

Southern and Northern Italy in the Great Divergence: New Perspectives from the Occupational Structure

David Chilosi¹

Carlo Ciccarelli²

Abstract

A dearth of quantitative data on Southern Italy's development before the unification of Italy in 1861 has prevented the study of the Italian North-South divide from fully engaging with its pre-modern roots and the analysis of Italy's place in great divergence from including the bottom half of the peninsula. This paper reconstructs the occupational structures of Southern and Central-Northern Italy between 1300 and 1861, combining direct observations and urbanisation rates, and examines their economic implications. We find that during the Risorgimento (1800-1861) the agricultural employment share was higher and the industrial employment share was lower in Southern Italy than in the Centre-North, with stable differences. In the previous centuries, the South saw structural transformation, particularly in the fifteenth and sixteenth centuries, leading to a halving of the predicted Centre-North/South GDP pc percentage difference between the 1350's peak (75%) and 1861 (31%). The predicted GDP pc series show that Southern Italy forged ahead of China after and fell behind Britain before the Centre-North, but by pre-modern standards it was relatively well off.

JEL Classification: E01, N13, N93, O47, R12

Keywords: occupational structure, economic growth, regional inequality, great divergence.

'E' noto esser diversa la condizione d'un paese secondo che è diversa la proporzione delle persone che campano del prodotto delle terre, o dei capitali, o dell'industria.'

[It is known that the conditions of countries are different depending on the proportion of people whose livelihood depends on the produce of lands, capitals or industry]

(Regia Commissione Superiore 1839: LXIV)

1. Introduction³

How did the occupational structure of Southern and Northern Italy⁴ evolve in the centuries before the unification (1861)? What are the implications for our understanding of

¹David Chilosi: Department of Political Economy, King's College London. E-mail: david.chilosi@kcl.ac.uk.

²Carlo Ciccarelli: Department of Economics and Finance, University of Roma Tor Vergata. E-mail: carlo.ciccarelli@uniroma2.it.

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⁴Daniele and Malanima (2009) define the Centre-North as all the regions from the Alps to Latium and the South as the other regions, including the islands. This definition fits with the conventional one and is close to the one used in this paper, where we define the South as the Kingdom of Naples and the islands and all the other provinces as Centre-North. These boundaries differ slightly from those used by Malanima (2005, 2011) and Federico and Malanima (2004), who consider Latium as lying outside the Centre-North, due to the structure of agriculture there, but this difference has hardly affects the results, as the robustness checks reported below demonstrate.

their comparative development? The debate on the origin of the North-South divide, blindfolded by a dearth of quantitative data, has so far paid scant attention to what happened before the unification.⁵ The conventional wisdom sees the North-South Italian income gap as being significant already at the time of the unification (Eckaus 1961; Felice 2013, 2019a; Federico *et al.* 2019). Revisionist historians disagree: for them, in 1861 there was no difference in standards of living between Northern and Southern regions. Marked differences emerged only in the wake of industrialisation (Daniele and Malanima 2007, 2017). According to Cafagna (1989), the roots of the industrial triangle in North-Western Italy are to be sought in the development of the silk industry during the Risorgimento (see also Ciccarelli and Fenoaltea 2013). This argument sits well with evidence on human capital (Chilosi 2007; Ciccarelli and Weisdorf 2019). However, Federico and Tena-Junguito (2014) find that foreign trade was too static in the decades before the unification to imply major economic changes. Revisionist and conventional scholars alike implicitly assume that not much changed between the late middle ages and 1800.

Lack of quantitative data on Southern Italy's pre-modern development has also meant that, to date, the debate on Italy's position in the "great divergence" has almost entirely ignored the Southern half of the peninsula. Pomeranz (2000) and the California school claim that before the industrial revolution standards of living in the most advanced parts of Asia and Europe were at the same level. Real wage and GDP estimates agree that the transition took place earlier. By the eighteenth century, North-Western Europe had become richer than even the most advanced parts of Asia. However, there are sharp disagreements on the comparative position of Italy, either on trends or levels. For Allen (2001) real wages in England became higher than in (both Central-Northern and Southern) Italy as early as the fifteenth century. In a follow up paper, Allen *et al.* (2011) confirm that by the eighteenth century Northern Italian real wages were very close or even below bare bone subsistence, being much lower than in North-Western Europe and also somewhat lower than in China.⁶ Malanima's (2013) revisions of Allen's (2001) wage-data are somewhat more optimistic on the welfare of the Italians and agree with GDP estimates (Malanima 2011; Broadberry *et al.* 2015) that England took over Central-Northern Italy only in around 1700. Similarly, Rota and Weisdorf (2020) finds that a wide gap between annual rural real wages in England and Central Italy emerged from the mid-17th century. The GDP estimates (Malanima 2011; Broadberry *et al.* 2015, 2018), however, also show that Central-Northern Italy was much richer than implied by the wage figures. Before 1650, England's GDP pc was around a third lower. Between 1400 and 1850 Chinese income per capita was about a half or less than that of Central-Northern Italy, though it is possible that in the most advanced part of China, the Yangzi Delta, GDP pc was at a similar level until about 1700. The extent to which these results can be generalised to the Italian peninsula as a whole remains a very much open question.

This paper offers a new quantitative analysis of the comparative development of Southern and Central-Northern Italy in the five and half centuries before the unification. We look at the occupational structure because it is a key indicator of economic development: urban sectors (industry and services) tend to exhibit higher productivity and dynamism than agriculture; Engel's law implies that as income rises, the primary occupational share shrinks (Kuznets 1966; Persson 1988). The occupational structure is particularly suited to analyse the development of data-scarce pre-modern economies. Even in the absence of direct observations, the trend of the urban occupational share can be estimated with urbanisation rates, using early

⁵ Here we focus on some recent contributions. For a more comprehensive survey of the voluminous literature on the North-South divide at the time of the Risorgimento see Riall (2009: 108-113).

⁶ Mocarelli (2018) argues these Northern Italian real wages are negatively biased.

national censuses, taken before modern industrialisation altered the distribution of industry across city and country, to anchor them to final levels (Allen 2000; Malanima 2011, Alvarez-Nogal and Prados de la Escosura 2013). Until now, however, two related obstacles prevented the application of this approach to Southern Italy: first, the early Italian censuses are biased, with an agricultural occupational share which is too low (Vitali 1970; Kuznets 1971; Zamagni 1987; Daniele and Malanima 2017); second, the widespread presence of large centres inhabited by a large proportion of farmers, agro-towns, make it difficult to extrapolate agricultural employment shares with urbanisation rates. As stressed by Malanima (2005: 98-99), using conventional thresholds, 19th-century Southern Italy shows up as one the most urbanised area of the world, not because it was one of the most developed, but because several big centres were inhabited by a majority of peasant families. They were agro-towns, rather than cities.

We overcome the difficulties associated with estimating the occupational structure of pre-modern Southern Italy by relying on a new source: censuses carried out by the regional states in the early 19th century. We show that these censuses do not suffer from the same biases as the post-unification censuses in the South. They report occupational data by province, which we use not only to describe spatial patterns of occupational shares at the time, but also to estimate by how much the proportion of agricultural workers differed in cities of the South as compared to those in the Centre-North. Combining these estimates with urbanisation rates, we extrapolate the evolution of agricultural occupational shares in over the very long-run. To explore the economic implications of the trends that we observe, we exploit Engel's law and rely on Groth and Persson's (2016) microeconomic model to estimate consistent GDP pc series in Central-Northern and Southern Italy since 1300.

We find that – consistent with the conventional wisdom and against the revisionist view - the agricultural occupational share in 1861 was in the order of 10 percentage points larger in the South than in the Centre-North. This gap is even larger than that previously estimated by Felice (2019a) in 1871 and so is our associated GDP pc ratio between Centre-North and South: 1.31, as compared to 1.18 in his case. Our findings are consistent with the view that the Risorgimento did not see major economic changes: there were little or no changes in the aggregate occupational shares of the South and the Centre-North.⁷ Yet the assumption that not much happened before 1800 remains unwarranted: the South saw slow structural transformation, particularly marked in the 15th and 16th centuries, while in the Centre-North the occupational structure was stable. In consequence, by 1861, the GDP pc percentage difference between the two areas had halved, as compared to the 1350's peak, when it was about as high as it is now.

The international comparison shows that, on the one hand, our trends in agricultural occupational shares are incompatible with the real daily wage series (Allen 2001, Malanima 2013). On the other hand, they are consistent with both annual rural wages (Humphries and Weisdorf 2019; Rota and Weisdorf 2020) and GDP figures (Malanima 2011; Broadberry *et al.* 2015, 2018; Xu *et al.* 2016). We add Southern Italy's GDP pc to the picture, finding that it was different from the Centre-North: it was initially poorer than the Yangzi Delta, it decidedly forged ahead of China in the eighteenth century and was taken over by Britain in the mid-17th century. Yet our levels are difficult to reconcile with the idea that bare bone subsistence real wages were representative of standards of living in pre-modern Italy, even for the South. Four

⁷ There were significant differences within macro-areas and underneath the aggregate calm the picture was actually rather dynamic, with structural transformation in the North. Nevertheless, even at the provincial level we fail to detect divergence. Slow catch-up growth, rather than proto-industrial provinces forging ahead, is the pattern that we observe (Chilosi and Ciccarelli 2021).

our series, its income per capita ranged between 2.14 and 2.87 subsistence baskets. In fact, pre-modern Southern Italy emerges as a comparatively well-off place.

The rest of the paper is organised as follows. Section 2 presents our sources. Section 3 demonstrates that our sources provide more reliable guidance to the occupational structure of Southern Italy in the 19th century than the early Italian censuses. Section 4 presents the occupational structure of Southern and Central-Northern Italy during the Risorgimento (1800-1861). Section 5 presents their agricultural employment shares since 1300 in a comparative perspective. Section 6 looks at the economic implications of these shares by estimating consistent GDP pc series. Section 7 concludes.

2. Pre-unification censuses: sources and methods

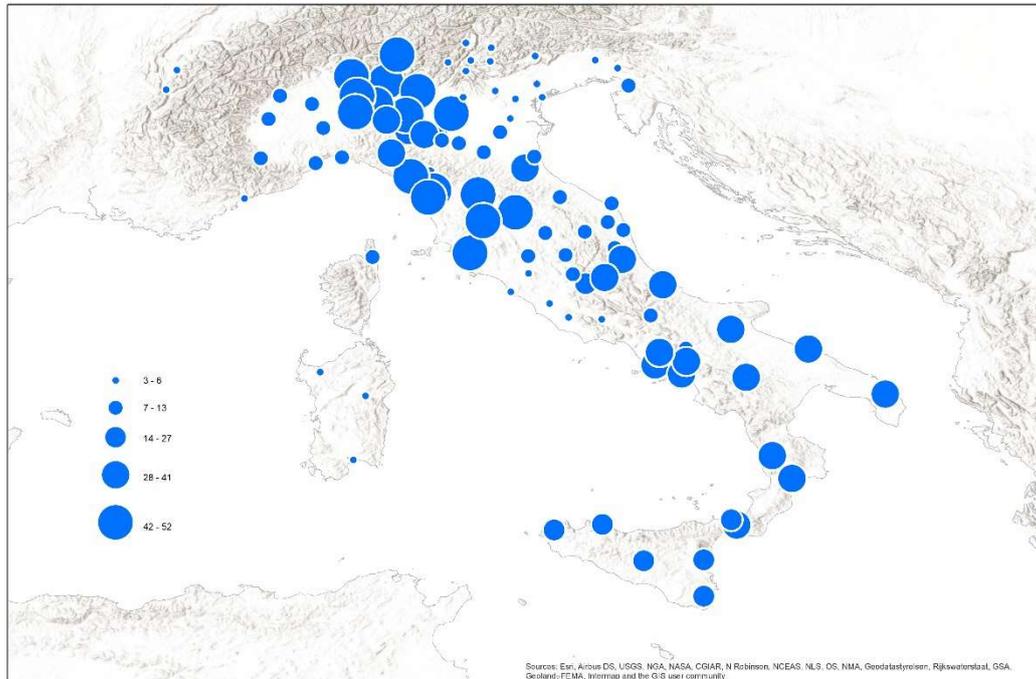
In the early decades of the 19th century, following up the Napoleonic legacy and in the wake of the growth of administrative monarchies (Laven and Riall 2000), Italian regional states began to regularly collect occupational data in population censuses. As seen in the quotation at the beginning of the paper, their motivations were similar to ours: they thought that the occupational structure was informative for mapping comparative economic development. This does not mean that rulers at the time interpreted the figures like we do: an interest in occupational data stemmed from Physiocratic influences (Patriarca 1998). Physiocrats stressed that farmers were the productive class, while manufacturers and traders were sterile (Quesnay 1758), quite the opposite of what we think now, looking at the data with Kuznetsian eyes (Kuznets 1966). Nevertheless, occupational boundaries of the time match well with our distinction between primary and urban sectors and thus are suited for our purposes.

Altogether we look at 354 censuses, 61 of which have occupations, carried out between 1800 and 1859.⁸ Our sources report provincial data, at varying levels of detail. We compute the occupational shares as the number of workers allocated to each sector divided by the total number of workers. We use the first Italian census from 1861 only for populations and comparison with pre-unification occupations. We disregard occupational censuses from two small areas (Trentino and Modena) on grounds of quality: labour participation rates were in excess of one, since statisticians allocated individuals to multiple occupational groups, like clerks and military (Roncaglia 1850: 10). For the sake of quality, we also ignore the results of the 1835 Sicilian census (Alberti 2011): they are based on a very partial coverage and they are inconsistent with those of the 1843 census (De Sanctis 1843), which includes also data from the mainland consistent with those from other censuses. Figure 1 shows for how many years we have population (part a) and occupational data (part b) in each province. We cover virtually all the peninsula and the islands, including also Corsica, Savoy and Istria. Populations are available at frequent benchmarks both in the North and the South, with an average of 21 observations per province. Occupations are particularly well-covered in Lombardy and the mainland of the Two Sicilies.

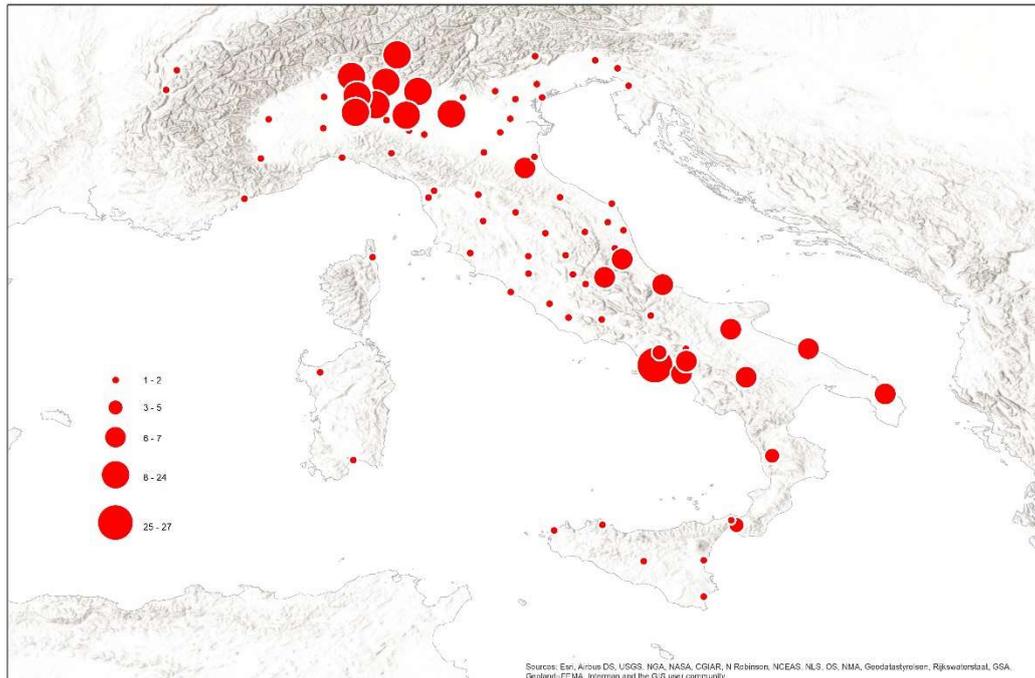
⁸ In addition, we use three censuses from before 1800 to interpolate population data in Lucca and the Neapolitan provinces.

Figure 1: Number of observations by province, 1800-1861: geographical distribution

a) Populations



b) Occupations



Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

We use standard criteria to measure urbanisation: population living in centres with 5,000 or 10,000 inhabitants divided by total population of the area (Malanima 2005, de Vries 2006).⁹ We thus need population of the cities, as well as the provincial populations recorded in the pre-unification censuses. These censuses report population of the cities at frequent benchmarks only in a few selected cases, mostly the regional capitals. We therefore rely also on other sources on urban populations, including both secondary sources and period statistics (Chilosi and Ciccarelli 2021: appendix B). We linearly interpolate between available data-points for both cities and provinces. Hence, while we miss short-term shocks, like the cholera epidemics of the 1830s, we nevertheless capture long-term trends. For the cities, we also extrapolate a few missing observations in 1800 with the values fitted by a fixed effect regression of (log of) population over year dummies. The regression specification takes into account that growth rates were higher for centres reaching 10,000 inhabitants than for smaller centres, both in the Centre-North and the South.¹⁰ We use pre-unification provincial boundaries. These boundaries under-went substantial changes in Tuscany in 1851 and the Kingdom of Sardinia in 1859 (Ministero d’Agricoltura, Industria e Commercio 1862). Since we need urbanisation data to extrapolate the occupational structure, in these two areas, we use constant boundaries at the dates used in the sources reporting occupations: 1841 for Tuscany and 1859 for Sardinia (Chilosi and Ciccarelli 2021: appendix B).¹¹

Agricultural employment shares are computed with Wrigley’s (2004) Primary-Secondary-Tertiary criteria, allocating mining to the secondary sector, however. “Sailors and

⁹ Centres are different from *comuni*, which also include the population of rural areas surrounding cities.

¹⁰ Results not reported here for reasons of space, but available upon request.

¹¹ Though for figure 3, we use Sardinian data at pre-1859 boundaries, which are more precise.

fishermen” and “labourers” are ambiguous categories, cutting across the primary and urban sectors. “Owners”, too, included small landowners cultivating their plots: “[farmers include] the owners themselves, a good number of whom attend to the cultivation of the fields” (Ministero del Commercio e dei Lavori Pubblici 1857: 78). “Servants” in some of the provinces included also agricultural labourers: “amongst servants have been written down in some provinces also agricultural daily labourers” (Ministero del Commercio e dei Lavori Pubblici 1857: 79). These provinces, identified as those with particularly high shares of servants (except for Rome), are in the Papacy and the Duchy of Parma. Following Shaw-Taylor *et al.* (2010), who allocate labourers to industry and agriculture depending on whether the observation is from a city, we divide up individuals in ambiguous categories with urbanisation rates.¹² One census from Veneto and all censuses from Lombardy and the Litorale Illirico report only male occupations. In these cases, we extrapolate the agricultural employment share with the ratio between male and total agricultural employment share in Tuscany (1.09), where the gender break-up is available and the ratio is remarkably stable across provinces. The break-up between genders is also available for Corsica and the Kingdom of Sardinia. The Tuscan ratio is very close to the average ratio in the two provinces of the Sardinian Island (1.11). By contrast, in Corsica and the mainland of the Kingdom of Sardinia there is hardly any difference in the agricultural employment shares between males and females. We prefer to rely on the Tuscan ratio because it agrees with the expectation that women were less involved in agriculture than men (Shaw-Taylor and Wrigley 2014: 68-69; Broadberry *et al.* 2015: 362; Sarasua 2019) and the structure of industrial production in Lombardy and Veneto is expected to be closer to the Tuscan one than to that of Piedmont, whose economy was peripheral during the key formative period of the “commercial revolution” of the middle ages. For the same reason, we rely on Tuscan figures also to extrapolate the overall labour participation rates of the provinces with male only figures.

We also compute tentative splits between industry and services. Several censuses allow to distinguish between industry and services only imperfectly, as they group together large categories of workers cutting across their boundaries, like “artisans and domestic servants” in the Two Sicilies or “bourgeois, traders and artisans” in Lombardy. When such ambiguous categories are used, for want of better alternatives, we simply distribute workers evenly between industry and services. The available data suggest that there were no systematic differences in the services employment shares across males and females, while the Tuscan data shows that, as expected, industrial employment shares tended to be higher for females than for males. In provinces where male only data are available, we therefore estimate the services share for the province as a whole as the same as that for males only and allocate to industry the difference between the agricultural provincial share and the male one. Table 1 reports the descriptive statistics.

Table 1: Descriptive statistics of the sample (1800-1861)

Variable	Unit	N	Places	Average year	Mean	Standard deviation	Sources
Population	City	2,332	622	1834	32,277	62,855	Censuses, others
Population	Province	2,038	99	1838	277,710	175,124	Censuses
Urbanisation rates	Province	4,396	99	1836	16-27%	19-24%	Cities, provinces
Agriculture shares	Province	379	83	1840	67%	15%	Censuses
Industry shares	Province	379	83	1840	15%	8%	Censuses
Services shares	Province	379	83	1840	18%	10%	Censuses

Notes: the urbanisation rates are computed as population of the cities in a province divided by total population of the province, after linearly interpolating provincial and urban populations between available years (this is why the number of observations of urbanisation rates is greater than the number of observations for the populations of cities and provinces). The range in the urbanisation rates depends on whether the 5,000 or 10,000 inhabitants threshold is used to identify cities. N=number of observations (number of places times number of years per place). In the occupational statistics, we use urbanisation rates with a 5,000 inhabitants threshold in the Centre-North and a 10,000 inhabitants threshold in the South to allocate ambiguous categories because these thresholds provide the best fits between urbanisation and occupational structure (table 5).

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

3. Pre- and post-unification censuses: reliability

Taken at face value, the early national censuses show that at the time of the unification the agricultural employment share was about 8 percentage points higher in Central-Northern Italy than in Southern Italy and remained so until the turn of the century (Daniele and Malanima 2009: table 5). However, historians (Vitali 1970; Kuznets 1971; Zamagni 1987; Daniele and Malanima 2017) have raised serious concerns on the reliability of these figures. In the early national censuses, they argue, women's participation in the textile industry was overstated because statisticians neglected to distinguish between home production and production for the market. The issue was particularly serious in the South, as the structure of southern agriculture, with fields often distant from homes, implied that women's participation in agriculture tended to be lower than in the rest of Italy. The argument that the employment share of industrial women was too high can be traced back to the official commentary to the 1871 census: "weavers, without other qualification ... are probably those who, owning rough hand looms at home ... weave only for part of the year ... hence our figures, and particularly those of the female weavers, will appear greater than implied by the real importance of textiles in our country" (Ministero d'Agricoltura, Industria e Commercio 1876: IV). Eventually the ministry addressed this issue. An increase in the agricultural employment share in the South in 1901 coincides with a change in the criteria used to demarcate labour participation, with a hardening of the previously porous distinction between active and passive population (Patriarca 1998).

The commentary to the 1861 census gave a different reason for the high industrial employment share in the South from the one stressed by historians. In case of doubt, statisticians allocated people to the industrial sector if they were located in large centres, which were particularly common in the South:

The manufacturing population appears comparatively more numerous in the Sicilian and Neapolitan provinces; that is not, in our view, due to higher industrial development, but because being [southern] inhabitants gathered almost exclusively in big centres ... whenever they performed some art or work they were classified as industrialists (Direzione della Statistica Generale del Regno 1867: 90).

This bias is potentially very large. Statisticians at the time considered big centres those with at least 6,000 inhabitants, a threshold which is close to those that we use now (5,000 or 10,000 inhabitants) to estimate urbanisation. According to conventional threshold by the 19th

century urbanisation rates in the South had become much higher than in the Centre-North (figure 5). According to the 5,000 threshold the southern urbanisation rate hovered at over 40%, as compared to a European average in 1800 of 12.4% (Malanima 2020: table 2).

Pre-unification censuses were run by different administrations from the early Italian censuses. They thus do not necessarily suffer from the same biases. In a context of high linguistic diversity, where 90% or more of the people did not speak Italian as a first language (Berruto 1983), regional states were arguably better equipped to reliably communicate with their citizens than a newly unified state. What follows argues that reliability indicators are reassuring, particularly in the South.

Our first test is a comparison with aggregate populations from previous studies. In 1850, when our panel of provincial populations is balanced, our estimate is 24.45 million at republican borders (without, however, Alto Adige) and 23.86 at 1871 borders, as compared to 24.7 (Del Panta *et al.* 1996: table 4) and 24.16 (Travaglini 1933), respectively. Our populations by macro-area are also very close to those from Del Panta *et al.* (1996: table 4): at republican borders in the South and the Centre-North we record 9.25 and 15.11 million respectively, while their estimates of the same figures are 9.5 and 15.2. Federico and Malanima's (2004) figures for 1861, 26.9 million for Italy and 15.95 for the Centre-North, are consistent with our figures: using the same borders as them (excluding Latium from the Centre-North) our figure for the Centre-North in 1857 is 14.89 million.

Next, we do an internal consistency check by looking at whether the occupational structure across provinces shows the persistency that one would expect. Repeated occupational measurements in pre-unification censuses are available in Lombardy, Veneto and the Two Sicilies (mainland). Table 2 reports the average correlation coefficients of the sectorial employment shares across provinces in subsequent periods (like the Lombard censuses in 1850 and 1853).

Table 2: Comparison between pre-unification censuses: average correlation coefficients of the provincial sectorial labour shares in subsequent periods

State	Provinces	Correlations	Agriculture	Industry	Services
Lombardy	10	23	0.98***	0.98***	0.97***
Naples	14	6	0.96***	0.90***	0.94***
Veneto	8	1	0.89***	0.59	0.91***

Notes: ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level; statistical significance for Veneto refers to the correlation coefficient rather than the average correlation coefficient because there is only one observation; "Naples" = mainland of the Two Sicilies. We use urbanisation rates with a 5,000 inhabitants threshold in the Centre-North and a 10,000 inhabitants threshold in the South to allocate ambiguous categories because these thresholds provide the best fits between urbanisation and occupational structure (table 5).

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

Occupational data are remarkably consistent across the pre-unification censuses: the correlation coefficients are consistently very high, across states and sectors. The only and partial exceptions are industry in Veneto, where we detect a marked increase in the industrial share (figure 5), and to a lesser extent in the Neapolitan state.

Our subsequent test is a comparison with the 1861 census. The new administrative map in 1861 introduced hardly any changes to provinces in the South, but sweeping ones in the Centre-North (Ministero d'Agricoltura, Industria e Commercio 1866: 213-236). We are therefore able to compare the occupational structure in our censuses and the first Italian census in all southern provinces (with the only exception of Corsica), but only in 10 provinces from the Centre-North, which are nevertheless spread across several regions: Emilia (1), Liguria (1),

Lombardy (2), Marche (1), Piedmont (4) and Tuscany (1). Table 3 reports correlation coefficients and mean differences between our final years (like 1843 in the Two Sicilies) and the 1861 census.

Table 3: Comparison between pre-unification (last year) and 1861 censuses: correlation coefficients and mean differences of the provincial sectorial labour shares

	N	Correlation coefficient			Mean difference		
		Agriculture	Industry	Services	Agriculture	Industry	Services
Italy	33	0.60***	-0.29	0.71***	0.105***	-0.123***	0.017
Centre-north	10	0.76**	0.28	0.94***	-0.008	0.022	-0.017**
South	23	0.74***	-0.03	0.73***	0.154***	-0.186***	0.032*

Notes: ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level; N=number of provinces. We use urbanisation rates with a 5,000 inhabitants threshold in the Centre-North and a 10,000 inhabitants threshold in the South to allocate ambiguous categories because these thresholds provide the best fits between urbanisation and occupational structure (table 5).

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

The correlation coefficients are relatively high for agriculture and services. However, they are not as high as those between pre-unification censuses (table 2) and are very low for industry, which again emerges as the noisiest sector. Noise is not the only issue, though. The correlation coefficients are higher within macro-areas than in Italy as a whole, consistent with an uneven bias in the 1861 census between central-northern and southern provinces. The mean differences are consistent with a particularly high positive bias in 1861 in the industrial employment shares of southern provinces, which translates in a negative bias for agricultural employment shares in the same provinces. While the absolute sizes of the implied biases are very close, the relative size of the bias is much higher for industry, whose employment share is significantly smaller than that of agriculture, leading to particularly low correlation coefficients in industry.

Finally, we explore the role of biases in the pre-unification and 1861 censuses, beginning with the gender bias. Kuznets (1971: 53-54) notices that labour participation rates (active population over total population) in liberal Italy were abnormally high: in around 1870 it was nearly 60%, as compared to around 40% in other developed countries. In support of the argument that inflated industrial participation of women in textiles were behind the Italian anomaly, Kuznets (1971: 53-54) reports that in 1871 the ratio of Italian women in non-agricultural occupations over total population was 12%, the same as in the UK and much higher than in countries, like France (6%) or Germany (4%), where the occupational structure can be expected to be closer to that of Italy's than that of the first industrial nation. Table 4 reports mean labour participation rates and industrial employment shares in the main Italian pre-unification polities, together with those recorded in the first Italian census in 1861 in the same territories. Where available, we also include the break-up by gender and the ratio of non-industrial women to total population. In proto-industrial societies, like Risorgimento's Italy, women are expected to have a lower agricultural and higher industrial employment share than men (Shaw-Taylor and Wrigley 2014: 68-69; Sarasua 2019). Hence, the difference between total and male industrial employment share (column 7 minus column 5) shown in column 9 is an upper bound estimate of the bias in the total industrial employment share due to an over-representation of industrial work amongst women.

Table 4: Labour participation rates, non-agricultural female labourers over total population and industrial employment shares in the pre-unification and 1861 censuses (main polities)

Polity	Census	(1) (2) (3)			(4) Non-ag F/P	(5) (6) (7)			(8) Max. bias
		Labour participation rate				Industrial labour share			
		Male	Female	Total		Male	Female	Total	
<u>Centre-north:</u>									
Piedmont	Pre-unification	74%	60%	67%	9%	21%	18%	20%	-1%
Piedmont	1861	74%	49%	62%	7%	17%	14%	16%	-1%
Lombardy	Pre-unification			23%		12%		18%	
Lombardy	1861	75%	50%	63%	10%	20%	30%	24%	4%
Veneto	Pre-unification			67%				13%	
Tuscany	Pre-unification	76%	34%	55%	10%	19%	40%	26%	7%
Tuscany	1861	74%	41%	58%	10%	22%	36%	27%	5%
Papacy	Pre-unification			62%				13%	
Papacy	1861	78%	51%	65%	9%	15%	24%	18%	3%
<u>South:</u>									
Naples	Pre-unification			50%				6%	
Naples	1861	78%	59%	68%	13%	16%	38%	26%	9%
Sicily	Pre-unification			55%				5%	
Sicily	1861	70%	34%	52%	13%	20%	57%	33%	12%
Sardinia	Pre-unification	71%	14%	43%	4%	17%	32%	20%	2%
Sardinia	1861	72%	17%	45%	6%	12%	13%	12%	0%

Notes: Piedmont=Kingdom of Sardinia (mainland), Naples=Kingdom of Two Sicilies (mainland); Non-ag F/P=non-agricultural female labourers over total population; Max.=maximum; in polities with repeated measurements (Lombardy, Veneto and Naples), we report the mean values. We use urbanisation rates with a 5,000 inhabitants threshold in the Centre-North and a 10,000 inhabitants threshold in the South to allocate ambiguous categories because these thresholds provide the best fits between urbanisation and occupational structure (table 5).

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

Male labour participation rates (column 1) were remarkably similar across polities and years. Consistent with the hypothesis that female work was recorded with errors, the female rates (column 2) were much more volatile. In the Centre-North, the overall labour participation rates (column 3) were comparatively high, close to 60% or more, both before the unification and in 1861, with only one exception: Lombardy. There the figures appear too low, suggesting under-counting. Lombard censuses were carried out very frequently, but evidently not as thoroughly as in the other polities. Yet, a lower male industrial employment share before the unification than in 1861 suggests that any bias in the pre-unification censuses militates against our finding that Lombardy saw structural transformation (Chilosi and Ciccarelli 2021). High labour participation rates elsewhere in the Centre-North match into relatively high, up to 10%, ratios of non-agricultural female labourers to total population (column 4). Hence, we cannot rule out a positive bias in the female industrial employment share in the Centre-North, in the pre-unification period, too. However, there, industrial employment shares for males (column 5) tended to be rather close to the total ones (column 7) and thus even if there were a bias in the overall figures, it is going to be small (column 8). The only and partial exception is Tuscany, where nevertheless the female labour participation rate was comparatively small.

The inferred maximum bias is very small in the Sardinian isle, where actually both the total labour participation rate and the weight of non-agricultural female labourers were very

much in line with the European norm, but not in the rest of the South: for the 1861 census in the Two Sicilies the female industrial employment shares made big differences for the total industrial employment shares. It is therefore reassuring for us that there the pre-unification industrial employment shares were particularly low. Correspondingly, in the mainland, the employment participation rate recorded before the unification shrank by nearly 20 percentage points, confirming the relevance of the bias in female textile workers in the 1861 census there. In Sicily, by contrast, the employment participation rate was relatively low by Italian standards both before and in 1861, suggesting that there the industrial bias cut across genders and the higher industrial employment share amongst women than men was genuine, as the *latifundia* made it difficult for women to participate in agricultural work. Evidently, in Sicily, the main issue with the results of the 1861 census was a different one: agro-towns.

Our last reliability test looks at the role of agro-towns by examining consistency between urbanisation and occupational figures in our two macro-areas. Table 5 reports the results of regressions of agricultural employment shares on urbanisation rates, in the pre-unification and in the 1861 censuses. Specifically, the estimated equation is:

$$ag_{it} = \alpha + \beta urb_{it} + u_{it} \quad (\text{Equation 1})$$

Where ag_{it} is the agricultural employment share and urb_{it} is the urbanisation rate in province i in year t . In the OLS specification, the constant α is the expected value of the agricultural employment share in a province with no urbanisation, or in the country-side. The sum of the constant and the slope β is the expected value of the agricultural employment share in a province with 100% urbanisation, or in a city.

Table 5: Agricultural employment share-urbanisation OLS regression

Sample	Urbanisation threshold	N	Adj. R-squared	Alfa	Beta	Ag in cities	Ag in country
Centre-north	5,000	267	0.323	0.729***	-0.462***	27%	73%
Centre-north	10,000	267	0.235	0.709***	-0.443***	27%	71%
South ⁺	5,000	112	0.907	0.930***	-0.427***	50%	93%
South ⁺	10,000	112	0.937	0.903***	-0.480***	42%	90%
Centre-north 1861	5,000	34	0.501	0.722***	-0.527***	20%	72%
South 1861 ⁺	10,000	25	0.589	0.695***	-0.409***	29%	69%

Notes: N=number of observations, adj.=adjusted, ag=agricultural employment share, ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level; ⁺ interaction of the slope with Naples dummy allows a different urban agricultural labour share in that province. Alfa and Beta are estimated with equation 1.

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

The goodness of fit improves in the Centre-North with a 5,000 threshold and in the South with a 10,000 threshold, consistent with expectation that southern agro-towns were less prevalent amongst relatively large places.¹³ Indeed, the urban agricultural labour share drops significantly with the 10,000 threshold in the South, but not in the Centre-North. We therefore focus on the first and fourth specifications. The results imply that for the pre-unification censuses, the agricultural employment share in southern cities was much higher than in central-northern cities, 42% vs. 27%. This difference almost entirely disappears in the 1861 census. Agro-towns hardly show up there. Moreover, for the pre-unification censuses rural industry and/or services were more developed in the Centre-North than in the South. This difference, too, disappears in the 1861 census, consistent with a positive bias in southern industry also in

¹³ Including Latium in the South has a tiny effect on the size of the coefficients and implies a slightly poorer fit there than under our baseline boundaries.

places with less than 10,000 inhabitants, since that census used 6,000 inhabitants as a threshold to identify cities and the positive bias in industrial women affected rural areas, too. The hypotheses that agricultural employment shares in cities and countryside were the same in Centre-North and South are soundly rejected with the pre-unification censuses data but accepted with data from the 1861 census.¹⁴ In short, the pre-unification censuses emerge as more reliable guides to the agricultural occupational shares of southern provinces than the 1861 census.

4. Occupational structure during the Risorgimento

To reconstruct time series of provincial employment shares during the Risorgimento, we interpolate between points with occupational data and extrapolate when interpolation is not viable.¹⁵ To extrapolate the agricultural employment share, we can use urbanisation rates, but need to take into account that not all workers in cities were non-agricultural and not all workers in the country-side were rural. This is why we rely on the fitted differences by our favourite specifications from table 3 (the first and the fourth specifications). However, we use a generalised linear model for fractions to obtain estimated levels bounded between 0 and 1 (Papke and Wooldridge 1996). By definition, the same approach is not viable to distinguish between the two urban sectors. We have thus to assume that extrapolated changes in the agricultural employment shares were evenly split between them. Formally, we extrapolate as follows:

$$\widehat{ag}_{it} = \widehat{ag}_{i,t-1} + \frac{e^{\widehat{\alpha} + \widehat{\beta}urb_{it}}}{(1 + e^{\widehat{\alpha} + \widehat{\beta}urb_{it}})} - \frac{e^{\widehat{\alpha} + \widehat{\beta}urb_{i,t-1}}}{(1 + e^{\widehat{\alpha} + \widehat{\beta}urb_{i,t-1}})} \quad (\text{Equation 2a})$$

$$\widehat{ind}_{it} = \widehat{ind}_{i,t-1} - 0.5\Delta\widehat{ag}_{it} \quad (\text{Equation 2b})$$

$$\widehat{ser}_{it} = \widehat{ser}_{i,t-1} - 0.5\Delta\widehat{ag}_{it} \quad (\text{Equation 2c})$$

Where the hat refers to estimation, *ind* and *ser* stand for industry and services, respectively, and otherwise the notation is the same as for equation 1. All our provincial estimates are presented and discussed in Chilosi and Ciccarelli (2021). Here we show the trends by macro-area (figure 2). Since the panel is unbalanced, we use province fixed effects regressions weighted by the means of the provinces' populations to aggregate the provincial shares. Formally:

$$sec_{it} = \alpha_i + \sum_t D_t t + u_{it} \quad (\text{Equation 3})$$

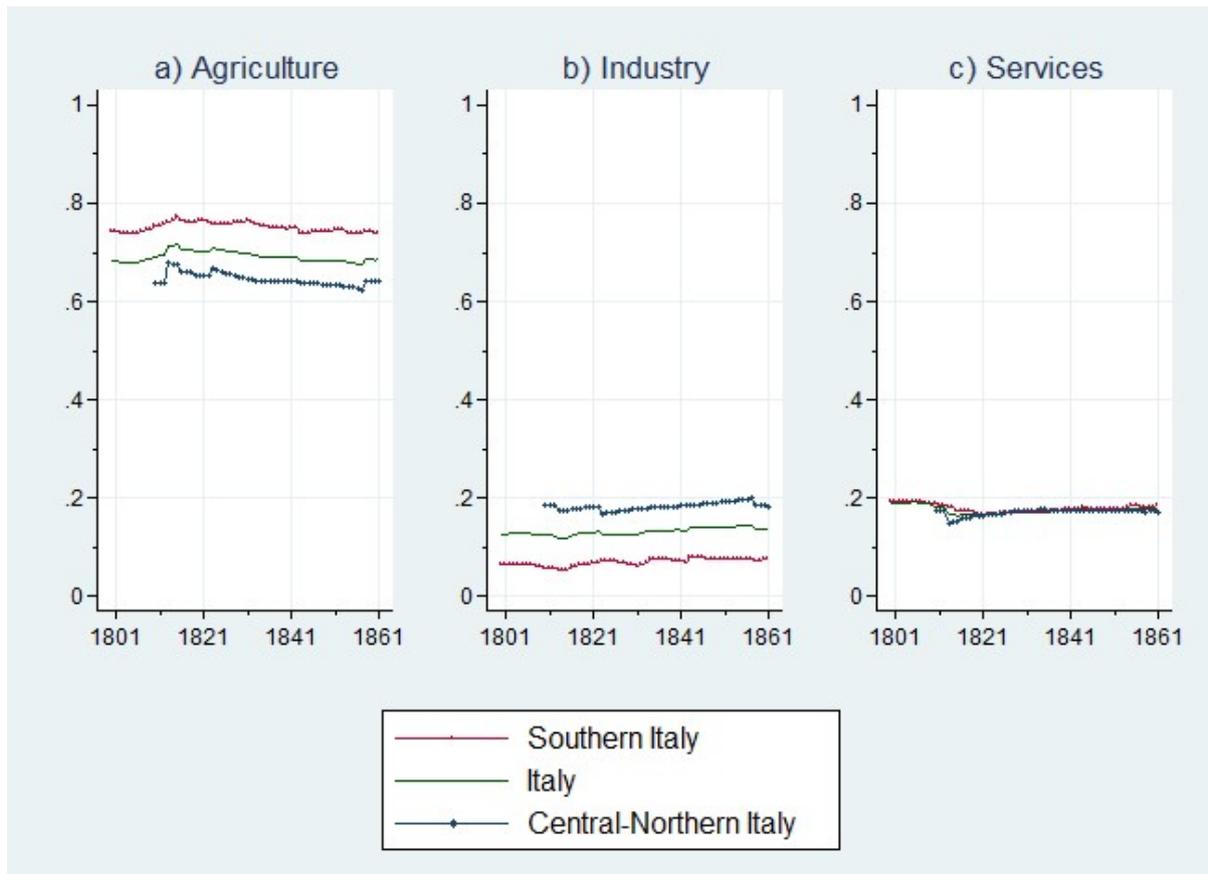
Where sec_{it} is the employment share for each of the three sectors in province i in year t and D_t are dummies equal to one in year t .¹⁶

¹⁴ The F-statistics with pre-unification censuses are: 169.27*** (null hypothesis that the agricultural employment share in the country is the same in the Centre-North and South) 8*** (null hypothesis that the agricultural employment share in the city is the same in the Centre North and the South). With the 1861 data, the same F-statistics are 0.66 and 0.69 respectively. *** denotes significant at the 1% level.

¹⁵ As industry emerges as noisier than the other two sectors (tables 2 and 3), we treat it as a residual category between interpolations. The same approach is used with the results by macro-area (figure 2).

¹⁶ Constant weights may potentially introduce distortions in the levels. Yet comparison with weighted averages in the years when these are viable (1848-1853 for the Centre-North and 1838-1861 for the South) shows that while the panel figures for agriculture are slightly too low, the differences are small, just over a percentage point on average and always less than two. While the Italian shares are nearly identical, a similar bias affects the estimates for Centre-North and South, implying that their differences are hardly affected: the error is 0.07 percentage points, on average.

Figure 2: Sectoral employment shares in Italy, 1800-1861



Notes: we omit the centre-north in 1800-1809 as data are available from only two provinces. Figures based on provincial estimates aggregated with equation 3.

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

Consistent with the urbanisation rates (figure 3), the overall picture is one of stagnation, across the three sectors. The levels yield two related results. First, the data of pre-unification censuses are much more in line with the conventional wisdom than those of the post-unification censuses. We find that southern Italy was significantly more agricultural than the Centre-North, with differences mostly over 10 percentage points. This difference is significantly bigger than that found by Felice (2019a), 4 points, after adjusting 1871 census data exploiting industrial census data and making ad hoc adjustments (following Zamagni 1987). Such a large shrinking of the difference between 1861 and 1871 is un-plausible. Felice's (2019a) downward adjustment of the southern agricultural employment share does not go far enough. Second, the levels point to an interesting and previously un-noticed¹⁷ feature of the North-South divide: while the services employment shares were the same in the Centre-North and in the South, the industrial employment shares were significantly higher in the former than in the latter. It was specifically industry that was comparatively under-developed in the South. Services employment shares higher than the industrial employment shares are in apparent contradiction of Petty's law prediction that the secondary sector expands before the tertiary sector and point to a process of "premature deindustrialisation" (Rodrik 2016) *ante litteram* in Southern Italy.

As stressed, industry and services figures are more tentative than those for agriculture. In part, the result on southern deindustrialisation has to be an artefact of the crude division

¹⁷ The debate on the services/industry split has so far concentrated on the trend in services value added after the unification (cf. eg. Felice 2019b; Fenoaltea 2020).

employed in the censuses of the Two Sicilies, which typically grouped all secondary workers together with domestic servants, while offering a more refined division of other tertiary occupations. Yet the southern difference between employment shares of services and industry are downsized, but nevertheless confirmed, by Petroni's (1826) census, which covered the continental part of the kingdom and offered a very refined occupational division, including nearly 500 different categories. Thus, while for our estimates in 1848 on average the provincial difference was 8%, for the 1824 census it was 5%. The 1824 census also offer insights into the nature of the southern Italian service sectors. Five categories of workers stand out as being much bigger than the rest: priests (12% of services), servants (11%), domestic workers (10%), clerks (10%) and sailors (10%) together accounted for about half of the whole sector.¹⁸ People involved in sales and finance accounted for a relatively low share of services (13%). By way of comparison, while in the Papacy in 1853, as expected, the clergy (10%) and servants (41%) were amongst the largest categories of services, too, "dealers, merchants, bankers and money changers" accounted for over a fifth of services. In the Kingdom of Sardinia in 1858, the share of the clergy (5%) was comparatively small, while domestic servants were also an important category (26%). Commerce accounted for 16% of services. "Capitalists" were grouped together with "owners and pensioners" in a category accounting for over one fourth of the tertiary sector. In sum, the evidence suggests that before the unification Southern Italy was already less industrialised and possibly commercialised than the Centre-North.

5. Agricultural occupational shares since 1300: a comparative perspective

What happened in the previous centuries? To extrapolate backwards the agricultural employment shares again we use the fitted differences by our favourite specifications from table 5, with a generalised linear model for fractions (Papke-Wooldridge 1996). However, since provincial urbanisation rates are not available before 1800, we directly look at those from macro-areas, Central-Northern and Southern Italy (figure 5).¹⁹ We compute urbanisation rates for the macro-areas since 1300, the time when population data become available, drawing on a range of secondary sources. Our estimates are very close to those of Malanima (2005, 2020) (Chilosi and Ciccarelli 2021: appendix B). As Italian populations are at republican borders, we exclude provinces outside those borders from this part of the analysis.²⁰ The 19th century levels are aggregated provincial agricultural employment shares obtained thus: we first compute state-level estimates, which take into account differences in the labour participation rates across provinces, and then take their population-weighted average, since we cannot rule out that participation rates suffered from different biases in different states, as noticed before in relation to Lombardy (table 4). In the South, we first estimate the agricultural employment share outside Naples and then we aggregate it with that from the city, using populations as weights.²¹ To do so, we assume that the Neapolitan agricultural employment share remained at the initial 19th century level (4%). This procedure allows taking into account that Naples was not an agrotown and its nearly tenfold growth from 33,000 inhabitants in 1300 to 320,000 in 1800 significantly increased the relevance of the urban sectors in the southern occupational structure.

Backward extrapolation assumes that the distribution of agricultural workers across cities and country-side did not change much our macro-areas in the five centuries before the

¹⁸ In industry, two occupations had a share of more than 10%: "shoe-makers" and "spinners and weavers".

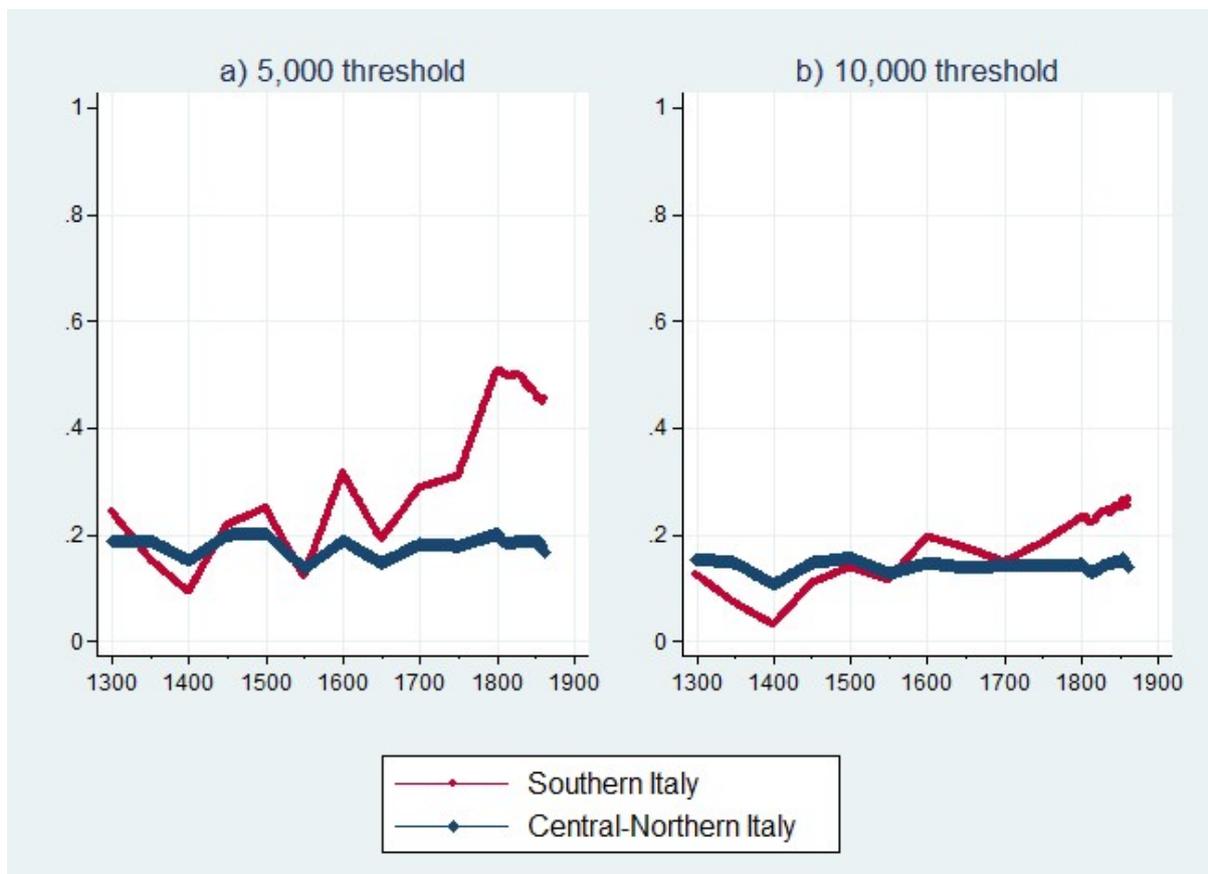
¹⁹ To obtain the relevant coefficients we still rely on the Risorgimento's data, but we weight the regressions by mean province population.

²⁰ Namely, Ancecy, Chambery, Corsica, Nice and Istria. While we don't have occupational data for Trentino-Alto Adige and the Duchy of Modena, the impact of this gap is on aggregate occupational shares is expected to be negligible.

²¹ Though labour participation rates in the capital, which had a mean of 36%, were somewhat lower than in the rest of the South (table 4), they were broadly in line.

unification. While this assumption is standard, the previous literature (eg. Allen 2000) has highlighted how the growth of proto-industry can render it problematic. Yet the issue is less serious in Italy than in other contexts. Allen's (2000) recommends to adjust European estimates by allowing the rural agricultural employment share to rise to 80% in 1500. That adjustment would have a very small effect in Central-Northern Italy, where we find that during the Risorgimento this share was 73%, and none in the South, where this share was 90% (table 5). By the same token, agro-towns can be potentially problematic, too. If the share of agricultural workers living in large centres increased over time, an increase in urbanisation rates would overstate the actual increase in urban occupational shares. While the phenomenon of agro-towns did harden in the early modern age, such changes mainly involved centers with less than 10,000 inhabitants (Benigno 2001). Indeed, the rise in urbanisation rates in early modern Southern Italy using the 5,000 threshold is significantly faster than using the 10,000 threshold (figure 3). Our assumption that in cities with at least 10,000 inhabitants the share of agricultural workers remained broadly constant can thus be considered as legitimate. Moreover, since urbanisation rates in the South and the Centre-North were initially very similar, only in the extreme case that Southern agro-towns only emerged after 1300 would more rapid urbanisation in the South than in the Centre-North be entirely spurious. We can rule out such a possibility: the origin of Southern agro-towns can be traced back to antiquity (King and Strachan 1978). In other words, the urbanisation rates imply that we can be confident that Southern Italy experienced some structural transformation between 1300 and 1861. The question that we need to answer is thus not if but how much.

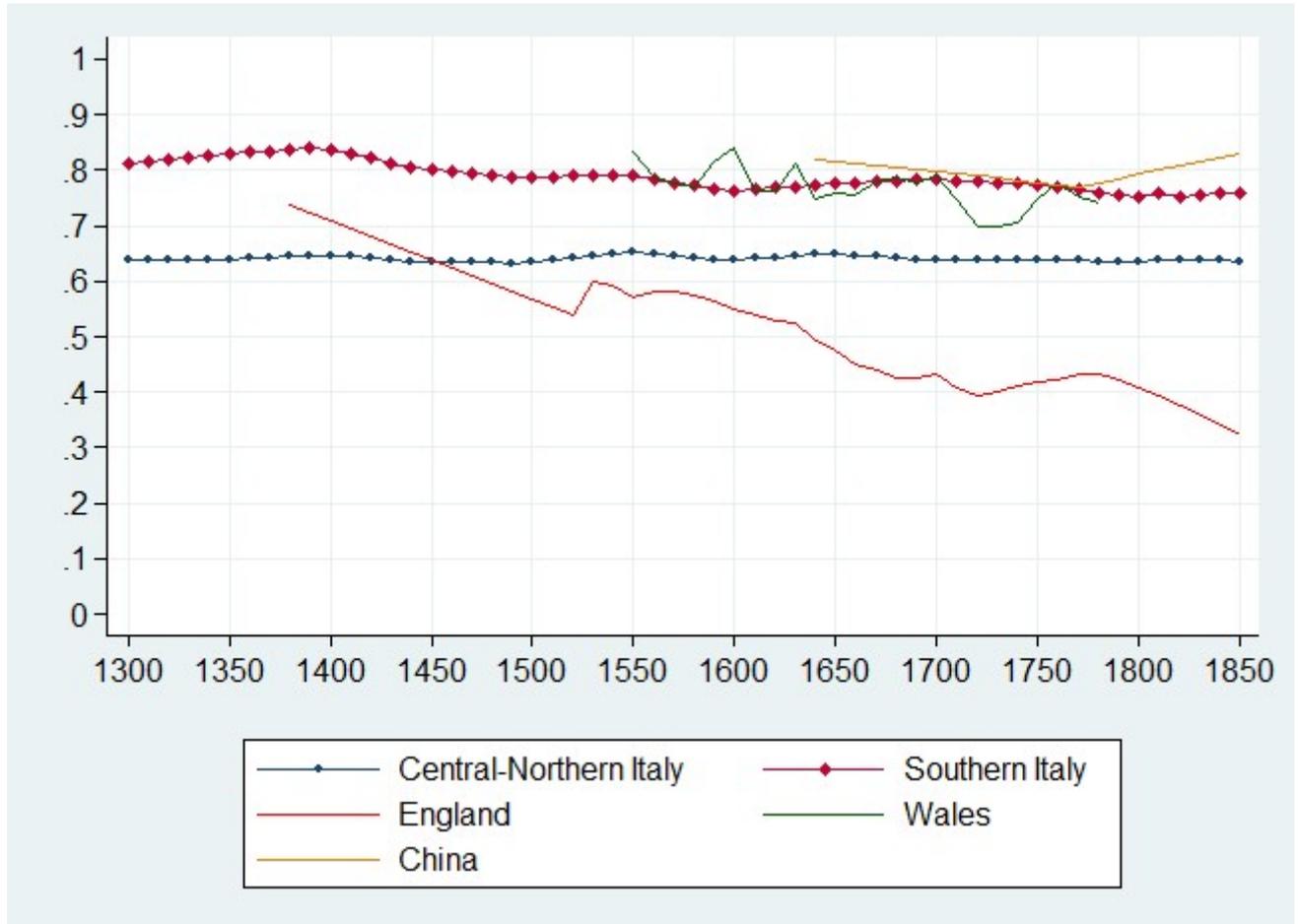
Figure 3: Urbanisation rates in Italy 1300-1861



Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

Figure 4 presents our estimates of the agricultural employment shares, placing the Italian figures in an international perspective. We include figures specifically from Britain and China for three reasons. First, these two countries have been at the centre of the debate on the great divergence. Second, as their occupational shares are based on direct observations of occupational data, they are of comparatively high quality. Third, since in these two countries GDP estimates have been constructed (mostly) independently from these occupational shares, when we move on to examine their relationship with economic growth we do not run the risk of simply capturing a mechanical relationship implied by the construction of the GDP estimates.

Figure 4: Agricultural employment shares in Italy, Britain and China, 1300-1850



Notes: we linearly interpolate between observations. We omit an obvious outlier at the beginning of the Welsh series. In the 19th century the English data also include the rest of the UK.

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

Our agricultural employment shares for Central-Northern Italy are very close to those from Malanima (2011: table 3) and the overall picture is the same: secular stagnation. The 1300 value for us (Malanima) is 64% (63%), while the 1861 value is 64% (62%). Our estimates are also consistent with the recent figure in Tuscany computed by Van Zanden and Felice (2017: table 3 and page 22) on the basis of the Florentine Catasto of 1427: between 57% and 59%. This share compares with our estimated agricultural employment share in the regional state in 1500 of 56%, using the same approach as for the Centre-North and Tuscan population data from Chilosi (2014). Consistent with an upward urbanisation trend (figure 4), Southern Italy, in contrast to the Centre-North, saw slow structural transformation: the agricultural employment share declined from 81% to 75%, implying that the gap with the Centre-North

went from a maximum of 19 percentage points in 1400 to a minimum of 11 in 1861, with most of the fall taking place in the 15th and 16th centuries. The level in Southern Italy was very close to those seen in early modern Wales and China. The latter, however, show significantly higher levels towards the end of the period, at the same time as China's deindustrialisation began (Williamson 2011: 62-63). In the late 14th century, the English agricultural employment share was above that in Central-Northern Italy. However, by the early sixteenth century, it had become lower. A large difference emerged in the decades around 1650: the gap went from 5 percentage points in the 1530s to over 10 a century later and over 20 by the early 18th century.

Are the series in figure 6 consistent with other available measures of economic development? To answer this question, we run the following regression:

$$ag_{it} = \alpha_i + \beta y_{it} + u_{it} \quad (\text{Equation 4})$$

Where ag_{it} is the agricultural labour share and y_{it} is the GDP per capita or real wage in place i in decade t . GDPs per capita in 2011\$ are from the 2020 version of the Maddison database. Within our sample, they are available for Central-Northern Italy, Britain and China. We consider daily wages from Allen (2001), assigning Florence to Central-Northern Italy, Naples to Southern Italy and London to Britain, as well as the subsequent revisions for Central-Northern Italy and England by Malanima (2013).²² Finally, we look at the annual rural real wage series from Tuscany and England from Humphries and Weisdorf (2019) and Rota and Weisdorf (2020). Engel's law predicts a negative coefficient for β . Table 6 shows the results, including also, for the sake of comparison, the results of the same income regression for the 19th century and for 20th centuries' developing countries from Clark *et al.* (2012: 366-367).

Table 6: Agricultural labour share (%) and income regression

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Ours	19 th century	20 th century	Ours	Ours	Ours
Constant	90.690***	86.8 ^a	84.9 ^a	60.461***	55.741***	82.070***
GDP pc	-0.014***	-0.011 ^a	-0.010***			
Wage Allen				0.071		
Wage Malanima					0.353	
Wage annual						-15.060***
Central-northern Italy	10.870***			3.004	5.614***	3.452***
Southern Italy				16.130***		
Britain	-14.014***			-9.429***	-6.433***	-2.517***
China	3.936***					
R-squared	0.427	0.479 ^b	0.865	0.000	0.008	0.408
N	122	81	182	120	103	83

Notes: ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level; ^a=statistical significance not reported in the source, ^b=from the slightly different specification reported in Crafts (1984: table 3).

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

The message is clear. On the one hand, daily real wages do a very poor job at predicting agricultural employment shares, as signalled by insignificant β coefficients with unexpected signs and very poor fits. This result lends support to the reservations of those that argue that

²² As the series has not been published, we were not able to use the Chinese real wages from Allen *et al.* (2011). Its inclusion is not expected to alter our conclusions.

daily wages cannot be considered as representative of annual incomes (Broadberry *et al.* 2015; Hatcher 2018; Stephenson 2018; Humphries and Weisdorf 2019; Rota and Weisdorf 2020). On the one hand, our series match very well both the annual real wages and the GDP pc series. There is also a close match between our results and those of subsequent regressions using GDP pc as the explanatory variable: thus, one hundred extra \$ are expected to decrease the agricultural occupational share by 1.37% in our sample and by 1.13% with the 19th century sample.²³ This result is, of course, reassuring. There is also substantial agreement with the coefficient estimated with annual wages, which implies that an increase by one subsistence basket in the real wage is expected to be associated with a decrease by 15.06% in the share of agricultural workers. Converting the corresponding coefficient from the GDP pc regression (column 1) with the absolute poverty line of 694\$ (at 2011 prices) (Bolt and van Zanden 2020: 19) yields a decrease by 9.52%.

The fixed effects in the first specification show that the agricultural labour share was lower than expected in England and higher than expected in China and especially Italy, on the basis of their GDP pc figures. Our Britain's fixed effect, 14%, is very close to that estimated by Wallis *et al.* (2018: 889) for the mid-19th century, 16%. The annual wages also confirm that the English fixed effect was negative (column 6). A comparatively low agricultural labour share is consistent with an early lead in English agricultural labour productivity (Allen 2000; Wallis *et al.* 2018), dating back to the commercial economy of the middle ages: English wheat markets exhibited significantly lower transaction costs as compared to continental Europe from as early as the 13th century (Chilosi *et al.* 2019). A higher fixed effect in Central-Northern Italy than in China could be due to agricultural labour productivity, which in China was relatively high, at least in the most advanced areas (Allen 2009). It could also reflect the fact that early modern China was specialized in the production of manufactures (Williamson 2011: 62). Two related consequences follow. Firstly, rural wages are bound to inflate English living standards relative to the Italian ones. An implication of the comparatively high British agricultural labour productivity is that the early Italian lead in GDP pc (Figure 5) had to be due to the urban sectors. A comparatively high productivity in these sectors is to be expected in medieval Italy, which was at the core of the "commercial revolution". This inference is also consistent with the particularly wide urban-rural income gap noticed by Van Zanden and Felice (2017) in 1427 Tuscany. Secondly, for equal agricultural employment shares, one would expect the revealed agricultural consumption to be lower and therefore the income to be higher in Italy than in China and Britain. Establishing what the trends in our agricultural labour shares reveal on the evolution of incomes is the task to which we now turn.

6. Implications for comparative development

The coefficients from table 6 (column 1) can be used to estimate the GDP pc in Southern Italy at the time of the unification. Assuming that agricultural labour productivity and thus the fixed effect was the same in Southern and Central-Northern Italy,²⁴ the agricultural occupational share in Southern Italy in 1861 would have been compatible with a GDP pc of 1954 (in 2011 international \$). Our assumption of equal labour productivity is indeed reasonable. Federico (2007: 324) finds that, surprisingly, in 1891 the index of agricultural labour productivity in the South (102.4) was higher than in the Centre (71.8) and the North

²³ Clark *et al.* (2012) use 2005\$, but that is bound to have a small effect on the results. The results with this conversion using 19th data from Crafts (1984) have been given by Gregory Clark to one of the authors in a private correspondence.

²⁴ In the 19th century, both the Centre-North and the South were net exporters of primary products, but as also stressed below, the difference between their values of exports and imports was likely small (personal communication with Giovanni Federico).

(87.2). However, he bases himself on census data. If we substitute in our estimate of the agricultural employment share in the South in 1861 – a better estimate, in the light of the biases plaguing the liberal Italy’s censuses (section 2) - the index in the South becomes 77.3, essentially the same as in the Centre-North. Our GDP pc for the South corresponds to a GDP pc ratio between Central-Northern and Southern Italy of 1.31. The 95% confidence interval of this ratio (1.19, 1.45) implies that the hypothesis of equal GDP pc at the time of the unification is soundly rejected.²⁵

Our baseline ratio is slightly above Eckaus’ (1961) older upper bound ratio of 1.25 in 1861. Our ratio is also higher than that recently found by Felice (2019a: table 3.7.1) with his reconstruction of regional GDP pc in 1871: 1.18. This difference with our ratio is consistent with our contention that Felice (2019a) did not go far enough in his downward adjustment of the Southern industrial employment share, which still suffers from a positive bias (7 percentage points) (section 4). In fact, combining value added figures by sector from Baffigi (2015: 178) with our sectoral employment shares in Italy in 1861 (figure 2) yields an urban income premium of 139%. This figure, together with the differences between ours and Felice’s (2019a) sectoral employment shares, implies that Felice’s (2019a) Southern GDP pc in 1871 is 9.84% higher than it would be with our employment shares. Correcting for this discrepancy implies that Felice’s (2019a) GDP pc ratio between Central-Northern and Southern Italy becomes identical to ours: 1.31.²⁶ Such a close match between an estimate based on pre-modern trends and an estimate computed with our occupational data from 1861 and Felice’s (2019a) 1871 value added figures is, of course, very reassuring.

We use Groth and Persson’s (2016) method to estimate trends in the GDP pc in Central-Northern and Southern Italy. Their model exploits Engel’s law and uses a set of elasticities and parameters to construct micro-founded income trends with agricultural employment share data. The strength of the model is that it is undemanding in terms of data availability and is not dependent on daily wage data, the representativeness of which is increasingly being questioned, as mentioned before. Parsimony is, of course, a weakness as well, as the model neglects to consider other potentially informative variables, such as relative prices. Yet, there is evidence that the short-cut is effective. As shown by Wallis *et al.* (2018: 890), for Britain in 1530-1800 its predictions are very close to Broadberry *et al.* ’s (2015) trend, based on output figures: the correlation coefficient between the two series is as high as 91%.

²⁵ In fact, the regression coefficients imply that the 95% confidence interval for the GDP pc in Southern Italy in 2011 international \$ is (1761, 2147).

²⁶ The urban income premium is obtained by dividing the value added over sectoral share in urban occupations by those in agriculture. The error in Felice’s (2019a) is computed as the difference in urban sectoral shares times 2.39 (one plus the urban income premium) plus the difference in agricultural labour shares. The corrected GDP pc ratio is computed as Felice’s (2019a) original ratio divided by one minus the error.

Table 7: Baseline parameters of Groth and Persson's (2016) model in theirs and this paper

	Groth and Persson (2016)	This paper
Elasticity of agrarian output with respect to intermediaries from industry and services	0.09	0.09
Elasticity of agrarian output with respect to labour	0.51	0.6825
Elasticity of output in industry and services with respect to agrarian intermediaries	0.2	0.2
Elasticity of output in industry and services with respect to labour	0.53	0.48
Marginal propensity to consume agricultural goods out of the consumption basket	0.05	0.05
Marginal propensity to save	0.1	0.1
Urban-agrarian wage ratio	1.25	1.7

Sources: see the text and Groth and Persson (2016).

Groth and Persson's (2016) parameters are calibrated to England in 1688, where the income per capita is expected to be not too different from those of our macro-areas. We use the same baseline values as them, with two tweaks (table 7). First, we set the urban wage premium at 70% instead of 25%. It is common to assume a basic skill premium of 50% for early modern Europe and that value matches Italian data, too (Bandettini 1960; Malanima 2006). However, the premium was much higher for other urban occupations, e.g. in the early and mid-19th century it was about 150% for a foreman (Bandettini 1960: 8; Daniele and Malanima 2017: table 3). Hence, differences in average urban and agricultural wage rates cannot be established from wage rates alone. They also depended on the distribution of skill amongst the work-force. If most urban workers were unskilled then the premium would be lower than 50%, as Groth and Persson (2016) argue. If enough urban workers were sufficiently skilled, however, the premium could be higher.

The overall difference between the average labour income in urban and agricultural occupations can be gleaned from national accounting figures. Combining Van Zanden and Felice's (2017: tables 3 and 4) figures on labour and total incomes with sectoral shares implies that in 1427 Tuscany the urban wage premium was 84% and the urban total income premium was 173%.²⁷ This difference between the wage and total income premia reflects a higher labour income, as opposed to capital/land income, share in agriculture than in the richer urban sectors. As mentioned before, in Italy in 1861 the urban total income premium was 139%. That this figure is somewhat lower than the corresponding one in 1427 Tuscany confirms Van Zanden and Felice's (2017) contention that there the distribution of incomes across sectors was particularly unequal. Nevertheless, the 1861 figure is also consistent with a comparatively high urban wage premium. Assuming that the ratio between total income and wage income premia were the same as in 1427 Tuscany yields an urban wage premium of 61%, but the figure would be higher if the distribution of capital/land across sectors were not as skewed. We therefore use 70%, a figure which is in between 61% and 84%.

²⁷ Figures obtained by dividing the wage and total income over sectoral share in urban occupations by those in agriculture.

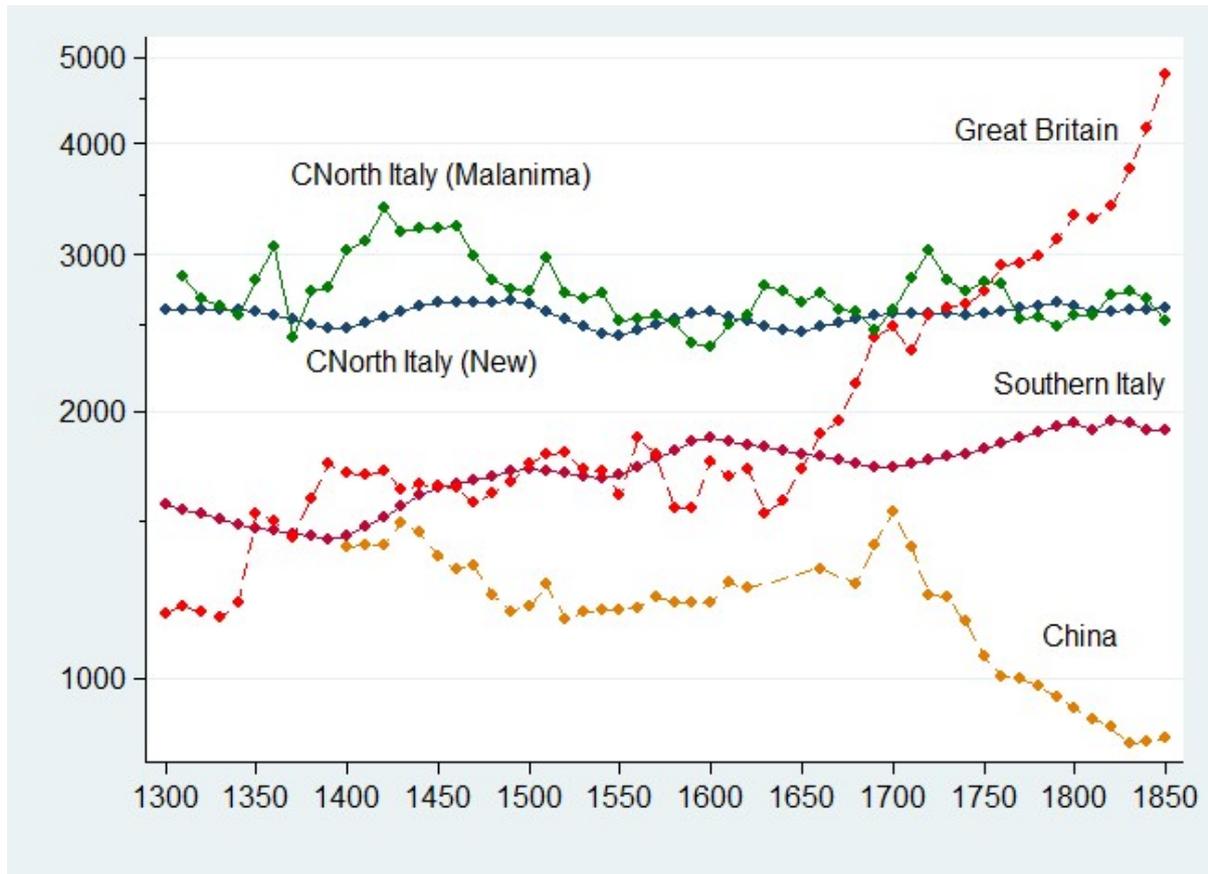
The second change that we implement to the values of the baseline parameters is that we allow the labour income share to be higher in agriculture than in the urban sectors.²⁸ Groth and Persson (2016: 21) assume that the labour income share was 66% in the urban sectors. Consistency with other parameters and value added figures in 1688 England imply that their agricultural labour income share was 56%. Van Zanden and Felice's (2017: table 3) data from the 1427 Florentine *catasto* show that the urban labour income share (54%) was significantly lower than the agricultural labour income share (80%).²⁹ This hierarchy is as expected: labour income shares are bound to be lower for poorer sectors of the work-force. At the same time, probably sector inequality in 1427 Tuscany was relatively high also by Italian standards and therefore we settle for slightly different figures: 60% in the urban sectors and 75% in agriculture.

The GDP pc levels are set by our estimate for 1861 for the South and Malanima's (2011) estimate in the same year for the Centre-North, which is based on a more solid statistical basis than earlier estimates. Our model assumes that trade in primary products was balanced, so that changes in the agricultural labour share match changes in the share of income spent on primary products. This assumption is standard for Central-Northern Italy, where trade was a small share of agricultural production (Allen 2000; Federico and Malanima 2004: 447-448). It is even less demanding in the South, where mid-19th century statistics show that the value of trade per capita was much lower than in the Central-Northern states (Federico and Tena Junguito 2014: table 3). Figure 5 shows our estimates and compare them with those of Malanima (2011) for Central-Northern Italy and those of Broadberry *et al.* (2015, 2018) and Xu *et al.* (2016) for Britain and China.

²⁸ : The elasticity of output in agrarian output with respect to labour is equal to one minus the elasticity of agrarian output with respect to intermediaries from industry and services times the income labour share in agriculture. The elasticity of output in industry and services with respect to labour is equal to one minus the elasticity of output in industry and services with respect to agrarian intermediaries times the income labour share in industry and services.

²⁹ The overall labour income share, 63%, was very much in line with those observed in other pre-modern (and indeed modern) contexts.

Figure 5: GDP per capita in Italy, Britain and China (2011 international \$, log scale), 1300-1850



Notes: CNorth=centre-north. Conversions into 2011 international \$ by the Maddison Project (2020 version). Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

Our long-term trend in Central-Northern Italy is mostly reassuringly close to that of Malanima (2011). There is nevertheless an obvious discrepancy in the aftermath of the Black Death (1348), when we detect decline rather than growth. Our figures are thus more in line with the old view that there was a late medieval depression (Postan 1952; Lopez and Miskimin 1962) than the current orthodoxy that the aftermath of the Black Death was a “golden age of labourers”, with rising GDP pc and income labour shares (Jedwab *et al.* 2020; Alfani forthcoming). Whence the difference? As mentioned before, our agricultural employment shares are very close to those of Malanima (2011: table 3), in spite of slightly different borders and he, too, detects a higher agricultural employment share in 1400 than in 1300 and 1350. This is not so surprising: our and Malanima’s (2011) estimates are based on very similar urbanisation rates (Chilosi and Ciccarelli 2021: table A1 in appendix B). The available evidence suggests that if anything we understate the extent to which the Black Death caused de-industrialisation: in fifteenth-century Tuscany the non-agricultural rural employment share was 6% (Herlihy and Klapisch-Zuber 1978: ch. 10), much less than our estimate for the Centre-North during the Risorgimento of 27% (table 3). The difference with Malanima’s (2011) series is caused by fluctuations in daily wages, which are a key input in his series but not ours and shot up after the Black Death. If, as argued by Hatcher (2018), wages after the Black Death

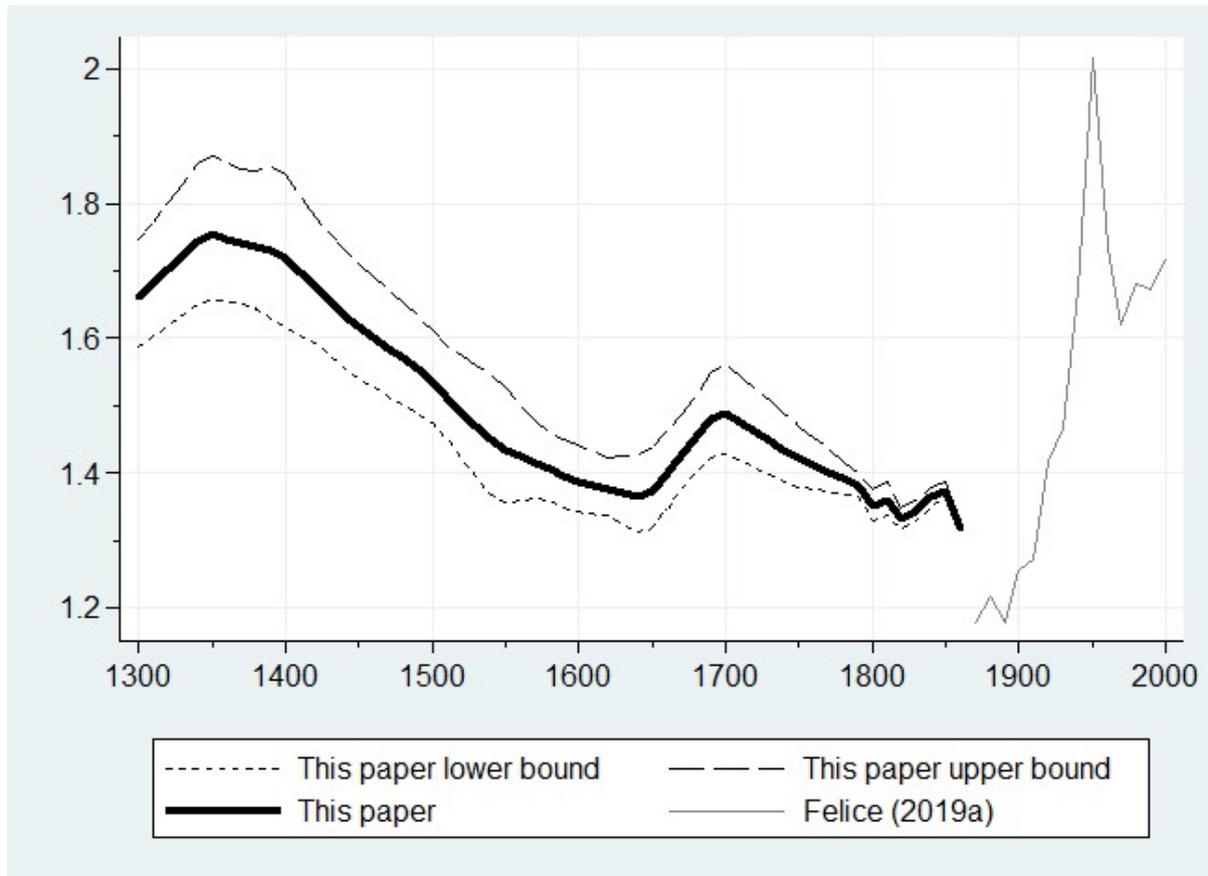
went up less and are less representative of incomes than usually thought, the boom and bust in the century and half after 1348 needs to be reconsidered.³⁰

The post-1348 growth also raises issues of consistency with other measures of development. In particular, all else being equal, Engel's law implies that rising incomes are inconsistent with rising agricultural employment shares. Can the two be consistent if we relax the assumption of stability of the parameters and allow the labour income share to rise after 1348? On the one hand, increased agricultural wages and labour income shares are associated to increased agricultural labour productivity and thus consumption of primary products. By Engel's law such a change reveals a decreased income per capita. By the same logic, on the other hand, an increased labour income share in the urban sectors is associated with increased consumption of urban goods and thus reveals an increased income. Moreover, by definition, increased labour income shares (both primary and urban) match into falls in the capital and land income shares. Hence, for any given agricultural labour share, the sign of the net effect of an increased labour income share on the estimated GDP pc is undetermined a priori, but likely negative in an agricultural society. Indeed, if we allow labour income shares to rise by 20 percentage points between 1348 and 1430 we predict a marked economic contraction.³¹ While for Malanima (2011) the Centre-North expanded by 22.15%, our baseline estimates are that it grew by 1.14% in the same place and by 3.73% in Southern Italy. With increased labour income shares the same two figures become -50.63% and -35.24%. While these figures are computed assuming that agricultural and income labour shares increased equally, the evidence is that after 1348 the urban wage premium was falling (Malanima 2012). It is thus likely that agricultural income labour shares increased more than the urban ones, implying that the predicted contraction would be even more severe. A more equal distribution of income is also expected to decrease the propensity to save and increase the propensity to consume food. Changing these propensities in these directions implies greater consumption of primary goods at any given a level of income and thus a greater revealed income at any level of agricultural labour share. Yet, the size of these effects is rather modest. Even in the extreme case where we allow people after the Black Death to stop saving altogether and spend virtually all income on food (more than 99%) we would still predict a marked contraction, by -47.80% in the Centre-North and -28.17% in the South. In short, the sensitivity analysis strongly suggests that if anything our baseline specification understates the negative economic consequences of the Black Death in Italy. A new outburst of the plague in the seventeenth century was also followed by similar contractions.

³⁰ If the trend produced by wages were spurious our estimate of the southern GDP pc in 1861 could be biased. Nevertheless, re-computing the estimate with our series for the Centre-North shows that our result is robust: the ratio remains 1.31.

³¹ We choose 1430 as it is the peak of Malanima's (2011) series. We allow the labour income shares to rise by 20 percentage points because this is the increase observed in England, where the data are comparatively reliable, after the Black Death by Federico *et al.* (2020). Our final levels are those measured by Van Zanden and Felice (2017: table 3) in 1427 Tuscany.

Figure 6: GDP pc ratio between Central-Northern and Southern Italy, 1300-2000



Notes: upper and lower bounds implied by the 95% confidence intervals of the coefficients of the ag-urb regression (equation 1) applied to macro-areas with a weighted fractional model for the backward extrapolation.

Sources: see the text and Chilosi and Ciccarelli (2021: appendix B).

The Italian North-South gap shows up as significantly higher in the late middle ages than on the eve of the unification, as the South saw slow economic growth, with a yearly rate of change 0.05% and a total change of 24%, while the Centre-North stagnated (figure 6). The late medieval gap is even more marked with Malanima's (2011) series for the Centre-North (figure 5), but we expect our GDP pc ratio to be robust to the neglect of information on wages and prices. Prices and wages in the South and the Centre-North were fairly strongly correlated. In Allen's (2001) database the consumer price index and real wages in Florence and Naples exhibit correlation coefficients of 70% and 46%, respectively. In Malanima's (2006) dataset the same figures for Milan and Naples are 79% and 75%. Hence, we expect short-term fluctuations missed out by our procedure to be similar in our two macro-areas and thus a tendency to cancel each other out in the ratio. We explore the sensitivity of the results to the backward extrapolation of the agricultural labour shares, by looking at the 95% confidence intervals implied by the coefficients of the agricultural labour share-urbanisation regression. While the agricultural labour shares are estimated rather precisely, with bands 1 percentage point wide on average and 3.4 points at most, relatively wide bands are caused by the fact that GDP pc figures are rather sensitive to changes in these shares. Nevertheless, the main results hold across the band.

Felice's (2019a) figures on regional inequality in Italy since 1871 imply that the late medieval peak in our series of GDP pc ratios (1.75 in the 1350s) was not surpassed until the 1950s peak (2.02) and is similar to the current level (1.72). Catch-up growth in Southern Italy

occurred in the fifteenth and sixteenth centuries. At the same time as there also was catch-up in state capacity: by the mid-16th century the Southern kingdoms had developed fiscal systems able to exercise a fiscal pressure comparable to that of those of the city-states of the Centre-North and significantly greater than in other European countries, like France or England, as well as public debts enabling them to flexibly meet sudden fiscal needs. Moreover, consistent with the hypothesis that state capacity was driving long-term trends, fiscal pressure in both the South and the Centre-North stagnated over the two and a half following centuries (Chilosi 2014).

Nevertheless, the early modern era saw marked short-term fluctuations, which can be related to war and epidemiological shocks. Economic historians routinely stress that, after the buoyant “Indian summer” of the sixteenth century, Spanish involvement in the Thirty Years War (1614-1648) meant that the 17th-century crisis was particularly pronounced in the Kingdom of Naples, culminating in Masaniello’s revolt against Spanish taxation in 1647. Indeed, we find a contraction in Southern GDP pc in the first half of the 17th century. However, in those decades the contraction was even more marked in the Centre-North, while the opposite was true in the second half of the 17th century, implying that our ratio follows a u-shaped curve during that century. This pattern matches the different timing of the 17th-century plague, which hit the Centre-North in the 1630s and the South in the 1650s. Alfani (2013) and Alfani and Percoco’s (2019) stress that the 17th-century plague had long-lasting negative economic consequences in Italy, where it was particularly deadly, as it led to de-urbanisation and human capital losses. De-urbanisation was particularly long-lasting in the North (as distinct from the Centre-North): the urbanisation rate went from 14.1% in 1600 to 11.3% in 1650 and only recovered the pre-plague level in 1800 (using a 5,000 inhabitants threshold). However, the Central part of the peninsula was largely spared by the epidemiological crisis. In consequence, in the aggregate figures, the Centre-North had rebounded already by 1700, while the South took longer: there, we find that it is only by 1800 that the GDP pc had returned to the level of 1600.

We already noticed that not much happened during the Risorgimento (1800-1861) (section 4). Our upward revision of the GDP pc ratio at the time of the unification suggests that also liberal Italy (1861-1914) saw little changes: it is only in the 1920s that the ratio became larger than it was in 1861. Divergence was thus concentrated in the wars and inter-war period (1915-1950). Movements were much faster in modern than in pre-modern times. Thus, catch-up during the “golden age” (1950-1973) achieved a similar reduction in the GDP pc ratio as that of the 15th/16th centuries over twenty rather than two-hundred years.

Turning to the international comparison, the timings of the “great” divergence between Europe and Asia and the “little” divergence within Europe are unaffected by the choice of series for the Centre-North, whose income per capita was in the order of twice as big as that of China already at the beginning of the 15th century, was caught up by Britain by 1700 and had fallen behind it by the mid-18th century. Southern Italy was different. In 1300, it, too, was better off than Britain. However, after the Black Death (1348), it was broadly on par with Britain and China, though it temporarily became quite a lot richer than the latter in the 16th century. It markedly fell behind Britain with the latter’s take-off of the mid-17th century and forged ahead China with the latter’s decline in the 18th century. By the mid-19th century, the GDP pc in Southern Italy was about twice as large as that of China, but less than half that of Britain. Using Broadberry *et al.*’s (2018: 990-991) method to extrapolate the GDP pc in the Yangzi Delta from the Chinese one, implies that South Italy’s GDP pc in 1400 was between 60% and 75% of that of the most advanced part of China. However, South Italy had become richer than the Yangzi Delta between 1720 and 1760 and by the mid-19th century its GDP pc was between

25% and 60% greater. The impression that Southern Italy was relatively well-off by pre-modern standards, in spite of being behind Centre-Northern Italy, is confirmed by a wider comparison of GDP pc levels before 1800 (Chilosi and Ciccarelli 2021: figure 9). Southern Italy emerges as a middle-high income place, at the time. Its average income was on par with France and the United States, higher than in most Western European countries and all extra-European countries bar South Africa, whose GDP pc was only a little higher. It was in the order of twice as big as the income per capita in Southern American, middle Eastern and Eastern European countries. Southern Italy's income per capita range in our period was between 2.14 and 2.87 subsistence baskets.³² These are figures which are difficult to reconcile with the picture emerging from some real wage series of a pre-modern Italian population that by the 18th century had become so poor that it struggled to survive (Allen 2001; Allen et al. 2011).

7. Conclusion

This paper reconstructs the agricultural occupational share and consistent GDP pc series in the five and half centuries before the unification of Italy in order to offer new perspectives on the origin of current economic divides. We rely on pre-unification censuses that do not suffer from the same biases plaguing the early Italian censuses. In line with the conventional wisdom and in contrast to the censuses of the liberal age, we find that the agricultural employment share was higher in Southern than in Central-Northern Italy at the time of the unification, as the southern provinces were not as industrialised and possibly commercialised. In both macro-areas, the aggregate occupational structure changed little between 1800 and 1861, matching the perspective that this was a period of economic stasis. Yet we challenge the implicit assumption of the debate on the origin of the North-South divide that not much happened before 1800. Our reconstructions show that the evolution of the agricultural employment share in the Centre-North since 1300 is consistent with secular economic stagnation, while that of the South predicts slow economic growth. In consequence, our GDP pc ratio between Central-Northern Italy and Southern Italy was significantly higher in the late middle ages than at the time of the unification. The drop was concentrated between the fifteenth and the sixteenth centuries. Our ratio's series is consistent with a role for state capacity in driving long-term trends and for war and epidemiological shocks in driving shorter term fluctuations.

The international comparison shows that our series of shares of agricultural workers are incompatible with trends in daily real wages, but match rather well annual real wages and GDP series. Our estimates agree with the timings of the great divergence identified by GDP data, with Central-Northern Italy being ahead of China already in 1400 and being over-taken by Britain in the decades around 1700. We can now also add Southern Italy to the picture. Its agricultural employment share is consistent a GDP pc trajectory rather different from that of the Centre-North: we find that Southern Italy in 1400 and 1700 was not much richer than China and it was in fact poorer than the Yangzi Delta. However, a large gap emerged in the wake of China's decline in the intervening period, when Southern Italy became richer than even its wealthiest part. After the Black Death (1348) Britain had caught up with Southern Italy, to forge ahead after the mid-seventeenth century take off. Overall, Southern Italy emerges as a middle-high income place, by the standards of the late medieval and early modern world, calling into question overly pessimistic assessments of standards of living in pre-modern Italy. Future research should further examine the growth accounting implications of our new data and systematically analyse the causes and consequences of the patterns that we discovered.

³² Again using an absolute poverty line in 2011 \$ of 694 \$ per year (Bolt and van Zanden 2020: 19).

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