Unequal Development.
Geography and Market Potential in Italian Industrialisation 1871-2001

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Abstract. The article deals with the long-term history of industry in Italy and is based on data on the labour force per province from population censuses. Particular attention is devoted to disparities in industrialisation between North and South. After the analysis of trends from 1871 until 2001, concentration and spread of industry, importance of the South-North disparity within national disparities among provinces, we test the role of the access to markets on the geographic spread of the Italian industry. Our results are that access to markets and geography played a main role in the formation of Italian inequalities during the phase of industrial development.

Keywords: Italy; regional inequality; market potential.

JEL codes: N94, 018, R11, R12.

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Virtually, all present day wealthy countries have experienced a phase of industrial development during the last two centuries. Italy is no exception. In comparison with other western European countries industrialisation started quite late, that is from around the 1880s onwards. It lasted for about a century, until the 1970s-1980s, when her industrial basis began to shrink.

In the approach of the New Economic Geography, the location of economic activities is the result of the interaction of some major economic forces: market potential, transport costs and scale economies.[1] Empirical studies on the geographic distribution of industry suggest concentration in a first stage of development and spread in a later stage.[2] This process occurred in Italy as well: modern industry, initially localised in few northern regions, slowly involved the rest of the country. However, industrial development, did not spread evenly across Italy as a whole. The disparities existing today among Italian regions, and particularly between North and South,[3] depend in the main, on this unequal spread of industrialisation. The analysis of these disparities is the principal focus of our work.

Increasing international literature during recent years has confirmed the link existing, at national and sub-national levels, between industrialisation and extent of market potential. Both the economic success of some regions and the difficulties experienced by others depend primarily on the access to the domestic market. When the domestic market is small, firms may not be able to generate enough sales to make the adoption of increasing returns technologies profitable. The access to foreign markets can replace a narrow internal market. However, it can barely substitute the spillovers deriving from the domestic demand for both final consumption and intermediate inputs from other sectors.[4]

[1] Krugman (1991a, b).
[2] See, for example, Kim (1998), Combes et al. (2011).
[3] By North (or Centre-North, CN) we mean the regions from Latium (included) to the Alps; by South (or South-Islands) we refer to the Italian regions from Abruzzi and Molise to Calabria and Apulia, including Sicily and Sardinia.
[4] Murphy, Shleifer, Vishny (1989). For Italy in a historical perspective, see also the similar approach by A'Hearn, Venables (2013).

With few notable exceptions, the dynamics of industrialisation have been examined on the basis of cross-section data and for relatively short time spans. Our aim is to analyse this process for a longer period, that is from the end of the nineteenth century until the end of the twentieth, and to investigate the economic differences occurring between North and South Italy during this long period. Quite recently the start of Italian industrialisation from the national Unification in 1861 until the First World War, has been examined on a provincial basis.[5] Our aim is to present the development of the Italian industrialisation and market potential in the period 1871-2001 on the basis of provincial data on the labour force from population censuses. Such an investigation, for so lengthy a period, has never before been attempted. Italy represents an interesting case study for investigation of the effects of economic integration on industry's location: a topic widely discussed in literature.[6]

This article is divided into eight sections. We will clarify, in section 1, our sources and their limits and potential. In sections 2 and 3 we will present some descriptive statistics about industrialisation per macro-area. In section 4 we will examine the concentration of industry and, in section 5, the North-South disparity in industrialisation. Sections 6, 7 and 8 will be devoted to quantifying and testing the importance of market access, both domestic and foreign, in the disparities among provinces and between North and South. Our main results are summarized in the Conclusion.

1. The sources

The main sources of the present work are census data for the years 1871, 1911, 1951, 1961, 1971, 1981, 2001.[7] This data differs from that provided by the censuses of agriculture, industry and services and are not comparable to those.[8]

The first three Italian censuses, held in 1861, 1871 and 1881, have been considered less reliable than subsequent ones, especially as far as industrial employment is concerned.[9] The same 1871 census officials warned about a possible overestimation of female population employed in industry.[10] More recently scholars have begun to be less negative about those censuses.[11] We include the

[5] By Ciccarelli, Fenoaltea (2011, 2013) and Ciccarelli, Missiaia (2013).
[6] See Krugman (1991b), Krugman and Venables (1996), Puga (1999) and, for a review, Ascani, Crescenzi, Iammarino (2012).
[7] Census 1871, Maic-Dirstat (1875); Census 1911, Maic-Dirstat (1911); Census 1951, Istat (1957); Census 1961, Istat (1967); Census 1971, Istat (1977); Census 1981, Istat (1985); Census 2001, Sistan, Istat (2005). Census data exploited in the article are available in www.
[8] We also exploited (in Tables 2 and 3) industrial censuses per decade from 1951 onwards, (that is when the quality of data is more reliable), until 2001, in order to specify the distribution of employment per industrial sector. This data from industrial censuses is available in the Istat website: http://dwcis.istat.it/cis/index.htm. The same data is partially reported by Svimez (2011), pp. 239-76.
[9] While Vitali (1970), p. 3, doubted the reliability of the censuses held in 1861 and 1871, Zamagni (1987) also considered the 1881 unreliable and adjusted the census data on industry for that year .
[10] Giordano, Zollino (forthcoming).
[11] See Ciccarelli, Fenoaltea (2013) and Ciccarelli, Missaia (2013), pp. 142-48.

1871 census in our research, well conscious, however, that particularly Southern Italian industry may have been overrepresented in that census.[12]

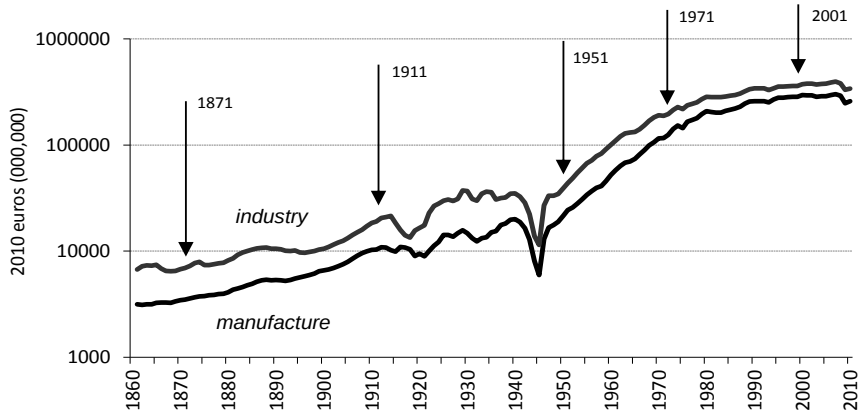
In our elaboration we followed census data carefully, incorporating negligible changes only to improve comparability. Our main changes concern the 1871 and 1911 censuses. In the summary information about occupation in both years, census officials included in the "active population" family members dependent on the workers. In order to make our data comparable, we subtracted the dependents from the labour force both in 1871 and 1911.

Labour force includes minors, whose employment was legal at the time of any census: in 1871 youth under 15 years; in 1911 young workers over 10; in 1951, minors were not specified, while in 1971 youth is included in the non-active population. In subsequent censuses minors are excluded from the labour force.

The Italian national borders are those of the years when censuses were held. Trentino Alto Adige and Friuli Venetia Giulia enter our database only after the First World War. The number of provinces changes over time. In the 2001 census, there were 103 provinces. In 1971 these were 94, in 1952 were 92, and, in our first two censuses, 69. The increase in the number of provinces depended both on the change of the Italian territory after the First World War and on the division of some provinces.

In our series, the manufacturing industry includes food and tobacco, textiles, clothing, wood and furniture, engineering, leather and skin, mines, chemicals, oil refineries, utilities (energy and water).[13] We will focus primarily on *manufacture* and we will specify whenever we refer to *industry* on the whole (including constructions).

Figura 1. The product of industry and manufacture 1861-2010 (in millions of 2010 euros) and the five censuses exploited in the article (log vertical axis)



Source: the series on the product of industry and manufacture are from Baffigi (2013), pp. 632-52.

[12] As emphasized by Zamagni (1987). Probably this overestimation of the labour force in industry in Southern Italy depended on the low participation rate of the female population in agriculture and their attribution to industry when employed part-time in non-agricultural jobs, often on a domestic basis.
[13] See Table 3, where sectors are specified.

We will exploit five censuses in particular, corresponding to benchmark years in Italian industrial history (Figure 1). The 1871 census represents industry and manufacture before modern industrialisation. The fifty years 1871-1911 correspond to the first phase of industrial growth. The period 1911-51 includes four decades of slow increase; while the period 1951-71 represents the golden age of Italian industrial history, before the decline from the decade 1971-81 on.

2. The labour force

In order to provide an outline of modern Italian industrial history, it is useful to start from some aggregate descriptive statistics on the labour force in industry and manufacture and the participation rate per macro-area in our five censuses. The North and Centre, where 63 percent of the Italian population lived in 2001, is also divided into three main subareas, that is North-West (Piedmont, with Val D'Aosta, Lombardy and Liguria), North-East (Venetia, Alto Adige and Friuli),[14] and Centre (Emilia Romagna, Tuscany, Marches, Umbria and Latium). This data is presented in Table 1.

In section A of Table 1, we can follow the parabola of the secondary sector in Italy and the intensity and times of the structural change occurring from about 1880.[15] At the time of the Unification in 1861, Italy was still an agrarian country. More than 65 percent of its labour force was employed in agriculture.[16] The weight of the industrial sector in terms of employment, equal to 18 percent in 1861,[17] rose fast between 1871 and 1911 (the first wave of Italian industrialisation; when the industrial product rose by 50 percent in forty years);[18] increased very little between the two World Wars; boomed between 1951 and 1971 (the second wave of the Italian industrialisation; when the industrial product rose by 50 percent in twenty years); then diminished in importance both in terms of employment and product.

We also see that the performance of the industrial sector was higher than the national average in the North-West, North-East and Centre. In the South and the Islands, by contrast, the share of the labour force employed in the secondary sector has always been lower than the national mean, with the exception of 1871.[19] This macro-area was, in fact, close to the North or even ahead in terms of industrial employment at the start of industrialisation (according to our confidence in the 1871 census). From then onwards the share of the labour force in industry has been lower than the Italian average. After a period of

[14] Alto Adige and Friuli Venetia Giulia are excluded from the censuses held in 1871 and 1911.
[15] Regional data on this phase of Italian industrialisation is collected and presented in Ciccarelli, Fenoaltea (2009-2014).
[16] Daniele, Malanima, (forthcoming), and Broadberry, Giordano, Zollino (2013).
[17] Daniele, Malanima (2011), p. 240.
[18] The source of data on the industrial product is the same as Figure 1. Of importance for that period is the reconstruction of the industrial product by Fenoaltea (2003a, 2003b), whose data is followed by Baffigi (2013).
[19] Vitali (1970) and Zamagni (1987), whose reconstruction of the Italian labour force per sector starts with the 1881 census and proposes different figures for the industrial labour force. In Zamagni (1987, pp. 58-9), the percentage of the industrial labour force in industry is 21.4 in the Centre-North and 18.1 in the South-Islands, while in Vitali (1970, p. 148), it is respectively 22.7 and 30.6. The differences between data from censuses and the adjustment of the data by Zamagni are discussed by Fenoaltea (2006), pp. 228-32.

deindustrialisation between 1871 and 1951, the South also witnessed a period of industrialisation in the 1950s and 1960s, followed by the same decline experienced by Italy as a whole and the northern macro-areas from 1973-80.

Table 1. Labour force in industry (A), manufacture (B), participation rate (C), and labour force in manufacture on population (D) 1871-2001 (%)

		1871	1911	1951	1971	2001
A. Labour Force in Industry on total Labour Force *(Ls,j/Lj)*						
North-Centre		21.2	32.7	37.2	47.6	36.2
	North-West	*23.6*	*37.8*	*48.6*	*55.2*	*38.7*
	North-East	*20.1*	*26.6*	*30.1*	*43.9*	*38.4*
	Centre	*18.5*	*30.1*	*28.3*	*39.2*	*29.7*
South-Islands		23.6	25.2	22.7	34.4	26.3
Italy		**22.1**	**30.0**	**32.3**	**43.6**	**33.5**
B. Labour Force in Manufacture on Labour Force in Industry (*Lm,j/Ls,j*)						
North-Centre		82.0	84.8	78.2	79.9	77.7
	North-West	*83.0*	*86.5*	*85.7*	*84.8*	*78.7*
	North-East	*80.1*	*82.1*	*71.1*	*76.7*	*78.9*
	Centre	*81.9*	*83.6*	*67.7*	*72.3*	*74.2*
South-Islands		85.6	80.5	60.2	55.1	64.2
Italy		**83.4**	**83.5**	**73.9**	**73.9**	**74.8**
C. Participation Rate *(Lj/Pj)*						
North-Centre		57.2	48.2	43.5	37.3	41.9
	North-West	*58.7*	*51.3*	*44.7*	*38.6*	*42.4*
	North-East	*54.2*	*45.2*	*43.6*	*37.6*	*43.9*
	Centre	*58.1*	*46.6*	*41.5*	*34.9*	*39.2*
South-Islands		54.2	41.9	37.1	30.2	28.1
Italy		**56.1**	**45.8**	**41.1**	**34.8**	**36.9**
D. Labour Force in Manufacture on Population *(Lm,j/Pj)*						
North-Centre		10.0	13.4	12.7	14.2	11.8
	North-West	*11.5*	*16.8*	*18.6*	*18.1*	*12.9*
	North-East	*8.7*	*9.8*	*9.3*	*12.7*	*13.3*
	Centre	*8.8*	*11.7*	*8.0*	*9.9*	*8.6*
South-Islands		11.0	8.5	5.1	5.7	4.7
Italy		**10.4**	**11.5**	**9.8**	**11.2**	**9.2**

Source: population censuses (see text). **Note**: the four sections A, B, C, D of the Table are linked by the following identity: $\frac{Lm,_j}{P_j} = \frac{Lm,_j}{Ls,_j} \cdot \frac{Ls,_j}{L_j} \cdot \frac{L_j}{P_j}$

where *Lm,j* is the labour force employed in manufacture in the area *j*, *Ls,j* is the labour force employed in the secondary sector, *Lj* is total labour force and *Pj* is population.

Our viewpoint on the industrial South cannot but change whenever we look at the sections B and C of Table 1 and focus on manufacture and participation rates. It may in fact be seen that, while in Italy as a whole the manufacturing sector, the most innovative part of the industry, gently diminished as a share of the secondary sector from the decades 1871-1911 on, in the South its decline was much sharper. Participation rates (represented in Section C), already lower in the South than in the rest of the country in 1871, diminished remarkably from then on, with the consequence that in the South the labour force

in manufacture with respect to the total population declined (actually halved) from the beginning of our series until the end; while in the North-West, North-East and Centre it remained stable or increased.[20] Even allowing for a reduction of the share of the southern labour force in manufacture in the 1871 census, the decline cannot be denied. Looking at the long-term changes, we can actually speak of a *deindustrialisation of the South*.

Table 2. Percentages of the workers in manufacture (A), mining (B), utilities (C), construction (D) and industry as a whole (E) on population per macro-area and in Italy 1951-2001.

	1951	1961	1971	1981	1991	2001
A. Manufacture						
North-Centre	9.95	12.29	13.12	14.23	13.21	12.08
South-Islands	3.15	3.36	3.83	4.86	4.86	4.44
Italy	**7.42**	**9.01**	**9.88**	**10.90**	**10.19**	**9.33**
B. Mining						
North-Centre	0.24	0.20	0.14	0.11	0.10	0.07
South-Islands	0.28	0.22	0.13	0.10	0.08	0.06
Italy	**0.25**	**0.21**	**0.13**	**0.11**	**0.09**	**0.07**
C. Utilities						
North-Centre	0.24	0.28	0.34	0.35	0.33	0.25
South-Islands	0.12	0.16	0.21	0.25	0.24	0.19
Italy	**0.20**	**0.23**	**0.29**	**0.31**	**0.30**	**0.23**
D. Costructions						
North-Centre	1.42	2.26	2.19	2.42	2.63	3.09
South-Islands	0.64	0.98	1.23	1.56	1.86	2.04
Italy	**1.13**	**1.79**	**1.86**	**2.12**	**2.35**	**2.71**
E. Industry (A+B+C+D)						
North-Centre	11.85	15.03	15.78	17.11	16.28	15.49
South-Islands	4.18	4.72	5.40	6.77	7.04	6.72
Italy	**8.99**	**11.25**	**12.16**	**13.44**	**12.94**	**12.34**

Sources: industrial censuses (see text).

The industrial censuses (Tab. 2), although less reliable than population censuses until 1981,[21] confirm, for the period 1951-2001, the much lesser importance of manufacture (and utilities) in the South than the North and its relative stability (with some very modest increase in 1981). Actually industrialisation in the South after 1951 was supported by the construction sector rather than manufacture.

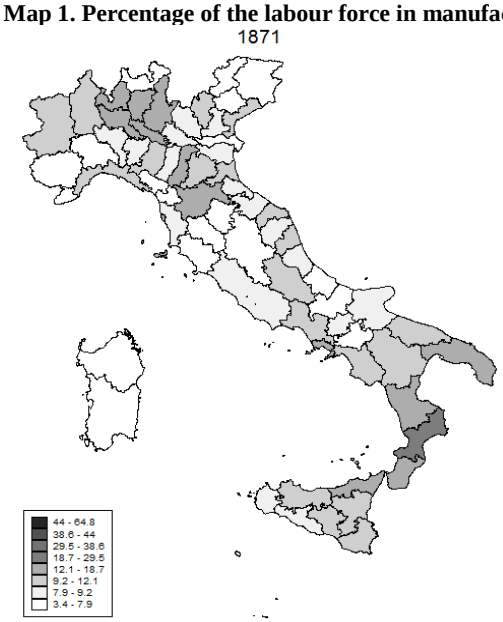
3. The geography of Italian Industrialisation

The industrial system represented by the 1871 census witnesses the typical structure of pre-modern industry. Map 1 illustrates the share of the labour force in manufacture on the total labour force. Given that the share of

[20] This is the reason why in the following sections we often exploit the ratio between employees in industry or manufacture and total population (just to take into account both the trend of the occupation and that of the participation rate).
[21] Istat (2011), pp. 669-70.

manufacturing employment is low, provincial data is comprised in the first classes: everywhere the colour of the map is clear.

Map 1. Percentage of the labour force in manufacture on total labour force in 1871



Source: 1871 population census (see text).

In 1871, Italy was not yet an economically integrated market. In a pre-industrial economy, such as that of Italy at that time, where the scarcely developed transportation system implies high trade costs and where the structure of production is based on small craftsmanship, industrial activities tend to be scattered. Proximity to domestic demand is important in order to minimise transport costs. In such an economy, the location of industry depends on "first nature" factors, that is natural resources and on the size of local markets.[22] The Italian industrial system is made up of the domestic manufacture, in the form of the putting out system, especially in textiles (e.g. in the silk sector near the Alps and in Calabria), and the artisan work in the cities is addressed to satisfy the demand of the urban population.[23] Modern factory system and modern industry are almost totally lacking.[24]

In a successive stage of development, when transportation costs for shipping goods diminish and the importance of the economies of scale increases, economic activities, and particularly manufacture, tend to become concentrated in some areas. According to the New Economic Geography models, in this stage the location of industry is mainly driven by advantages deriving from the access to large markets. Given the self-reinforcing pattern of industrial development, the location of a business attracts other businesses and workers, thus polarising the economic geography. In turn, agglomeration economies and wider markets

[22] See Krugman (1991a).
[23] Fenoaltea (2001), p. 17.
[24] Cafagna (1989b), pp. 281-88.

stimulate the birth and location of other businesses in complementary sectors producing intermediate inputs, thus enhancing the process of development. This is the phase when advantages accruing from the growth of industry dominate.

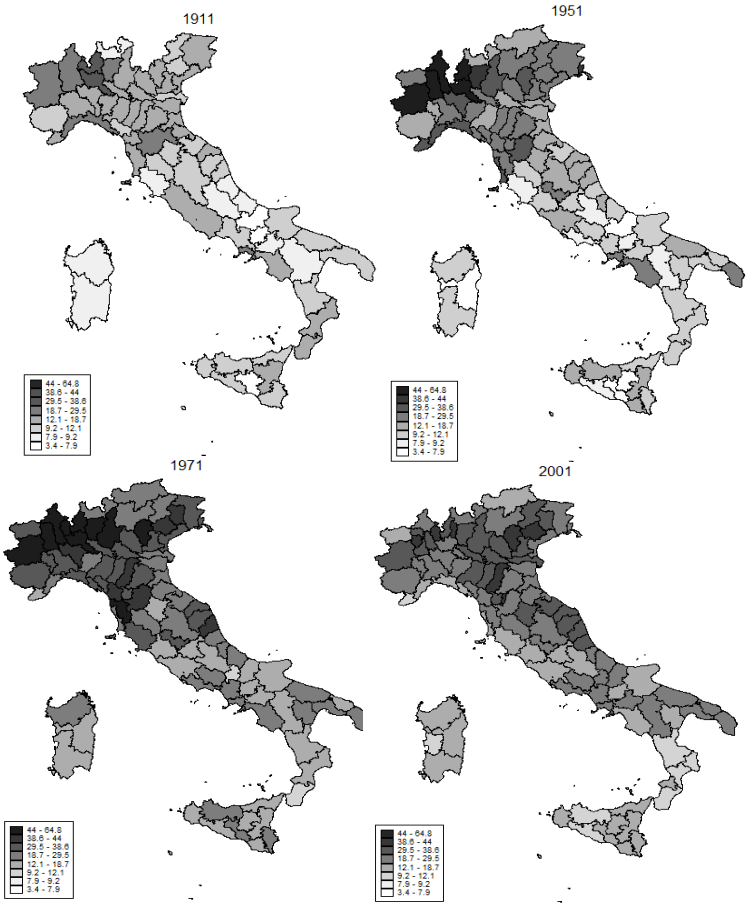
This circular and cumulative process may draw to a halt in a later stage of development, when location diseconomies and congestion costs work as centripetal forces that favour the geographic diffusion of economic activities and when technical know-out spreads, thereby stimulating the creation of complementary industries.[25] These trends may be observed through Maps 2-5, that synthesize Italian industrial history during the last century.

By 1911, the existence of the so-called "industrial triangle", localised in the North-West, between Genoa, Turin and Milan, hardly visible in the previous map relating to 1871, had become apparent.[26] The high concentration of manufacturing in the North and the triangle is clearer in 1951. At the time the South was still an agricultural area: 55 percent of its labour force was employed in the primary sector, while in the North it was 39.[27]

The construction sector had grown slowly, while manufacture had fallen, in relative terms, in the previous decades. The golden age of Italian industrialisation, between 1950 and 1970-80, involved the South as well, thanks to investments by the State and private entrepreneurs. Modern industry spread in the South. Poles of development were born in the Italian Mezzogiorno: from the iron and steel industry in Taranto, to great chemical industries in Brindisi, Cagliari, Sassari and Porto Torres, to oil refineries in Sicily, and steelwork and engineering in Campania. Less involved in the process of industrialisation were the regions of Basilicata, Calabria, Abruzzo and Molise. A comparison between the maps relating to 1971 and 2001 shows both the end of industrialisation (the colour is turning clearer everywhere) and the persistence of a remarkable North-South divide in industry.

[25] This development follows the cumulative and circular causation stressed by Myrdal (1957), and modeled by Krugman (1991a). See Baldwin (2005), Prager, Thisse (2009), pp. 39-50 and Fujita, Mori (2005).
[26] Fenoaltea (2006), p. 237 and (2001), p. 16.
[27] Daniele, Malanima (2011), p. 239.

Maps 2-5. Percentage of the labour force in manufacture on total labour force in 1911, 1951, 1971 and 2001



Sources: population censuses (1911, 1951, 1971, 2001)(see text).

On the basis of the industrial censuses, Table 3 presents the North-South divide for any sector of manufacture. We use the following index of relative industrialisation:

$$I = \frac{\frac{L_{i,j}}{L_i}}{\frac{P_j}{P}} \qquad (1)$$

where $L_{i,j}$ is the workforce employed in sector i in area j (North-Centre or South-Islands); L_i is the total workforce employed in sector i; P_j is the population of area j (again North-Centre or South-Islands) and P is the total Italian population. In the period in question, the population in the North was equal to 63-65 percent of the Italian population and in the South to the remaining 35-37 percent.[28] In Table 3, a value lower than 1 means that the relative weight of the industrial workforce employed in a specific manufacturing sector is lower than the relative share of population of the area compared to the total Italian population.

[28] Daniele, Malanima (2011), p. 230.

We can see that in any branch of manufacturing the value for the South is lower than 1 (with the exception of *Foodstuffs and tobacco industries* in 1951) and that the relative disparity is more severe in the technically more advanced sectors such as textiles, paper making, printing, steel production, engineering and rubber.

Table 3. Index of relative concentration of manufacture (per sector) in 1951-2001

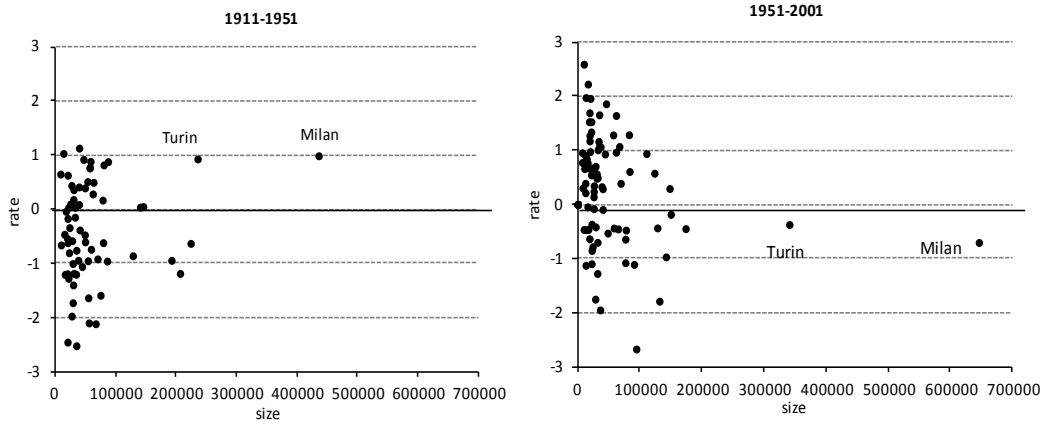
	1951	1961	1971	1981	1991	2001
Foodstuffs and tobacco						
North-Centre	0.96	1.08	1.13	1.11	1.12	1.13
South-Islands	1.07	0.87	0.76	0.80	0.79	0.78
Skins and leather						
North-Centre	1.38	1.44	1.37	1.31	1.32	1.31
South-Islands	0.35	0.24	0.32	0.43	0.42	0.44
Textiles						
North-Centre	1.53	1.51	1.43	1.43	1.45	1.44
South-Islands	0.11	0.13	0.20	0.19	0.20	0.22
Clothing						
North-Centre	1.15	1.22	1.26	1.27	1.25	1.20
South-Islands	0.75	0.62	0.51	0.49	0.56	0.64
Wood						
North-Centre	1.16	1.26	1.28	1.28	1.30	1.28
South-Islands	0.72	0.56	0.47	0.48	0.47	0.50
Paper						
North-Centre	1.47	1.47	1.40	1.37	1.38	1.34
South-Islands	0.20	0.20	0.25	0.31	0.33	0.39
Print						
North-Centre	1.42	1.44	1.41	1.39	1.37	1.35
South-Islands	0.28	0.25	0.24	0.28	0.34	0.37
Photo and cinema						
North-Centre	1.25	1.29	1.24	1.21	1.17	1.26
South-Islands	0.58	0.51	0.56	0.61	0.71	0.54
Steelwork						
North-Centre	1.48	1.47	1.33	1.25	1.26	1.30
South-Islands	0.19	0.20	0.38	0.54	0.53	0.46
Engineering						
North-Centre	1.44	1.45	1.38	1.32	1.32	1.32
South-Islands	0.26	0.23	0.30	0.41	0.43	0.43
Non metal Minerals						
North-Centre	1.31	1.27	1.21	1.18	1.17	1.20
South-Islands	0.28	0.32	0.33	0.36	0.39	0.36
Chemicals						
North-Centre	1.44	1.44	1.31	1.24	1.29	1.32
South-Islands	0.47	0.54	0.61	0.66	0.70	0.65
Rubber						
North-Centre	1.56	1.52	1.40	1.33	1.38	1.39
South-Islands	0.05	0.12	0.25	0.39	0.33	0.31
Plastic and sundry manufactures						
North-Centre	1.52	1.50	1.44	1.38	1.39	1.38
South-Islands	0.11	0.15	0.18	0.30	0.31	0.32

Source: industrial censuses (see text).

4. Industrial hierarchies

An analysis of the rates of growth in manufacturing employment in the provinces confirms, first of all, the working of Gibrat's law: there is no relationship between the size of a province, in terms of employees in manufacturing, and its rate of growth, both in the period 1911-51 and 1951-2001 (Figure 2). As is the case for the development of industrial enterprises and urban agglomerations, the overall growth rate of the labour force in manufacture in the Italian provinces is uncorrelated with the size of the labour force in manufacture in the same province. This development was identified by R. Gibrat in 1931 for French manufacturing firms in 1920-21, that is in a case study similar to ours.[29] Stochastic shocks, or a large number of small additive influences, independent of each other, seem to dominate the development of Italian manufacture.

Figure 2. Relationship between the rates of growth (%) and the size of the labour force in manufacture (rates of growth in 1911-51 on size in 1911; rates of growth in 1951-2001 on size in 1951)



Sources: population censuses (see text).

A closer look at our data shows, however, some regularities and particularly systematic differences between North and South. Shocks are not independent of economic and geographic influences; although, in a micro approach, chance seems to dominate. Microscopic stochastic behaviour results in macroscopic economic regularities.

Differences between North and South are represented in Table 4. The rate of growth of manufacturing employment has always been higher in the North than in the South. We see that, especially in the period 1911-51, the manufacturing labour force in the South was decreasing (and industrial labour in its entirety stagnating), while the North continued to progress.

During the decades 1951-71, manufacture advanced both in the North and South, but at different speeds. Looking at industry as a whole, the rate of growth was the same in the North and South in these decades, because of the increase in the number of workers employed in construction in the South. It was the period

[29] Gibrat (1931), and the outline of Gibrat's theory in Sutton (1997).

when remarkable flows of workers from the South found employment in Northern manufacturing centres. We could speak of an "unlimited" supply of labour from the subsistence agrarian economy of the Mezzogiorno.[30] In 1981 between 16 and 26 percent of the population of Abruzzi and Molise, Campania, Apulia, Sicily and Sardinia and between 31 and 42 percent of Calabria and Basilicata lived outside the regions where they were born.[31] These South-North migration increased market size in a cumulative way in the most advanced regions.[32]

Table 4. The rate of growth of the labour force in manufacture and industry in North-Centre Italy, in South-Islands and in Italy as a whole 1871-2001 (%)

Manufacture	**1871-1911**	**1911-1951**	**1951-1971**	**1971-2001**
North-Centre	1.47	0.59	1.43	-0.51
South-Islands	0.08	-0.67	0.90	-0.34
Italy	**0.99**	**0.30**	**1.33**	**-0.47**
Industry				
North-Centre	1.38	0.79	1.32	-0.42
South-Islands	0.23	0.05	1.33	-0.85
Italy	**0.98**	**0.61**	**1.32**	**-0.51**

Sources: population censuses (see text).

Table 5 summarises the hierarchies of the main manufacturing provinces both in the North and the South. The comparative flagging of the South is already apparent in 1911, in terms of the share of workers in manufacture on population. The disappearance of some of the former strongholds of the Italian industrial system is also apparent (primarily Milan in the North and Naples in the South) during the latter period of our history; that is during the recent phase of deindustrialisation.

Table 5. Rankings of the first 10 provinces in 1911, 1951, 2001 according to the ratio workers in manufacture/population (%)

	North-Centre	**1911**		**1951**		**2001**
1	Milan	25.0	Milan	25.8	Vicenza	19.7
2	Como	21.5	Como	25.3	Modena	18.3
3	Florence	20.4	Turin	23.8	Treviso	17.6
4	Leghorn	19.9	Novara	21.4	Reggio E.	17.4
5	Turin	19.2	Bergamo	17.7	Bergamo	16.9
6	Genoa	18.4	Pavia	15.1	Varese	16.8
7	Novara	16.4	Genoa	14.2	Como	16.3
8	Bergamo	16.1	Florence	14.0	Brescia	16.0
9	Pisa	14.1	Vicenza	13.6	Mantua	15.9
10	Cremona	13.7	Brescia	12.9	Belluno	15.4
	South-Islands	**1911**		**1951**		**2001**

[30] Kindleberger (1967), Ch. 2.
[31] Del Panta, Livi Bacci, Pinto, Sonnino (1996), p. 210. There is a wide range of literature on Italian migration, both internal and international. See especially the outline of internal migration presented by Vitali (1975).
[32] See Myrdal (1957) and Krugman (1991a).

1	Naples	17.1	Lecce	12.3	Teramo	12.0
2	Reggio C.	11.8	Naples	8.3	Chieti	10.3
3	Catanzaro	10.2	Salerno	7.8	Pescara	7.3
4	Catania	9.3	Bari	5.1	Campobasso	6.7
5	Salerno	9.0	Catania	4.9	Avellino	6.6
6	Bari	8.6	Caserta	4.7	L'Aquila	6.4
7	Palermo	8.5	Teramo	4.7	Bari	6.4
8	Trapani	8.2	Palermo	4.7	Potenza	6.0
9	Messina	8.0	Chieti	4.6	Taranto	5.9
10	Caserta	8.0	Trapani	4.5	Lecce	5.7

Sources: population censuses (see text).

The change in the hierarchies[33] has been quantified in Table 6 through the coefficient of correlation between the rankings of the provinces in terms of workers in manufacture on the total population. The higher the coefficient the lower the change in the hierarchy of the manufacturing centres. We see that the alternation is slow in the North and faster in the South, especially during the southern deindustrialisation between 1911 and 1951 and industrialisation between 1951 and 1971. Both for the North and the South the industrial expansion in 1951-71[34] and the recent decline implied a fast change of our provinces in the industrial hierarchy.[35]

Table 6. Coefficient of correlation among hierarchies of provinces in Centre-North, in South-Islands and Italy 1871-2001

	1	**2**	**3**	**4**	**5**
	1871-1911	**1911-1951**	**1951-1971**	**1971-2001**	**1951-2001**
North-Centre	0.80	0.75	0.70	0.71	0.30
South-Islands	0.66	0.56	0.77	0.59	0.41
Italy	**0.52**	**0.75**	**0.86**	**0.86**	**0.65**

Sources: population censuses (see text). **Note:** hierarchies are established among the same provinces (with exclusion of the new provinces) in consecutive censuses.

5. Concentration and disparities

Up to this point we have focused on employment in industry and manufacture as a share of labour force and population. It is important to look now at the disparities in the distribution of manufacture among provinces and particularly between the North and South.

In order to specify the industrial concentration of manufacture, we use, first of all, a geographic concentration index,[36] including the censuses held in

[33] The ranking of the provinces (manufacture on population) is established for the first and last date of the period. The coefficient of correlation is then computed between the rankings of any province.

[34] In Table 6 the correlation in cols. 3-4 is relatively high because they include only two decades and not forty years such as in cols. 1-2. Whenever we include the period 1951-2001, the correlation between hierarchies is lower.

[35] The problem was addressed, in a different perspective, for the period 1971-91, by De Robertis (2001).

[36] Used by Spiezia (2002). This index is a simplified version of that used by Ellison, Glaeser (1997).

1961 and 1981, together with data from the five censuses used until this point. This index is equal to:

$$GC = \sum_{j=1}^{N} \left| L_{m,\,j} - a_j \right| \qquad (2)$$

where $L_{m,j}$ represents occupation in manufacture in region j and a_j the surface of the same province, both expressed as ratios respectively of the total Italian industrial labour force and the extent of the country. The index shows a low concentration at the end of the nineteenth century; an increase until 1951-61 and a decline thereafter (Table 7). According to this index, industrialisation in Italy followed the ordinary inverted U curve we expect to find whenever industrialisation progresses.[37] From pre-modern equality, when work in manufacture is widespread all over the country and modern industry is hardly present, to the concentration of modern industry in the northern provinces and its spreading all over the country. At the end, however, geographic concentration of manufacture is much higher than at the beginning.

Table 7. Index of geographic concentration of the Italian manufacture per province 1871-2001.

	Index
1871	0.58
1911	0.70
1951	0.90
1961	0.90
1971	0.88
1981	0.86
2001	0.79

Sources: population censuses (see text).

An adaptation of the Theil index to the geographic concentration of manufacture helps specify the trend. The formula we use is the following:

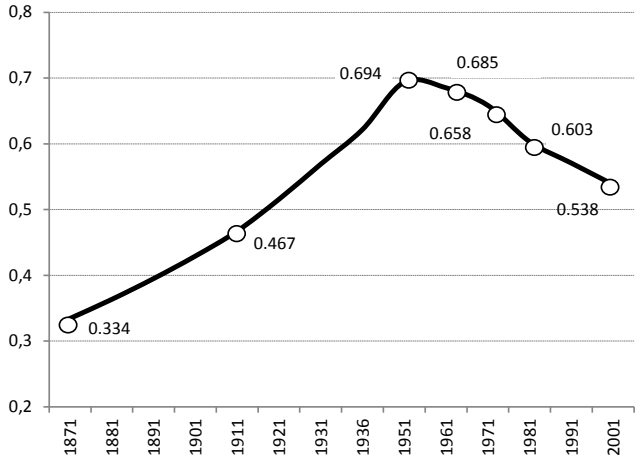
$$Ic = \sum_{j=1}^{n} \frac{L_{m,\,j}}{L_m} \ln \left(\frac{\frac{L_{m,\,j}}{L_m}}{\frac{a_j}{A}} \right) \qquad (3)$$

where $L_{m,j}$ are the workers in manufacture in province j divided by the national workers in manufacture represented by L_m; a_j is the area of province, divided by the national surface A. The results we reach confirm those already attained with the previous index and clearly show an inverted U curve. We see that the top of the curve is reached again in 1951-61. Thereafter the curve is downward bent;

[37] The problem is especially analysed, with reference to Italy, by Daniele, Malanima (2013).

although disparities among provinces are wider at the end than at the beginning of the curve. These patterns of geographical concentration/dispersion are consistent with those experienced by other countries[38].

Figure 3. The index of concentration (adjusted territorial Theil index) of the Italian manufacture 1871-2001



Sources: population censuses (see text).

We can proceed further and establish the importance of the North-South disparity within the geographic disparities existing in Italy in the manufacturing industry. For this purpose we exploit a property of deviance: having a set divided into two subsets, total deviance (*DevT*) is equal to the sum of the deviances within the subsets (*DevW*) plus the deviance between the averages of the subsets (*DevB*). That is:

$$DevT = DevW + DevB \qquad (4)$$

DevT represents total deviance in the share of manufacturing workers on total population of any province:

$$DevT = \sum_{i=1}^{n}\left(\frac{L_{m,\,j}}{P_j} - \frac{L_m}{P}\right)^2 \qquad (5)$$

where $L_{m,j}$ is labour force of the *j* province employed in manufacture; P_j is the population of the same province; L_m is total Italian workforce in manufacture and *P* is national population. Deviance within the subsets North and South (*DevW*) is represented by:

$$DevW = \sum_{j=1}^{2}\sum_{i=1}^{n}\left(\frac{L_{m,\,j}}{P_j} - \frac{L_m}{P}\right)^2 \qquad (6)$$

The deviance between North and South, (*DevB*), is equal to:

[38] See, Combes et al. (2011) for France; Badia-Miró, Guilera, and Lains (2012) for Portugal; Martínez-Galarraga, J., Rosés, J. R., Tirado, D. A. (2015) , for Spain.

$$DevB = \sum_{j=1}^{2} \left(\frac{L_{m,\,j}}{P_j} - \frac{L_m}{P} \right)^2 \qquad (7)$$

The share of North-South disparity (D_{NS}) of total regional disparity is then computed as:

$$D_{NS} = \frac{DevB}{DevT} \cdot 100 \qquad (8)$$

Table 8 reports, in the last line, the percentage ratio between the North-South deviance and total deviance among regions according to eq. (8).

Table 8. Deviance among provinces within Italy in labour force in manufacture on population 1871-2001

	1871	**1911**	**1951**	**1971**	**2001**
Total Deviance (*DevT*)	8.0	10.5	32.7	19.9	27.5
Deviance Within (*DevW*)	7.7	8.1	19.2	8.4	14.7
Deviance Between (*DevB*)	0.3	2.4	13.5	11.5	12.8
DevB/DevT (%)	*3.5*	*22.8*	*41.2*	*57.7*	*46.5*

Sources: population censuses (see text).

We see that in 1871 the share of the North-South deviance on total deviance is almost nil. Even assuming an overestimation of the southern Industry in 1871 census, the North-South disparity would be certainly lower than in 1911 (when it still accounted for only 23 percent of total deviance). The importance of the North-South deviance on the total grew rapidly thereafter and reached its top in 1971. It diminished later; although it still represented 46.5 percent in 2001. Otherwise stated: the North-South disparity played a marginal role in 1871 and 1911. The disparities among provinces were scattered over the Italian territory at the time. Later on between 40 and 60 percent of the Italian disparities in manufacture depended on the disparities between southern and northern provinces.

6. Economic integration

The problem we would now like to address is the importance of market potential in the geographic spread of industry. The idea behind this is that the level of economic activity in a location is conditioned by that location's access to markets for its products. We will address both the *extent* of market potential (presence of barriers to trade and trade costs), in this section, and its *depth* (population and income per province), in the following section.

At the time of Unification, Italy was not yet a fully integrated market. Existence of barriers to trade among the existing regional states, together with poor infrastructure, limited interregional trade.[39] The unification of the administrative systems, the adoption of a single currency and the development of rail networks after 1861 fostered the process of integration. This process was slow, however, at

[39] Federico, Tena-Junguito (2014).

least till the end of 1880s. L. Cafagna, in particular, stressed the weak economic integration arguing that, in the first decades after the Unification, both northern and southern regions were rural economies. Because of the scarce diversification and economic complementarity of the two areas, the opportunities of interregional trade were scant.[40] More recently, on the basis of wheat prices and their degree of convergence, G. Federico showed how market integration, that occurred from the 1870s onward, was brought about mainly by progress in maritime transportation, that exposed Italy to international competition, while the development of railways and trade liberalization affected North Italy before Unification.[41]

In the first decades after the Unification, the infrastructural endowment of Italy notably rose: between 1860 and 1880, the railway network augmented from 2,400 to 9,290 km, while the extent of the road system (national and provincial) increased from 22,500 to 35,500 km. The railway network was unifying the entire peninsula, even though differences between North and South long persisted.[42] In 1871, the rail tunnel of Cenisio was opened, connecting Genoa and Turin with France and, in 1882, the Gottardo tunnel between Italy and Switzerland; the northern regions especially benefitting from these important connections with the main European markets. In the same period, the merchant fleet's carrying capacity rose from 654,174 in 1862 to 945,677 tons in 1886, while coastal shipping grew by 137 percent and international navigation by 90 percent.[43] Until the end of 1880s, much of the trade was carried out by ship, since rail freight rates were expensive and transport networks still not wholly developed.[44] The volume of domestic trade remained, however, remarkably lower than that of other European countries, such as Germany or France. Internal trade also rose slowly. In the 1880s, trade from South to North still accounted for only 12 per cent of rail shipment.[45]

From the end of the nineteenth century, the rapid development of road networks continued to reduce transport costs, even though the South was longer penalized in comparison with the North.[46] The growing importance of road transportation is apparent considering the number of licensed trucks, that increased from 200 in 1910 to 17,000 in 1920 reaching 60,000 in 1930. The share of freight traffic transported by trucks in 1933 reached 20 per cent of the total.[47] From the 1950s onward the road systems grew remarkably with the construction of new motorways, increasing from 500 to 5,000 kilometres between 1955 and 1975.

Given its relative level of development at the time of Unification, Italy was an exporter of agricultural products and particularly of silk.[48] Overall, primary goods accounted for 86 percent of exports in 1871 and 61 percent in 1911 (Table 9). Manufactured goods represented a very marginal share of the

[40] Cafagna (1989a).
[41] Federico (2007).
[42] Svimez (1961), p. 477.
[43] Pescosolido (1998), p. 159.
[44] Fenoaltea (1984).
[45] A'Hearn, Venables (2013), p. 613.
[46] Svimez (1961), p. 487.
[47] A'Hearn, Venables (2013).
[48] However, silk threads included a share of industrial value added.

Italian exports (only 13.7 percent), in comparison with 50-60 percent in France in the 1860s, and 70 percent in Germany in the 1880s.[49] From the Unification until 1911, the degree of international openness – the ratio between imports plus exports and GDP – increased from 19 to 26 percent. It remained, on average, around 20 percent during the 1920s; subsequently collapsing, as in other countries, during the Great Depression. The fall of international trade of Italy was also due to autarkic policies pursued by the fascist regime from 1925 onward. After the Second World War, the trade policy drastically changed. Italy opted for trade liberalization and, in 1951, was the first OECD country that removed all quotas on imports. In 1951, trade represented about 23 per cent of GDP, even though its composition was, by now, considerably changed in comparison with previous decades. During the 1950s, the integration of Italy into the international economy increased.[50] Manufactured goods began to represent the main share of exportation. The adhesion to the European Community and the "economic miracle" of the 1960s, boosted exports, especially toward the main European partners of Italy: France, Germany and Benelux. In 1970, openness exceeded all previous levels and continued to grow, reaching a peak of about 55 per cent of GDP around the mid-2000s.

Table 9. Degree of openness and trade composition of Italy 1871-2001 (%)

	Openness	Import		Export	
		Manufacture	Primary	Manufacture	Primary
1862	19.0	39.1	60.9	17.2	82.8
1871	21.1	41.3	58.7	13.7	86.3
1911	26.0	35.8	64.2	38.9	61.1
1951	22.7	23.8	76.2	70.2	29.8
1971	31.7	49.0	51.0	82.5	17.5
2001	52.8	78.5	21.5	92.6	7.4

Source: Federico, Wolf (2011).

7. Market potential

The geographic location of economic activities depends on several factors. Among these, one of the most important is represented by the size of the market that can potentially be reached from a single location. The idea that the level of economic activity in a location is related to that location's access to markets for its products was initially proposed by C. Harris in 1954 and has been confirmed by a number of studies.[51]

It is worth noting that, in Italy, during the long period under examination, regional differences in levels of development and population density initially existed. These structural differences have to be taken into account, since GDP and population size determine the width of each local market. In the first decades after Unification, regional differences in per capita GDP levels were relatively

[49] Federico, Natoli, Tattara, Vasta (2011); Federico, Wolf (2013).
[50] Graziani (1998), Pistoresi and Rinaldi (2012).
[51] Harris (1954), Hanson (2005), Combes, Mayer, Thisse (2008); Brakman, Garretsen, van Marrewijk (2009); Paluzie, Pons, Tirado (2009); Martinez-Galarraga (2012). For an application at the country level, Boulhol, de Serres, Molnár (2008).

small, and the North-South economic divide was modest. From the end of the nineteenth century, the gap began to rise and continued to increase during the first half of the subsequent century (Daniele, Malanima, 2011, 2014; Felice, Vecchi, 2015). Population density has always been notably higher in the North than in the South. In 1871, for example, density in the South was 72 percent of that in the Centre-North and 60 percent of that in the North-West area. In the course of our period, average population density increased from 90 to 189 inhabitants per square kilometre. Yet density in the South remained notably lower than in the North (Table 10).

Table 10. Population density (inhabitants per sq.km) 1871-2001

		1871	1911	1951	1971	2001
North-Centre		104	138	167	198	205
	North-West	*124*	*163*	*203*	*258*	*258*
	North-East	*108*	*143*	*152*	*162*	*172*
	Centre	*80*	*106*	*149*	*177*	*187*
South-Islands		75	109	144	153	167
Italy		**90**	**125**	**158**	**180**	**189**
	South/North (%)	***72***	***79***	***86***	***77***	***81***

Sources: population censuses (see text).

In order to test the relationship between industrialisation levels and the access to markets, we estimate the following baseline eq. (9):

$$\log \frac{L_{m,\,j}}{P_j} = \alpha + \beta \log MA_j + \varepsilon_j \qquad (9)$$

where, for a province *j*, the share of employment in manufacture on total population is regressed on a measure of market access (or market potential) *MA*, a variable that proxies the access of each province to external markets. Within *MA* we then distinguish domestic (*DMA*) and foreign market access (*FMA*):

$$MA_j = DMA_j + FMA_j \qquad (10)$$

For a province *j*, domestic market access is given by the sum of GDP of all Italian provinces, weighted by the inverse of bilateral distances *d*, plus the province's *j* internal potential, according to eq. (11):

$$DMA_j = \sum_{l \neq j} Y_l d_{lj}^{-1} + Y_j d_{jj}^{-1} \qquad (11)$$

This index, which follows Harris' market-potential function, states that the demand for goods produced in a location is the sum of purchasing power in other locations, weighted by distance among different locations. In eq. (11), the distance among provinces is computed as the distance in kilometres between their chief towns; for island provinces, 100 km are added to distance (except for the distances among the provinces of the same isle) as a penalty for insularity. The internal market potential (the self-potential) of province *j* is calculated, according to a standard approach, by assuming

that provinces are circular, so their radius is $r_j = \sqrt{a/\pi}$ (where *a* is the area), and the internal distance is calculated following Keeble et al. as $d_{jj} = \frac{1}{3} r_{jj}$.[52]

The *FMA* of each province *j* is calculated by simply considering the sum of GDP of the main trading partners of Italy (*f*) weighted by the inverse of relative distances between *j* and *f*:

$$FMA_j = \sum_f^N Y_f d_{fj}^{-1} \qquad (12)$$

It is noteworthy that this simple proxy presents a strong explanatory power, and yields results very similar to those of more complex indices designed to estimate trade costs on the basis of the trade gravity equation.[53] *FMA* is calculated on the basis of geodetic distances between each province and the capital cities of the major trading partners of Italy - Austria, France, Germany, Switzerland – with whom the bulk of trade took place overland. For Britain, the Netherlands and the US, the main nautical routes between the main Italian ports and those of London, Rotterdam and New York have been considered. For provinces without ports, their distance to the nearest port is added.[54] In 1871, the above mentioned countries represented 88 per cent of total Italian export, in 1911, 65 per cent, in 1951, 48 per cent and, in 2001, 56 per cent.[55] We can see how the European countries considered are sufficient to estimate the accessibility index of provinces: given the peculiar geography of Italy, European markets may be reached by road or railway through the northern border. So, adding other countries to those already included, would not change the relative indices for each province.

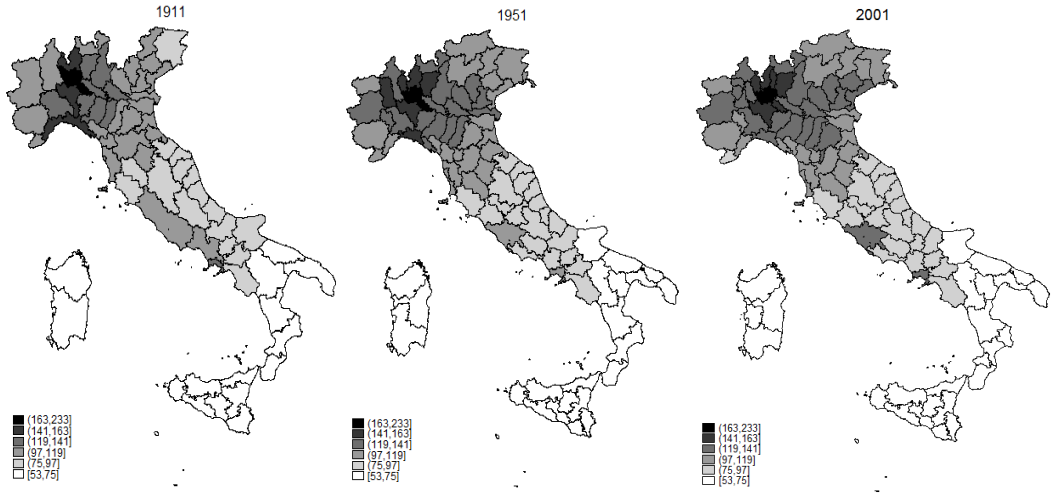
A major problem we meet in order to estimate eq. (12) consists in the availability of data on GDP. Data on GDP per province is, in fact, available only from the 1990s onward. However, for previous periods, we can avail of estimates of per capita GDP at the regional level. So, in the calculation of domestic market potential, for each province per capita GDP of the corresponding region is assigned according to the regional borders of the epoch.[56] For 2001, GDP data is from Istat.[57] GDP of foreign countries is from Maddison.[58] The resulting estimates for *DMA* and *FMA* are computed relative to the Italian average. Our estimates cover the censuses 1911-2001.

Maps 6-8 illustrate the relative market potential in three different years: 1911, 1951 and 2001. In 1911 we can already see that market potential in the North-West is higher than in the South and in the Eastern provinces (the Adriatic provinces from Venetia to Apulia). In 1911, Milan was the province with highest

[52] Keeble et al. (1982).
[53] Breinlich (2006); Breinlich, Cuñat (2011). Some versions of the foreign market potential equation include also the tariffs applied by foreign countries. The inclusion of tariffs, however, would not change the relative market access of each province or region.
[54] The ports considered are the following: Ravenna, Trieste, Genova, La Spezia, Leghorn, Venetia, Ancona, Civitavecchia, Naples, Brindisi, Taranto, Cagliari, Catania, Messina, Palermo, Trapani, on the basis of MAIC and Istat data on their traffic.
[55] See, Federico, Natoli, Tattara, Vasta (2011) and Istat.
[56] According the GDP estimates by Daniele, Malanima (2011), where GDP estimates are provided according to present borders. We adjust to coeval borders GDP data referring to 1911.
[57] Istat, online database at: http://dati.istat.it/Index.aspx.
[58] Maddison (2008).

domestic market potential, followed by Naples that was, at the time, the only southern province among the first twenty in the provincial ranking.[59] In 1951, the domestic market potential of Naples was 60 per cent of that of Milan, and lower than that of the other North-West provinces. The North-South gradient in total market potential, already visible in 1911, increased from then on and remained more or less the same between 1951 and 2001. The lower market potential of the South derives both from the lower GDP (the numerator of the market potential equation) and the higher distance from large markets (the denominator), that is central and northern regions and European trade partners. This picture – showing an initial larger market access of North-West provinces - is perfectly consistent with A'Hearn and Venables findings, that estimated how, already in 1890, domestic market access of Lombardy and Piedmont was 50 per cent wider than that of Campania, the region with the second highest share of its labour force in manufacturing.[60]

Maps 6-8. Market potential of any province 1911, 1951 and 2001



Source: see text.
Note: the colours of the maps show the relative market potential per province and not changes over time.

8. Market access and labour force in manufacturing

Table 11 reports the results of cross-section OLS estimates of eq. (9) for the Italian provinces. It is easy to see how the access to markets has a strong explanatory power on provincial distribution of employment in the manufacturing industry. While in 1911 the distribution of manufacture is driven by domestic market potential, from 1951 the contribution of foreign market potential is equally relevant for the location of manufacturing.

[59] According to our calculations, already in 1891 the North-West provinces benefited from a higher domestic market potential than the Italian average, with the exception of the province of Naples, whose market potential was similar to that of Milan, given its large population and relatively high per capita GDP.
[60] A'Hearn, Venables (2013), p. 619.

Table 11. Employment in manufacture and market access

	1911	1951	1971	2001	1911	1951	1971	2001
const	-2.33**	-2.56**	-2.36**	-2.45**	-2.33**	-2.56**	-2.35**	-2.44**
	(-64.1)	(-73.3)	(-80.8)	(-68.1)	(-64.0)	(-74.7)	(-83.5)	(-66.9)
Market Access	0.867**	1.52**	1.40**	1.42**				
	(6.44)	(13.7)	(18.3)	(13.5)				
DMA					0.597**	0.530**	0.490**	0.562**
					(3.83)	(4.67)	(4.09)	(3.12)
FMA					0.153	1.21**	1.09**	1.04**
					(0.562)	(4.38)	(4.88)	(2.95)
N	69	92	94	103	69	92	94	103
R^2	0.39	0.68	0.71	0.64	0.40	0.69	0.73	0.67

Note: OLS - Heteroskedasticity-robust standard errors; t-statistics in parentheses; * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level.

Such as suggested by economic location models,[61] increased employment in manufacture tends to positively affect the local size of market that, in turn, contributes to attract more industries, in a self-reinforcing process. This may imply a possible problem of endogeneity among variables. To address this problem, we used the lagged values for market potential measures. For the year 1911, market potential estimates for 1891 are used, while for other years, those of the previous census year. Given the significant correlations among the market potential estimates over time, estimates of regression confirm the previous picture (Table 12).

Table 12. Employment in manufacture and domestic and foreign market access (lagged)

	1911	**1951**	**1971**	**2001**
const	-2.33**	-2.58**	-2.35**	-2.46**
	(-60.5)	(-67.0)	(-82.5)	(-65.6)
DMA_{t-n}	0.530**	0.556**	0.520**	0.420**
	(3.20)	(3.67)	(4.69)	(2.15)
FMA_{t-n}	0.255	1.25**	0.986**	1.17**
	(1.01)	(4.66)	(4.03)	(3.41)
n	69	69	92	94
R^2	0.34	0.67	0.73	0.60

Note: OLS - Heteroskedasticity-robust standard errors; t-statistics in parentheses; * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level.

Table 13 reports the results of cross-section estimates that include two control variables: the log of population density and the log of labour force in the mining sector on population in each province. Population density may be considered both as a proxy of agglomeration economies and the size of local markets, while mining employment captures the presence of localised natural resources.[62] We see how, while mining employment is not significant, population density is related to manufacturing employment in 1911 and 1951, but not in the following period. Such as confirmed by theoretical and empirical studies, the distribution of manufacturing is related to transportation costs for shipping goods. When these costs are high, manufacturing activities tend to locate near to

[61] Krugman (1991b), Baldwin (2005).
[62] See, Brakman, Garretsen van Marrevijck (2009), and Betran (2011).

customers or suppliers, while when transportation costs fall (as today), location is not anymore driven by proximity to densely populated areas.[63]

Table 13. Employment in manufacture and market access with control variables

	1911	1951	1971	2001
const	-3.70**	-3.44**	-2.62**	-2.35**
	(-10.7)	(-9.69)	(-8.33)	(-5.67)
Market access	0.587**	1.40**	1.38**	1.54**
	(4.29)	(12.1)	(17.8)	(16.1)
Pop. density	0.316**	0.181**	0.0090	-0.123*
	(5.13)	(2.85)	(0.154)	(-1.89)
Mining	0.028	0.007	-0.0329	-0.0794
	(1.19)	(0.21)	(-0.99)	(-1.39)
n	68	92	94	103
R^2	0.59	0.72	0.71	0.66

Note: OLS - Heteroskedasticity-robust standard errors; t-statistics in parentheses; * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level.

Table 14. Employment in manufacture and market access – panel estimates

	(1)	(2)	(3)	(4)	(5)
const	-2.37**	-2.36**	-2.30**	0.473	0.280
	(-53.0)	(-58.5)	(-57.9)	(0.990)	(0.599)
Market access	2.73**			3.54**	3.71**
	(2.75)			(5.77)	(6.01)
DMA		1.54**	1.66**		
		(3.22)	(3.70)		
FMA			2.22**		
			(2.46)		
Pop. density				-0.556**	-0.584**
				(-5.78)	(-5.97)
Mining					-0.0534**
					(-2.05)
n	*358*	*358*	*358*	*358*	*357*
Within R^2	0.12	0.15	0.18	0.26	0.28
LSDV R^2	0.80	0.80	0.81	0.83	0.84
F-test	2.36	2.96	2.54	3.23	3.29
(p-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hausman (H)	8.61	5.80	21.66	63.93	68.7
(p-value)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)

Note: * indicates significance at the 10 percent level; ** indicates significance at the 5 percent level. For the F-test and Hausman test, p-values are reported in brackets (a low p-value counts against the null hypothesis that the random effects model is consistent, in favour of the fixed effects model).

Finally, we present in Table 14 the results of panel estimates for the years 1911-2001. The results of *F* and Hausman tests indicate that the fixed effects model is adequate to our data. Results are perfectly consistent with the previous ones, showing a highly significant effect of market potential on the distribution of the manufacturing industry, while over the entire period considered, population density and mining are negatively related to manufacturing.

The lack of reliable data at provincial level, impedes to control the estimates for the effect of other variables potentially influencing the distribution of

[63] Krugman (1991a) and Glaeser and Kohlhase (2004).

manufacture, such as human capital. However, our results, that show the existence of a strong link between potential market and employment in manufacture, are in line with those reached in other studies regarding Italy, such as those by Martinelli[64] and A'Hearn and Venables[65], and those concerning other countries. For example, in a study on Spain, Tirado, Paluzie and Pons[66] found that, during the second half of the nineteenth century, economic integration was accompanied by concentration of industry in areas characterized by a comparative advantage in human capital endowment, favourable geo-economic location and initial specialization in sectors with scale economies. Martínez-Gallaraga, Tirado, and González-Val, showed how market potential deeply influenced regional economic growth in Spain during the period 1900-30;[67] similar results have been found by Betran.[68] Wolf suggested that market potential, coupled with other factors, played a role in industrial location in Poland between 1926-34.[69] Our results are also consistent with research on the geographical distribution of industry in the EU[70] and at international level.[71]

Conclusion

Recent literature on Italian industrialisation dealt with labour force from census data on a provincial basis to investigate the first spread of modern industry between the Unification and the First World War.[72] The relationship between industry and market access has until now only been investigated at regional level. Our contribution provides a first attempt of analysis of the industrial labour force and market potential on a secular scale and at provincial level. The resulting picture shows how the progressive economic integration of Italy was accompanied by an increase in geographical concentration of manufacture. Concentration rose during the period 1871-1951, then slightly decreased, although –it is important to note!- at the end of our period, in 2001, the degree concentration was much higher than before modern industrialisation. In fact, when the phase of industrialisation finishes, after 1971-81, modern industry and particularly manufacturing is hardly present in southern Italian provinces. This pattern of concentration/dispersion – that follows an inverted U-shaped curve − is wholly consistent with those found in other countries.[73]

We also analysed the relationship between manufacture employment and access to markets, showing how the access to domestic and foreign markets played an important role in the geographic distribution of manufacture. Estimates show how northern regions benefited from a larger market potential than those of

[64] Martinelli (2014).
[65] A'Hearn, Venables (2013).
[66] Tirado, Paluzie, Pons (2002).
[67] Martínez-Gallaraga, Tirado, González-Val (2014).
[68] Betran (2011).
[69] Wolf (2007).
[70] Midelfart-Knarvik et al. (2000); Niebuhr (2006).
[71] Breinlich, Cuñat (2011).
[72] Ciccarelli, Fenoaltea (2011, 2013), and Ciccarelli, Missiaia (2013).
[73] The inverted U-shaped curve of regional inequalities has been firstly proposed by Williamson (1965), and has been empirically confirmed by several studies. For example, Kim (1998) for the US, Combes et al. (2011) for Spain, Badia-Mirò, Guilera, Lains (2012) for Portugal.

the South, especially as far as the internal market is considered. It was the consequence of several factors: higher population density and development levels, in particular of the north-western regions of the "industrial triangle"; more developed infrastructure networks; geographical proximity to large European markets. The peculiar geography of Italy also privileged the North under other aspects. It is easy to observe, in fact, how the location in a barycentric point of the North – e.g. in the city of Milan – gives access, within a given radial distance, to a comparatively larger population (a market) than from a barycentric location in southern regions. In particular, the larger domestic market access was important from the end of 1890s to the 1950s. From then on, foreign market access began to play an increasingly important role especially for northern regions. Initial differences in market access, deeply contributed to shape the geography of industry in Italy and, consequently, the regional patterns of national economic development.

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