

REVIEW ARTICLE

HUMAN CAPITAL ACCUMULATION AND INDUSTRIALISATION IN ITALY'S FIRST WAVE OF INDUSTRIALISATION

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Abstract : World War I represented for Italy a great (albeit dramatic) chance for industrialisation and catching-up with the "early birds" of industrial revolution. One of the main problem at stake was a scarce availability of human capital, though. This problem is deeply entangled with the so called technology/education race which has recently been at the centerstage in the economic theory debate. In this paper I try and propose some relevant issues with respect to this problem.

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INTRODUCTION

As my interest for economic history had initially been fostered by a reflection on the state and on the foundations of the discipline, I felt the need to start my project's description with a section on these issues considering them as an integral part of the project itself. According to Robert Allen, "Economic history is the queen of the social sciences.

Her subject is The Nature and Causes of the Wealth of Nations, the title of Adam Smith's great book. Economists seek the causes in a timeless theory of economic development, while economic historians find them in a dynamic process of historical change." Allen's quote is the methodological inspiration for my research project: the "dynamic process of historical change" is the ground in which causal relations that economic phenomena derive from and rely upon are to be looked for.

My enthusiasm for Allen's argument (an argument that might sound quite expected to an historian but not necessarily to an economist or even to an economic historian) stems from a certain dissatisfaction for current economic history and, in particular, for its methodological foundations. Painted with a broad brush, economic wisdom explains the emergence and features of

economic phenomena in terms of relative efficiency. Based on rational choice theory, the main assumption is that opportunities for material gain are always recognize and exploited and thus it holds true that institutional forms as well as other economic phenomena and entities -- can be interpreted as efficient responses to the environment.

A wide body of works in one of the currently prevailing paradigms of economic history (i.e. "new economic history", "cliometrics") assumes -- to varying degrees -- the above proposition (and General Equilibrium Theory, for that matter) as its methodological foundation together with a strictly quantitative approach. In doing this, a sort of Panglossian attitude somehow pervades the historical discourse. One might capture this attitude with the slogan "existence is a proof of efficiency": anything that exists does so because of its (relative) greater efficiency.

The "timeless theory of economic development" that Allen talks about thus becomes a tale of the relentless emergence of relatively more efficient entities and structures at the price of seeking causes without finding them and of transforming economic history in a "thinly disguised theodicy justifying the ways of the market to mankind".

Historiography - in a wholly ancillary position with respect to theory -- is thus transformed into a continuous search for confirmations of General Equilibrium Theory's principles in the historical past: a natural history of utility maximisation.

Under this perspective, historiography paradoxically becomes a-historical search for universal, context-free and atemporal laws of economic behaviour. In this view, markets, institutions, coordination modes, patterns of economic behaviour and economic laws *tout court* are thought of as natural entities rather than as social constructs deriving from human contexts and history dependent activities. So it becomes possible to talk about "profit" in ancient Rome or of "impersonal markets" in eleventh century mediterranean traders.

Robert Solow makes the point in the clearest of possible ways: "If the project of turning economics into a hard science could succeed, it would surely be worth doing. [...] If it did succeed, then there would be no difference between economics and economic history other than the source of data, no more than there is a difference between the study of astronomical events taking place now and those that took place in the Middle Ages. In this dispensation an economic historian is merely an economist with a high tolerance for dust [...]."

The very core of Solow's argument is his (rhetorical?) question about economics as a "hard science". In the time we still need to "turn economics into a hard science" we should probably adopt a different mind-set with respect to history and historiography. First, we should keep measuring things and adopt a quantitative approach but never forget that we are measuring human constructs and not astronomical events. Second, the whole realm and environment of "man in time" should always be clearly in front of us: politics, institutions, beliefs, religion, meanings, etc.

As Francesco Boldizzoni puts it: "The *histoire totale* advocated by Braudel is not a choice but a cognitive requirement." Third, accept Frank Hahn wish that "theorising of the pure sort will become both less enjoyable and less and less possible" and that economists will and should enter the "uncertain embrace of

history and sociology'. Fourth, remember that historiography is more than looking for confirmations of a theory in the past and that making regressions is still not writing history. Fifth, bear in mind Sidney Winter's imperative: "Dynamics first!" Understanding something and thus explaining it, means being able to answer questions such as: "What does it derive from? How did it form itself?" As stated in Plato's Republic: "You ask a question whose answer can only be given with a tale".

THE BIRTH OF THE ITALIAN FACTORY SYSTEM

The time interval considered in my research is especially relevant as it coincides with the development of a factory system in Italy. Forty years after England, in the last twenty years of XIX century a large part of Italian industries underwent the huge change brought about by a throughout process of production' mechanisation.

The debate around Italy's backwardness is a huge one. Painted with a broad brush, one can schematise things in at least three schools of thought. First one finds the marxist tradition as exemplified by Gramsci and then by Emilio Sereni. According to this position, the main cause for Italy being such a latecomer was the missing "rivoluzione agraria" and the lack of a sufficiently wide internal market. On the other hand, Rosario Romeo, stemming on a liberal school of thought, traces it back to lack of investments and late and insufficient capital accumulation.

According to Romeo, the real obstacle to development was not the internal markets being too thin but insufficient productivity. Fostering productivity would require large investments in physical capital, public expenditure, infrastructures and fixed social capital. As to their financing, this would be possible thanks to internal savings or via foreign capital import. As a matter of fact, even if a significant import of foreign capital took place after Italy's unification, the larger part of financial needs came from agriculture.

Extremely high rents and extremely low wages allowed land owners the accumulation of quite large a surplus eventually transferred to other sectors via taxation.

To put it shortly, the whole story is told by Romeo in terms of investment being the real engine of growth rather than consumption.

Alexander Gershenkron replied to Romeo with the famous sentence "Clio is not a tidy housewife! [...] yours is a beautiful exercise in logic which has been defeated by history". Italian backwardness, according to Gershenkron, was first of all largely underestimated and by and large due to a wide variety of different factors interacting in complex ways (the technology gap, missing railways, lack of industrial culture, factors low payment, sticking to an agricultural incentive structure).

Up to that time, the organization of production still resembled that of "cottage industries before the industrial revolution. This regime was mainly characterised by a prevalence of individual skills over physical capital and by a "household" organization of labor in which every "mastro" in a variety of activities (folding, lathe turning...) coordinated a plethora of non specialised workers under his direct command. Production processes, often taking place in basements and courtyards, were strictly coordinated by the "mastro" who also had the property of his own tools and set the pace and organization of production.

Around 1880 and starting from the more developed Northwest, Italy began to face its own process of industrialisation and emergence of a relevant factory system. In particular, the process was relatively more evident in mechanical firms such as Breda, Ansaldo, Acciaierie di Terni, Tosi Meccanica. In a nutshell, the whole process was about division of labor, specialisation and substitution of physical capital for (skilled) work.

This substitution forced a radical mutation of working conditions: the demise of traditional artisanal or semi-artisanal crafts, the end of workers-controlled apprenticeship forms, a new participation to the labor force of women and non specialised workers, workers' contractual power, the emergence of new kinds of hierarchical structures, roles and tasks. In addition, it must be considered that the larger part of the labor force was made available through a draft of mostly illiterate peasants from the country.

I remained literally speechless when I recently came across a commercial brochure published in 1890 by the mechanical firm Tosi of Legnano (Milan). In an attempt to describe the firm's efficiency, the brochure goes: "the same tasks are always assigned to the same individuals that, so to say, continuously perform the same operations so that they acquire in their execution the greatest dexterity and the greatest speed". More than a century later, the very same words used by Adam Smith to describe its proverbial pin factory.

TERNI STEEL MILL

Birth place of Publius Cornelius Tacitus, the city of Terni had a major role in the Italian industrialisation process. Terni is located in the central region of Umbria: far from the sea but easily accessible since Roman times, it has been for centuries at the very heart of trade and exchange between the Tyrrhenian and the Adriatic sea. Since 1884 it has been the site of one of the most important steel mills in Europe.

Right after Italy's unification, the need was felt to establish a national iron and steel industry. Defence reasons were the primary source of the need. Terni was chosen as a site by a parliamentary commission led by the admiral Benedetto Brin. The reasons for choosing Terni as a steel mill site were: a) the presence of existing industrial and military plants (most notably the a weapon factory and an old cast iron furnace); b) the huge amount of water resources (Terni is most close to the Marmore Cascades); c) the strategic and safe position of the city. The foundation act dates to March 1884 with financial warranties granted by the Italian State and the private capitals of Banca Generale, Credito Mobiliare and the Banca Nazionale.

Right from the beginning the plant was on the cutting edge of the iron and steel industry with two Bessemer furnaces, five Martin Siemens furnaces, five rolling mills and the greatest power hammer in the world. At that time, the plant specialised in war ships armours, cannons, bullets and reached a productive capacity of 140.000 tons of steel per year. After a period of stagnation following World War I, the plant was singled out as one of national strategic relevance by the founder of IRI/footnote{Institute for Industrial Reconstruction.

IRI was a public body founded in 1933 by the dictator Benito Mussolini and by Alberto Beneduce with the main aim of saving Italy's main banks and companies after the 1929 crises.} and went through a new period of expansion. As soon as the end of World War II the company went through a period of relentless adoption of technological innovations and specialised in the production of "special purpose steel": in particular magnetic steel and nuclear plants parts (e.g. it worked for Westinghouse Electric Company, Elecricité de France, Central Elecricity Generating Board).

As of 1985 Terni's plant was among the five world's biggest steel companies with 1.000.000 tons of steel produced per year. As of 2013, Terni's plant is owned by the Thyssen Krupp group and, while sharing the dull destiny of Europe's steel industry, employs 4.000 workers at full productive capacity.

Terni's plant has had a huge historical, cultural and economic relevance. First and foremost, the plant became through the years the very industrial heart of a whole region whose almost unique productive sector until 1884 was agriculture. In a short lapse of time, Terni became -- together with Turin and Milan -- one of the cities in which a working class consciousness has most developed. What is however noteworthy is the fact that the ideological background of workers was of anarchist and libertarian socialism ascendance rather than marxist (in harsh opposition with the rest of the italian working class political orientation).

THE PROBLEM

Painted with a broad brush, the theoretical problem I shall try and analyse relative to the Terni steel mill is about the effects of technological (and organisational) innovation on the labor force as measured by wage levels and differentials. At the very same time, I shall try and analyse the composition of the labor force especially as far as human capital (as measured by years of education) is concerned.

A traditional hypothesis interprets the effects of technological innovation on the one hand in terms of quantitative reduction of the labor force and of increased productivity and, on the other hand, as a deskilling process

obtained through the transfer of abilities from workers to physical capital.

An alternative position is based on the idea of complementarity between technology and human capital. Under this perspective, technical change is biased towards skilled workers as it replaces unskilled labor and increases wage inequality. As a consequence both wage structure and work demand change. A strong complementarity between technology and skills has characterised most of the twentieth century, when innovation has probably always been skill biased, in contrast to the unskilled bias typical of the nineteenth century, when mechanisation led to the deskilling of artisans As pointed out by Goldin and Katz in their 1998 paper: "The switch to electricity from steam and water-power energy sources was reinforcing because it reduced the demand for unskilled manual workers in many hauling, conveying, and assembly tasks."

If, as I believe, the technology-skill complementarity perspective is correct, then in a firm such as the Terni steel mill, characterised by the adoption of advanced technologies in the time interval considered, we should observe the employment of workers representing a relatively high level of human capital in terms of education. This is what I shall try and reconstruct through an analysis of individual workers' enrolment records from 1884 to 1939.

The other key issue of my research -- inextricably bound to the themes described so far -- is the study of the establishment of a national system of public education (which in Italy is exactly coeval to industrialisation). As a complementarity between physical capital and human capital emerged through an increasing demand for skilled workers, it is quite natural to assume that dominant classes (i.e. employers) might have had an interest in the education of the labor force as this ensured them the availability of skilled workers.

Under this respect I shall try and parallel the analysis of workers data with a reconstruction of the edification of the national school system starting from the "Casati Act" of 1860 and following its history and application relative to the Terni area until 1939. Education through a public

system is most relevant for my analysis as not only does schools train young people and provide them with skills and competencies but they also endow them with middle class values such as diligence, docility, respect for authority and sense of belonging. Most notably, the establishment of the public education system was of utmost importance in Umbria -- formerly a region of the Papal State -- to undermine the until then primary role in education of the Catholic Church.

ON THE ECONOMICS OF WORLD WAR I

Starting from WWI, wars have become "mass wars": 12.5% of Uk population was drafted, 15.4% in Germany, almost 17% in France. Painted with a broad brush, roughly the 20% of total work force was drafted. Key point here is that such a huge level of drafting cannot be sustained for a

long period of time in the lack of a highly productive industrialised economy nor with one in which non-fighting population is not fully employed. As a matter of fact, no rural economy ever could sustain such an effort without collapsing. Even an industrialised and productive economy such as the English or the German had to face a radical reorganisation of production processes. These reshaping of production remained as permanent after the end of the war.

Another interesting sense that helps us adopt the right perspective, in which wars have become mass wars is relative to the quantitative dimension of materials employed. As an example and as a measure: Napoleon Bonaparte needed 1.500 shots of cannons to win over the Prussians in the battle of Jena. France planned the production of 12.000 grenades per day before the war started and ended the war with an estimated production of 200.000 grenades per day. Even the at that time underdeveloped czarist Russia produced 150.000 grenades per day and peaked up to 4.000.000 grenades per month.

During WWII: 519 millions pairs of socks, 219 millions trousers, 4.4 millions scissors, 6.2 millions seals tampons. As Eric Hobsbawm puts it: mass war called for mass production and total war have been the greatest planned economic enterprise that mankind had ever known. As noted by Francesco Galassi, "some long term benefits

e.g. electrification and accumulation of technical knowledge" were some of the gains from the war.

Financing and managing issues emerged that never had been experienced before in a nearly comparable measure. First, should one finance war with tax raising or with debt? For the first time in history, finance and accounting department were, in a sense, managing war economics. As a matter of fact, WWI lasted far more than expected and was by most countries (notably England) conducted well beyond their own financial capabilities.

The old adagio "business as usual" vanished and proved impossible to be attended to: public managers, directors and economic deputies (*quorum* John Maynard Keynes) had to witness politicians taking their place with utterly different perception and awareness of budget constraints. Second, it forcefully emerged the need to not only fight war with weapons and armies but with production, productivity, effective planning and management.

As a matter of fact, one of the greatest and bitterly learned lessons learned from WWI have been that war time meant central planning (relative both to production and distribution) and a withdrawing of markets and free enterprise from economic life. Those who won the war were those that succeeded the most in doing this.

The same hard to over esteem role of central planning held true for the exploitation of technology in production. As a matter of fact, war enhanced and fostered the pace of technological and productive advance. In particular, war acted to make, or make look, costs - both human and economic - necessary to finance technological and organisational innovations necessary to conduct war [1-7].

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