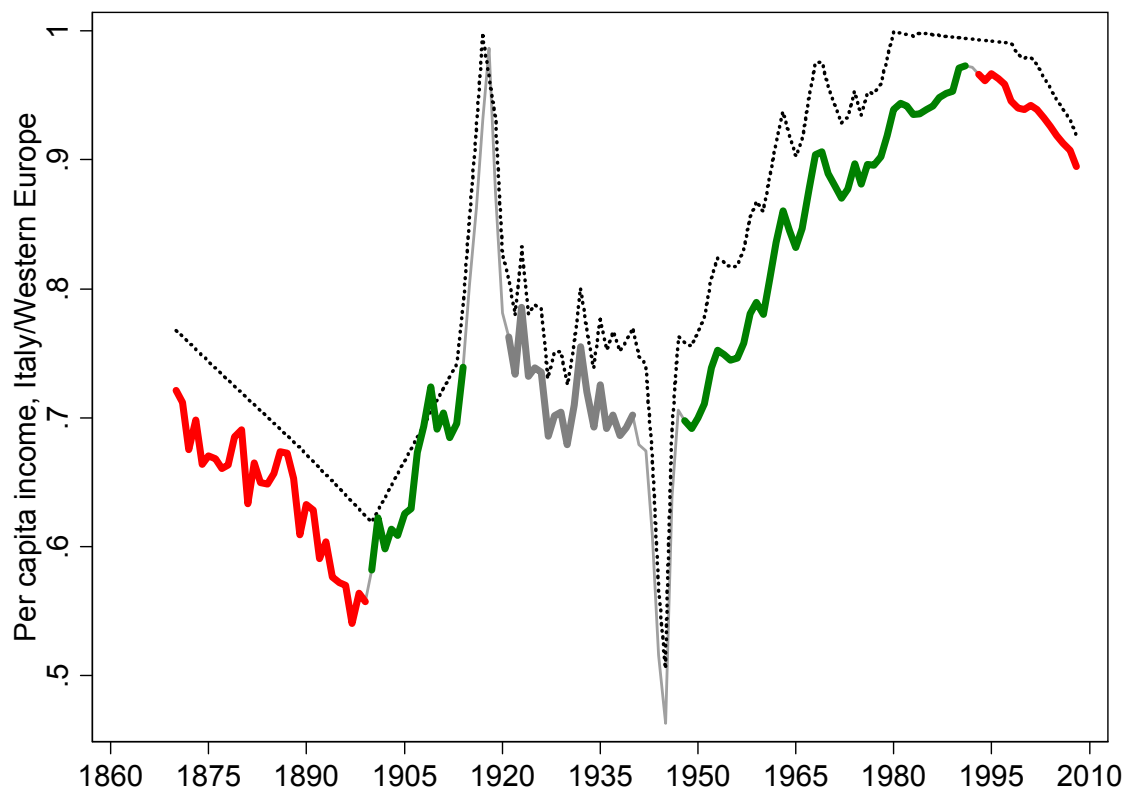
Source: Hanushek and Woessmann, 2009.

Figure 5
Means of literacy competence scores and years of formal education for specific cohorts
in the IALS data sets, as computed and reported by Meschi and Scervini (2010)



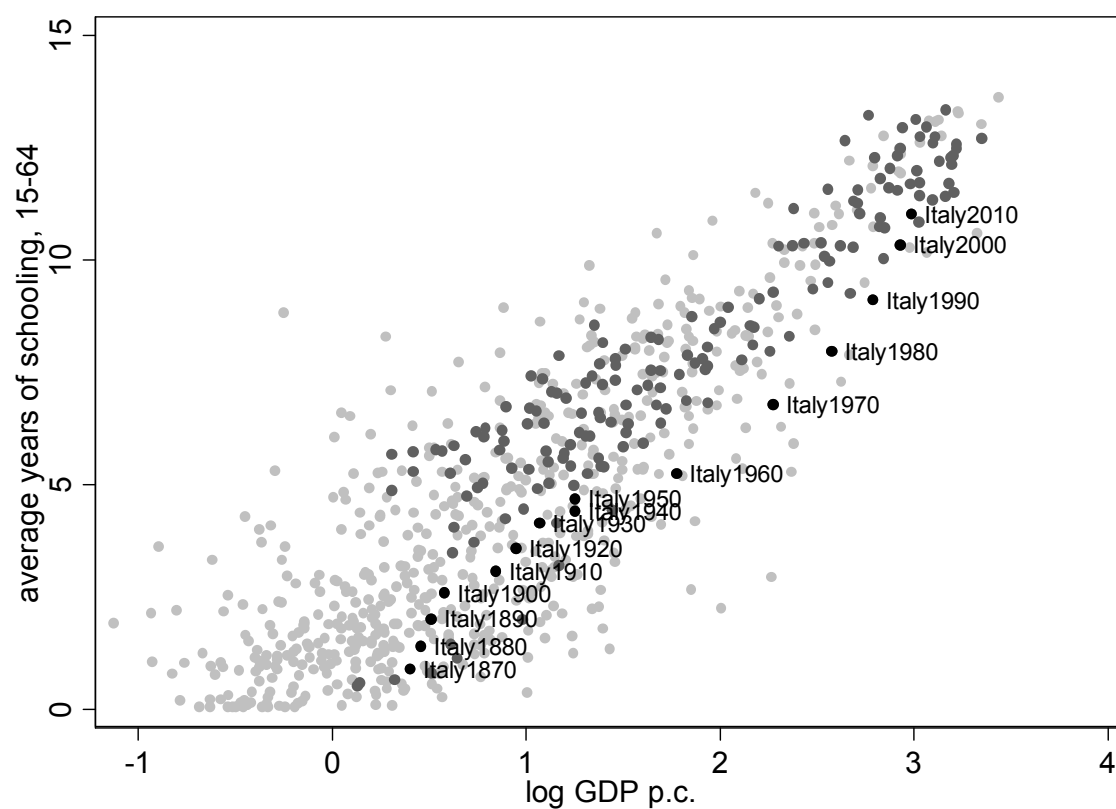
The lines join observations (labeled by birth-year cohort information) for the same country.

Figure 6



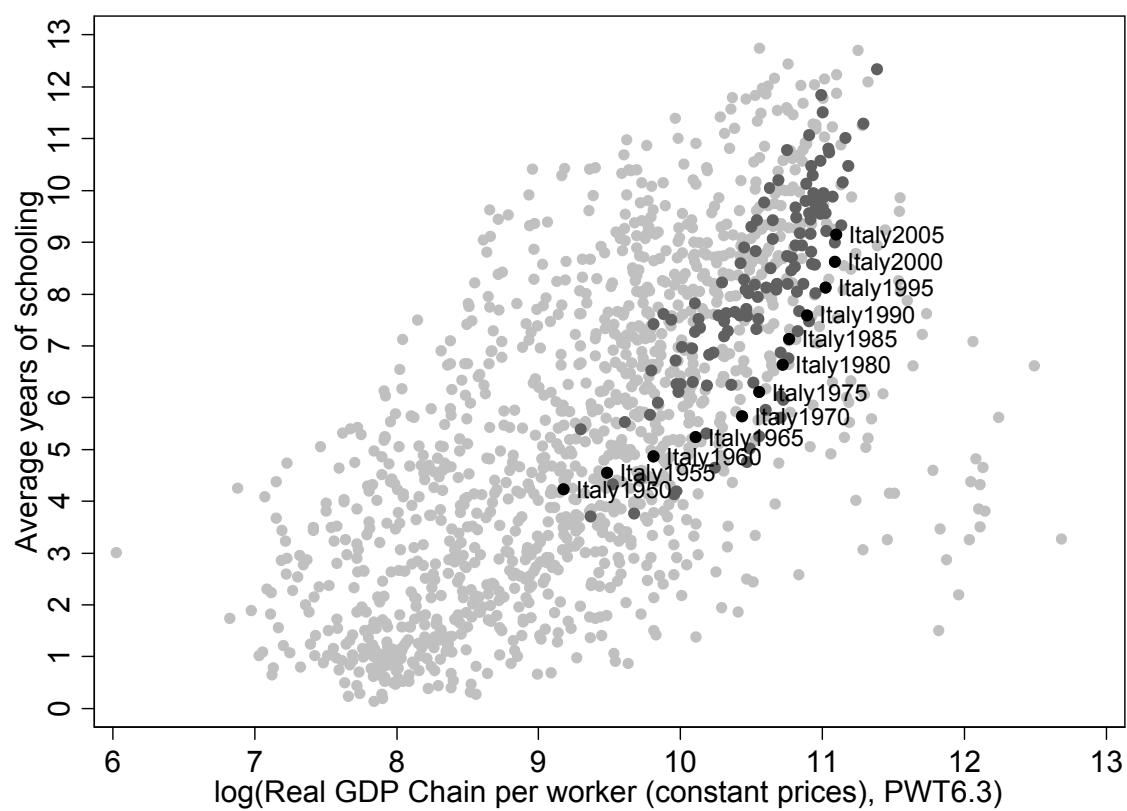
The 12 Western European countries considered are Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom. The dotted line also includes in the comparison group the other 28 countries in Western Europe. GDP per capita in purchasing power is drawn from the Maddison data base; the new series constructed in the framework of this research project for Italy's GDP is much smoother in the World War I period.

Figure 7



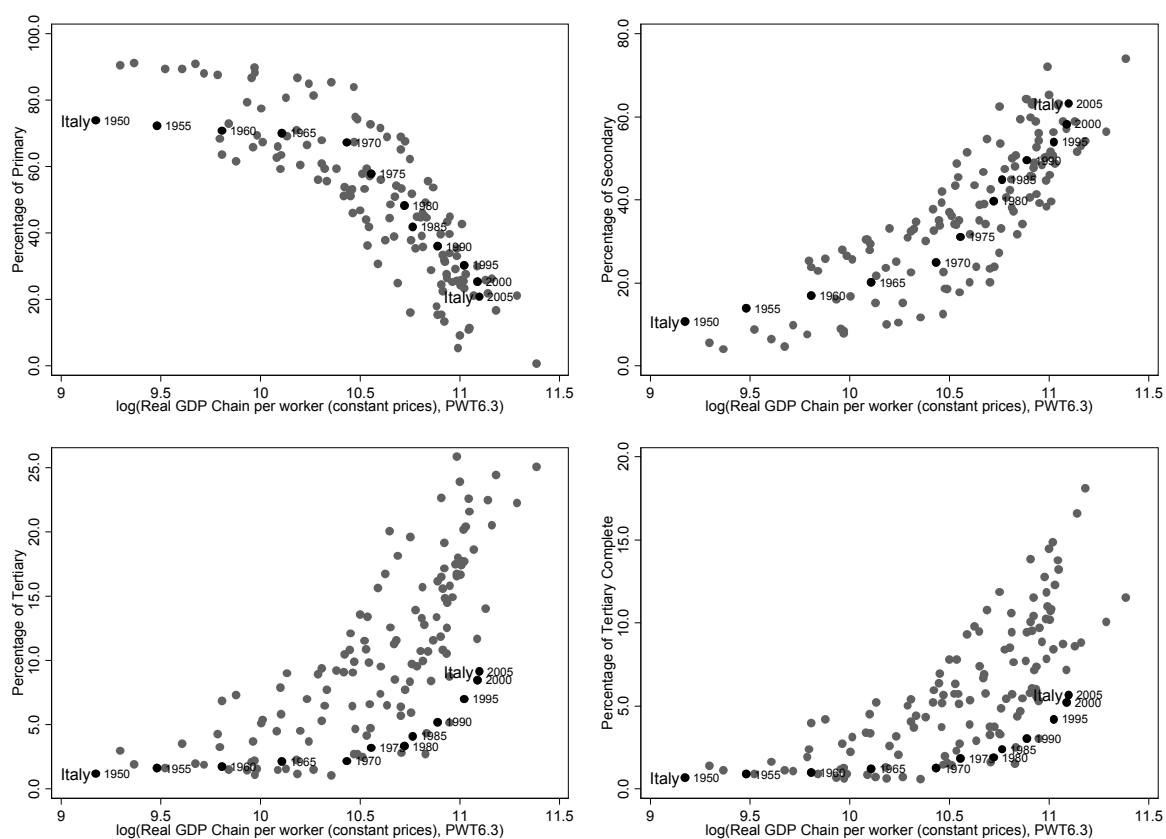
All available countries and periods are plotted. Darker symbols mark observations for the 12 Western European comparison group of countries. Observations for Italy are marked as such and labeled with the year they refer to. Source: Maddison database for GDP per capita in purchasing power units. Morrison-Martin (2009) for education endowment of working-age population.

Figure 8



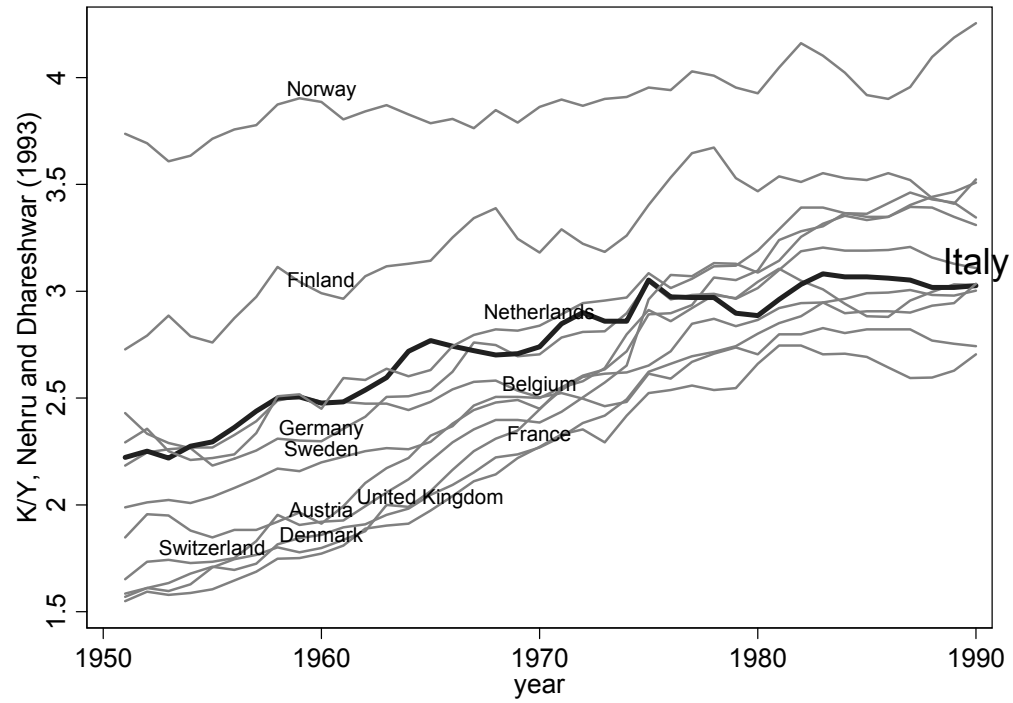
Source: Barro and Lee (2010) and Penn World Tables 6.3. All observations are shown, those that refer to the 12 Western European comparison countries in darker color.

Figure 9



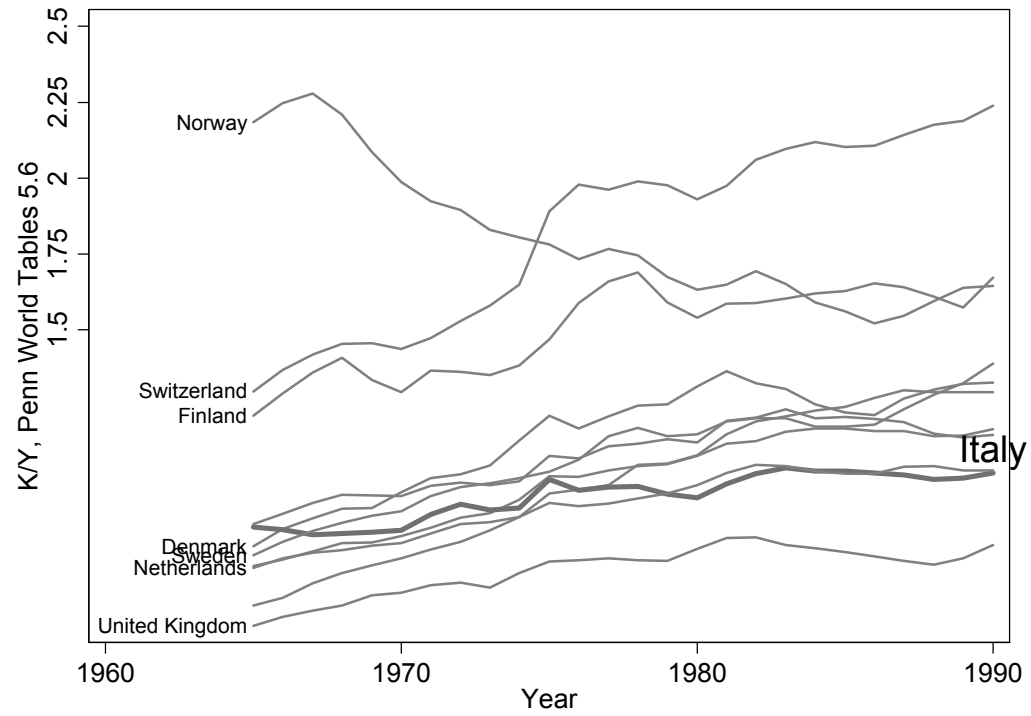
Source: Barro-Lee and Penn World Tables 6.3. Observations shown refer to the 12 Western European countries listed in the legend of Figure 6.

Figure 10
Capital/output ratios, selected countries



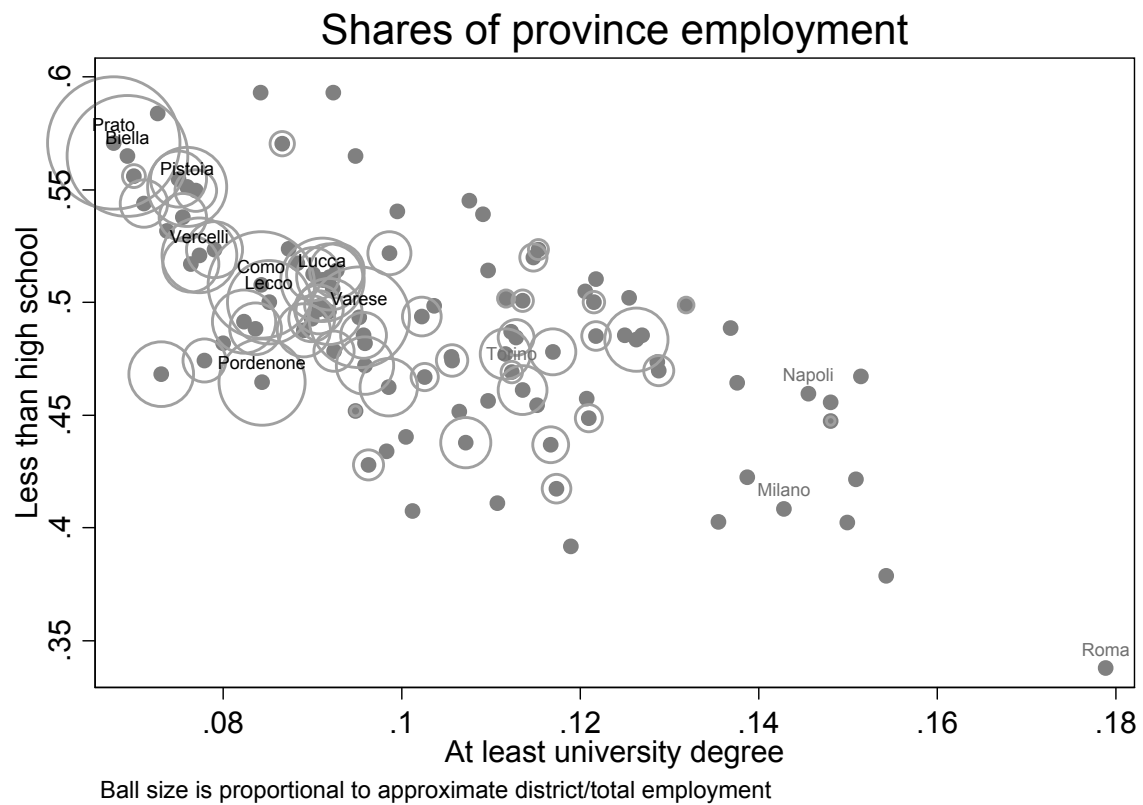
Source: Nehru and Dhareshwar (1993).

Figure 11
Capital/output ratios, selected countries



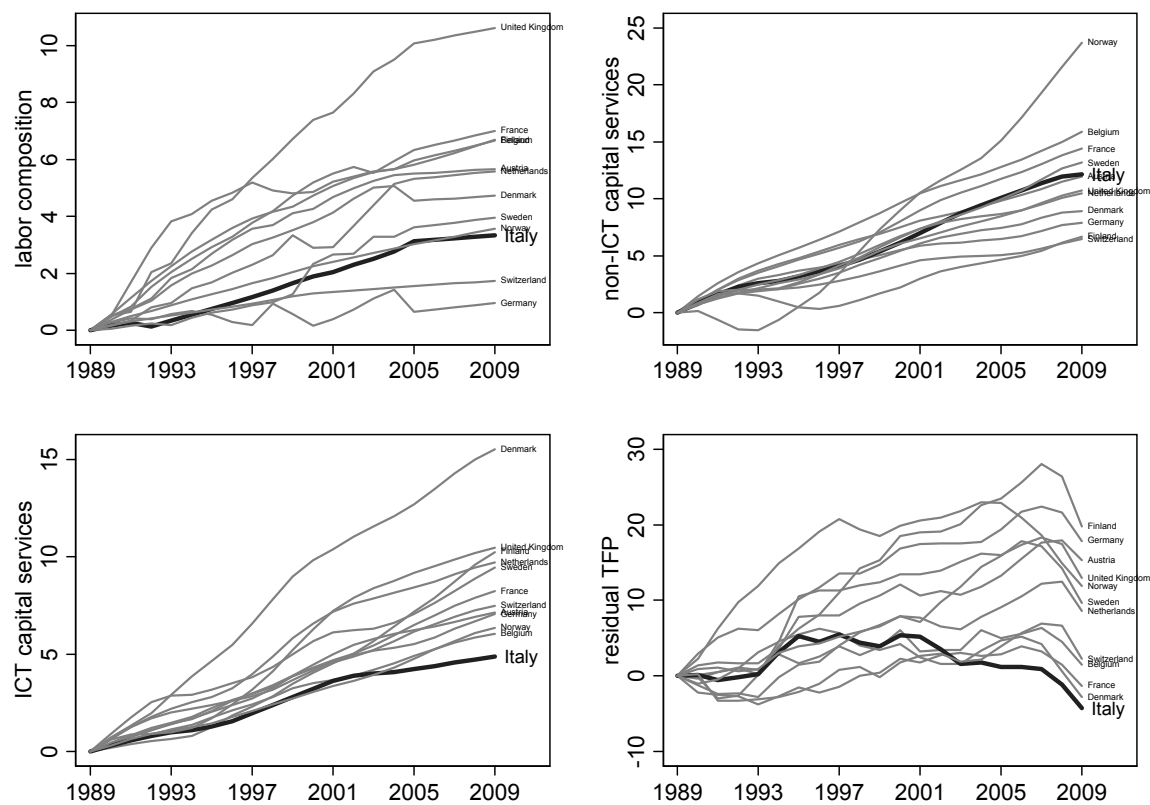
Source: Penn World Tables 5.6.

Figure 12



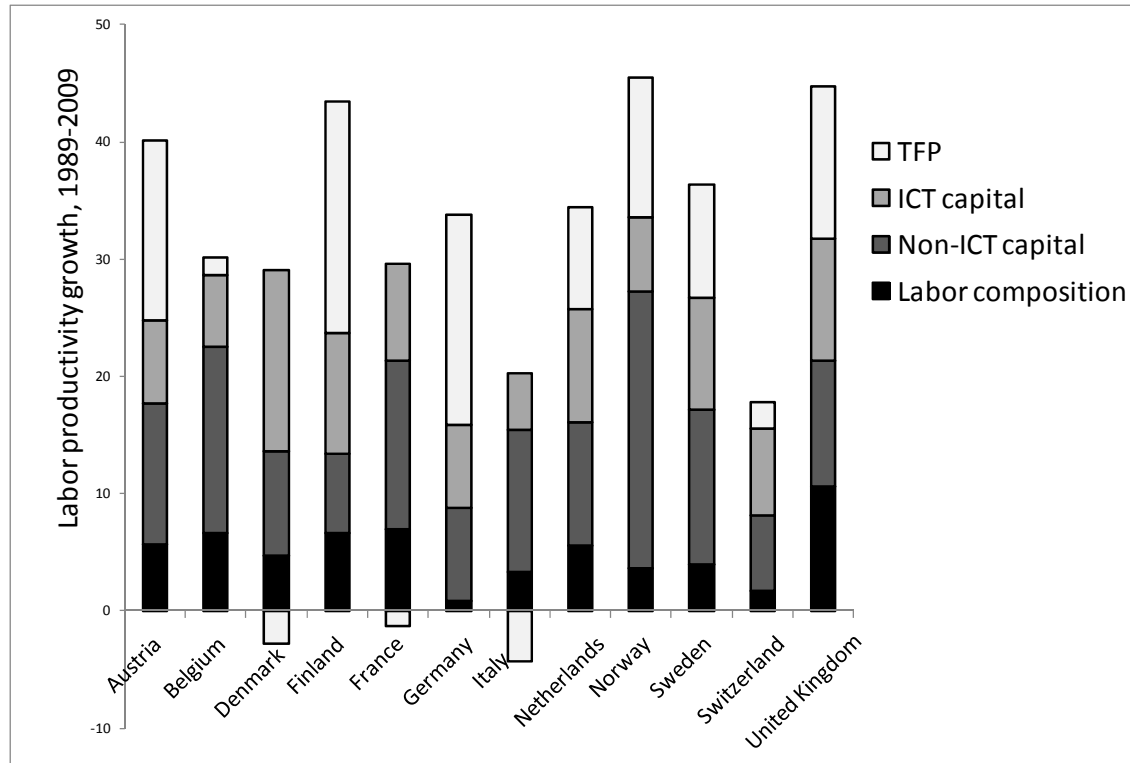
Distretto employment is allocated to the province containing the municipality after which Distretto is named (this is an approximation since a Distretto may span multiple provinces). Source: our elaboration of data from Istat, Censimento 2001.

Figure 13
Contributions to labor productivity growth, cumulation of yearly 1990-2009
observations



Source: The Conference Board Total Economy Database.

Figure 14
Contributions to cumulative 1989-2009 labor productivity growth



Source: The Conference Board Total Economy Database.

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