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## Quaderni di Storia Economica

(Economic History Working Papers)

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GDP, Productivity and Structural Change  
in the Italian Regions in the Long-run (1871-2011)

Emanuele Felice

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# The Roots of a Dual Equilibrium: GDP, Productivity and Structural Change in the Italian Regions in the Long-run (1871-2011)

Emanuele Felice\*

## Abstract

This paper explores the evolution of Italy's regional inequality in the long run, from around Unification (1871) until our days (2011). To this scope, a unique and up-to-date dataset of GDP per capita, GDP per worker (productivity) and employment, at the NUTS II level and at current borders, for the whole economy and its three branches – agriculture, industry, services – is here presented and discussed. Sigma and beta convergence are tested for GDP per capita, productivity and workers per capita (employment/population). Four phases in the history of regional inequality in post-unification Italy are confronted: mild divergence (the liberal age), strong divergence (the two world wars and Fascism), general convergence (the golden age) and the “two-Italies” polarization. In this last period, for the first time GDP and productivity, as well as workers per capita and productivity, have been following opposite paths: the North-South divide increased in GDP, decreased in productivity.

**JEL Classification:** O11, O18, O52, N13, N14

**Keywords:** Italy, regional convergence, long-run growth, economic geography, institutions

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## 1. Introduction

Regional inequality is a subject of growing attention by economic historians and economists (e.g. Robinson, 2013; Rosés and Wolf, 2017). On the one side, this can be related to the revival of interest for long-run (personal) inequality, following the success of Piketty's (2014) work among scholars and the public opinion. But on the other it is due to the fact that, in recent years, new studies have become available, allowing us to track and discuss the historical pattern of regional inequality, through a consistent methodology, for an increasing number of countries. Following the approach originally formalized by Geary and Stark (2002), with obvious variations due to the peculiarities of each country, new long-run GDP estimates have been produced for Spain (Martínez-Galarraga, Rosés and Tirado, 2010, 2015), Great Britain (Crafts, 2005; Geary and Stark, 2015), the Austrian-Hungarian empire (Schulze, 2007), Sweden (Henning, Anflo and Andersson, 2011; Enflo and Rosés, 2015), Belgium (Buyst, 2010), Portugal (Badiá-Miró, Guilera and Lains, 2012), France (Sanchis and Rosés, 2015); as well as, outside Europe, for Chile (Badia-Miró, 2015) and Mexico (Aguilar-Retureta, 2015).

Italy is among the first countries where these estimates were produced – originally for only two benchmarks, 1938 and 1951 (Felice, 2005a), then for two more years, 1891 and 1911 (Felice, 2005b) – and, through time, they were increasingly refined (Felice, 2009, 2010, 2011a; Brunetti, Felice and Vecchi, 2011; Felice and Vasta, 2015; Felice and Vecchi, 2015a; Felice, 2015a), in order to incorporate advances from new research (Ciccarelli and Fenoaltea, 2009a, 2014). Five more benchmarks – 1871 and 1931 (Felice and Vecchi, 2015a), 1881, 1901, 1921 (Felice, 2015a) – were also added, and as a consequence it became possible to have a long-run picture, at ten years intervals spanning from around the unification of the country to – after linking the historical estimates to the official figures available since the 1960s – our days. The present article is the final outcome of this multi-year research effort: the updated long-run picture of regional GDP in Italy, running at regular intervals from 1871 to 2011, is here presented and discussed, together with the corresponding estimates of total and sectoral productivity and employment (both never presented thus far in such a broad historical coverage);<sup>1</sup> furthermore, all the estimates have been converted from the historical to the present (national and regional) borders, in order to ensure long-run consistency. Finally, the historical estimates are here accompanied by a complete and consistent description of sources and methods (see the Appendix I).

The results constitute a novel and broad data source, the essential basis for further analyses. But they also represent, in themselves, crucial insights for our comprehension of Italy's regional development. It is worth premising that Italy is one of the Western countries (maybe it is *the* Western country) where the issues of regional imbalances has been most widely felt and deeply discussed, at the national and the international level; and not only by economists and historians but also by philosophers, politicians, novel writers, film makers, social scientists, anthropologists, and other intellectual and public figures. Also, Italy is arguably the only Western country where regional imbalances still play a major role nowadays: Italy's North-South divide in terms of GDP has no parallels in any other

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<sup>1</sup> In previous works (Felice, 2005a, 2005b, 2010, 2011) regional estimates of productivity and employment were also presented, though limitedly to a few benchmarks.

advanced country of a similar size, and southern Italy is, after Eastern Europe, the biggest underdeveloped area inside the European Union.<sup>2</sup> In this respect, our figures allow us to trace the roots of Italy's dual development, to identify different historical phases along this path as well as specific regional (or macro-regional) patterns; also, they consent us to properly discuss the role played by productivity and structural change – and along with them other issues such as the rise and decline of modern industry and of regional policies and State intervention – in determining the different regional outcomes. Therefore, they come to be the essential framework upon which further improvements (concerning the role played by human and social capital, or by natural endowments or by the market size, or by enduring socio-institutional differences) are to be built: being precious in giving us a preliminary understanding of what have been the determinants of Italy's regional imbalances, and a broad view of fruitful future lines of research too.

The article is organized as follows. Section 2 is a brief outline of sources and methods, while Section 3 presents the new regional figures on regional GDP per capita, productivity (GDP/employment) and workers per capita (employment/population), in ten-years intervals from 1871 to 2011, and tests beta and sigma convergence over the long-run. In the light of the existing literature, Section 4 separately analyses the four main periods in the evolution of Italy's regional imbalances, following the benchmark estimates and the Italian political and economic history: the liberal age (1871-1911), the interwar years (1911-1951), the 'golden' age (1951-1971), and the 'silver' and 'bronze' ages (1971-2011). In guise of a conclusion, Section 5 discusses possible future lines of research. The Appendix contains a full description of sources and methods and the regional estimates of productivity and activity rates at the sectoral level.

## **2. Reconstructing regional GDP in Italy: an outline of sources and methods**

The estimates of regional income (GDP per capita), productivity (GDP/employment) and workers per capita (employment/population) run from 1871 to 2011, at regular ten-year benchmarks (with one exception, 1938 in stead of 1941). Official accounts are available only for the last fifty years, corresponding to six benchmarks: 1961 (Tagliacarne, 1962), 1971 (Svimez, 1993), 1981, 1991 (Istat, 1995), 2001, 2011 (Istat, 2012). For the previous years (1871, 1881, 1891, 1901, 1911, 1921, 1931, 1938, 1951) regional GDP is reconstructed through an indirect procedure, pioneered by Geary and Stark (2002). As a first step, for each sector, national value added is allocated according to the corresponding regional shares of employment: regional VA1 and VA2 figures are thus produced (where in our case VA2 is a refinement obtained by decomposing the labour force by sex and age, at the same level of sectoral decomposition as VA1). As a second step, these figures are corrected via regional wages, used as proxies for productivity disparities, under the assumption that the elasticity of substitution between labour and capital equals 1 (usually this hypothesis is as more realistic as the level of sectoral detail increases): the final VA3 estimates are delivered.

Conceptually straightforward, this methodology needs many qualifications when

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<sup>2</sup> The Italian Mezzogiorno has about twice the inhabitants of Greece, with all its regions eligible for European funds, either because they are under the 75% European per capita PPP GDP threshold (the most populous regions – Campania, Sicilia, Apulia, Calabria – plus Basilicata), or because they are between 75% and 90% European per capita PPP GDP (Abruzzi, Molise, Sardinia) (Felice and Lepore, 2016, pp. 21-22).



transferred into practice, in accordance with the availability of sources and the state of the research peculiar to each country. In the case of Italy, the main qualifications here introduced are six. First, thanks to the availability of new and detailed reconstructions of value added at the national level (Rey, 1992, 2000; Baffigi, 2011, 2015), the sectoral decomposition is significantly high in our case (more than in Geary and Stark's and in similar works available for other countries): in four benchmarks (1891, 1911, 1938 and 1951), the workforce is allocated through more than a hundred or even hundreds of sectors (for industry and the services 128 sectors in 1891, 163 in 1911, 358 in 1938, and 134 in 1951); the wage data have the same sectoral decomposition in 1938 and 1951, a less detailed but still high one in 1891 (28 sectors) and 1911 (33); the estimates for 1871, 1881, 1901, 1921 and 1931 are less detailed, 26-27 sectors for both VA1/VA2 and VA3. Second, for all of agriculture regional production estimates have been used, instead of labor force and wages: for some benchmarks (1891, 1911, 1938, 1951), they were those reconstructed by Giovanni Federico (2003), which correct some biases observed in the official sources; for other benchmarks (1871, 1881, 1901, 1921, 1931), they have been extrapolated from official sources and made consistent with the new estimates by Federico. Third, direct data have been used also for most of industry in the liberal age (1871, 1881, 1891, 1901, 1911), by taking advantage of the recent and quite reliable reconstruction by Ciccarelli and Fenoaltea (2006, 2008a, 2008b, 2008c, 2009a, 2009b, 2009c, 2010, 2012a, 2014; see also Fenoaltea, 2004). Fourth, for 1871, 1881, 1901 and part of 1891, for each of the remaining industrial sectors (and for each of the tertiary sectors), productivity differences were in turn estimated on the assumption that, in each sector, the ratios between the differences observed in 1911 – and in 1891 for some sectors – through wages or other sources and the differences reconstructed by Ciccarelli and Fenoaltea for most of industry (or, for the tertiary sectors, those resulting for the whole of industry) remained the same.<sup>3</sup> Fifth, in order to have figures of regional employment more suitable to be used for value added estimates, when allocating national value added we always compared the employment data from the population census with those of the industrial censuses (usually, lower) and considered the difference as underemployment.<sup>4</sup> Sixth and finally, in all the benchmarks estimated, as anticipated our

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<sup>3</sup> To be more precise, the ratios of 1891 were retropolated from 1911; the ratios of 1871 and 1881 were retropolated from 1891; the ratios of 1901 were interpolated between 1891 and 1911. For instance, for a *i* industrial sector in 1881, the following formula has been employed:  $\Delta Py_{i1881} = \Delta Py_{i1881} * (\Delta Py_{i1891} / \Delta Py_{i1891})$ , where *y* is the region, *P* is productivity,  $\Delta$  is the difference compared to the Italian average and *t* is the total of the sectors estimated by Ciccarelli and Fenoaltea (for which productivity estimates result from dividing their figures, which we use as VA3, by our previous VA2 estimates).

<sup>4</sup> This procedure, used to estimate value added, is different from the one used to produce the employment figures here presented. From 1901 onwards, the employment is from the population censuses, as revised by Vitali (1970); for 1881, Vitali's (and thus population census') figures are used too, but 1881 textile employment is re-estimated from Ellena's 1876 industrial census (Ellena 1880), following Zamagni (1987); in turn, 1891 figures are produced by interpolating the 1881 new estimates and the 1901 Vitali's figures (see also Felice, 2011a, p. 937). Zamagni's rule for re-estimating textiles was to take «110% of the industrial census figure, to allow for some 'physiological' discrepancy, whenever this did not exceed the population census figure (in which case, the latter has been retained)» (*Ibidem*, p. 38). A similar rule has been used for 1871, when we have a similar problem, but in this case only 100% of the industrial census figure has been taken, in order to account for some growth of the textile sector in the 1870s. The reason for using Ellena, limitedly to textiles in 1871 and 1881, is the high shares of female employment in that sector recorded by some southern regions, according (and again, limitedly) to the population censuses of 1871 and 1881, because in those sources agricultural housewives spinning and weaving for self-consumption, and usually unemployed, were registered as female textile workers. In this respect, the Ellena's industrial census is much more reliable than the two



data consider female and child employment separately, by assigning them lower weights than in the case of adult male employment – at the same level of sectoral decomposition.

The reader interested in replicating the estimates may find in the final appendix of this article (tables A.1.1-A.1.4), and in the further references therein, a full description of sources and methods. Here it is worth adding that, thanks to our high level of detail, when changing from Geary and Stark's indirect approach to direct production data (such as those by Ciccarelli and Fenoaltea), no significant differences are observed (Felice, 2011b); and no significant changes are noticed when relaxing the assumptions about the unitary elasticity of substitution between labour and capital, implicit in Geary and Stark's method (Di Vaio, 2007).<sup>5</sup> Both the exercises in Felice (2011b) and Di Vaio (2007) can be regarded as sensitivity tests. Another way of looking at the soundness of our estimates is to consider the changes produced when passing from VA1 to VA2, and to VA3. These have been fully reported in previous articles (Felice, 2005a, 2005b), where the early regional estimates for 1891, 1911, 1938 and 1951 were produced: changes from VA1 and VA2 are minimal and negligible, whereas those from VA1/VA2 to VA3 are significant;<sup>6</sup> thus, the correction for productivity can have a remarkable impact on the final results.

All these estimates were at the historical national and regional borders: inevitably, because they followed the original sources. The final step was a conversion from historical to present (EU NUTS II level) borders: as can be seen (Figure 1), in the liberal age and the interwar years for some regions (Latium, Campania, Veneto, Abruzzi, Umbria) the changes were not negligible; additionally, in the case of four regions GDP had to be estimated *ex novo*, with figures coming either from the Austria-Hungarian empire (these are the cases of Trentino-Alto Adige, entirely, and Friuli-Venezia Giulia, which is made up of territories formerly belonging to the Habsburg empire and to Veneto) or from neighboring bigger regions which included them (Aosta Valley from Piedmont; Molise from Abruzzi); other minor changes, hardly to be detected in the map (and with a negligible impact), involved Lombardy/Emilia-Romagna, Emilia-Romagna/Tuscany and Campania/Apulia.

The reallocation from historical to present borders has been made via sectoral productivity (GDP per worker), at a four sectors level – agriculture, industry, constructions, services. In other words, for these four sectors employment and per-worker GDP were reallocated, together with the corresponding population, from the historical to the current borders, under the assumption that, in each of these sectors, the changing territories had the same productivity (GDP per worker) of their region at historical borders. To this purpose, for what concerns the territories within the Italian states, for each benchmark we used data from population censuses (in the case of 1891, when population census was not available, we

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population censuses: to quote Zamagni again, it is «quite accurate in terms of including truly 'industrial' units and (its) results agree with all the qualitative literature available on the development of the textile industry at the time» (*Ibidem*, p. 38). It is worth adding that we do not know the amount of underemployment in agriculture (but it must have been high) and in services and, of course, a re-estimation of total employment which would account for underemployment only in the industrial census would not make sense: therefore, for a matter of consistency, we followed Vitali (and Zamagni), that is the population censuses with a refinement for textile in 1871 and 1881, in order to produce our employment figures presented in Appendix II. To put it differently: the employment figures here presented are not full-time equivalent workers; those used to allocate the national value added of industry are, instead.

<sup>5</sup> See Geary and Stark (2015) for a similar exercise in the case of UK, with equally comforting results.

<sup>6</sup> For instance, for what concerns the industrial value added in 1911, in many cases the aggregate change goes from 10 to 20 points, being 100 the Italian average. For full details, concerning industry and services in all the benchmarks, see Felice, 2005a, pp. 9-24, and Felice, 2005b, pp. 300-305.

interpolated between 1881 and 1901, as with the previous estimates at historical borders), available at the provincial and even at the district level. For Trentino-Alto Adige and Friuli-Venezia Giulia, we used the estimates that Max Schulze (2007) produced for the Austrian-Hungarian empire, with a methodology similar to ours (in the case of Friuli-Venezia Giulia, we had to merge them with those of the province of Udine in Veneto), and of course the difference between the new estimate of Italian GDP at current borders and the same new estimates at historical ones, at the sectoral level (Baffigi, 2011): the results look consistent with what we know about the economic history of these areas from qualitative sources (for instance, the mountainous Trentino-Alto Adige was historically, before the advent of hydroelectricity and above all of mass tourism, a backward territory; Friuli-Venezia Giulia was considerably richer, thanks to the presence of Trieste, the main harbor of the entire Hapsburg empire). It is worth adding that our method is more reliable and precise than other possible alternatives, as the reallocation made on the assumption of the same per capita GDP (Daniele and Malanima 2007, 2011, 2014) (instead of the same sectoral per worker GDP): for instance, when transferring territories from Campania to Latium, corresponding to parts of the populous provinces of Latina and Frosinone, we consider the fact that these were more agricultural than the rest of Campania; in addition, this method allows to assign to the small regions entirely parceled-out of bigger ones (Aosta Valley and Molise) a GDP per capita different from that of their original whole, following their different employment structure (truly, only slightly different in the case of Molise; but significant different for Aosta Valley). Finally, our method is more widely used at the international level: actually, the available estimates for the other European countries at current (NUTS II) regional borders have been made under the same assumption (Rosés and Wolf, 2017).

### **3. The broad picture: opposite components and a feeble convergence**

Table 1 presents the estimates of per capita GDP, at present borders, for the Italian regions from 1871 to 2011 (author's estimates until 1951, official estimates from 1961 onwards). From this table, we may summarize the main features of Italy's regional development as follows.

First, around the time of unification a relatively high differentiation can be observed, not in Italy but, rather, within its main macro-areas: as a whole, southern Italy was below the national average (90, Italy = 100), but its most important region, Campania, lay above that (109); the second most important southern region, Sicily, also was not far from the average (95); in a specular way, some regions of the Centre-North, such as The Marches (83), Aosta Valley (80) and Trentino-Alto Adige (69), ranked below the Southern average. In other words, the three main macro-areas, the North-West, the North-East and Centre (or NEC), and the South and islands (or the *Mezzogiorno*), were not still clearly defined; neither was clearly defined the North-South divide, at least in terms of per capita GDP, although we should take into account that GDP was, by that time, low throughout the country – that is, Italy as a whole still had to undertake the process of modern economic growth.<sup>7</sup>

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<sup>7</sup> For an update overview of Italy's modern economic growth and a long-run comparison with the other advanced European countries, see Felice and Vecchi (2015b).

The second main result is that, after the Italian take-off (i.e. modern economic growth) began, a remarkable divergence took place *between* the above mentioned three macro-areas; furthermore, it went along a growing convergence *within* these macro-areas. This process began in the last decades of the liberal age (1891-1911) and increased in the interwar years. By 1951, it had reached its peak. The three macro-areas were by that time clearly defined, with no overlapping among single regions: all those of the North-West – the historical ‘industrial triangle’ – are in the leading positions, all those of the North-East and Centre rank in the middle, all those of Southern Italy lie at the bottom; also the North-South divide is at its peak, with southern Italy reaching less than half the GDP per capita of the Centre-North.

The third result is the convergence of the second half of the twentieth century. Such a convergence can, in turn, be divided in two parts: during the golden age, exceptionally (given its long-term relative performance), southern Italy converged too, and even at a higher speed than the NEC; in the following decades, however, the convergence of South and islands came to a halt, while that of the North-East and Centre accelerated. As a consequence of this process, by 2011 actually the North-East and Centre has almost reached the North-West, and many of its regions have overcome those of the former industrial triangle; at the same, all the regions of southern Italy have remained behind. If in 1951 in terms of per capita GDP Italy looked divided into three thirds, by 2011 it looks split into two parts, with all the regions of the Centre-North well above any region of the *Mezzogiorno*.

We may further qualify this broad picture, by considering the estimates of per worker GDP, or productivity (see Table 2), and workers per capita, or employment over population (see Table 3). They are, in a certain sense, the two factors yielding per capita GDP: following the equation  $GDP/P = GDP/L * L/P$  (where L is the employment and P is the population), imbalances in per capita GDP turn out to be the product of the imbalances in these two underlying determinants.<sup>8</sup> For what concerns the North-South divide, first of all it should be noticed that in both productivity and workers per capita regional differences are relatively milder than in the case of per capita GDP; southern Italy displays both lower productivity and lower workers per capita than the average, and this throughout the history of post-unification Italy, and as a consequence it has an even lower per capita GDP.<sup>9</sup>

However, and this is the second significant outcome, the inequality patterns of these two variables are significantly different; in the second half of the twentieth century, they even follow opposite paths. To be more precise, until 1951, inequalities are on the rise in both productivity and workers per capita and, therefore, both reinforce the divergence process observed in per capita GDP: truly, the increasing gap in productivity is remarkably larger than the one in workers per capita, mostly as a consequence of the fact that while the Centre-North is experiencing industrialization, in southern Italy the share of agricultural labor force remained around the 60% of the total (per worker GDP is lower in agriculture

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<sup>8</sup> For an early application to the Italian North-South divide, see Daniele and Malanima (2007).

<sup>9</sup> It may be worth adding that, during the liberal age, the relatively good performance in productivity of southern Italy – and above all of Apulia, Sicily, Sardinia – is due to the high GDP in agriculture (see Table A.2.1 in Appendix II), as resulting from Federico’s estimates for 1891 and 1911 (Federico, 2003; but see also Federico, 2007, for a critical discussion of these results) and from our own estimates following Federico for 1871, 1881, 1901 (see Table A.1.4 in Appendix I): it is a lead in per worker terms, however; in per hectare terms the southern agriculture was significantly less productive (see Felice, 2007a, p. 133). Other sources, both quantitative and qualitative, confirm that a remarkable improvement in southern agriculture took place in the years following unification, thanks to the free-trade policies of the new Italian state (Ciccarelli and Fenoaltea, 2012b; Felice, 2013, pp. 38-40 and 81-82).

than in industry and services, see the final appendix for more data); however, differences in the workers per capita are also, slightly, increasing, particularly in the interwar years (when, the lack of any industrial awakening of the South nonetheless, expansionist demographic policies were implemented and international emigration was no longer possible).

Since 1951, as mentioned the two factors follow opposite trends: in productivity, southern Italy converged, mostly during the golden age, but also, although at a slower rate, in the last forty years; conversely, in workers per capita the North-South divide did increase, and it did so precisely in the last forty years. In other words, the falling behind of southern Italy observed from 1971 to 2011 is due entirely to the increasing gap in workers per capita; differences in productivity, still present though, are decreasing. Another difference worth being emphasized is that, within the Centre-North, during the last decade the NEC fully reaches the North-West and even overcomes it in workers per capita, while remaining below in per worker productivity; it is a consequence of the specialization of the regions of the 'third Italy' (mostly in the Centre and the North-East) in lighter manufactures (intensive in labor and with lower per worker value added). This process, too, is a novelty of the last decades – from the end of the nineteenth century throughout the golden age, the gap in workers per capita between the North-West and the NEC was significantly in favor of the former.

Figure 2, displaying beta convergence (on the left) and population-weighted sigma convergence (on the right) for the three variables over the long run, visually exemplifies these different trends. From 1871 to 2011, beta convergence, i.e. the negative slope of the line in the left, is remarkably stronger in productivity (as much higher is the value of R squared: 0.797, versus 0.247 of per capita GDP), while virtually absent in workers per capita. Sigma convergence is, possibly, even more eloquent: the inverted-U shape of the curve is noticeable in the case of productivity, only mild in per capita GDP. For activity rates, instead, the graph of sigma convergence has an opposite orientation (U-shaped), that is, in this case we have indeed an increase of dispersion over the long-run and, in particular, in the second half of the twentieth century: the contrast with the above figure of productivity could hardly be stronger.

A part from these different trends, the figure also gives more information about the regional paths in the long-run (beta convergence) and in the different periods (sigma convergence). Concerning the former, we may see as Campania, the most important southern region is the worst performer in both per capita GDP and workers per capita, while in productivity lies on the average (that is, on the reference line). To a minor degree, this difference holds true also for the next two most important southern regions, Sicily and Apulia; however, it is less strong in the three other regions of mainland South, demographically less important; and the second island, Sardinia, is actually a winner in workers per capita. Within the Centre-North, the situation is less clear: the two best performing regions in per capita GDP are Trentino-Alto Adige and Aosta Valley, both also the best performing regions in productivity; then comes third Friuli-Venezia Giulia, that instead owes success to its high workers per capita; Emilia-Romagna and Veneto also owe their good performance mostly to their workers per capita; and finally the most important Italian region and a remarkable success story, Lombardy, is significantly above the average in both productivity and workers per capita.

Concerning the different periods, from the graphs of sigma convergence we may single out a few basic results. First, in the liberal age divergence was mild, in all the three dimensions. During the interwar years, in productivity and per capita GDP regional

inequality remarkably increased; and later on, during the golden age, in both these variables convergence further increased; furthermore, both trends are in sharp contrast with that of workers per capita, where instead regional dispersion remained roughly unchanged both in the interwar years and the golden age. Finally, the last four decades saw a strong and unprecedented increase of inequality in workers per capita, against a slight but palpable decrease in productivity; in per capita GDP, the slight increase of the North-South divide was counterbalanced by the convergence within the Centre-North, and on the whole things remained stable. In the following section, we will consider these different periods in more detail.

## 4. GDP and productivity by sub-periods

### 4.1. *The liberal age (1871-1911)*

During the liberal age (1871-1911), in spite of the (slow) take-off of the industrial triangle in the North-West, we may observe a slow process of convergence, in both income and productivity (see Figure 3). Some outliers, like the small and mountainous Aosta Valley and Trentino-Alto Adige (at that time, part of Austria) contribute to this result. However, convergence is also due to the fact that very poor southern regions, such as Calabria and Basilicata, do not perform so bad. It is not a coincidence that both Calabria and Basilicata are also regions with very high emigration rates; on the other end, it is significant that all the regions with higher emigration (including Veneto in the North) perform bad in terms of per worker productivity: their relative good performance in per capita GDP is due to increasing workers per capita (lifted by the fact that hundreds of thousands of unemployed people were leaving the homeland),<sup>10</sup> rather than to structural change prompted by industrialization, which in fact was almost absent.<sup>11</sup> As anticipated, the North-West in this period is doing well, and it is therefore a factor of divergence (starting from above the average, it scores a higher growth rate); however, with the exception of Liguria (the smallest region) to be

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<sup>10</sup> Massive emigration did not always play this role: from 1901 to 1911, the southern regions with the highest emigration rate experienced a decline in workers per capita. It is worth reminding that workers per capita can be seen, in turn, as the product between the employment rate (the employment divided by the working age population) and the activity rate (the working age population divided by total population); massive emigration should increase the former (on the assumption that most of the people emigrating is unemployed), decrease the latter; whether this is true, and which of the two forces is going to prevail, depends on a number of other variables (such as unemployment, the amount and composition of the working age population as well as fertility and mortality rates) whose discussion and measurement go beyond the scope of this paper. It is also worth reminding that a decline in workers per capita can be a result of (arguably) positive changes, such as the decline in child labour and the extension of compulsory education: these were surely taking place in the liberal age, but to measure their effects would require a data set different from the present one (a decomposition of the working force by age); however, it can be speculated that the decline in child labour and the extension of compulsory education were in the South slower than in the Centre-North (e.g. Felice, 2013, pp. 41-49 and 117-123; Felice and Vasta, 2015), and therefore these too contributed to the South's better performance in workers per capita.

<sup>11</sup> For regional figures on international emigration during the liberal age, see Felice (2007, pp. 45-50). Among the first Italian scholars to point out to the benefits of emigration for the homeland regions, are Francesco Saverio Nitti (1968) and Benedetto Croce (1925, pp. 207-228). For international comparisons (where, however, Italy is considered as a whole) see Williamson (1996) and O'Rourke and Williamson (1997). For up-to-date figures and analysis, see Ardeni and Gentili (2014).

honest the performance of this area is not impressive: the industrialization of Piedmont and Lombardy, in aggregate terms already visible and important,<sup>12</sup> in per capita terms is not yet as significant. In the NEC the two big winners are Latium, mostly in productivity thanks to the expansion of the tertiary sector of the capital region, and Emilia-Romagna, in both income and productivity, mostly thanks to agriculture (and to some manufactures, mostly linked to the primary sector) (Cazzola, 1997).<sup>13</sup> Campania, in the South, has a growth rate below the Italian average, and this also is a factor of divergence (both its income and productivity were above the Italian average in 1871).

To sum-up, the regional picture for the liberal age confirms the idea of a slow take-off of the Italian economy (Fenoaltea, 2003a, 2003b): the industrial triangle is taking shape, and thus forging ahead, but not at an impressive rate, with the exception of the smaller Liguria, which also received significant state aid (Doria, 1973; Corna Pellegrini, 1977; Rugafiori, 1994); outside the Triangle, regions with little industrial basis such as Latium (services) and Emilia-Romagna (agriculture) are also doing well. The divergence caused by the slow rise of the Triangle is hampered by the growth of some of the poorest mountainous regions of the North, which are just beginning to develop a tourist sector (Battilani, 2001, pp. 287-298) as well as (in Trentino-Alto Adige) hydro-electricity (Zanin, 1998), and by the massive emigration from the poorest southern regions, which increase their per capita figure (although, significantly, not their share of total GDP).<sup>14</sup>

#### **4.2. The interwar years (1911-1951)**

Unlike the liberal age, the interwar years are a period of undisputed divergence: the standardized beta is positive for both income and (to a minor degree) productivity (see Figure 4). Now the rise of the North-West is, above all, a rise of its two most important regions, Lombardy and Piedmont: and it is a three-fold rise, in income, productivity, as well as in workers per capita (where instead Liguria is losing ground). Conversely, in per capita GDP all the southern regions are grouped at the bottom of the graph, in the left corner; and Calabria and Basilicata, which performed relatively well in the liberal age, are now the worst ones in terms of convergence. Still in per capita GDP, we may notice as all the regions of the North-East and the Centre are grouped in a vast area between the North-West and the *Mezzogiorno*: it is all the more noticeable, because if we exclude the three outliers of the NEC – each with its own peculiarities: the new regions from the Hapsburg empire Trentino-Alto Adige and Friuli-Venezia Giulia as top performers, and the capital region Latium as the worst one – all the others (Veneto, Emilia-Romagna, Tuscany, the Marches and Umbria) stay in the middle, slightly above the Italian average, and very close to each other. With few exceptions (Friuli-Venezia Giulia) the trends in productivity are similar

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<sup>12</sup> For the industrialization of these regions, see among the others Castronovo (1977), Cafagna (1999), Corner (1992), Colli (1999).

<sup>13</sup> Some engineering also began to develop in this region (Zamagni, 1997, p. 133), but with little effects, at this stage, on the aggregate figures. For sectoral estimates see the final appendix.

<sup>14</sup> As it would result from multiplying these figures of per capita GDP with the present population (from population census): from 1871 to 1911, the total GDP share of Basilicata (over the Italian total) would have decreased from 1.2. to 1.0 per cent; the share of Calabria from 3.0 to 2.8 per cent; the share of Abruzzi from 2.5 to 2.0 per cent; the share of Molise from 1.1 to 0.7 per cent; the share of all south and islands from 33.0 to 30.9 per cent.

between the NEC and the *Mezzogiorno*: there is more dispersion than in the case of income, and yet still the North-East and Centre regions rank in the middle and slightly above the Italian average (again, without Trentino-Alto Adige and Latium), those of South and islands at the bottom. We can therefore conclude that the evolution of regional inequality in this period follows, broadly speaking, a three-fold pattern – the North-West at the top, the North-East and Centre in the middle, the South at the bottom – which is now much better defined than in the previous period: the outcome is the threefold repartition by 1951 we have seen in Section 3. With some differences and a little more diversification, productivity follows similar paths – and, therefore, is a major contributor to this process.

In part, this outcome is due to the fact that the previous counterbalancing forces, namely massive emigration, no longer work in this period (Nazzaro, 1974; Ostuni, 2001) and, therefore, can no more slow down the falling behind of the poorest regions. In part, it is related to the changes caused by the Great war, which channeled public priorities and efforts towards the industry already in existence in the North-West, an industry that, furthermore, after the war had to be rescued with public funds (Zamagni, 2002); the 1929 crisis, World War II and the Reconstruction had similar consequences, that is, to channel resources towards the North-West (Fauri and Tedeschi, 2011) or, as with World War II, to harm the South more than the North (De Benedetti, 1990, pp. 604-605; Davis, 1999, p. 250). And finally, in part this outcome is due to specific fascist policies: Mussolini's 'battle of grain' favored in the South agricultural production intensive in land and not in labor, and thus in contrast with the factor endowments of that area (poor in land, but rich in labor) (e.g. Profumieri, 1971; Toniolo, 1980, pp. 304-314); expansionist demographic policies, by providing incentives to give birth, increased population pressure on the poorest areas, at the same time when emigration was limited by both national and international restrictions; the reform of extensive latifundia was avoided (Bevilacqua and Rossi-Doria, 1984; Cohen, 1973) and thus agriculture was not modernized, while also internal migration, from South to North, was put under control; autarchic policies and government restrictions to the opening of new plants, also turned out to favor the industries already in existence and their territories, that is (mostly) the Triangle (Gualerni, 1976).<sup>15</sup> In short, international and unforeseeable events, such as the world wars and the 1929 crisis, where reinforced by national policies: not by chance, these went in favor of the different ruling élites of the countries, industrialists in the North and agrarian in the South (Gramsci, 2005 (1951); Salvemini, 1955; Felice, 2013).

### **4.3. The golden age (1951-1971)**

The graph of beta convergence for the golden age (see Figure 5) is, in many respects, specular to that for the previous period. It is a picture of convergence, in both income and productivity, and of a strong one (standardized beta is -0.886 for per capita GDP, -0.914 for per worker GDP). Furthermore, it is worth noticing as, at least in income, we have once again the threefold repartition: all the regions of South and islands are at the top (they grow the most), all those of the North-East and Centre in the middle, all those of the North-West at the bottom. In productivity, we observe something similar, the only difference being that in this case the three-fold repartition is a bit less defined. To be more precise, it should be added that the convergence in per capita GDP is entirely driven by productivity in the case

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<sup>15</sup> For an updated analysis of economic and social policies in Fascist Italy, see Felice (2015b, pp. 186-227).



of southern Italy – which indeed, as average, slightly fell behind in workers per capita (see Table 3). For the NEC regions the contribution of productivity is less strong, only in part counterbalanced by the fact that there is no falling behind in workers per capita.

Such a convergence process is an exception in the entire history of post-unification Italy: it did not happen before, it won't happen again. Furthermore, it took place during the period of most intense growth of the Italian economy, that is when also the leading North-West was growing as never before – and for this reason, it seems at odds with theoretical predictions (both those from the neo-classical approach and the alternative new economic geography). How can be explained? On the one end, and this is true for the North-East and Centre, there is the beginning of a diffusive process seeing the spread of industry towards the bordering regions of the Triangle, such as Emilia-Romagna, Veneto, Tuscany, and then the Marches (Fuà e Zacchia, 1983; Bagnasco, 1988; Bellandi, 1999); this process, however, will gain momentum only from the 1970s onwards, that is, after the crisis of the big firms more intensive in energy and capital (and in fact the convergence of the NEC is relatively mild during the golden age). On the other end, and here is the most important factor, there is the Italian state actively intervening in the South, to promote first infrastructures and then industrialization – and therefore strongly altering the market rules (upon which also the competing theories are based) in favor of the convergence of the most backward regions (Felice, 2007a, pp. 72-93). From 1957 until the mid 1970s, the state-owned *Cassa per il Mezzogiorno* financed in the South new plants in capital-intensive and highly productive industrial sectors (steel, chemicals, engineering, electronics), mostly belonging to state-owned firms although at a later stage also to the private big business (Fiat above all) (Felice and Lepore, 2017; Felice, Lepore and Palermo, 2016): and in fact the South is converging not only in the share of industrial employment, but also – and at a very impressive and high rate – in per worker productivity and particularly in industrial productivity (see the figures in the statistical appendix).<sup>16</sup> For the first time, industrialization is taking place on a massive scale in the South, and it is the modern industry (Svimez, 1971; Del Monte and Giannola, 1978); for the most part, however, it is not a home-grown industry, unlike in the North-East and Centre.

#### **4.4. A tale of two Italies (1971-2011)**

The picture for the last period (see Figure 6) is, once again, dramatically different from the previous one – as from that of any other period. It is an entirely distinct scenario. First, there is a remarkable differentiation between per capita and per worker GDP, without precedents: in per capita GDP there is, practically, no longer convergence (standardized beta is down to -0.048); conversely, in per worker GDP convergence continues, with quite a high value for standardized beta (-0.865). Second, and more precisely, the lack of convergence in per capita GDP is limited to the southern regions: those that grew the most in the previous decades (but that still lie behind in absolute terms) are now falling behind. Conversely, the

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<sup>16</sup> Internal migration, from the South to the North, may also have played some role, but probably a minor one; actually, in this period the South fell back in terms of activity rates, and thus it could be argued that emigration could have been even negative, drawing away the most productive labour force; in any case, what caused convergence in per capita GDP was the growth of southern employment in industry and services, and the fact that this employment produced high GDP per worker.

NEC regions – plus the small northernmost regions of the South, Abruzzi and Molise – continue to converge: this is patent in the left part of Figure 6, where we observe all these regions above the fit line; while all the other southern regions are below, in the left, and most of the North-West is also below, in the right. As a consequence of this process, as we have seen by the early twenty-first century Italy looks divided into two parts: a Centre-North much more homogeneous internally, as never before, and a poorer South. Convergence was half-completed, we could say, that is it was (more or less) achieved for one of the two macro-areas behind the North-West. But it was half-convergence also because, for the South, it actually continued in one of the two components of per capita GDP: productivity. Here nowadays a gap is still present, but it is also true that southern Italy converged, slowly nonetheless, reaching 90% of the Italian average. Of course you can see the glass half empty: there is, in this period, a dramatic falling back of southern Italy in employment (ten points are lost over the Italian average in forty years, down to 77% of the Italian average, see Table 3): the underdevelopment of southern Italy is now, essentially, a problem of unemployment.

In a certain sense, the falling behind of southern Italy is the other side of its convergence, in the previous periods: those very capital-intensive plants, that were financed by the State and weaker than analogous plants in the North, collapsed with the oil-shocks (Pontarollo and Cimattoribus, 1992; Barbagallo and Bruno, 1997). At the same time, however, the effectiveness of State intervention in the South went lost, because of growing political clientelism, wrong industrial choices, and even an increasing and at traits pervasive influence of organized crime (e.g. Bevilacqua, 1993, pp. 126-132; Felice, 2013, pp. 112-116 and 149-163). In this respect, the convergence in productivity should not be overestimated, being limited to those who work (of course), and being artificially prompted by national laws, who set wages equal throughout the country,<sup>17</sup> thus leveling per worker GDP figures independently of real productivity (furthermore, in some tertiary sectors of growing importance, such as public administration, ‘real’ productivity cannot even be measured) (Fuà, 1993). To all of this, in sharp contrast stands the convergence of the North-East and Centre: it is a convergence of ongoing industrialization, led by small and later on by medium sized firms, at first organized in industrial districts (Becattini, 1979, 1987; Saba, 1995),<sup>18</sup> then evolving in the so-called ‘fourth capitalism’ (medium sized, highly international firms emerging from their former districts) (Colli, 2002, 2003).<sup>19</sup> In line with the post-Fordist scenario, the relevant sectors are, broadly speaking, light manufactures intensive in labor, and this explains why the NEC performs much better in workers per capita than in productivity – once again, the opposite of South and islands.

## 5. In guise of a conclusion: where do we go from now?

From this broad picture, can we draw some conclusions – or at least, can we develop hypotheses – about the determinants of regional inequality in Italy over the long-run? We

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<sup>17</sup> A territorial wage differentiation (the so-called *gabbie salariali*) was introduced in 1945, but abolished in 1969. The subject reemerged in the political and economic debate of the country in the following decades. For a brief overview, see Busetta and Sacco (1992).

<sup>18</sup> On the social and economic characteristics of the so-called ‘third Italy’, see also Bagnasco (1977) and Trigilia (1986).

<sup>19</sup> The expression was first introduced in Turani, 1996, p. 125.

have seen, in the previous section, as the new figures fit quite well with (some of) the vast literature about regional development in Italy. But if in terms of description we have made significant steps, for what concerns the interpretation, the research still has a long road ahead. Recent works allow us to discuss the role of geography – the market size, in particular – following the approach of the new economic geography (Krugman, 1991); as well as other crucial determinants such as human and social capital, which can be treated as conditioning variables following the alternative neo-classical conditional convergence (Barro and Sala-i-Martin 1992, 2004) and the well-known augmented Solow model framework.<sup>20</sup> None of them (neither alone, nor in combination)<sup>21</sup> seems to be, thus far, the key explanatory factor of Italy's regional inequality in the long-run: an obvious impediment is posed by the fact that the history of regional inequality in post-unification Italy is not uniform, as we have seen, but structured around historical periods quite different from each other. But it is not only this, as we are going to explain.

The most updated estimates for the market size suggest that this did not play a major role in the liberal age (Missiaia, 2016). For the second half of the twentieth century, although the debate is open (A'Hearn and Venables, 2013), the basic conclusion should not be different: geography is likely not to be the major ingredient behind the falling back of the Mezzogiorno. Against the importance of geography, is the fact that Campania, the most geographically favored region of the South (and one that in terms of market size was above the Italian average), actually is the region with the worst performance in the South and in the entire country; in a specular way, other regions not favored in terms of market size, namely the mountainous Trentino-Alto Adige or Aosta Valley, are the best performers. Apparently against the geographical explanation is also the fact that the falling back of the South in the last four decades is not due to productivity or wage differentials (the primary factor of divergence according to the new economic geography, based on economies of scale favouring divergence and then on costs of congestion favouring convergence) but, instead, to employment: it is a problem of entrepreneurship (in the supply side), not of less productive enterprises for the lack of economies of scale (in the demand side) – and actually the southern regions nowadays are more consumption hubs, than centers of production. This is, however, an issue deserving further investigation, for instance by properly differentiating between the changes in per capita GDP attributable to industry-mix and those attributable to productivity.<sup>22</sup> Geography, of course, may have had some role in the performance of particular regions (for instance, although not alone (Felice, 2007b), in the moderate convergence of Abruzzi and Molise during the last decades, once they were connected to Rome through highways); proximity to the European core may have favored the Centre-North in the second half of the twentieth century, after the onset of the Common market (A'Hearn and Venables, 2013) (but in the 1960s southern Italy lived through an impressive convergence); and natural endowments (namely the hydraulic force), more than the market size, have surely played a role in the initial take-off of the northern regions during the liberal age (Cafagna, 1965, 1999). But on the whole, at the present stage of the research this is too little to say that geography was the key factor behind the rise of the North-West,

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<sup>20</sup> See also Durlauf, Johnson and Temple (2005) for a thorough survey (up to 2005, of course) of empirical applications.

<sup>21</sup> For a useful combination of both these approaches, see Midelfart-Knarvik, Overman and Venables (2000). For an application to Spain, see Martínez-Galarraga (2012).

<sup>22</sup> For an application to Spain, see Rosés *et al.*, 2010.

the convergence of the NEC (mostly in workers per capita), the falling back of the South (equally in workers per capita); at best, it could have been a concomitant factor.

Long-term conditional convergence tests, made on these estimates from 1891 to 2001 at historical borders, suggest that neither human capital, nor social capital are able to explain the falling back of southern Italy. Truly, human capital has played a major role in the first two periods of our story (the liberal age and the interwar years), social capital in the last one (Felice, 2012). But none of them, and not even a combination of the two, seem to be the key conditioning variable in the long-run: a model with fixed effect (which are negative in the South) remain superior even after the introduction of both the conditioning variables – and regressions run with the present estimates, which only add a few more benchmarks, and some more cases for the regions at current borders, would yield similar results. So, what are the unexplained fixed effects which hampered the convergence of the South? (and, more in particular, its structural change and growth of activity rates?) It has been argued that these fixed effects could be enduring socio-institutional differences: higher inequality in the South, coupled with extractive political (clientelism) and economic (latifundium versus sharecropping, organized crime) institutions, which reinforced a *de facto* extractive setting in the South – although within a nominally national institutional framework (Felice, 2013). Historically, inequality and extractive institutions in the South may have also determined, in that area, lower human and social capital, that is, they may have created the concomitant conditioning variables which favored the falling back of the South in some periods; furthermore, we know that in the 1970s they caused the collapse of the regional policies and the deteriorating of State intervention, which marked the end of convergence in that decade and the ensuing slowly falling back. This hypothesis is fascinating, and quite in line with the evolution of regional inequality we have reconstructed in this article, but it still lacks a rigorous quantitative testing; in part, this is due to the fact that it is not easy to properly quantify a *de facto* functioning of institutions (most of them are nominally the same) – and it is even more difficult to do so for past historical periods.

Nevertheless, it is a challenge worth being taken on. Surely, results would be much more reliable if we were able to pass from regional (NUTS II level) to provincial (NUTS III) estimates of GDP and productivity. Provincial estimates are on their way to be produced, at least for the industrials sector (Ciccarelli and Fenoaltea, 2012c; Ciccarelli, 2015) (but those for the services and agriculture should be equally feasible), and therefore it would not be impossible to have, for the future, a picture at the provincial level similar to the regional one we have presented in this article. Provincial figures would remarkably increase the robustness of conditional convergence tests, at least for specific periods, thus giving us better insights on the roles played by human and social capital (for both variables too, figures can be produced at the provincial level), as well as by natural endowments. At the provincial level, and at least for specific periods, even estimates of institutional functioning and differences, to be profitably tested into models, could be produced: for instance, for what concerns agrarian regimes (hard to be generalized at the regional level), or the historical presence of organized crime in specific territories of the South (Buonanno *et al.*, 2015), or election corruption and cronyism. The overall picture – the broad pattern of territorial inequality in the long run – would not change; it may instead significantly improve the interpretation.

## **Figures and Tables**



Figure 1. *The Italian regions at historical borders (1871-today)*

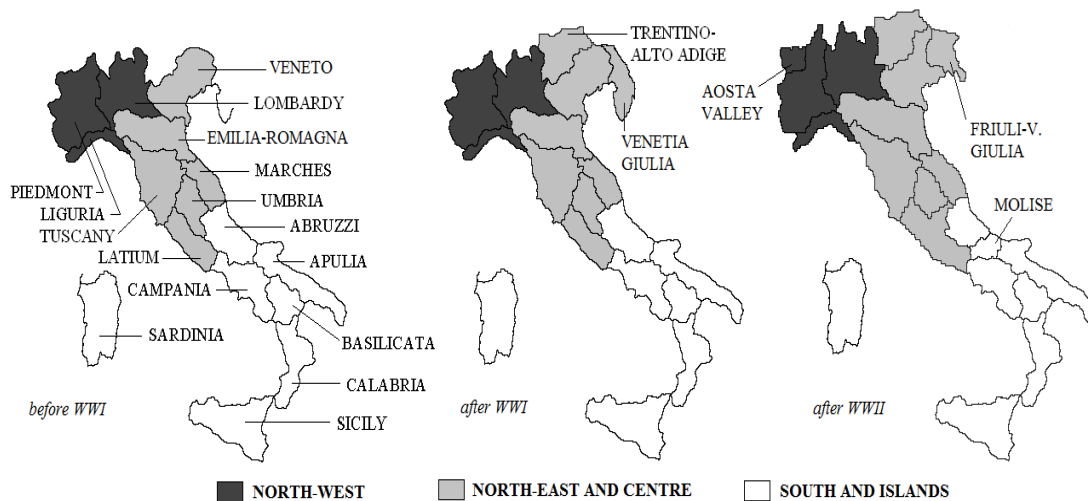
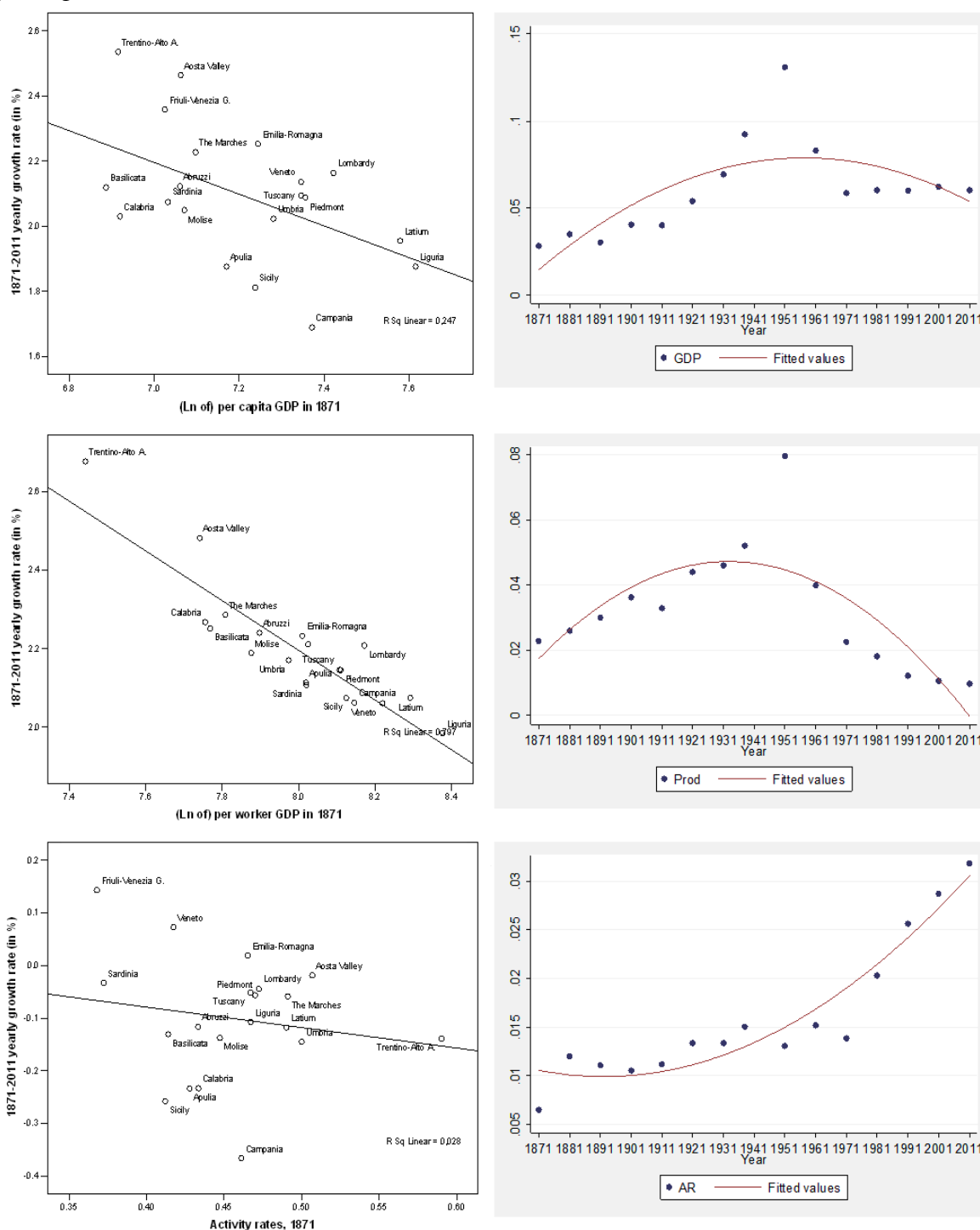




Figure 2. Beta and sigma convergence in per capita GDP, per worker GDP and workers per capita, 1871-2011

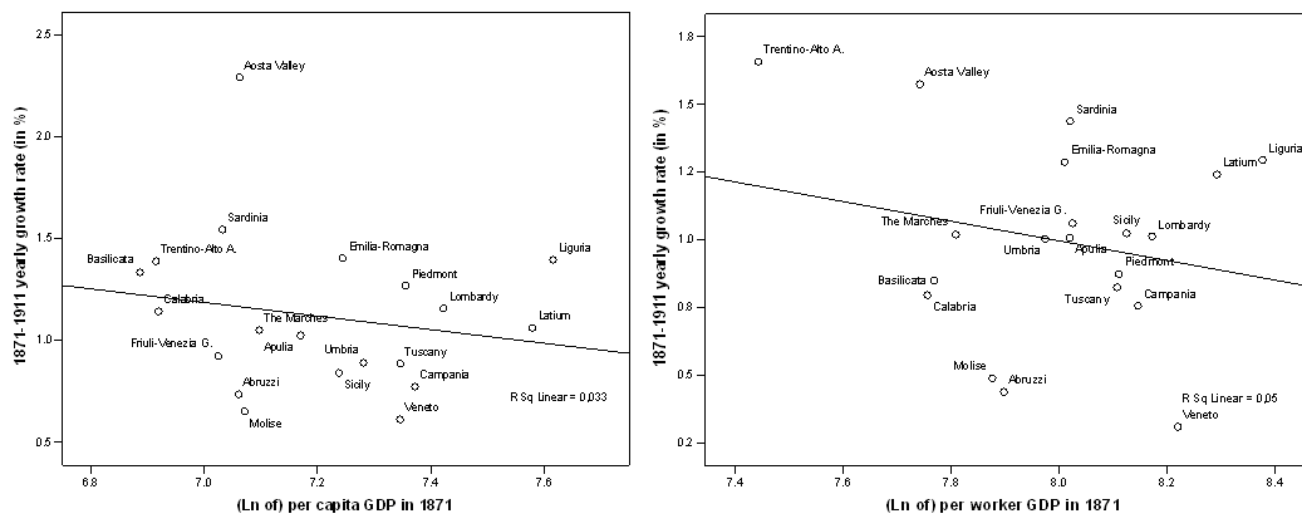


Notes and sources: elaborations from tables 1-3; for beta convergence, standardized beta is -0.497 for per capita GDP, -0.893 for per worker GDP, -0.166 for workers per capita; sigma convergence is the Williamson index, that is, it is calculated using as

$$D = \sqrt{\sum_{i=1}^n \left( \frac{y_i}{y_m} - 1 \right)^2 \cdot \frac{P_i}{P_m}}$$

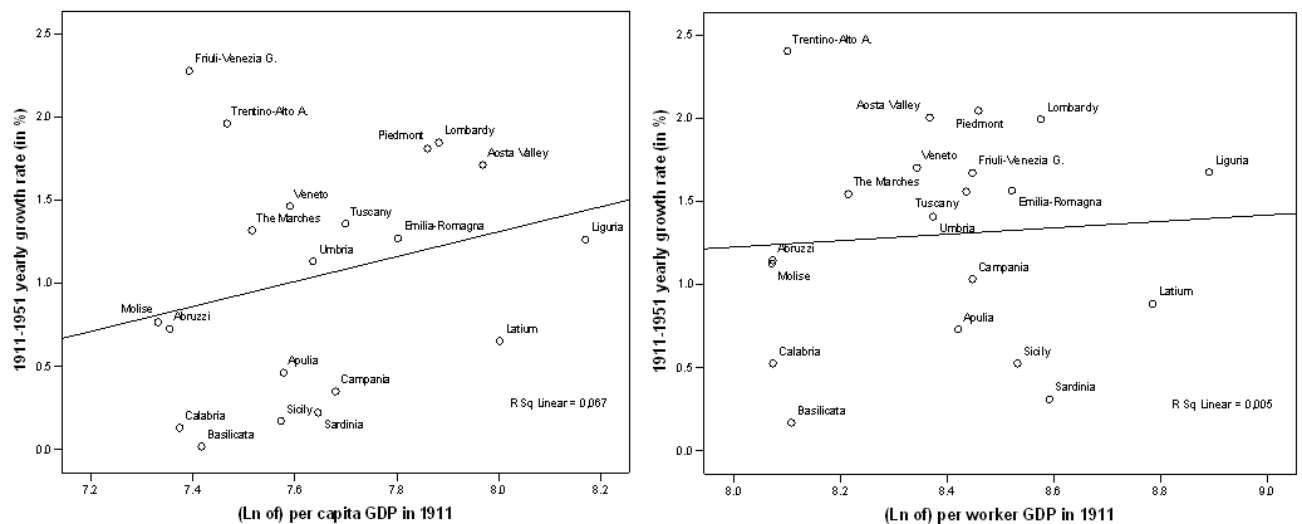
weights the regional shares of population, according to the formula: where  $y$  is the per capita GDP,  $p$  is the population and  $i$  and  $m$  refer to the  $i$ -region and the national total, respectively (Williamson, 1965).

Figure 3. Beta convergence in per capita and per worker GDP, 1871-1911



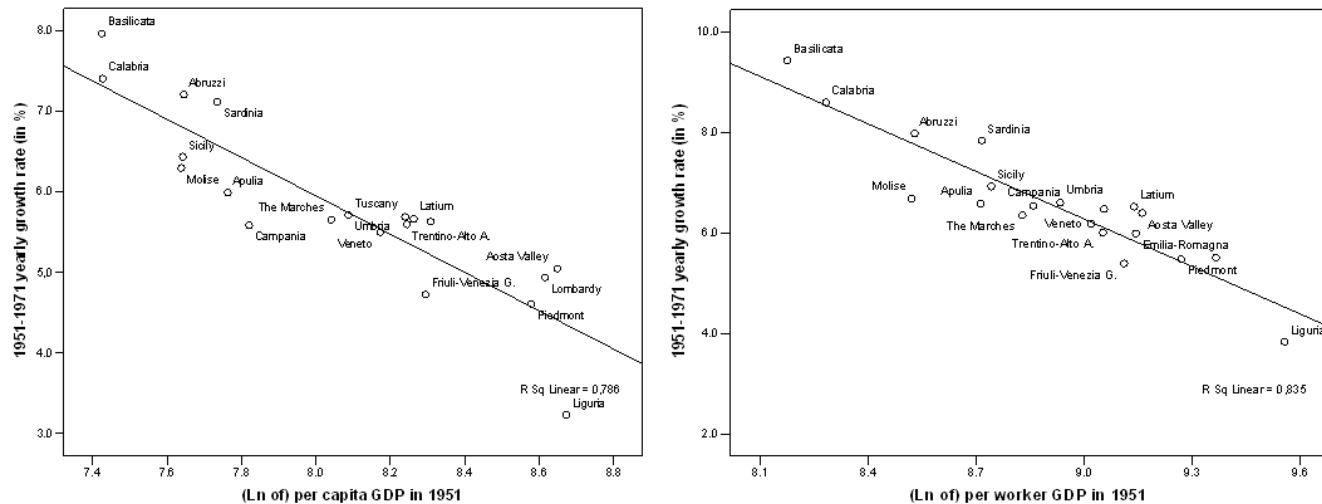
Notes and sources: elaborations from tables 1-2; standardized beta is -0.183 for per capita GDP, -0.224 for per worker GDP.

Figure 4. Beta convergence in per capita and per worker GDP, 1911-1951



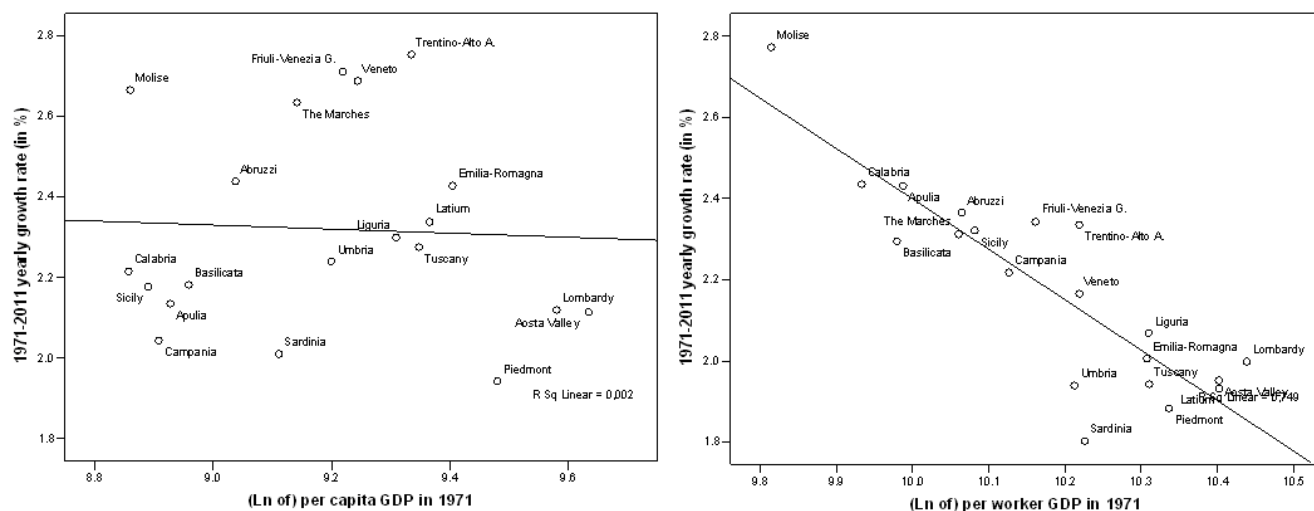
Notes and sources: elaborations from tables 1-2; standardized beta is 0.259 for per capita GDP, 0.072 for per worker GDP.

Figure 5. Beta convergence in per capita and per worker GDP, 1951-1971



Notes and sources: elaborations from tables 1-2; standardized beta is -0.886 for per capita GDP, -0.914 for per worker GDP.

Figure 6. Beta convergence in per capita and per worker GDP, 1971-2011



Notes and sources: elaborations from tables 1-2; standardized beta is -0.048 for per capita GDP, -0.865 for per worker GDP.

Table 1. *Per capita GDP of the Italian regions, 1871-2011 (Italy = 100)*

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	107	108	107	119	116	128	123	138	151	131	124	119	114	115	109
Aosta Valley	80	99	106	119	129	143	143	144	158	168	144	140	142	124	136
Liguria	138	142	139	148	157	142	164	167	162	125	104	101	106	109	106
Lombardy	114	115	114	123	118	124	123	138	153	145	136	130	132	130	129
Trentino-Alto A.	69	73	78	82	78	88	92	94	105	101	107	127	130	130	129
Veneto	106	89	81	84	88	78	073	83	98	97	98	109	112	113	115
Friuli-Venezia G.	125	123	122	125	128	106	117	123	111	91	95	97	104	112	113
Emilia-Romagna	96	107	106	102	109	110	109	104	112	117	114	130	122	123	122
Tuscany	106	108	103	93	098	104	106	101	105	105	108	111	105	109	109
The Marches	83	78	88	83	082	78	71	78	86	87	88	100	95	99	102
Umbria	99	103	106	100	092	93	100	95	90	93	93	101	96	96	92
Latium	134	145	137	135	133	136	140	119	107	111	110	106	114	113	113
Abruzzi	80	77	68	67	70	72	62	57	58	72	79	85	90	85	85
Molise	80	77	67	65	68	72	64	59	57	67	66	76	78	80	78
Campania	109	101	99	96	96	88	81	81	69	72	70	65	66	65	64
Apulia	89	95	104	94	87	92	85	72	65	71	71	67	68	67	68
Basilicata	67	63	75	73	74	75	70	57	46	64	73	69	67	73	71
Calabria	69	66	68	66	71	61	55	49	47	59	66	62	62	64	65
Sicily	95	92	95	89	87	72	82	72	58	61	69	72	72	66	66
Sardinia	77	81	97	91	93	91	85	82	63	75	85	75	77	77	77
North-West	114	115	114	125	122	128	129	142	154	138	129	123	124	124	121
North-Ea. & Cen.	100	101	99	97	98	101	102	100	104	104	105	112	112	113	114
South & islands	90	88	90	86	85	79	77	70	61	68	71	69	70	68	68
Centre-North	106	107	106	108	108	112	113	117	123	118	115	116	117	117	117
<i>Italy</i> (2011 euros)	2049	2225	2327	2562	2989	2843	3506	3853	4813	8158	13268	18202	23141	27113	26065

*Notes:* the North-West comprises Piedmont, Aosta Valley, Liguria, Lombardy; the North-East and Centre comprise Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna, Tuscany, The Marches, Umbria, Latium; Abruzzi, Molise, Campania, Apulia, Basilicata, Calabria, Sicily and Sardinia are the regions of southern Italy; the Centre-North is made of the North-West and the North-East and Centre. See also Figure 1.

*Sources:* see Section 2 and, for further details, the Appendix. The national figures are from Felice and Vecchi (2015a).

Table 2. Per worker GDP of the Italian regions, 1871-2011 (Italy = 100)

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	103	94	93	105	99	106	102	114	124	112	108	107	105	105	99
Aosta Valley	71	83	83	90	90	101	88	98	111	130	115	106	111	102	109
Liguria	134	136	135	147	152	142	157	160	165	125	105	101	105	107	104
Lombardy	109	100	102	113	111	114	110	125	137	127	119	116	113	113	115
Trentino-Alto A.	53	67	71	79	69	84	86	86	100	90	96	102	105	104	105
Veneto	115	92	83	86	88	81	78	84	97	95	96	100	99	99	98
Friuli-Venezia G.	94	106	108	115	98	145	136	112	106	86	91	89	97	101	100
Emilia-Romagna	93	107	105	99	105	104	104	95	109	110	105	110	103	103	101
Tuscany	102	109	104	94	97	105	102	98	100	99	105	101	97	98	99
The Marches	76	71	81	77	77	71	64	71	80	78	82	86	87	93	89
Umbria	90	103	106	101	91	90	98	91	89	91	95	98	95	94	89
Latium	123	139	135	136	137	140	140	121	109	118	115	113	113	109	108
Abruzzi	83	76	65	62	67	69	66	58	59	74	82	89	94	89	91
Molise	81	76	65	62	67	69	67	58	59	52	64	78	90	89	83
Campania	106	104	101	97	98	91	89	93	82	87	87	79	87	88	92
Apulia	94	106	114	103	95	102	98	84	71	78	76	80	81	82	87
Basilicata	73	64	73	68	70	69	73	57	42	61	75	77	86	90	81
Calabria	72	75	69	60	67	58	62	54	46	66	72	75	79	82	82
Sicily	104	108	114	108	106	89	98	91	73	77	84	93	94	90	91
Sardinia	94	100	119	111	113	112	95	97	71	86	97	91	86	88	86
North-West	109	102	103	114	112	115	113	126	136	123	114	111	110	110	109
North-Ea. & Cen.	99	103	101	99	99	103	101	96	101	101	102	104	102	102	101
South & islands	95	97	99	93	93	87	87	82	69	78	82	84	87	87	89
Centre-North	103	102	102	105	104	108	106	108	115	110	107	107	105	105	104
Italy (2011 euros)	6302	6423	7266	8068	9455	8120	10425	11111	15106	22094	35925	46604	55486	64813	65743

Notes and sources: see table 1.

Table 3. *Workers per capita of the Italian regions, 1871-2011 (Italy = 100)*

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	104	115	115	114	117	121	121	121	119	117	114	111	108	110	110
Aosta Valley	112	120	127	132	143	142	162	146	142	129	125	131	128	121	125
Liguria	103	105	103	101	103	100	105	104	98	100	99	100	101	103	102
Lombardy	104	114	111	108	106	109	113	110	112	114	114	112	117	115	112
Trentino-Alto A.	130	110	110	104	113	104	108	109	106	112	111	124	123	124	123
Veneto	92	97	98	98	100	97	94	98	102	103	102	109	113	115	117
Friuli-Venezia G.	81	73	72	73	74	73	86	110	105	106	105	108	107	111	114
Emilia-Romagna	103	99	101	103	104	106	105	109	103	106	109	118	119	120	121
Tuscany	103	99	99	99	102	99	104	103	105	106	103	110	107	111	110
The Marches	109	110	109	109	106	111	111	110	108	112	108	117	108	107	114
Umbria	111	100	101	100	102	103	102	105	102	102	98	103	101	102	103
Latium	108	104	102	99	97	97	100	98	99	94	96	94	101	103	105
Abruzzi	96	101	104	108	104	105	94	99	98	96	97	96	96	96	93
Molise	99	101	102	104	102	104	96	102	98	128	104	98	87	90	93
Campania	102	98	98	99	99	97	91	87	84	82	80	82	76	74	70
Apulia	95	90	91	91	92	90	86	85	92	91	93	84	83	81	78
Basilicata	92	98	103	107	107	109	96	100	112	106	97	90	78	81	87
Calabria	96	89	98	111	106	106	90	91	101	90	92	83	78	78	79
Sicily	91	85	83	82	81	81	84	79	79	80	82	78	76	74	73
Sardinia	82	81	82	82	83	81	90	85	89	88	88	83	89	87	90
North-West	104	114	112	110	110	112	115	113	112	113	112	111	113	112	111
North-Ea. & Cen.	102	99	99	99	100	99	101	104	103	103	103	108	110	112	113
South & islands	95	92	93	94	93	92	89	87	89	87	87	83	80	79	77
Centre-North	103	105	104	103	104	104	106	107	107	107	107	109	111	112	112
Italy (%)	45,2	50,3	49,8	49,7	47,0	47,2	39,8	43,4	42,2	41,9	37,1	39,1	41,6	41,7	39,6

Notes and sources: see table 1. Estimates are based on the present population.





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## Appendix I. Sources and methods

*General notes:* all estimates are at the borders of the time; all interpolations are calculated through the continuous compounding yearly rate; per capita data are based on the present population.

Table A.1.1. *Sources of national value-added and of regional employment*

	National value-added	Regional employment
1871	Agriculture: Federico (2003). Industry: Fenoaltea (2003a), Baffigi (2011). Services: Battilani, Felice and Zamagni (2014), De Bonis <i>et al.</i> (2012).	1871 Census of Population (CP) (Maic, 1876). For industry also Ellena's 1876 Industrial Census (CI) (Ellena, 1880). Industrial underemployment is approximated through the difference between CP and Ellena's CI, following Zamagni (1987).
1881	Agriculture: Federico (2003). Industry: Fenoaltea (2003a), Baffigi (2011). Services: Battilani, Felice and Zamagni (2014), De Bonis <i>et al.</i> (2012).	1881 Census of Population (Maic, 1884). For industry also Ellena's 1876 CI (Ellena, 1880). Industrial underemployment is approximated through the difference between CP and Ellena's CI, following Zamagni (1987).
1891	Agriculture: Federico (2000). Industry: Fenoaltea and Bardini (2000). Services: Zamagni and Battilani (2000).	Interpolation between 1881 and 1901 Censuses of Population. For industry also interpolation of Ellena's 1876 CI (Ellena, 1880) with 1911 Industrial Census (Maic 1914a). Industrial underemployment is approximated through the difference between interpolated CP and interpolated CI data, see Felice (2005b).
1901	Agriculture: Federico (2003). Industry: Fenoaltea (2003a), Baffigi (2011). Services: Battilani, Felice and Zamagni (2014), De Bonis <i>et al.</i> (2012).	1901 Census of Population (Maic, 1904). For industry also interpolation of Ellena's 1876 CI (Ellena, 1880) with 1911 Industrial Census (Maic 1914a). Industrial underemployment is approximated through the difference between CP and interpolated CI data, following Zamagni (1987).
1911	Agriculture: Federico (1992, 2000). Industry: Fenoaltea (1992); Fenoaltea and Bardini (2000). Services: Zamagni (1992), Zamagni and Battilani (2000).	1911 Census of Population (Maic, 1915). For industry also 1911 Industrial Census, Maic (1914a). Industrial underemployment is approximated through the difference between CP and CI data, see Felice (2005b).
1921	Agriculture: Istat (1957a), Federico (2000), Baffigi (2011). Industry: Carreras and Felice (2010); Felice and Carreras (2012). Services: Battilani, Felice and Zamagni (2014), De Bonis <i>et al.</i> (2012).	1921 Census of Population (Ministero dell'Economia Nazionale, 1921-1929). For industry also interpolation between 1911 Industrial Census (Maic, 1914a) and 1927 Industrial Census (Istat, 1929). Industrial underemployment is approximated through the difference between CP and interpolated CI data, following Felice (2005a).
1931	Agriculture: Istat (1957a), Federico (2000), Baffigi (2011). Industry: Carreras and Felice (2010); Felice and Carreras (2012). Services: Battilani, Felice and Zamagni (2014), De Bonis <i>et al.</i> (2012).	1931 Census of Population (Istat, 1934-35). For industry also interpolation between 1927 Industrial Census (Istat, 1929) and 1938 Census of Industry and Commerce (Istat, 1938-50). Industrial underemployment is approximated through the difference between CP and interpolated CI data, following Felice (2005a).
1938	Agriculture: Federico (2000). Industry: Fenoaltea and Bardini (2000). Services: Zamagni and Battilani (2000).	1938 Census of Industry and Commerce (Istat, 1938-50); 1936 Census of Population (Istat, 1939a). Industrial underemployment is approximated through the difference between CP and CI data, see Felice (2005a).
1951	Agriculture: Federico (2000). Industry: Fenoaltea and Bardini (2000). Services: Zamagni and Battilani (2000).	1951 Census of Population (Istat, 1957b); 1951 Census of Industry and Commerce (Istat, 1955-58). Industrial underemployment is approximated through the difference between CP and CI data, see Felice (2005a).

Table A.1.2. *Sub-sector breakdown of VA 1 and VA 2 estimates*

1871	<p><i>Industry:</i> 1) mining, 2) foods, beverage and tobacco, 3) textile, 4) clothing, 5) leather, 6) wood, 7) metallurgy, 8) engineering, 9) no-iron minerals, 10) chemicals, 11) paper, 12) various manufacturing, 13) construction, 14) utilities.</p> <p><i>Services:</i> 1) credits and insurance, 2) commerce, 3) mail service, telegraphs and telephones, 4) laundry and personal care services, 5) show business services, 6) typing activities, household services, clerical and church employees, 7) other various services; 8) police, cleaning and funeral services, 9) health services, 10) other employees, 11) horse and mule transports, 12) sea, lake and fluvial transports.</p>
1881	<p><i>Industry:</i> 1) mining, 2) foods and beverage, 3) tobacco, 4) textile, 5) clothing, 6) leather, 7) wood, 8) metallurgy, 9) engineering, 10) no-iron minerals, 11) chemicals, 12) paper, 13) various manufacturing, 14) construction, 15) utilities.</p> <p><i>Services:</i> the same as 1871.</p>
1891	<p><i>Industry:</i> 1) mining, metallic minerals, 2) mining, building materials, 3) other mining, 4) wheat, corn, rice and other flours, 5) bread, 6) pasta, 7) biscuits, pastry, candies 8) dairy and milk products, 9) meat and sausages, 10) seafood, 11) tomato preserves, pickles, dry and syrupy fruits, marmalades, vinegar, 12) chocolate and coffee, 13) sugar, 14) beer and gassy waters, 15) tobacco, 16) other foods and beverage, 17) silk cocoons and carding 18) silk throwing, spinning and weaving, 19) silk dyeing, 20) cotton spinning, 21) cotton weaving, 22) wool spinning, 23) wool weaving, 24) other wool manufacturing, 25) flax hackling and tow, 26) flax spinning, 27) linen weaving, 28) hemp hackling and tow, 29) hemp spinning, 30) hemp weaving, 31) jute hackling, tow and spinning, 32) jute weaving, 33) artificial silk spinning, 34) artificial silk weaving, 35) clothing: felt, straw, felt and straw hats, 36) other clothing, 37) metallurgy and engineering, 38) silver and gold, 39) chemical fertilizers, 40) pharmaceutical products, 41) explosives, 42) paints and colours, 43) other chemicals, 44) pulp, paper and cardboard, 45) paper industry, 46) printing, 47) photography and cinema, 48) leather, 49), wood, 50) clay, pottery and bricks, 51) glass industry, 52) other no-metallic minerals manufacturing, 53) construction, 54) utilities.</p> <p><i>Services:</i> 1) foods and beverage retail, 2) other retail, 3) foods and beverage wholesale, 4) other wholesale, 5) peddlers, 6) pharmacists, 7) hotels and restaurants, 8) trade agents, 9) railways and tramways, 10) mule drivers, 11) carters, 12) charioteers, 13) land transport entrepreneurs, 14) porters and carriers, 15) other horse transports, 16) sea, lake and fluvial transports, 17) mail service and telegraphs, 18) telephones, 19) banks, 20) insurance services, 21) other financial services, 22) police services, 23) funeral services, 24) laundry services, 25) other cleaning services, 26) hairdressers, 27) shoeshine 28) baths, 29) chiropodists and masseurs, 30) other personal care services, 31) public exhibitions, 32) other show-business services, 33) gymnastic teachers, 34) cantors and members of a choir, 35) dancers and mimes, 36) play and drama artists, 37) other variety artists, 38) stage whispers and bouncers, 39) acrobats, conjurers and puppeteers, 40) musicians, 41) doctors and surgeons, 42) veterinarians, 43) dentists, 44) obstetricians, 45) nurses, 46) other health services, 47) charity employees, 48) private teachers, 49) music teachers, 50) lawyers and notaries, 51) engineers and architects, 52) surveyors, 53) paymasters, 54) painters, 55) designers, 56) models, 57) composers and music directors, 58) writers, translators and interpreters, 59) private employees, 60) secular clergy, 61) monks, friars and nuns, 62) priests of other cults, 63) clerical and church employees, 64) employees of no-Christian cults, 65) private investigators, 66) other private employees, 67) typing activities, 68) household services, 69) department of War, 70) department of Education, 71) department of Navy, 72) all the other departments, 73) local administration, 74) housing.</p>
1901	<p><i>Industry:</i> 1) mining, 2) foods and beverage, 3) tobacco, 4) textile, 5) clothing, 6) leather, 7) wood, 8) metallurgy and engineering, 9) no-iron minerals, 10) chemicals, 11) paper, 12) various manufacturing, 13) construction, 14) utilities.</p> <p><i>Services:</i> the same as 1871.</p>
1911	<p><i>Industry:</i> 1) mining, metallic minerals, 2) sulphur mining, 3) fossil fuels, 4) salt mines, 5) mining, building materials, 6) mining, furnace materials, 7) mining, boric acid and graphite, 8) sea salt mining, 9) peat mining, 10) mineral water, 11) wheat and corn flour, 12) rice and other flours, 13) bread, 14) pasta, 15) biscuits and pastry, 16) dairy and milk products, 17) meat and sausages, 18) seafood, 19) tomato preserves, 20) pickles, dry and syrupy fruits, 21) marmalades, candies, sweets and chocolate, 22) coffee, 23) sugar, 24) amid, 25) honey, 26) seed oils, 27) wines, 28) alcohol, 29) beer, vinegar and malt, 30) gassy waters and ice, 31) tobacco, 32) silk cocoons and carding 33) silk throwing, spinning and weaving, 34) silk dyeing, 35) cotton spinning, 36) cotton weaving, 37) wool spinning, 38) wool weaving, 39) other wool manufacturing, 40) flax hackling and tow, 41) flax spinning, 42) linen weaving, 43) hemp hackling and tow, 44) hemp spinning, 45) hemp weaving, 46) jute hackling, tow and spinning, 47) jute weaving, 48) artificial silk spinning, 49) artificial silk weaving, 50) clothing: felt, straw, felt and straw hats, 51) other clothing, 52) iron metallurgy, 53) no-iron metallurgy, 54) foundries and heavy engineering, 55) rail and tram engineering, 56) shipbuilding, 57) light engineering and engineering of precision, 58) silver and gold, 59) chemicals: acids, 60) matches, 61) wax and soap, 62) rubber, 63) chemical fertilizers, 64) explosives, 65) chemical dyes, 66) pharmaceutical products, 67) electrochemical and gas products, 68) other inorganic chemical products, 69) coal, oil and other organic chemical products, 70) pulp, 71) paper and cardboard, 72) paper industry, 73) printing, 74) photography and cinema, 75) leather,</p>

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76) wood, 77) glass industry, 78) other no-metallic minerals manufacturing, 79) various industries, 80) construction, 81) utilities.

*Services:* 1) foods and beverage retail, 2) other retail, 3) foods and beverage wholesale, 4) other wholesale, 5) peddlers, 6) pharmacists, 7) hotels, 8) room rents, 9) eating houses and restaurants, 10) coffee-bars and tea-rooms, 11) brokers and agents, 12) other trade mediators, 13) railways, 14) tramways, 15) cable railways, 16) mule drivers, 17) other horse transports, 18) sea transports, 19) lake and fluvial transports, 20) port services, 21) other loading services, 22) courier services, 23) mail service, telegraphs and telephones, 24) banks, 25) insurance services, 26) other financial services, 27) police services, 28) funeral services, 29) laundry services, 30) hairdressers, 31) shoeshine 32) baths, 33) chiropodists and masseurs, 34) other personal care services, 35) public exhibitions, 36) gymnastic teachers, 37) cantors and members of a choir, 38) dancers and mimes, 39) theatre artists, 40) other variety artists, 41) stage whispers and bouncers, 42) acrobats, conjurers and puppeteers, 43) musicians, 44) doctors and surgeons, 45) veterinarians, 46) dentists, 47) obstetricians, 48) nurses, 49) other health services, 50) charity employees, 51) private teachers, 52) music teachers, 53) clerical teachers, 54) lawyers and notaries, 55) engineers and architects, 56) surveyors, 57) paymasters, 58) painters, 59) designers, 60) models, 61) composers and music directors, 62) writers, translators and interpreters, 63) private employees, 64) secular clergy, 65) monks, friars and nuns, 66) priests of other cults, 67) clerical and church employees, 68) employees of no-Christian cults, 69) private investigators, 70) other private employees, 71) typing activities, 72) household services, 73) department of Finances, 74) department of Justice, 75) department of War, 76) department of Education, 77) department of Navy, 78) all the other departments, 79) local administration, 80) public welfare, 81) employees of recreational and educational centers, 82) housing.

Vitali (1970) has been used in order to allocate data between industry and services in some foods and beverage sub-sectors, for further details see Felice (2005b, p. 309).

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1921 *Industry:* the same as 1881

*Services:* the same as 1871

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1931 *Industry:* the same as 1881

*Services:* the same as 1871

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1938 *Industry:* 276 sectors, see Fenoaltea and Bardini (2000), Felice (2005a)

*Services:* the same as 1911, see Zamagni and Battilani (2000), Felice (2005a)

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1951 *Industry:* 52 sectors, see Fenoaltea and Bardini (2000), Felice (2005a)

*Services:* the same as 1911, see Zamagni and Battilani (2000), Felice (2005a)

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Table A.1.3. *Estimates of women's and children's wages (as a share of men's wages)*

	Agriculture	Mining	Other Industry	Railw. and comm.	Other internal transp.	Sea transp.	Commerce	Credits and insur.	Various services	Public admin.
1871										
F	0.50	0.50	0.40	0.40	0.40	0.40	0.50	0.35	0.50	0.35
<M	0.45	0.50	0.35	0.30	0.35	0.30	0.35	0.25	0.35	0.25
<F	0.35	0.35	0.25	0.20	0.25	0.25	0.30	0.20	0.30	0.20
1881										
F	0.45	0.45	0.40	0.40	0.40	0.40	0.50	0.35	0.50	0.35
<M	0.40	0.45	0.35	0.30	0.35	0.30	0.35	0.25	0.35	0.25
<F	0.30	0.30	0.25	0.20	0.25	0.25	0.30	0.20	0.30	0.20
1891										
F	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.35	0.50	0.35
<M	0.35	0.35	0.35	0.30	0.35	0.30	0.35	0.20	0.35	0.25
<F	0.25	0.25	0.25	0.20	0.25	0.25	0.30	-	0.30	0.20
1901										
F	0.45	0.45	0.45	0.45	0.45	0.45	0.53	0.375	0.55	0.45
<M	0.375	0.375	0.375	0.325	0.375	0.325	0.35	-	-	-
<F	0.275	0.275	0.275	0.225	0.275	0.275	0.25	-	-	-
1911										
F	0.50	0.50	0.50	0.50	0.50	0.50	0.55	0.40	0.55	0.50
<M	0.40	0.40	0.40	0.35	0.40	0.35	0.35	0.25	0.35	-
<F	0.30	0.30	0.30	0.25	0.30	0.30	0.30	0.20	0.30	-
1921										
F	0.55	0.55	0.55	0.55	0.55	0.55	0.60	0.45	0.60	0.60
<M	0.40	0.40	0.40	0.35	0.40	0.35	0.35	0.25	0.35	-
<F	0.30	0.30	0.30	0.25	0.30	0.30	0.30	0.20	0.30	-
1931										
F	0.55	0.55	0.55	0.55	0.55	0.55	0.60	0.45	0.60	0.60
<M	0.40	0.40	0.40	0.35	0.40	0.35	0.35	0.25	0.35	-
<F	0.30	0.30	0.30	0.25	0.30	0.30	0.30	0.20	0.30	-
1938										
F	-	-	-	0.55	-	-	0.60	-	0.60	0.60

Legend: F, females 15 years old or more; <M, males less than 15 years old; <F, females less than 15 years old. Sources and notes: 1871 and 1881 estimates are derived from 1891, except for mining (elaborations from Young (1875)) and for agriculture (in turn derived from mining); 1901 estimates are interpolations between 1891 and 1911; 1891 and 1911 estimates have been drawn from different sources, at the sub-sector level of table A.2, for details see Felice (2005b); in the cases of 1938 and 1951, for many sectors estimates have not been produced since the total amount of wages (thus per worker wages allowing for men, women and children workforce breakdown) was available, for further details see Felice (2005a).

Table A.1.4. *Sources of productivity estimates and sub-sector VA 3 breakdown*

1871	<p><i>Agriculture:</i> direct estimates of value added, through regional quantities of the main products in 1870-74, from Maic (1878), and the regional ratios “total gross saleable production / gross saleable production of the main products” in 1891, from Federico (2003); the national value of the main products in 1871 is derived from the total gross saleable production, under the hypothesis of the same shares as 1891; to convert production in value added, the regional shares of costs are the same as 1891. The main products are 1) wheat, 2) corn, 3) oat, 4) barley, 5) rye, 6) rice, 7) beans, peas and lentils, 8) broad beans, vetches, chickling, chickpeas, lupines, 9) hemp, 10) flax, 11) potatoes, 12) chestnuts, 13) wine, 14) olive oil.</p> <p><i>Industry:</i> Fenoaltea (2004) and Ciccarelli and Fenoaltea (2006, 2008a, 2008b, 2008c, 2009a, 2009b, 2009c, 2010, 2012, 2014) for 1) mining, 2) textiles, 3) clothing, 4) metallurgy, 5) engineering, 6) no-iron minerals, 7) chemicals, 8) constructions, 9) utilities; for the remaining, that is for 10) foods and beverage, 11) tobacco, 12) leather, 13) wood, 14) paper, 15) various manufacturing, productivity is derived from 1891 through the productivity estimated by Ciccarelli and Fenoaltea for sectors 1)-9), see the main text.</p> <p><i>Services:</i> for 1) credits and insurance, 2) commerce, 3) mail service, telegraphs and telephones, 4) laundry and personal care services, 5) show business services, 6) typing activities, household services, clerical and church employees, 7) other various services; 8) police, cleaning and funeral services, 9) health services, 10) other employees, 11) horse and mule transports, 12) sea, lake and fluvial transports, productivity is derived from 1891 through the average productivity of industry, see the main text.</p>
1881	<p><i>Agriculture:</i> direct estimates of value added, through regional quantities of the main products in 1876-81, 1879-83 and 1880-85 from Maic (1887) and the regional ratios “total gross saleable production / gross saleable production of the main products” in 1891, from Federico (2003); the national value of the main products in 1881 is derived from the total gross saleable production, under the hypothesis of the same shares as 1891; to convert production in value added, the regional shares of costs are the same as 1891. The main products are 1) wheat, 2) corn, 3) oat, 4) barley, 5) rye, 6) rice, 7) beans, peas and lentils, 8) broad beans, vetches, chickling, chickpeas, lupines, 9) hemp, 10) flax, 11) potatoes, 12) chestnuts, 13) wine, 14) olive oil, 15) citrus fruits, 16) forage, 17) silk cocoons.</p> <p><i>Industry:</i> Fenoaltea (2004) and Ciccarelli and Fenoaltea (2006, 2008a, 2008b, 2008c, 2009a, 2009b, 2009c, 2010, 2012, 2014) for 1) mining, 2) textiles, 3) clothing, 4) metallurgy, 5) engineering, 6) no-iron minerals, 7) chemicals, 8) constructions, 9) utilities; for the remaining sectors of manufactures, that is for 10) foods and beverage, 11) tobacco, 12) leather, 13) wood, 14) paper, 15) various manufacturing, productivity is derived from 1891 through the productivity estimated by Ciccarelli and Fenoaltea for sectors 1)-9), see the main text.</p> <p><i>Services:</i> for 1) credits and insurance, 2) commerce, 3) mail service, telegraphs and telephones, 4) laundry and personal care services, 5) show business services, 6) typing activities, household services, clerical and church employees, 7) other various services; 8) police, cleaning and funeral services, 9) health services, 10) other employees, 11) horse and mule transports, 12) sea, lake and fluvial transports, productivity is derived from 1891 through the average productivity of industry, see the main text.</p>
1891	<p><i>Agriculture:</i> direct estimates of value added, from Federico (2003) gross saleable production; for the regional shares of costs, estimated according to the different agrarian regimes, see Felice (2005a, p. 7).</p> <p><i>Industry:</i> Fenoaltea (2004) and Ciccarelli and Fenoaltea (2006, 2008a, 2008b, 2008c, 2009a, 2009b, 2009c, 2010, 2012, 2014) for 1) mining, 2) textiles, 3) clothing, 4) metallurgy, 5) engineering, 6) no-iron minerals, 7) chemicals, 8) constructions, 9) utilities; for the remaining sectors of manufactures, that is for 10) foods and beverage, 11) tobacco,</p>

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12) leather, 13) wood, 14) paper, 15) various manufacturing, productivity is derived from 1911 through the productivity estimated by Ciccarelli and Fenoaltea for sectors 1)-9), see the main text.

*Services*: Maic (1893) for 1) credits and insurance; in the cases of 2) commerce, 3) mail service, telegraphs and telephones, 4) laundry and personal care services, 5) show business services, 6) typing activities, household services, clerical and church employees, 7) other various services; 8) police, cleaning and funeral services, 9) health services, 10) other employees, productivity is derived from 1911 through credits and insurance productivity; in the cases of 11) horse and mule transports, 12) sea, lake and fluvial transports, productivity is derived from 1911 through Fenoaltea (2004) textile productivity; direct estimates from taxation in 1891, from Maic (1893), for 13) housing.

For further details see Felice (2005b).

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1901 *Agriculture*: direct estimates of value added, through regional quantities of the main products in 1901 and the interpolation of the regional ratios “total gross saleable production / gross saleable production of the main products” in 1891 and 1911, as derived from Federico (2003); the national value of the main products in 1901 is derived from the total gross saleable production, interpolating the shares of 1891 and 1911; to convert production in value added, the regional shares of costs are the same as 1891 and 1911. Main products are the same as 1881; production of oat, barley, rye, beans, peas and lentils, broad beans, vetches, chickling, chickpeas, lupines, hemp, flax, potatoes, chestnuts, forage, wine is interpolated between 1891 (Maic, 1893) and 1911 (Maic, 1914b); the others are taken from Maic (1908) and refer to 1901-05.

*Industry*: Fenoaltea (2004) and Ciccarelli and Fenoaltea (2006, 2008a, 2008b, 2008c, 2009a, 2009b, 2009c, 2010, 2012, 2014) for 1) mining, 2) textiles, 3) clothing, 4) metallurgy, 5) engineering, 6) no-iron minerals, 7) chemicals, 8) constructions, 9) utilities; for the remaining sectors of manufactures, that is for 10) foods and beverage, 11) tobacco, 12) leather, 13) wood, 14) paper, 15) various manufacturing, productivity is derived from 1891 and 1911 (via interpolation) through the productivity estimated by Ciccarelli and Fenoaltea for sectors 1)-9), see the main text.

*Services*: for 1) credits and insurance, 2) commerce, 3) mail service, telegraphs and telephones, 4) laundry and personal care services, 5) show business services, 6) typing activities, household services, clerical and church employees, 7) other various services; 8) police, cleaning and funeral services, 9) health services, 10) other employees, 11) horse and mule transports, 12) sea, lake and fluvial transports, productivity is derived from 1891 and 1911 (via interpolation, at the aggregate level of 1891) through the average productivity of industry, see the main text.

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1911 *Agriculture*: direct estimates of value added, from Federico (2003) gross saleable production; for the regional shares of costs, estimated according to the different agrarian regimes, see Felice (2005a, p. 7).

*Industry*: Fenoaltea (2004) and Ciccarelli and Fenoaltea (2006, 2008a, 2008b, 2008c, 2009a, 2009b, 2009c, 2010, 2012, 2014) for 1) mining, 2) textiles, 3) clothing, 4) metallurgy, 5) engineering, 6) no-iron minerals, 7) chemicals, 8) constructions, 9) utilities; Zamagni (1978) for 10) foods and beverage, 11) tobacco, 12) leather, 13) wood, 14) paper; the average of all the previous sectors, weighted according to the corresponding shares of workforce, for 15) other manufacturing sectors.

*Services*: in the cases of 1) commerce, 2) horse and mule transports, 3) loading services, 4) couriers services, 5) sea transports, 6) lake and fluvial transports, 7) port services, 8) mail service, telegraphs and telephones, 9) laundry and personal care services, 10) show business services, 11) typing activities, household services, clerical and church employees, 12) other various services, productivity is derived from 1938 through Maic (1912) construction wages, see text; Giusti (1914) for 13) police, cleaning and funeral services, 14) health services,

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	<p>15) employees of recreational and educational centres; Maic (1893), Soresina (1992) and Felice (2006) for 16) credits and insurance; Doria (1967) for 17) cable railways. Direct estimates from taxation in 1911, from Maic (1913), for 18) housing. For further details see Felice (2005b).</p>
1921	<p><i>Agriculture</i>: direct estimates of value added, through regional quantities of the main products in 1921 (Maic, 1925; Istat, 1926) and the interpolation of the regional ratios “total gross saleable production / gross saleable production of the main products” in 1911 and 1938, as derived from Federico (2003); the national value of the main products in 1921 is derived from the total gross saleable production, interpolating the shares of 1911 and 1938; to convert production in value added, the regional shares of costs are the same as 1911 and 1938. Main products are the same as 1881. <i>Industry</i>: interpolations between 1911 and 1938, at the aggregate level of 1911, then rescaled to have the same aggregation of VA1 and VA2. <i>Services</i>: interpolations between 1911 and 1938, at the aggregate level of 1911, then rescaled to have the same aggregation of VA1 and VA2.</p>
1931	<p><i>Agriculture</i>: direct estimates of value added, through regional quantities of the main products in 1931 (Istat, 1931, 1932) and the interpolation of the regional ratios “total gross saleable production / gross saleable production of the main products” in 1911 and 1938, as derived from Federico (2003); the national value of the main products in 1931 is derived from the total gross saleable production, interpolating the shares of 1911 and 1938; to convert production in value added, the regional shares of costs are the same as 1911 and 1938. Main products are the same as 1881. <i>Industry</i>: interpolations between 1911 and 1938, at the aggregate level of 1911, then rescaled to have the same aggregation of VA1 and VA2. <i>Services</i>: interpolations between 1911 and 1938, at the aggregate level of 1911, then rescaled to have the same aggregation of VA1 and VA2.</p>
1938	<p><i>Agriculture</i>: direct estimates of value added, from Federico (2003) gross saleable production; for the regional shares of costs, estimated according to the different agrarian regimes, see Felice (2005a, p. 7). <i>Industry</i>: wages from Census of Industry and Commerce 1938, Istat (1938-50), approximately according to the same sub-sectors as Va1. <i>Services</i>: constant regional productivity in railways, air transport, communication and central administration; Tagliacarne (1937) for commerce, cleaning services, household services, clergy and employees of public agencies, local administration; Istat (1940) for show business services, professional services and other various private services; for all the rest, wages from Census of Industry and Commerce 1938, Istat (1938-50), approximately according to the same sub-sectors as Va1; direct estimates from taxation, from Istat (1939b), for housing. For further details see Felice (2005a).</p>
1951	<p><i>Agriculture</i>: direct estimates of value added, from Federico (2003) gross saleable production; for the regional shares of costs, estimated according to the different agrarian regimes, see Felice (2005a, p. 7). <i>Industry</i>: wages from Census of Industry and Commerce 1951, Istat (1955-58), approximately according to the same sub-sectors as Va1. <i>Services</i>: constant regional productivity in railways, air transport, communication and central administration; wages from Census of Industry and Commerce 1951, Istat (1955-58), for commerce, cleaning and health services, show-business services; for all the other sectors the average of commerce, cleaning and health services, show-business services, weighted according to the corresponding shares of workforce; direct estimates from taxation, from Istat (1952), for housing. For further details see Felice (2005a).</p>

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## Appendix II. Sectoral estimates: per worker GDP and employment

Table A.2.1. *Per worker GDP of the Italian regions in agriculture, 1871-2011 (Italy = 100)*

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	60	68	80	82	87	103	95	99	134	93	87	96	98	121	78
Aosta Valley	60	68	80	82	87	103	95	99	78	53	24	46	38	64	77
Liguria	109	98	71	87	104	123	110	97	111	109	129	91	137	132	105
Lombardy	75	66	73	83	93	108	106	122	135	143	163	138	115	150	124
Trentino-Alto A.	52	72	74	92	83	90	95	68	94	71	69	75	111	102	144
Veneto	118	73	71	76	85	76	77	89	97	120	118	120	102	118	103
Friuli-Venezia G.	94	106	112	122	119	141	110	88	68	70	85	102	114	118	92
Emilia-Romagna	117	119	117	116	123	110	103	118	140	170	148	160	108	124	119
Tuscany	98	100	103	92	94	111	92	96	101	88	107	81	106	108	133
The Marches	88	85	93	91	91	80	76	91	118	77	72	79	109	124	81
Umbria	115	132	126	112	105	103	112	113	113	85	76	92	105	122	129
Latium	106	124	116	133	128	135	103	93	103	116	139	108	110	97	116
Abruzzi	108	95	77	73	74	78	88	73	75	77	79	87	105	109	70
Molise	108	95	77	73	74	78	88	73	75	55	60	53	82	103	83
Campania	106	124	88	85	83	84	99	85	82	96	91	76	87	83	111
Apulia	113	149	160	139	111	126	124	118	82	86	81	100	103	73	81
Basilicata	92	78	83	84	77	84	109	81	59	57	64	71	88	98	100
Calabria	119	100	91	86	82	64	90	63	62	81	68	69	68	65	60
Sicily	170	163	167	158	140	91	115	128	95	90	93	109	102	76	99
Sardinia	116	111	159	142	160	165	132	129	87	89	113	85	73	87	86
North-West	72	70	76	83	91	107	102	109	131	115	121	111	109	136	103
North-Ea. & Cen.	102	100	100	101	103	102	93	98	109	112	114	111	107	114	115
South & islands	121	125	119	111	103	93	107	97	80	85	85	87	91	79	87
Centre-North	89	87	90	94	98	104	96	102	115	113	116	111	108	121	111
<i>Italy</i> (2011 euros)	4600	5010	5304	5728	6524	5928	5213	6778	9064	11931	16166	20972	24414	30462	29584

*Sources and notes:* see Table 1, Section 2 and, for further details, the Appendix. The national figures are from Felice and Vecchi (2015a).

Table A.2.2. *Per worker GDP of the Italian regions in industry, 1871-2011 (Italy = 100)*

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	177	138	132	149	110	110	102	127	116	116	110	106	102	107	108
Aosta Valley	177	138	132	149	110	110	102	127	174	215	169	101	112	85	113
Liguria	150	173	184	182	159	121	147	146	155	131	93	95	99	107	106
Lombardy	129	110	113	120	105	106	97	113	117	117	109	111	109	112	115
Trentino-Alto A.	39	53	61	57	48	83	92	105	111	112	121	114	105	110	104
Veneto	120	121	103	96	106	89	81	83	102	83	88	97	94	94	99
Friuli-Venezia G.	94	111	100	100	90	137	124	110	102	82	96	98	95	100	99
Emilia-Romagna	52	97	105	89	105	108	116	99	100	93	98	113	105	106	106
Tuscany	93	104	107	108	95	98	103	100	93	94	100	100	92	95	91
The Marches	53	63	72	71	79	79	74	65	61	74	81	84	81	83	80
Umbria	55	108	92	119	116	108	127	115	97	116	112	105	97	90	85
Latium	118	111	125	129	125	127	148	106	91	112	95	109	118	110	100
Abruzzi	24	59	45	56	78	92	87	63	65	77	92	89	93	86	97
Molise	24	59	45	56	78	92	87	63	65	68	74	82	84	84	81
Campania	101	87	93	89	93	85	75	85	74	85	95	79	91	86	81
Apulia	74	54	52	51	76	77	86	47	72	85	93	83	81	78	84
Basilicata	24	58	76	47	94	76	67	48	33	71	97	85	85	89	82
Calabria	31	47	41	23	52	64	52	54	37	49	70	70	85	83	76
Sicily	56	67	68	64	82	91	96	63	55	61	80	79	100	89	85
Sardinia	53	103	97	105	96	78	93	99	82	107	119	98	106	92	82
North-West	149	126	127	136	113	109	104	121	121	119	109	109	106	110	113
North-Ea. & Cen.	86	102	102	99	100	103	108	97	95	93	95	103	99	99	98
South & islands	66	70	69	63	81	83	82	67	63	76	90	82	91	85	84
Centre-North	115	114	115	118	107	106	106	110	109	107	102	105	102	104	104
Italy (2011 euros)	9768	7643	9591	9036	10401	9094	15116	12667	19336	23862	35207	47536	55486	62220	61798

Sources and notes: see Table 1, Section 2 and, for further details, the Appendix. The national figures are from Felice and Vecchi (2015a).

Table A.2.3. *Per worker GDP of the Italian regions in services, 1871-2011 (Italy = 100)*

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	130	117	97	113	110	107	102	103	103	105	107	106	106	103	96
Aosta Valley	130	117	97	113	110	107	102	103	97	92	105	113	115	107	107
Liguria	145	125	122	116	124	115	123	133	145	108	97	98	102	103	100
Lombardy	159	145	127	130	124	113	100	109	111	106	115	110	112	111	113
Trentino-Alto A.	80	79	90	78	64	76	77	87	105	95	86	100	106	103	105
Veneto	103	97	88	95	86	86	86	90	99	98	99	100	102	101	99
Friuli-Venezia G.	96	90	98	102	69	158	126	114	118	90	82	80	95	100	99
Emilia-Romagna	86	97	91	88	93	103	118	92	103	105	104	103	103	101	99
Tuscany	112	120	102	87	101	100	105	98	100	101	103	103	97	98	100
The Marches	74	61	83	80	80	73	75	87	80	105	94	92	91	97	94
Umbria	66	57	107	114	84	88	105	88	80	98	93	96	95	94	89
Latium	144	153	136	118	123	121	124	118	102	104	106	109	108	106	105
Abruzzi	65	67	85	86	94	77	72	77	76	101	91	96	96	91	93
Molise	65	67	85	86	94	77	72	77	76	99	91	100	99	92	90
Campania	103	80	103	98	101	92	85	98	90	87	88	85	86	89	93
Apulia	78	72	90	96	98	93	100	95	94	98	87	82	84	88	91
Basilicata	73	54	80	85	86	72	74	73	62	108	97	93	92	94	85
Calabria	37	53	64	72	79	68	61	68	61	92	94	90	87	89	91
Sicily	68	62	75	75	79	86	91	83	84	92	91	102	96	92	94
Sardinia	84	80	78	77	73	67	81	82	69	87	88	90	83	88	88
North-West	146	132	116	121	119	112	105	111	115	106	110	107	109	108	107
North-Ea. & Cen.	102	105	101	96	94	102	107	100	101	101	100	102	102	101	101
South & islands	76	69	86	86	89	85	85	87	83	92	90	91	89	90	92
Centre-North	117	117	107	107	105	106	106	105	107	103	104	104	105	104	103
<i>Italy</i> (2011 euros)	9264	9442	10826	13151	15695	12748	18661	17111	19940	28722	45266	52196	59925	69350	69688

Sources and notes: see Table 1, Section 2 and, for further details, the Appendix. The national figures are from Felice and Vecchi (2015a).

Table A.2.4. Share of agricultural employment over total employment, 1871-2011 (Italy = 100)

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	111	107	105	103	100	95	88	88	78	83	72	81	75	68	96
Aosta Valley	157	127	129	130	130	117	127	122	123	118	122	98	110	82	86
Liguria	89	83	77	71	64	58	55	53	58	67	57	60	46	57	61
Lombardy	102	93	89	85	79	72	62	59	52	42	34	35	49	45	49
Trentino-Alto A.	129	124	122	114	114	108	108	105	111	129	104	115	117	128	130
Veneto	96	100	103	106	109	106	113	110	109	101	90	96	95	87	90
Friuli-Venezia G.	101	89	87	80	80	89	76	87	88	92	76	71	74	77	75
Emilia-Romagna	99	101	103	107	105	111	120	122	107	98	99	98	117	108	99
Tuscany	93	93	95	98	92	96	97	99	92	84	69	86	60	60	72
The Marches	114	113	116	119	122	126	137	139	125	147	141	128	100	77	89
Umbria	117	122	124	125	126	126	133	135	125	144	124	115	106	83	80
Latium	95	94	95	95	91	89	84	87	74	63	53	71	55	60	49
Abruzzi	130	126	128	130	140	141	152	156	155	166	174	152	123	117	156
Molise	126	124	130	134	141	141	148	151	155	223	259	242	178	144	225
Campania	85	88	89	92	95	96	97	100	105	107	137	150	126	128	111
Apulia	105	106	108	109	114	114	115	110	145	168	213	165	188	220	196
Basilicata	120	127	130	132	139	140	150	157	169	201	232	242	190	186	220
Calabria	92	110	108	106	122	132	136	141	149	155	206	215	243	289	285
Sicily	76	91	90	90	96	102	110	106	127	135	161	147	176	179	175
Sardinia	112	101	103	105	107	109	125	117	127	140	142	126	156	168	153
North-West	105	97	94	91	85	79	71	69	62	58	49	52	56	53	64
North-Ea. & Cen.	101	101	103	104	103	105	108	108	100	96	85	92	85	81	81
South & islands	95	101	102	103	110	113	118	118	133	144	174	162	167	178	173
Centre-North	103	99	99	98	95	94	92	92	84	80	69	75	73	70	74
Italy (%)	54,8	59,5	59,3	59,3	55,1	55,7	48,4	48,0	44,5	30,5	18,6	12,7	8,4	5,6	5,1

Sources and notes: see Table 1, Section 2 and, for further details, the Appendix. The national figures are from the statistical appendix in Felice (2015b).

Table A.2.5. Share of industrial employment over total employment, 1871-2011 (Italy = 100)

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	109	97	98	99	109	114	125	126	146	132	135	122	123	119	106
Aosta Valley	45	47	43	40	49	71	77	88	101	101	84	84	84	80	89
Liguria	109	111	113	115	127	124	121	128	111	95	85	74	73	73	73
Lombardy	130	128	134	139	148	160	163	164	173	153	145	135	131	125	123
Trentino-Alto A.	71	58	63	67	67	71	73	80	80	70	76	72	78	85	95
Veneto	116	96	92	87	84	92	83	90	95	103	112	114	128	129	134
Friuli-Venezia G.	100	104	121	137	111	132	114	111	107	96	99	92	102	99	105
Emilia-Romagna	96	96	92	87	96	82	75	76	90	103	104	108	112	116	116
Tuscany	112	115	111	107	121	106	105	103	115	116	111	109	108	109	102
The Marches	82	84	79	74	76	72	68	65	82	81	92	109	126	126	129
Umbria	67	64	65	66	69	69	72	71	80	83	93	107	108	106	104
Latium	88	89	85	81	85	79	86	81	76	72	67	66	63	63	64
Abruzzi	55	67	66	65	52	49	47	43	45	65	72	92	100	110	117
Molise	70	72	61	52	47	49	55	52	61	43	50	73	86	97	102
Campania	101	110	107	104	93	92	90	87	78	84	78	79	76	77	73
Apulia	88	86	87	88	79	80	87	93	50	57	63	80	79	80	90
Basilicata	74	57	56	54	50	52	53	47	41	56	61	75	78	101	95
Calabria	75	84	99	115	81	64	65	57	57	74	66	69	57	58	60
Sicily	101	108	108	106	90	94	81	79	63	68	67	76	63	61	62
Sardinia	73	92	85	79	82	77	63	72	65	67	68	78	71	68	65
North-West	118	113	116	120	130	138	144	146	156	139	135	124	123	118	114
North-Ea. & Cen.	98	95	93	90	94	89	86	86	93	95	96	98	102	104	105
South & islands	88	94	94	94	81	80	76	75	61	69	69	78	73	75	77
Centre-North	106	103	103	103	110	110	111	111	119	114	113	109	111	110	108
Italy (%)	19,8	21,9	22,5	22,8	25,4	23,7	27,3	27,7	26,8	33,9	38,1	35,7	30,5	28,8	26,1

Sources and notes: see Table 1, Section 2 and, for further details, the Appendix. The national figures are from the statistical appendix in Felice (2015b).

Table A.2.6. *Share of services employment over total employment, 1871-2011 (Italy = 100)*

	1871	1881	1891	1901	1911	1921	1931	1938	1951	1961	1971	1981	1991	2001	2011
Piedmont	68	83	87	91	89	97	95	95	91	84	81	90	92	95	98
Aosta Valley	20	75	77	79	82	87	72	71	62	83	104	112	107	110	105
Liguria	118	143	159	176	167	186	165	161	155	133	132	128	121	115	113
Lombardy	73	90	95	100	98	108	105	107	107	99	89	92	92	94	95
Trentino-Alto A.	60	73	74	95	104	111	114	114	102	103	120	116	109	104	100
Veneto	96	106	102	97	96	93	92	92	91	95	94	92	87	89	88
Friuli-Venezia G.	98	129	116	120	143	93	131	112	113	110	111	112	103	102	100
Emilia-Romagna	106	103	99	94	90	90	87	84	98	99	97	95	92	92	94
Tuscany	105	104	102	99	94	103	100	98	99	99	103	97	102	99	101
The Marches	85	78	74	70	69	64	63	63	78	78	90	87	87	90	90
Umbria	88	72	66	61	67	64	66	65	80	79	96	92	95	99	100
Latium	120	131	135	140	143	154	147	148	163	158	149	131	125	120	117
Abruzzi	71	56	51	47	51	49	56	55	65	76	92	92	97	94	89
Molise	68	55	52	48	51	49	54	53	51	49	76	84	96	98	90
Campania	131	128	126	124	122	119	117	115	114	109	104	102	108	108	109
Apulia	98	96	91	86	87	85	85	88	77	83	84	98	99	98	97
Basilicata	76	63	58	54	54	46	54	49	48	55	78	83	99	92	93
Calabria	138	87	74	62	62	55	69	68	64	78	84	93	102	102	101
Sicily	150	119	124	126	126	101	102	112	93	100	103	105	108	110	109
Sardinia	95	107	109	110	103	103	92	97	91	97	110	109	107	108	109
North-West	76	93	99	105	103	113	109	109	107	98	91	95	95	96	98
North-Ea. & Cen.	99	103	101	99	100	100	101	99	107	108	110	103	101	100	100
South & islands	120	103	100	97	98	89	91	93	86	91	96	100	104	104	103
Centre-North	89	99	100	102	101	105	104	103	107	104	102	100	98	98	99
Italy (%)	25,4	18,6	18,3	17,9	19,5	20,6	24,3	24,3	28,6	35,7	43,2	51,6	61,0	65,5	68,8

Sources and notes: see Table 1, Section 2 and, for further details, the Appendix. The national figures are from the statistical appendix in Felice (2015b).



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