

Wages, Productivity and Working Time in Italy, 1270-1913

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On the basis of published and unpublished data, this article presents a series of wage rates and wages in Central-Northern Italy from the end of the thirteenth century until 1913. The series is among the longest available. The movement of wage rates is explained against the background of the changes in average and marginal labour productivity and working time over six centuries. The analysis results in a very long-term profile of the Italian economy, which declined from the late Middle Ages, became stable after 1820, and then grew from the 1880s.

1. Introduction

Despite its industrial growth since the 1880s,¹ on the eve of the first world war Italy was still a relatively backward region of Western Europe. Its labour productivity in agriculture was one-quarter that of the United Kingdom.² Industrial production was still much lower than that of Belgium, France, Germany and Sweden, and less than half that of Great Britain. Industrial wages were, consequently, also lower.³ Gone were the times when Italian real wages had been among the highest in Europe.⁴ As far as we know from the only long-term data available,⁵ real wages in Italy had already started to decline in the late middle ages and did not

¹ Fenoaltea, "Notes".

² O' Brien-Prados De La Escosura, "Agricultural Productivity", p. 531; Federico-Malanima, "Progress, Decline, Growth".

³ Zamagni, "An international Comparison", p. 119.

⁴ Zanden, "Wages and the Standard of Living".

⁵ Allen, "The Great Divergence", which presents 25-year averages of Italian building-workers' wages.

begin to make a slow recovery until at the end of the nineteenth century. There are still many uncertainties regarding wage movement during the centuries from the late middle ages onwards. Despite its central importance for our understanding of the main trends of the economy, our knowledge of wage movement in Italy is limited to a rough outline.⁶ We still lack continuous series of wages for the period from the end of World War I to very recent times.⁷ We do have several fairly good series for individual regions or cities before the nineteenth century. They have not yet been connected, however and therefore cannot contribute to our understanding of long-period trends.⁸

The purpose of this article is, first of all, to collate the existing scattered series of wages and complete them with new and hitherto unpublished material. We shall identify the main phases and trends in wage movement within a long-term macroeconomic perspective, from the late thirteenth century – the period for which the first published data are available – until 1913, when Italy was going through the first phase of modern growth. They will be examined in the context of the evolution of the Italian economy from the late middle ages until it began to take off in modern times. The focus will be on Central and Northern Italy,⁹ because this area is better represented than Southern Italy in published studies.¹⁰

This paper is divided into two parts. The first (§§ I-IV) is a general outline of wage movements – yearly and decadal – in the 1270-1913 period. The second (§§ V-VIII) deals with the relationship between wages, productivity and working hours. I will start with three annual series

⁶ See, however, the important article by Vigo, "Real Wages of the Working Class in Italy".

⁷ The only continuous series from 1861 is published by Ercolani, "La documentazione statistica". See also several contributions by Zamagni on shorter periods between 1880 and 1946: Zamagni, "An international comparison"; *idem*, "I salari giornalieri"; *idem*, "La dinamica dei salari nel settore industriale"; *idem*, "Una ricostruzione".

⁸ Annual series of wages have been worked out by R.C. Allen and are available in the database at www.nuffield.oxford.ac.uk/users/allen. They concern labourers' and craftsmen's wages in the building industry in Florence, Milan and Naples. These series may provide a first approach to comparisons between Italian and non-Italian levels of wages. They will be discussed in the Appendix.

⁹ The area we will examine will be, with few exceptions, the part of Italy from the Southern borders of Tuscany, Umbria, and the Marshes to the Alps.

¹⁰ See, in any case, Malanima, "An Age of Decline", where series of Southern prices and wages are available for the period 1700-1913.

concerning respectively Tuscany, Lombardy and Italy as a whole, and spanning a very long period, from 1270 to 1913. Two main series of industrial and agricultural wage rates will then be constructed and, on this basis, a single concise series. It will allow the reader to distinguish two main phases within this long period, i.e. the pre-modern phase – from the late middle ages until 1820 – and the modern phase – from 1820 until 1913. This analysis will enable us to connect these two phases in the history of Italian wages to the main determinant of wage movement, i.e. labour productivity. It will be seen that wages clearly show a long-term decline from the late middle ages until 1820, followed by an initially slow, then a faster growth.

2. Wage rates and prices: the trend

Data on Tuscan prices and wages are available as early as the late thirteenth century (*Figures 1 and 2*).¹¹ In this case, as in many others, wage rates in the building sector are much better documented than those in other kinds of activity. Only from the first decades of the fourteenth century, however, do they describe a continuous curve. It seems that in 1320, after a period of growth, they were beginning to decline. From the mid-fourteenth century, after the Black Death, a rapid growth is to be seen in Tuscany, as in the rest of Europe. Real wage rates remain high, on average, until the second half of the fifteenth century, when a decline takes place for some decades, followed by a rapid recovery, then a fall from 1570 to 1600, when wage rates dropped to 40 percent less than in the previous century.

While data on wages in Tuscany until the end of the nineteenth century are available, data on prices are insufficient to construct the price index necessary to deflate nominal wages. Thus, at the beginning of the seventeenth century we leave the Grand Duchy of Tuscany and turn to the annual history of wages in the Duchy of Milan. For Lombardy, both

¹¹ For the series on which the present reconstruction is based see the notes in Appendix. The annual series (price index, nominal and real building wage rates, silver weights of Florentine and Milanese currencies) are available at www.issm.cnr.it.

series of nominal wages and series of prices are available from that time until the unification of Italy in 1861. Wages in the building sector are still better documented than other kinds of wages. This new series can be combined with the previous one, given the similarity of wage levels in Tuscany and Lombardy from 1606 to 1620, when series of prices and wages are available for both areas.

Real wage rates show a clear recovery, starting from the first decades of the seventeenth century on, especially after the devastating plague epidemics of 1629-1630, which caused 1,365,000 victims in Central and Northern Italy.¹² They remained relatively high during the seventeenth century and the first half of the eighteenth century, dropping rapidly after 1733, and even more so from the 1760s onward. The lowest point was reached in 1800-20. Whereas in Northern Europe the year 1820 marked a sharp turning-point in wage series and the beginning of a long period of rapid growth, in Italy this was not the case. Wage rates ceased to decline and began a slow recovery, with interruptions in years of bad cereal harvests and a fall in wine production, which caused steep increases in prices.

A change worthy of note in the shift from the Tuscan to the Lombard annual series is the fall in the deviation of wage rates from the average (*Table 1*). Volatility in annual movement seems to decrease from the beginning of the seventeenth century onward, when measured by standard deviation or, as is more appropriate, by the coefficient of variation.¹³ This change does not depend on the shift from Tuscany to Lombardy, but on a real change in the agricultural price series, and occurs in both areas at the same time. A discussion of this change lies outside of the scope of this paper, since it concerns not wages, but the prices we use to deflate wages.¹⁴ However, it is important to note that, whatever the reason, wage rates appear much more stable from year to year in the second series than in the first. Workers' income was lower in the eighteenth and nineteenth centuries than, say, in the fifteenth, but their poverty was much more stable.

¹² Malanima, *La fine del primato*, p. 129.

¹³ Even though, as we can see in the Table, the coefficient of variation reveals relatively high values still in the period 1750-1900.

¹⁴ Persson, *Grain Markets in Europe*: although this book focuses on a later period.

TABLE 1. Standard deviation and coefficient of variation of real wages, 1300-1913 (index of real wages 1420-40=1).		
	Standard deviation	Coefficient of variation
1300-49	0.15	0.26
1350-99	0.21	0.26
1400-49	0.19	0.20
1450-99	0.22	0.28
1500-49	0.20	0.32
1550-99	0.14	0.22
1600-49	0.08	0.15
1650-99	0.08	0.15
1700-49	0.07	0.13
1750-99	0.09	0.22
1800-49	0.06	0.20
1850-99	0.06	0.20
1900-13	0.04	0.08

After the unification of Italy, and until the eve of the first world war, data on wages in the building sector are available for the whole of the new state.¹⁵ They can be deflated by means of a recently revised national price index.¹⁶ Tuscan and Lombard wage rates were more or less the same as the Italian average. Wage rates show a clear upward trend from the Eighties onward and, until the start of the war, a reversal of a centuries-long negative trend.¹⁷

3. A decadal series

The first two series examined above show the yearly movement of masons' wage rates in Tuscany from 1270 to 1605, and in Lombardy from 1606 until 1860... and nothing more! Probably, for some periods, it would be more accurate to say that they are merely series of Florentine and Milanese

¹⁵ Although the similarity with Northern Italian wages suggests that the series represents the North better than other parts of Italy. The Italian series is presented by Fenoaltea in "Production and Consumption".

¹⁶ By Fenoaltea, "Production and Consumption".

¹⁷ This series can be completed until 1946 with Zamagni, "La dinamica dei salari", and *idem*, "Una ricostruzione".

wage rates. If we aim at a more rigorous history of wages, we must resist the widespread temptation to use the annual series of prices and wages referring to a small area or a city as being representative of much broader situations and working conditions; particularly when dealing with an area such as Central and Northern Italy, which until 1861 was divided into several political units separated by frontiers and having different currencies. To the question whether under such conditions it is possible to construct a single homogeneous annual price index, the answer can only be that it is not.

The difference in currencies makes the yearly prices of individual states scarcely representative of the broader Italian picture.¹⁸ The long period under examination was characterised, in Italy as elsewhere, by frequent monetary debasements, which occurred at different times in different states.¹⁹ Each debasement influenced the price system – labour price included – within the state where it occurred in a way that is impossible to quantify, and which varied according to the economic conditions of the time.²⁰ The conversion of prices into precious metal does not eliminate the problem. It only becomes less relevant as we proceed to the early modern age, when debasements are less frequent,²¹ smaller, and the circulation of several diverse currencies within the borders of different states in Northern and Central Italy leads to the formation of what C.M. Cipolla defined as a common “monetary area”²²; an area, that is, where currencies influenced each other and followed similar trends in their loss of value.

The problem of building an annual price series for Northern and Central Italy is much more serious when we look at the homogeneity of the basic data used to build price indexes. In a recent article, G. Federico has pointed out the low correlation between different agricultural price series for pre-unification Italian states.²³ In the first half

¹⁸ For a broader discussion of this problem, see Malanima, *L'economia italiana*, App. 3.

¹⁹ This is hardly perceived in Allen's database (see my comments in the Appendix), where Florentine nominal wages in silver remain stable from 1372 until 1519!

²⁰ An old, but still important, article on the subject, originally published in 1940, is Einaudi, “Dei criteri informativi della storia dei prezzi”.

²¹ See the silver weight of the currencies used in the annual series (col. 3) in www.iissm.cnr.it.

²² Cipolla, *Le avventure della lira*, p. 49.

²³ Federico, “On the Economic Causes”.

of the nineteenth century, despite a probable growth of exchanges among the different states of the Italian peninsula, which caused this volatility to decline, differences were still deep. Diverse levels of agricultural production did not compensate one another, because transportation costs were much higher in a hilly and mountainous area such as Italy – where only transport by sea was relatively cheap – than in many Northern European regions. Frontiers between states and laws forbidding the transfer of agricultural produce from areas of plenty to areas of want contributed to inhibiting the convergence of prices. Only the most severe crises, determined by meteorological conditions affecting wide areas at the same time, resulted in similar movements in agricultural prices in different states.

The conclusion is that, both for monetary and market reasons, the only possible correct approach would be to deflate wage series for any state in Italy only by the price index of that particular state. Price indexes built by putting together data concerning areas far apart from one another, as if the basic data on prices were similar everywhere, should always be avoided, and not only in the case of Italy.

However, this lack of homogeneity should not be regarded as an insuperable obstacle to the writing of a comprehensive history of wages in Italy. In known series for different Italian regions, while yearly movements differ and the correlation is low, long-term trends show marked similarities. On a decadal basis,²⁴ in the sixteenth century, price movements are not so different in two Italian areas distant from one another such as Tuscany and Campania (*Figure 3*),²⁵ and in the eighteenth century price trends are quite similar in Naples and Milan (*Figure 4*).²⁶ The correlation is higher than we would expect. The choice of a decadal processing of data on prices may enable us to deflate the nominal wages of different regions. The advantages

²⁴ The series in App. (col. 1) represents, however, the central term of a moving average of 11 terms.

²⁵ The price index for Naples is based on the series presented by Coniglio, "La Rivoluzione dei prezzi". After 1610, the Tuscan index has been continued with data referring to Lombardy (and already presented in the previous pages).

²⁶ The price index for Naples is based on data from Romano, *Prezzi, salari e servizi*. A price index for the Kingdom of Naples from 1647 until 1860 has been recently built by Mantovani, "Potere d'acquisto della moneta".

of a much broader perspective on such an important subject as wages seem to more than justify the risks involved in such a procedure.

Thus, a decadal price index can be worked out by combining the Tuscan, Lombard, and Italian data presented above. This index can be used to deflate wage series for the whole of Northern and Central Italy.

By eliminating yearly variability, we obtain a better long-term view of masons' wage rates from the late middle ages until 1913. Since the series for Tuscany is based on better basic data, only in part already known, and on information spanning a longer period, its curve provides a preliminary view (*Figure 5*).²⁷ This curve clearly follows a movement similar to that of other Western European series: the high 1350-1450 level, the ensuing decline, the slow seventeenth-century recovery, the late eighteenth-century fall, the nineteenth-century increase. The movement of Italian masons' wage rates, shows, however, some specific features: the fall from the 1350-1450 top level occurs earlier than elsewhere, already after 1450-60; the sixteenth-century decline is not as strong; the seventeenth-century recovery is considerable; low-level stabilisation took place between 1820 and 1880, instead of the rise that characterises most European regions.²⁸

**TABLE 2. Wage rates of building craftsmen in some European cities
in 1600-50 and 1800-50.**

	1600-50	1800-50
Antwerp	2.27	2.01
Amsterdam	1.93	1.49
London	1.82	2.31
Madrid	1.83	1.72
Paris	1.37	1.72
Leipzig	1.04	1.29
Krakow	1.16	1.30
Florence	1.82	1.02

Source: Allen, "The Great Divergence", p. 428. Data on Florence have been replaced with the series in the following App. (col. 2).

²⁷ Data in the figure after 1890 refer to Italy as a whole. Data from 1620 until 1819 are from archival sources (see Appendix).

²⁸ See the curves for several European countries in Allen, "The Great Divergence".

In the long run, however, Italian wages in the building sector diminished more than those of many other European areas, as the levels in 1600-50 and 1800-50 show when they are expressed according to the purchasing parity power of the several currencies (*Table 2*).

While Florentine wages were among the highest in Europe in the late middle ages and still the same as London wages in the first half of the seventeenth century, in 1800-50 they were among the lowest. Italy had dropped from the top to the bottom of the European hierarchy of wages in the early modern centuries. At the moment, given the difficulties of any interregional comparison, we only perceive a change that will deserve special attention in future research.

4. Rural wages

How much are these series of masons' wage rates representative of workers' wage rates as a whole? Italian cities, both in the late middle ages and in early modern times, were relatively advanced market systems where waged labour was widely diffused and opportunities for moving from one job to the other were not much limited. Restrictive laws in this regard were not as binding as past literature has often suggested. Even the guilds probably did not hinder mobility as much as many scholars believed.²⁹

A comparison between different nominal wages is possible on a local scale; for example, in sixteenth-century Florence.³⁰ This comparison shows that similar movements prevail both in the same and in different sectors of activity. The wage movement of building labourers and master bricklayers is almost equal.³¹

If we compare the wages of different cities and states, trends are quite similar, as the wages of building labourers in Venice and bricklayers in

²⁹ See especially Epstein, "Craft Guilds" and "Labour Mobility".

³⁰ See different series of wages concerning Florence in Parenti, *Prime ricerche*.

³¹ Despite some interesting differences bearing witness to a sort of skill premium in certain periods, e.g., in the late middle ages. In the textile industry, nominal decadal wages show a high correlation with wage series in the building industry. The original series for master masons and labourers in the building industry were elaborated by Goldthwaite, *The Building of Renaissance Florence*, Appendix.

Florence (Figure 6), and of masons in Florence, Milan³² and Genoa clearly show (Figure 7).³³ Even though, we must add, the resulting high correlation is, at least in part, spurious, since we are using a single price index to deflate different series.³⁴

The ratio between urban and rural wages is a different story.³⁵ Very few series of agricultural wages exist at the moment for other regions in continental Europe. Evidence on rural wages is still scanty and unreliable. Their trends are often considered to be similar in all respects to those of urban wages. In Central and Northern Italy, they show, on the contrary, some evident differences (Figure 8). The changing ratio over time between nominal urban and rural wages is far from negligible (Figure 9).³⁶

The relative decline of urban wages from 1350 to 1450 goes hand in hand with a low urbanisation rate.³⁷ It is a consequence of the declining number of rich buyers for Italian luxury goods and commercial services in the depopulated continent and along the coasts of the Mediterranean after the Black Death and the many other epidemics that followed.³⁸ The urban recovery of the sixteenth century, also attested by increasing urbanisation rates, is marked by a growth in the demand for labour in the cities, and the drawing of manpower from the countryside to the expanding cities. The difference between urban and rural wages deepens. It diminished, instead, from the seventeenth century onwards, because of the decreasing vitality of Italian industry and commerce, which lasted until the late start of modern growth.

³² For an in-depth discussion of the reliability of Milanese data on wages, see Mocarelli, "Wages and the Labour Market".

³³ The processed data for Venice, Milan, Florence and Genoa can be found in Malanima, *L'economia italiana*, App. 4.

³⁴ The correlation is, however, quite high also in nominal terms.

³⁵ The sources for the rural series are in App. For a comparison with England see especially Clark, "The Long March of History".

³⁶ The figure is the result of the ratio of decadal nominal wages for building workers –masons– to those of rural labourers. The difference between urban and rural wages in 16th-century Florence was already discussed by Parenti, *Prime ricerche*, pp. 216 ff.

³⁷ Data on Italian urbanisation in Malanima, "Italian Cities", and *idem*, "Urbanisation and the Italian Economy".

³⁸ The problem is discussed in Malanima, "Urbanisation and the Italian Economy".

5. Wages rates and population

The creation of a single weighted average wage index combining rural and urban wages indices, aimed at outlining the trend of the price of labour on the whole, may be regarded as arbitrary. A deep-rooted opinion is, in fact, that rural wages, especially in North-Central Italy, were not very representative of overall rural labour conditions. While rural labourers were actually relatively numerous in Southern Italy, in the Centre-North the prevalence of leases in kind, such as share tenancy, limited recourse to waged labour to marginal families. How can the wages paid to these labourers be representative of standard incomes and living conditions in rural areas? The objection is far from negligible. We lack reliable figures on the quantitative importance of waged labourers in rural North-Central Italy. What we do know is that they increased during the early modern and modern period, especially in the eighteenth and nineteenth centuries.³⁹ In some areas of the Po Valley, by the end of the nineteenth century, the waged labour force represented more than half of the whole population.⁴⁰

On the other hand, what else was the part of the harvest that peasant tenant families kept for themselves but a labour reward, paid for in kind, at least partially?⁴¹ This part could not be much higher or lower than the level of real wages. Competition in the rural labour market implied the convergence of any labour reward towards the wage. Reconstructions of tenant labour contracts and rural living standards point to the existence of similar trends in the rewards of tenant families, whether regulated by contracts of tenancy or monetary wages.⁴²

By combining urban and rural wage rates⁴³ in a single series, weighted by the relative importance of agricultural and urban wages as revealed

³⁹ For Tuscany see Malanima, *Il lusso dei contadini*, pp. 146 ff.

⁴⁰ Cazzola, *Storia delle campagne padane*, pp. 109 ff.

⁴¹ Several different sources of revenue can be distinguished in the income of a peasant share-tenant family: a rent, if the family owns land or the house; a profit, since the family does farm work; and a wage, for the labour employed on the farm. The topic is discussed by Giorgetti, "La rendita fondiaria".

⁴² Giorgetti, *Contadini e proprietari*.

⁴³ Rural wages from the seventeenth century onwards refer to Piedmont. See the criteria followed and the materials used in the Appendix.

by the urbanisation rates, we obtain a long-term decadal trend of labour rewards over the centuries, from the late middle ages until the eve of the first world war: a new perspective for Italy on how much labour prices varied in the very long run. Since from 1861 on we have hourly wages, I will express all wage movements, even those before that date, in 1860-70 Italian lire per worked hour (*Figure 10*). Obviously a series of daily wages would not be different, since the series in the graph is simply the result of the division of daily wages by 10 (the working time to which the late nineteenth-century series refer). Data presented by V. Zamagni and S. Fenoaltea for post-unification Italy are quite similar and those by Zamagni concern a great variety of industrial sectors.⁴⁴

There is no doubt that wage rates for many young workers and women were lower than those for the male labour in industry and agriculture to which our information refers. In the cities, on the other hand, wage rates of state officials, soldiers, professional men, teachers, artisans, petty traders and shopkeepers were higher than those to which our evidence is limited. It has been ascertained that for many countries, including Italy, in the 1950s, 1960s and 1970s the upward and downward deviations from the average of the male workers in industry and agriculture mutually compensated, and the evidence referring to workers in manufacture and agriculture could adequately represent the mean workers' reward on the whole.⁴⁵ To data per hour provided by Zamagni and Fenoaltea the reconstructed series – in Italian 1860-70 lire – is linked by means of the wage index.⁴⁶ We thus obtain, for Central-Northern Italy, an overall weighted series concerning, at the same time, urban and rural wage rates. From annual and then decadal data we shift now to a more general curve, representative of overall wages in a very long period.

The comparison of wage rates and population movements in the Centre-North⁴⁷ in a single diagram enables us to reach two preliminary conclusions:

⁴⁴ Zamagni, "An International Comparison"; *idem*, "I salari giornalieri degli operai", and Fenoaltea, "Production and Consumption".

⁴⁵ See especially Fuà, *Occupazione*, p. 99.

⁴⁶ Appendix, Col. 1 (price index), Col. 5 (per hour wage rate). The series of the hourly wage rates between 1861 and 1913 is completed backwards by means of the daily wage rates.

⁴⁷ Widely presented in Malanima, *L'economia italiana*, App. 1.

1. The first evident (but up to now undetectable) feature of our series is that, on the eve of the first world war, wage rates – but not wages –⁴⁸ were lower in Italy than in the late middle ages by about 30-40 percent. This is not an insignificant finding when we look at Italian history in a broad perspective. In the Italy of 1913 which was undergoing industrialisation, waged labourers' living conditions were worse than they had been 500 or 600 years previously. In this respect, the Italian economy had clearly described a declining trend;

2. The second conclusion results from a comparison of population movements and wage rates. Over a long period, an inverse correlation between population and wage rates dominates: at least from the beginning of the series until 1820. Wage rates increase only in times of population decline, such as the golden age for workers between 1350 and 1450, and the 1630-1750 period. This inverse relation is expressed by the following linear regression:⁴⁹

$$w = 42 - 0.003P (R^2=0.65) \\ (8.29E-13)$$

(where w is the wage rate for 100 working hours, and P the population divided by 1000). This relation changes from 1820 onwards. For the first time, a direct relation prevails. Population and wages progress jointly. The result of the linear regression of wage rate on population is now a positive one:

$$u = -4.22 + 0.001P (R^2=0.79) \\ (0.00054)$$

While before 1820 a 1000-man increase in population produced a 0.003 lire decrease in the reward of 100 hours work, between 1820 and 1913 the same increase was accompanied by a 0.001 lire rise.

6. Labour productivity

To measure the changes in time of average labour productivity, we

⁴⁸ We will discuss later the difference between wages and wage rates.

⁴⁹ P-value in brackets.

would have to know the gross product (Y), the labour force (L), the percentage (e) of the employed workers in the total labour force and the average number of hours (b) worked in a year by a worker. The average labour productivity (AP_L) is in fact:

$$AP_L = \frac{Y}{e \cdot L \cdot b}$$

The result is the product per worked hour. Output per worker is an incorrect estimate of labour productivity. It is based on the assumption that the worked hours remain the same year by year; however, this is not so, especially in a long-run perspective. As we will see, an indirect and plausible estimate of working time is possible. Since the problem to solve is far from easy, only probable magnitudes can be defined, and nothing else. Let us refer, for the moment, only to the labour force independently of the actual working time; which is what historians usually do in reconstructions of average labour productivity in the pre-industrial world.

To estimate the output per worker we need to know, first of all, the aggregate product. Some progress regarding this specific topic has been made recently, especially concerning Italy. Two long-period estimates of product,⁵⁰ from the fourteenth to the nineteenth century, have been worked out using different methods, but with very similar results.⁵¹ Once the numerator of the previous ratio is established, the denominator must be defined: the labour force.

For the first decades after Unification, the structure of the Italian economy was basically the same as in the previous centuries. It was still prevalingly agrarian, with 60-70 percent of the labour force employed in the primary sector and about 50 percent of GDP produced in

⁵⁰ Malanima, "Measuring the Italian Economy"; Zanden, "Una estimacion del crecimiento económico".

⁵¹ The series used in the following pages is based on a reconstruction of the agricultural product from the demand side, through coefficients of elasticity to price and wages (Federico-Malanima, "Progress, Decline, Growth"), and on the linear regression of the product of secondary and tertiary activities after 1861 on urbanisation rates (Malanima, "Measuring the Italian Economy"). The non-agricultural product, estimated by means of the resulting equation, has then been added to the agricultural product.

agriculture.⁵² The overall labour force has been estimated to have amounted to 59 percent of the population in 1861, with a declining trend in the following decades, to reach 49 percent in 1901 and 47 percent in 1911.⁵³ At the end of the 1990s it was less than 40 percent. We lack estimates for the centuries before the Unification. However, a comparison with the age distribution in populations with the same mortality rate and the same birth rate as Italy indicates that the population between 15 and 65 years of age was about 60 percent.⁵⁴ The Italian population in the 15-65 age group in the censuses 1861-81 hovered around this percentage: at that time, the demographic structure was the same as in the previous centuries.⁵⁵ Yet the participation rate was lower, as always. Indeed, we must exclude from this calculation rich families, people unable to work, and some of the women. We would have to add, however, the workers who were under 15 and over 65. A plausible conclusion is that in many pre-modern societies such as Italy a labour force of about 60 percent of population, directly contributing to the gross product, seems reasonable.⁵⁶ Although unemployment existed in traditional economies as well, especially in urban activities, the overall working time depended much more on the changing level of hours worked by any worker than on the exclusion of some workers from production activity; as in any traditional economy. We may assume $e = 1$ in the previous equation. Today working

⁵² See the revision of the ISTAT series by Fenoaltea, "La crescita economica", and "The Growth", where the relative importance of the agricultural product is lower than in the previous estimates.

⁵³ *Sommario di statistiche storiche dell'Italia 1861-1975*. Zamagni, "A Century of Change", p. 56 assumes the figure of 52.1 percent as the Italian active population in 1881. This low level is reached excluding from the labour force women employed in domestic industry for home-consumption. My opinion is that this female labour force has to be included in our estimates. Domestic industry for home-consumption is, after all, a kind of organization of the industrial activity in pre-modern agrarian societies. Its product is included in GDP estimates, and the labour force employed in it must be included in the labour as well. Higher figures for the labour force are preferable. See also data in Maddison, *Dynamic Forces*, p. 267.

⁵⁴ Coale-Demeny, *Regional Model Life Tables*.

⁵⁵ On the basis of data from censuses: *Sommario di statistiche storiche italiane (1861-1955)*, p. 14.

⁵⁶ We assume 60 percent, as at the end of the nineteenth century, although any other percentage between 55 and 62 could be plausible as well.

time is fixed and the working population changes over time. In past agrarian economies, on the contrary, the working population was a stable percentage and its working time varied.

The GDP to labour force ratio provides us with an approximation of the yearly average product per worker (and not per hour) from the late middle ages onwards (*Figure 11*).

Throughout this period, productivity declined in Italy. This downward trend was halted in times of population decline, such as the century from 1350 to 1450 and the seventeenth century, when, that is, the denominator in the capital-labour ratio decreased sharply. For a long time, it was the epidemics of plague that kept productivity from falling. An especially marked fall occurred in the second half of the eighteenth century. The lowest point was reached between 1810 and 1820. As we would expect, at that time wage rates declined in Italy, as did output per worker.

When speaking of wages, however, we have to look at the marginal product of labour rather than at the average product. A representation of the aggregate production function with labour as the only variable factor over the long 1300-1820 period allows an estimation of the marginal product (*Figure 12*).⁵⁷ It is simply the theoretical curve so often presented in textbooks of economics, here based on plausible, empirical data.

The result closely matches the curve of many neoclassical models. As an explanatory model, a Cobb-Douglas function would certainly be preferable. Data or proxies on capital are, however, not easy to find.⁵⁸ Looking at wages, furthermore, we can turn our attention to the marginal product of labour independently of capital. Obviously the declining average and marginal labour productivity suggests that capital per worker was decreasing in the long run, although with some interruptions. It does not seem that in this long period the curve shifts

⁵⁷ The gross product is based on Malanima, "Measuring the Italian Economy".

⁵⁸ On the other hand, this production function as regards the one factor, labour, is introduced here because of the need to calculate the marginal product of labour on an annual basis in the next paragraph. In that case we need the equation connecting marginal product to labour, given the existing capital (on which we lack information). In this perspective, the equation connecting product to labour is enough.

because of technical change or other exogenous variables affecting the movement of product. We could speak of movements along the curve rather than movements of the curve. Things changed drastically only after 1820. Before this date, rises in population are accompanied by diminishing returns to labour. If we assume product (Y) as the dependent variable and labour force (L) as the independent one, their relationship is expressed by the following equation:

$$Y = -0.0498 L^2 + 822.06 L + 180670 \quad (R^2 = 0.86)$$

The marginal product of labour (MP_L) is easily computed as the derivative of the production function just represented (*Figure 12B*). The result is:

$$MP_L = \frac{dY}{dL} = -0.0996L + 822.06$$

The yearly marginal product declines, reaching a very low level in 1810-1820. Before 1820, as we can see, the decline in MP_L entails a similar, albeit slower, decline in the average product (AP_L). Decreasing returns to labour characterise the economy, at least in the range of the changes in the labour force from 1300 until 1820. When wage rates and marginal product are converted into indices, they show the same slope; only the intercept is slightly different (*Figure 13*).⁵⁹ Diminishing productivity appears to be the main determinant of wage rate trends.

A classical approach can easily account for trends in the period from 1300 to 1820. In the long run, the rate of increase in capital – cultivated lands included – grows less than the population. Capital per worker diminishes, as does marginal productivity. Since technical progress cannot counterbalance the diminishing capital-worker ratio, a downward trend of productivity and production dominates. Only when the population declines does the capital-worker ratio increase again and

⁵⁹ The difference, albeit small, depends, however, on the fact that, while marginal product is on a yearly basis, wage rates are per hour. To solve our problem, however, we need the marginal product per year and not per day.

productivity grows, as do wage rates. Epidemics involve, so to speak, an accumulation of capital. The wealth of Italy's economy in the Renaissance was boosted by epidemic mortality. The sharp decline in exceptional mortality in the eighteenth century determined a sharp decline both in productivity and per capita GDP. A classical, Ricardian explanation fits this long period well.

7. Working time

Wages and wage rates cannot be regarded as equivalent in long-term reconstructions. Daily wages are the result of hourly wage rates multiplied by the hours worked per day. Unfortunately, when writing about wages in pre-modern Europe, historians usually forget to specify that their series do not represent wages, but only wage rates. The difference is not negligible.

From the ratio of the cost of the basic requirements for survival⁶⁰ – the poverty line – to the average hourly wage, we deduce that in the fourteenth and fifteenth centuries workers had to work 500-1000 hours per year simply to survive, whereas in the nineteenth century about 1500 hours were necessary. This is the first information we have on a probable rise in working time, but it does not tell us how many hours the workers actually worked. We have to try another way to establish better figures. Certainty is unattainable in such exercises; plausible figures to check on the direct data – when, after 1861, they are available – and on indirect information on previous economic changes are, on the contrary, not out of reach.

Let us take the following symbols:

- y per capita GDP;
- t the ratio between the labour force and the population;
- w the average wage rate (per worked hour);
- b hours worked per year;
- q the ratio between labour incomes and GDP.

⁶⁰ Defined as the level of subsistence: Malanima, "Measuring the Italian Economy", p. 267. This level was about 170-180 Italian lire of 1860-70, while the per capita GDP in the same decade was 300.

Per capita GDP can be expressed then:

$$y = t \cdot w \cdot b \cdot \frac{1}{q} \quad (1)$$

We have now two unknowns (b and q) in just one equation. The q coefficient (the ratio, that is, between W – the total mass of wages – and Y – gross product –, both on a yearly basis) may be calculated from what we already know about the marginal product:

$$\frac{W}{Y} = \frac{MP_L \cdot L}{AP_L \cdot L} = \frac{MP_L}{AP_L} \quad (2)$$

The average value we find for this ratio between 1310 and 1913 is 0.78.⁶¹ Today it is often assumed to be 70 percent in Cobb-Douglas production functions, when we try to compute total factor productivity. In economies of the past, endowment with capital was certainly lower than today, and the level of revenues from capital was lower as well.

To compute b , the equation (1) may be transformed into the following:

$$b = \frac{y}{w} \cdot \frac{q}{t} \quad (3)$$

The results for labour time are set out in *Figure 14*. This curve describes a general trend towards the intensification of labour. Given the obvious approximation of such a result, it is better to look at the interpolating trend than at the decadal curve. While in the fourteenth and fifteenth centuries yearly working time was around 2000 hours, it rose in the sixteenth century and, although it later decreased, it stabilised at between 2500-3000 hours from the second half of the eighteenth century onward.

⁶¹ Here the proportion of wages in GDP includes any kind of labour income and not only wages of dependent workers, as calculated ordinarily. The percentage of wages of independent workers in GDP is lower. In Italy it was about 60 percent at the end of the 1960s (Ircolani, "La documentazione statistica", p. 457).

The result of this curve coincides with the direct data available for the period 1880-1913. We know that, at the end of the nineteenth century, industrial labour time was a little less than 3000 hours per worker per year (10 hours per 6 days per 49 weeks).⁶² As for working time in agriculture, it varied with the seasons. An average of about 2500-3000 hours does not seem implausible for the same period. After all in Italy there are about 5000 hours of daylight in a year, and we have direct information from research⁶³ on peasant families and their work from the 1880s until 1938 that over 3500 working hours per year, and sometimes even 4000, were far from exceptional, both for men and for women and children. Later, in the second half of the twentieth century, the number of hours worked diminished. They were between 1600 and 1700 at the end of the century.⁶⁴ Obviously informal labour time, that is labour time not directly employed to produce what is referred to nowadays as GDP, is excluded.⁶⁵

Over the centuries, Italian workers had to work more and more. The "industrious revolution" of which J. De Vries⁶⁶ wrote was actually a long process, and in Italy it did not aim to raise the standard of living and introduce the population to the modern world of consumer goods, but it aimed to offset the worsening in the standard of living under rising demographic pressure. While today we assume an upward-bending curve of the aggregate supply of labour as regards the real wage, in economies of the past this curve was downward. When wages per worked hour diminished in real terms, people were forced to work longer hours to avoid falling below the poverty line. The use of free time diminishes sharply as the worker's standard of living approaches bare subsistence level.⁶⁷

It has been shown that, in agrarian economies of the past, population

⁶² Zamagni, "An International Comparison", p. 113.

⁶³ These investigations have been used by Federico, "Contadini e mercato".

⁶⁴ *Employment Outlook*, X, p. 322.

⁶⁵ Many people today are of the opinion that informal labour time increased continuously from pre-modern to modern societies. This impression is far from superficial and would deserve some attention in a social perspective.

⁶⁶ De Vries, "The Industrial Revolution".

⁶⁷ On this special topic the analysis of Chayanov, *The Theory of Peasant Economy*, is still important.

rises are often accompanied both by land intensification – more product per hectare – and labour intensification – more hours per worker.⁶⁸ Intensification of work and rising self-exploitation are a normal reaction to offset the decline in returns and rewards per man-hour. Only in a more advanced phase, if the capital per worker continues to diminish and marginal labour product approaches zero, there is no further scope for intensification, and underemployment appears as the inescapable consequence of a population too dense to be supported by the existing capital. Development economists have often stressed the high underemployment rates observable among rural and urban workers in overpopulated regions when the demographic pressure is stronger than capital formation. Workers endowed on average with less and less land, fewer implements and less livestock spend shorter hours at their occupations and enlarge the quota of disguised underemployment and unemployment. Population and working time appear to be connected by an inverse relation.

In Italy, while wage rates diminished, an intensification of labour followed. The declining capital goods and natural resources per worker, in the face of the increasing population, tended, however, to weaken the intensification process. In a pre-modern economy, labour intensification depends inversely on the level of the wage rate. It depends, however, directly on the capital – and land – ratio to the population, and then to the labour force: the less capital per worker, the less the engagement of workers in productive activity. The final result derives from the interplay of these two main trends *vis à vis* the movement of population. Thus we can explain why the intensity of labour was higher in the sixteenth than in the eighteenth century, when, that is, the rise in population was far greater than two centuries before and land and capital endowment per worker was lower. Intensification then makes a U curve as in our graph, increasing with the increasing population, and later declining when capital per worker diminishes.

What we know about the changes undergone by the Italian economy in the early modern period confirms the trend proposed here for the

⁶⁸ See especially Boserup, *The Conditions of Agricultural Growth*.

number of hours worked. There are numerous wide-ranging publications on the subject. In the countryside, fruit trees, olive trees and vineyards on the edges of arable lands increased year by year. From the sixteenth century onwards, the mulberry tree spread over wide areas of Northern Italy – especially in the Po Valley from the Veneto to Piedmont. Silkworm breeding raised labour intensity in the spring, generally a slack season in agriculture. The arrival of maize in the sixteenth century and its diffusion especially in the eighteenth and nineteenth centuries meant a higher availability of calories, but at the cost of a strong intensification of labour, since its cultivation required twice as much time as wheat. Proto-industrial activities in the silk, hemp and wool sectors grew, especially in the eighteenth and nineteenth centuries, largely as a result of attempts to mitigate poverty in rural areas. The slack seasons in agriculture were increasingly filled with many collateral forms of employment. Protoindustry was, however, less important in Italy than in Northern and Central Europe, probably because of the heavy involvement of Italian peasants in agricultural production and because of the intensification of their labour on the land.⁶⁹

We now understand why, at the end of the nineteenth century, Italy had the lowest agricultural labour productivity in Europe, but one of the highest land productivities.⁷⁰ If we assume labour and land productivities in the United Kingdom as equal to 100, in Italy they were respectively 28 and 146. Land intensification and labour intensification went hand in hand for several centuries.

8. Wages from 1820 until 1913

In 1820, Italy's economy was not so far from the "stationary state" of classical economists. If we equalize to 0 the level of Italian marginal labour productivity before 1820, we discover that 0 would have been

⁶⁹ This problem of labour intensification is discussed more in depth in Malanima, *L'economia italiana*, ch. III, and the relationship between the involvement in agriculture and in industry in Malanima, *La decadenza di un'economia cittadina*.

⁷⁰ O'Brien-Prados De La Escosura, "Agricultural Productivity" and Federico-Malanima, "Progress, Decline, Growth".

reached in the decade from 1860 to 1870, without any change in the production function. Yet in Italy, as in Northern Europe, a displacement to the left of the curve occurred after 1820. A Ricardian approach, useful to understand Late Medieval and Early Modern Italian economy, is no longer appropriate when we look at the subsequent period. We already saw that, from 1820 onwards, there was a direct relationship between population and wages for the first time. All over Europe, an era of increasing wage rates began. In Italy, it was more a stabilisation than a true rise.

Since the price of labour depends on the supply of labour, on the one hand, and on the demand for labour – and hence on capital formation –, on the other, and since population growth was faster during the nineteenth century than in the previous ones, we have to assume a higher increase in capital formation as early as the 1820-60 period, when the yearly demographic rise was about 0.7 percent. Hence:

$$\frac{\dot{K}}{K} > \frac{\dot{L}}{L}$$

(rate of capital formation – where K is the capital, $\dot{K} = \frac{dK}{dt}$, and t time – is higher than the rate of labour increase – where L is labour and $\dot{L} = \frac{dL}{dt}$ –; then capital per worker and productivity are growing). Wage movement supports, then, the thesis proposed by L. Cafagna⁷¹ and F. Bonelli⁷² on the long process of capital accumulation preparing the basis for Italian modern growth.

As to the sources of capital in the half century before Unification, we unfortunately lack quantitative information. In agriculture, the development of mulberry tree cultivation, which spread rapidly in the Po Valley, can be regarded as a major investment. In the first years after Unification, raw silk accounted for 30 percent of Italian exports. It was the most exported commodity.⁷³ With the expansion of sericulture, protoindustrial activities, such as the processing of silk and other textiles,

⁷¹ See the essays collected in Cafagna, *Dualismo e sviluppo*.

⁷² Bonelli, "Il capitalismo italiano".

⁷³ Federico, "Per un'analisi del ruolo dell'agricoltura".

came into being or grew.⁷⁴ While urbanisation rates decreased, secondary production in the countryside increased.⁷⁵ The demand for labour in protoindustrial activities was certainly among the main reasons for this stabilisation of wage rates, in spite of the fact that Italy's participation in the first phase of modern growth (the so-called First Industrial Revolution) was very modest.

As we can see, however, only from the 1880s onward does this wage rise gather momentum (*Figure 15*). As borne out by the recent results of S. Fenoaltea's research on industry and G. Federico's research on agriculture, this is precisely the decade when Italian economy starts its sustained growth.⁷⁶

Whereas Italy had been involved only marginally in the First Industrial Revolution, it participated fully in the Second. The main reasons for this spurt are to be found in the Italian economy's increasing global connections with European and extra-European economies.⁷⁷ The Italian economy was now able to import what it lacked, i.e., primarily energy sources, agricultural products – especially cereals from the USA – and foreign capital, and to export what it had in abundance: first and foremost, human beings, through its increasing emigration flows at least from 1880 onwards. Italy's growth began to intensify in the very last

TABLE 3. Industrial wage rates in some European countries and in USA in 1913 (Great Britain = 100)

USA	126-134
Great Britain	100
Sweden	86-92
Germany	68-75
Belgium	65-68
France	60-64
Italy	45-49

Source: Zamagni, "An International Comparison", p. 119.

⁷⁴ On the topic, see the important contributions by Cafagna, *Dualismo e sviluppo*.

⁷⁵ Malanima, "Urbanisation and the Italian Economy".

⁷⁶ Fenoaltea, "Lo sviluppo dell'industria" and Federico, "L'agricoltura italiana".

⁷⁷ As Toniolo, "La storia economica dell'Italia liberale", has recently stressed.

years of the century. Technical progress and particularly the adoption of the new energy system which evolved during the first period of modern growth – coal, steam, railways and later electricity –⁷⁸ contributed greatly to this economic spurt. Italy quickly caught up with the most advanced European regions, even though in 1913 its industrial wages were still lower than in many other Western European countries, and much lower than in the USA, for the same labour intensity of about 3000 hours a year (*Table 3*).

9. Conclusion

The long-term movement of Italian wage rates and wages is not the same (*Figure 16*). Both show a downward trend. Their slopes, however, are different. While wage rates were diminishing, an intensification of land and labour occurred to counterbalance the worsening standard of living. The success was only partial. Wages, too, declined until 1820, stabilised until 1880 and rose from then on. On the eve of the first world war, the level of wages was the same as in the fifteenth century, and per capita GDP was also the same but this level was reached by any worker with 600 to 700 more working hours per year.

Two different periods can be singled out in the long history of Italian wages:

- from the end of the thirteenth century to 1820: in this period an inverse relation exists between wage rates and population;
- from 1820 to 1913: here a classical, Ricardian approach is no longer valid. Both population and wage rates rise simultaneously.

These two periods may be divided into several sub-periods:

Period 1:

- 1300-1350: slight decline;
- 1350-1450: stability at a high level;
- 1450-1600: decline;
- 1600-1750: recovery;
- 1750-1820: the worst period for Italian workers.

⁷⁸ Bardini, *Senza carbone nell'età del vapore*.

Period 2:

- 1820-1880: very slight upward trend;
- 1880-1913: the beginning of modern growth also involves Italian workers.

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Appendix

Wages, Productivity
and Working Time in Italy, 1270-1913

APPENDIX

The complete annual series of prices and wage rates, on which Figures 1 and 2 are based, are available at www.issm.cnr.it. In those series, prices refer to Tuscany in the 1270-1605 period; to Lombardy from 1606 to 1860; and to the whole of Italy from 1861 to 1913. A more detailed discussion of the criteria used to construct these series can be found in Malanima, *L'economia italiana*, App. 3, where decadal series are presented, as well as elaborations of the price index based on the use of different baskets. The following notes refer to those series.

The price index is based on the following works: *Tuscany*: De La Roncière, *Prix et salaires à Florence*; Pinto, "I livelli di vita dei salariati fiorentini" and "Il personale, le balie e i salariati"; Parenti, *Prime ricerche*; Malanima, "Aspetti di mercato"; Tognetti, "Prezzi e salari". Some items are missing in the fourteenth and fifteenth centuries. Before 1286, only wheat prices are available for Pistoia (Herlihy, *Pistoia*). *Lombardy*: De Maddalena, *Prezzi e aspetti di mercato* and *Prezzi e mercedi*; Sella, "Salari e lavoro"; Zanetti, *Problemi alimentari*. *Italy*: Fenoaltea, "Production and Consumption".

Wage series are based on: *Tuscany*: (1280-95 and 1310-20) De La Roncière, *Prix et salaires à Florence*; (1310-20 and 1340-1580) Goldthwaite, *The Building of Renaissance Florence*; (15th century) Tognetti, "Prezzi e salari"; (1520-1620) Parenti, *Prime ricerche*; *Lombardy*: (17th century) Sella, "Salari e lavoro"; (18th-19th centuries) De Maddalena, *Prezzi e mercedi*; *Italy*: Fenoaltea, "Production and Consumption".

The conversion of currencies, whose weight in silver is provided in the yearly series at www.issm.cnr.it, is based on: *Florence*: (1270-1605): Cipolla, *Il fiorino e il quattrino*, and *La moneta a Firenze*; Goldthwaite, *The Building of Renaissance Florence*; *Milan* (1605-1860): Sella, *Crisis and Continuity*; *Italy*: the Italian lira was 4.5 gr. of silver.

R.C. Allen worked out the series of wages in the building industry for three Italian cities: Florence, Milan and Naples. They are useful in providing a first profile of the differences in the level of wages between Italy and other European countries. I list here some features of Allen's series concerning craftsmen (I do not deal here with his price indices nor with the series for Naples and for labourers in the building industry):

Nominal wages in silver in Allen's database are the same for Florence and Milan in 1520-1913 (but the averages 1850-99 and 1900-13 in Table 1 in "The Great Divergence" are different). Real wages are equal for both cities from 1326 until 1371, from 1520 to 1605 (the Milanese series finishes in 1605, while that for Florence continues: but just for Florence there are no published data on wages for the seventeenth and eighteenth centuries, and in the previous pages I used unpublished data from archival sources). Allen writes in "The Great Divergence", p. 439- that "there is little difference in price between the two

cities". Yearly prices in Florence and Milan were actually profoundly different and the yearly correlation in price movement very low, as shown in Malanima, *L'economia italiana*, App. 3;

Florentine nominal wages in Allen's database are equal to 5.3 silver gr. from 1372 to 1519. Nominal wages and the silver weight of currency are supplied by Goldthwaite, *The Building of Renaissance Florence*, quoted by Allen, but not used in this case. We see in Goldthwaite's book that nominal wages did actually change and the weight of Florentine lira in silver changed as well (from 8.59 gr. to 4.62). In Allen's database there is no information on the sources used to convert currencies into silver and this information is not always provided in the texts used in the references in "The Great Divergence";

It is unclear where data for nominal wages in silver during the seventeenth century come from, since the works quoted in Allen, "The Great Divergence", pp. 439-40 and in the References to the same article do not provide those data. The same holds true for Florentine and Milanese data after 1861. It is also unclear how the conversion from nominal into real wages has been possible for Florence, since we still lack published series to build a consumer price index from 1620 onwards, whereas such data exist for Milan. In Allen's series, however, there is a price index for Florence, but not for Milan;

Data both for prices and wages in 1861-1913 have been improved in recent years. In 1989, the article by Zamagni, "An international Comparison" had already been published. Data presented by Allen are from Hansen, "Wage Differentials", where decadal figures are reported until 1890 (with an estimate for 1903). It is not clear where Allen's data for 1903-13 come from.

The following decadal series of prices and wage rates represent:

1. Price index: based on the yearly price index: the decadal averages are the central values of a moving 11-year average.

2. Urban wage rates: decadal averages of Tuscan masons' wage rates based on: (1280-95 and 1310-20) De La Roncière, *Prix et salaires à Florence*; (1310-20 and 1340-1580) Goldthwaite, *The Building of Renaissance Florence*; (1580-1620) Parenti, *Prime ricerche*; (1620-1820) the data are from Archivio Salviati (in Scuola Normale Superiore di Pisa), serie II, 459 and 547 (Cerbone), and Serie V, 666-672 (Pisa); (from 1820) Bandettini, "Le retribuzioni dei lavoratori edili".

3. Rural wage rates: nominal wages for Tuscany are from Tognetti, "Prezzi e salari" (1320 to 1500) and Parenti, *Prime ricerche* (1939) (from 1500 to 1620); for Piedmont from Doria, *Uomini e terre* (from 1610 to 1720) and Pugliese, *Due secoli di vita agricola* (from 1710 to 1860); for Italy from Fenoaltea, "Production and Consumption".

4. **Urban-rural wage rates:** the weighted average (1860-70=1) is based on data on urbanisation rates from Malanima, "Urbanisation and the Italian Economy". Data from 1861 are based on Fenoaltea, "Production and Consumption (I have recalculated the urban-rural series as a weighted average, whereas Fenoaltea only presents an arithmetic mean).

5. **Wage rates:** the series of average per hour wage rates is based on Fenoaltea, "Production and Consumption" and is expressed in 1860-70 lire. Decadal data for the previous centuries are based on data in col. 4.

	1	2	3	4	5
	Price Index	Urban Wage Rates	Rural Wage Rates	Urban- Rural Wage R.	Wage Rates (per hour)
	1860-70=1	1860-70=1	1860-70=1	1860-70=1	1860-70 lire
1270-80	0.069				
1280-90	0.089	0.85			
1290-00	0.078	0.96			
1300-10	0.079				
1310-20	0.086	1.28	1.62	1.70	0.23
1320-30	0.098	1.17	1.43	1.50	0.20
1330-40	0.099	1.19	1.25	1.34	0.18
1340-50	0.098	1.70	1.11	1.35	0.18
1350-60	0.120	2.30	1.81	1.95	0.26
1360-70	0.115	1.99	2.05	2.08	0.28
1370-80	0.139	1.89	2.82	2.79	0.37
1380-90	0.167	1.57	1.75	1.73	0.23
1390-00	0.160	1.69	1.88	1.84	0.24
1400-10	0.135	2.15	2.41	2.38	0.32
1410-20	0.139	2.14	2.39	2.38	0.32
1420-30	0.112	2.68	2.81	2.80	0.37
1430-40	0.132	2.27	2.60	2.53	0.34
1440-50	0.130	2.46	2.38	2.36	0.31
1450-60	0.123	2.28	2.60	2.49	0.33
1460-70	0.124	2.30	2.60	2.50	0.33
1470-80	0.136	2.12	1.95	2.00	0.27
1480-90	0.144	1.78	1.89	1.87	0.25
1490-00	0.171	1.34	1.60	1.54	0.21
1500-10	0.181	1.25	1.48	1.41	0.19
1510-20	0.151	1.91	1.86	1.88	0.25
1520-30	0.239	1.22	1.27	1.30	0.17
1530-40	0.268	1.42	1.09	1.23	0.16
1540-50	0.236	1.58	1.14	1.26	0.17

1550-60	0.298	1.31	0.84	0.97	0.13
1560-70	0.304	1.61	0.87	1.08	0.14
1570-80	0.334	1.87	0.88	1.12	0.15
1580-90	0.370	1.58	0.93	1.08	0.14
1590-00	0.463	1.44	0.74	0.93	0.12
1600-10	0.468	1.50	0.73	0.92	0.12
1610-20	0.481	1.55	0.99	1.16	0.15
1620-30	0.496	1.48	1.07	1.22	0.16
1630-40	0.431	1.62	1.13	1.26	0.17
1640-50	0.439	1.74	1.16	1.35	0.18
1650-60	0.404	1.89	1.20	1.37	0.18
1660-70	0.371	1.91	1.29	1.43	0.19
1670-80	0.394	1.80	1.27	1.41	0.19
1680-90	0.378	1.73	1.30	1.48	0.20
1690-00	0.446	1.47	1.08	1.23	0.16
1700-10	0.430	1.52	1.09	1.19	0.16
1710-20	0.397	1.65	1.27	1.38	0.18
1720-30	0.334	1.96	1.31	1.49	0.20
1730-40	0.402	1.63	1.17	1.27	0.17
1740-50	0.446	1.47	1.22	1.27	0.17
1750-60	0.445	1.47	1.30	1.34	0.18
1760-70	0.455	1.44	0.99	1.10	0.15
1770-80	0.580	1.13	0.84	0.91	0.12
1780-90	0.572	1.14	0.88	0.95	0.13
1790-00	0.718	0.96	0.97	0.95	0.13
1800-10	0.837	0.78	0.84	0.83	0.11
1810-20	0.898	0.85	0.69	0.73	0.10
1820-30	0.715	0.97	0.77	0.81	0.11
1830-40	0.753	1.01	0.91	0.93	0.12
1840-50	0.806	0.97	1.00	0.99	0.13
1850-60	0.969	0.84	0.89	0.88	0.12
1860-70	1.000	1.00	1.00	1.00	0.13
1870-80	1.222	0.93	0.88	0.89	0.12
1880-90	1.042	1.27	1.08	1.14	0.15
1890-00	0.966	1.34	1.20	1.29	0.17
1900-10	0.981	1.49	1.46	1.58	0.21
1910-13	1.077	1.70	1.67	1.79	0.24

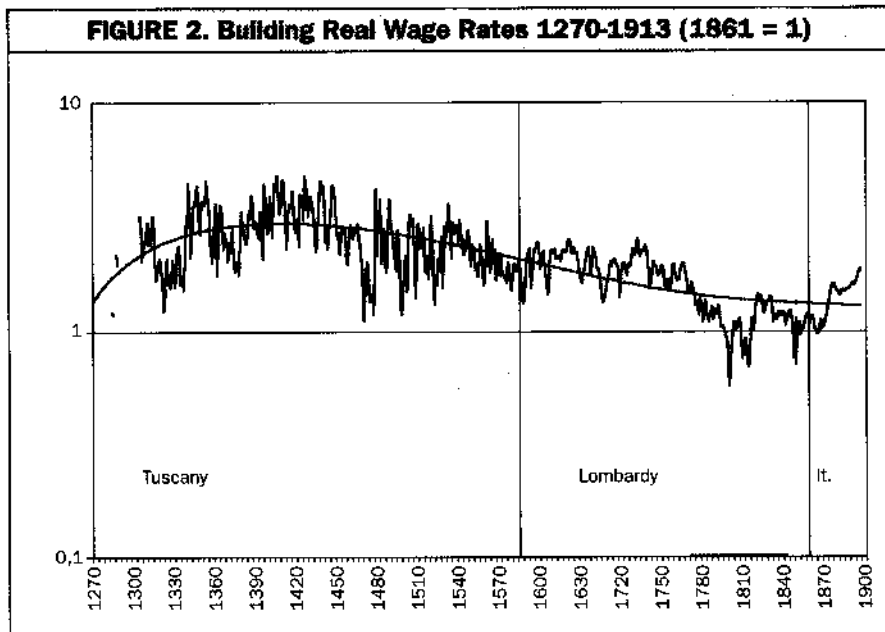
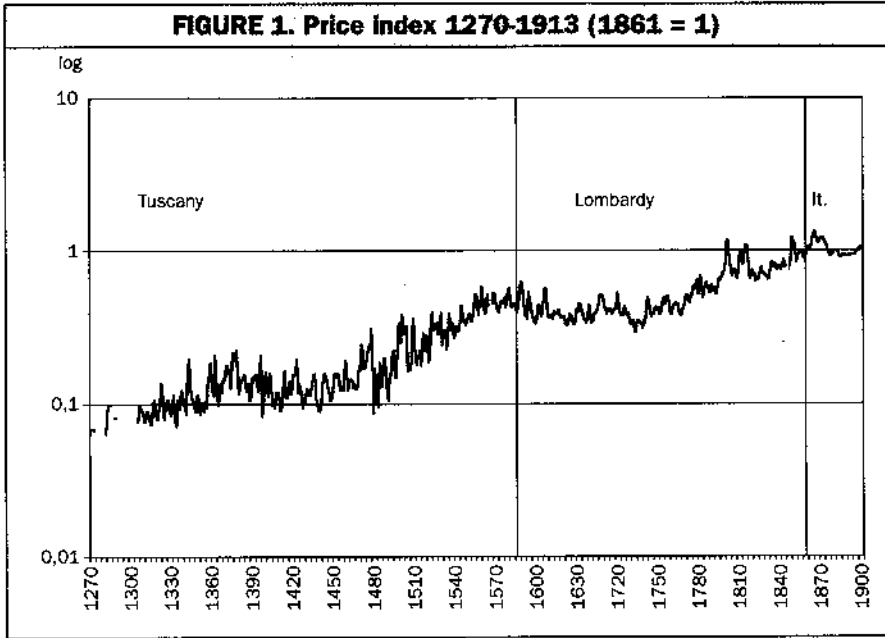


FIGURE 3. Price indice in Florence and Naples (1530-1650) (1860-70=1)

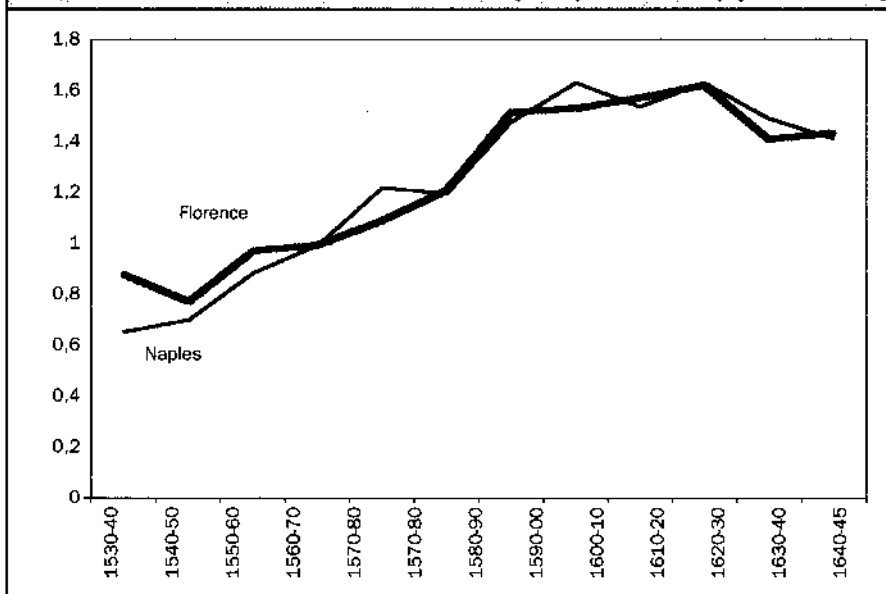
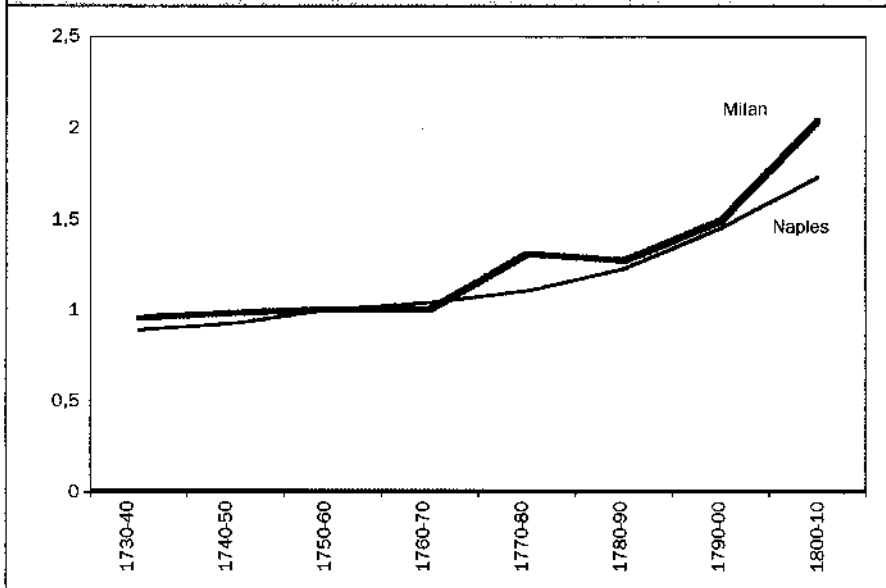
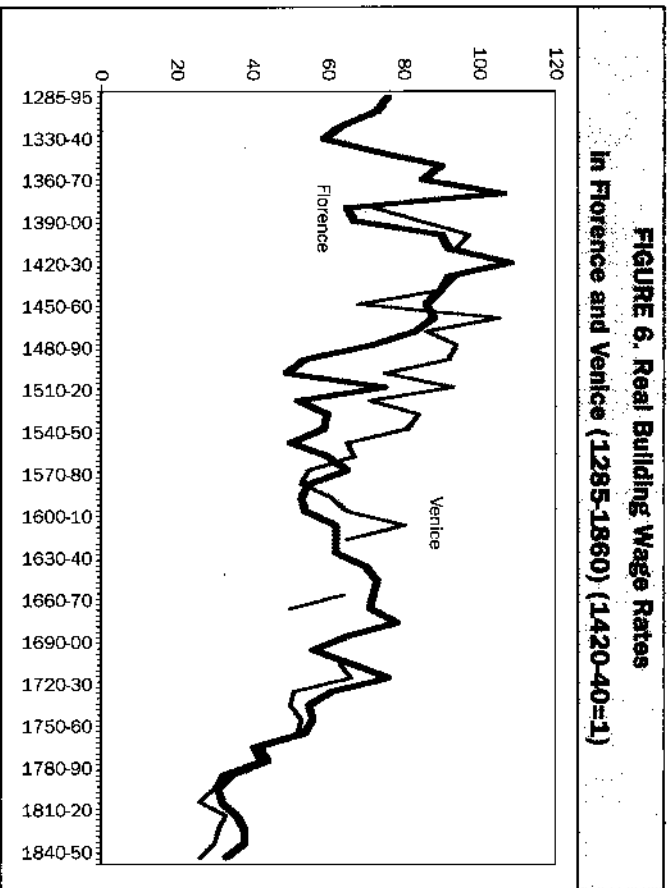
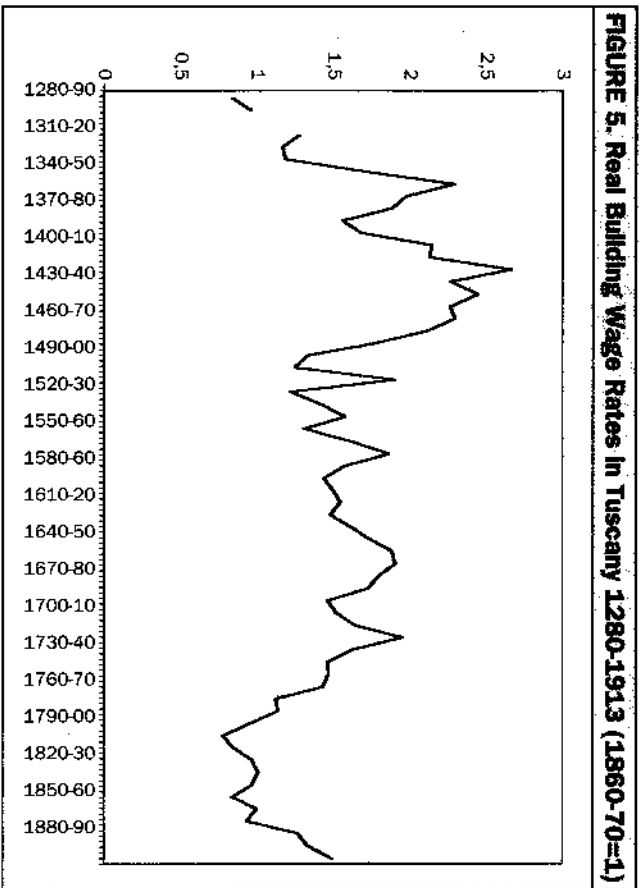
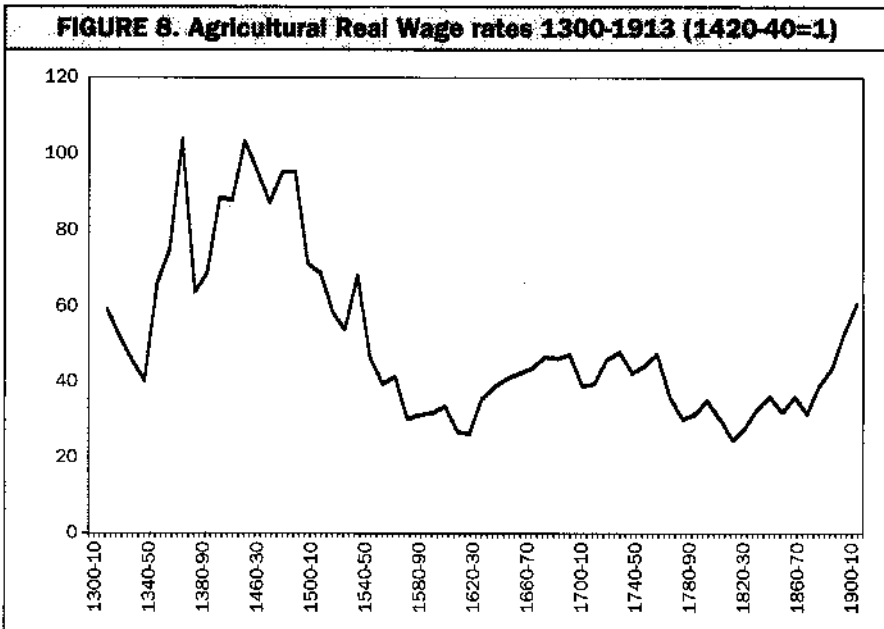
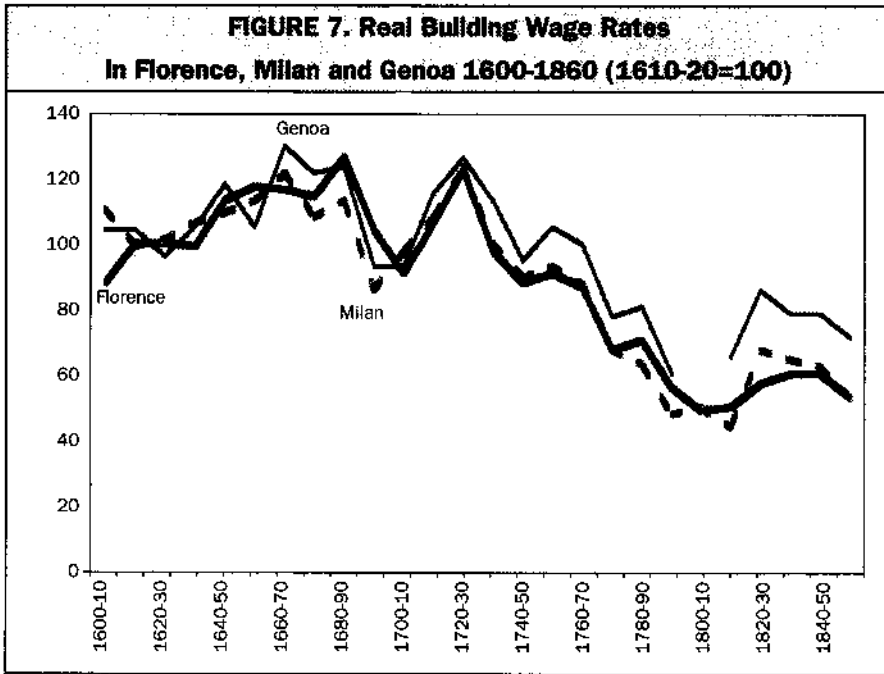


FIGURE 4. Price indices in Milan and Naples (1730-1807) (1750-60=1)







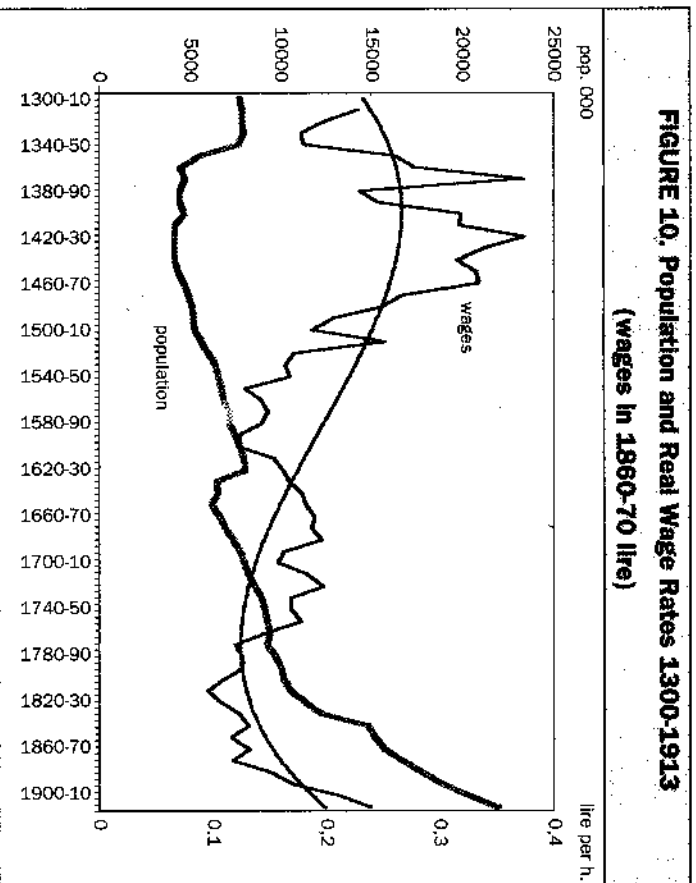
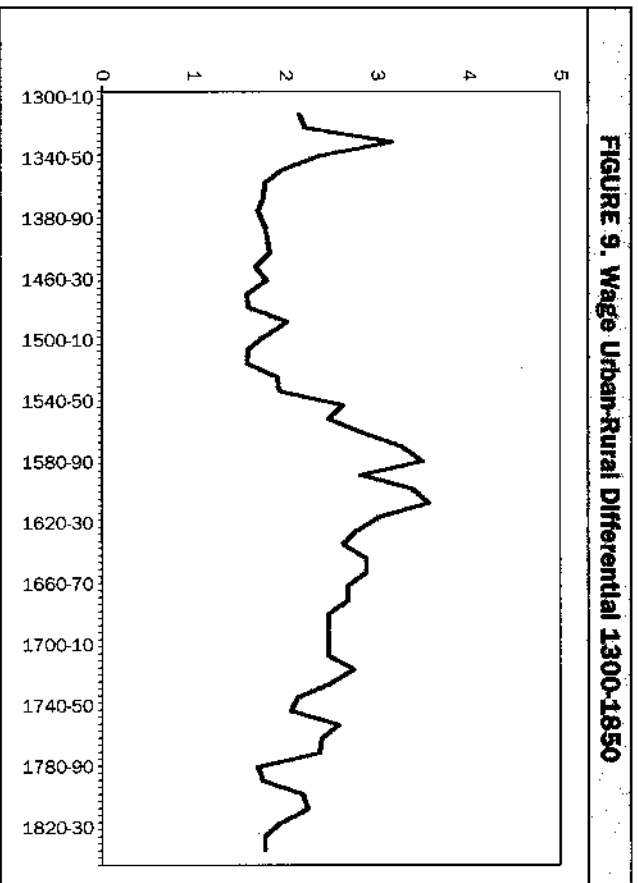
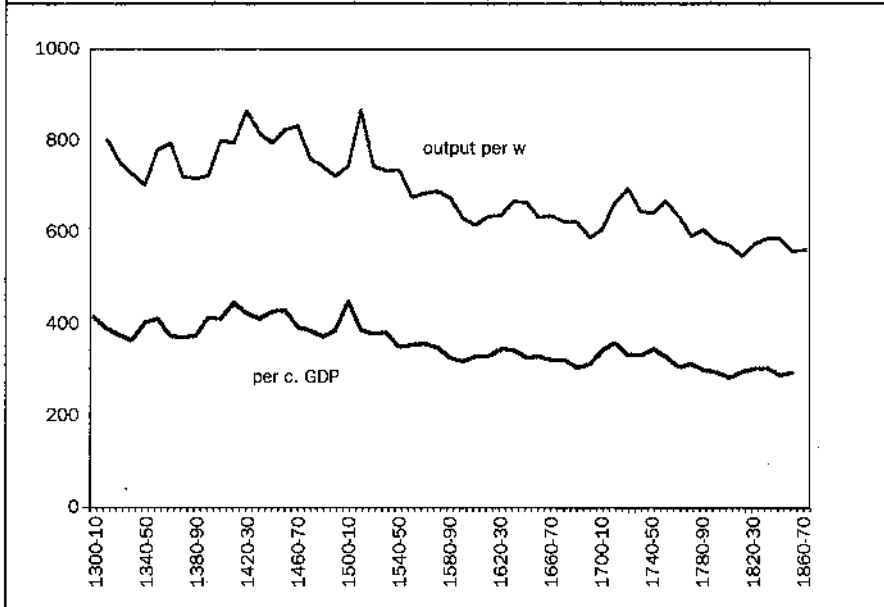


FIGURE 11. Per c. GDP and Output per Worker 1300-1870 (1860-70 lire)



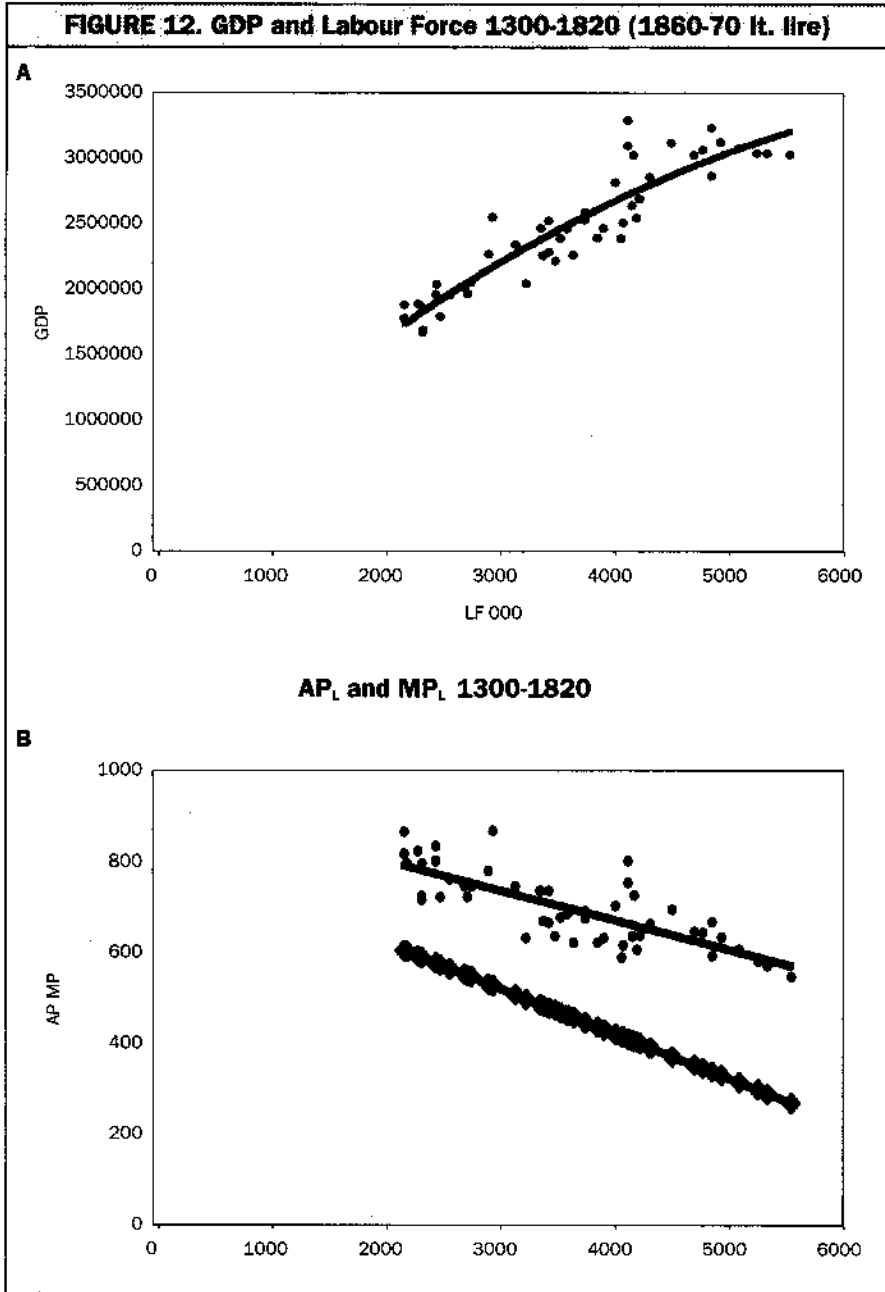


FIGURE 13. Wage Rates, Labour Force and MP, 1300-1820 (1480-90=1)

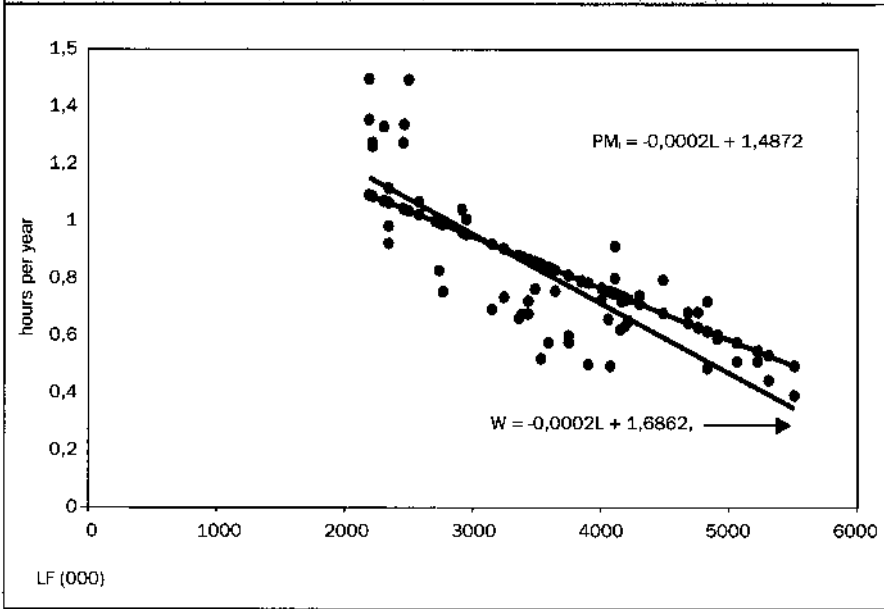
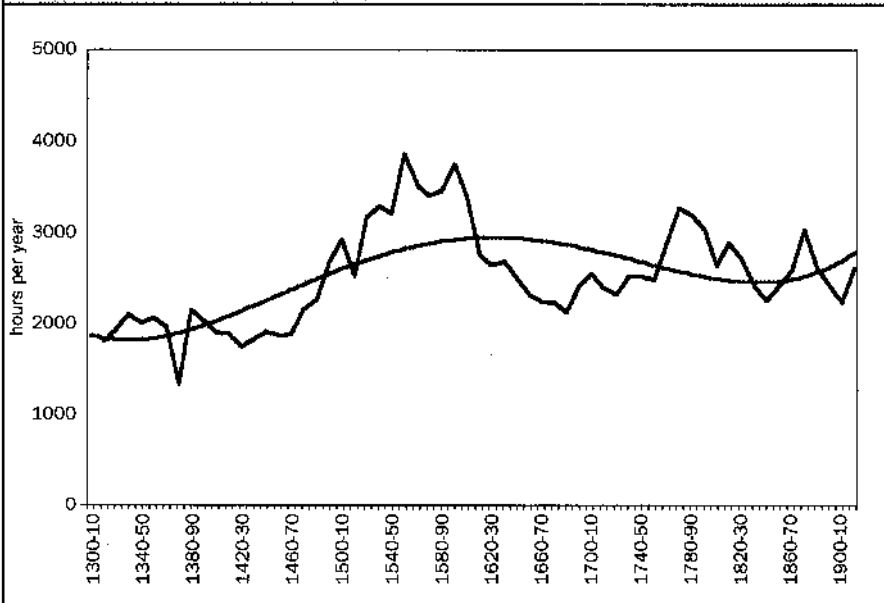
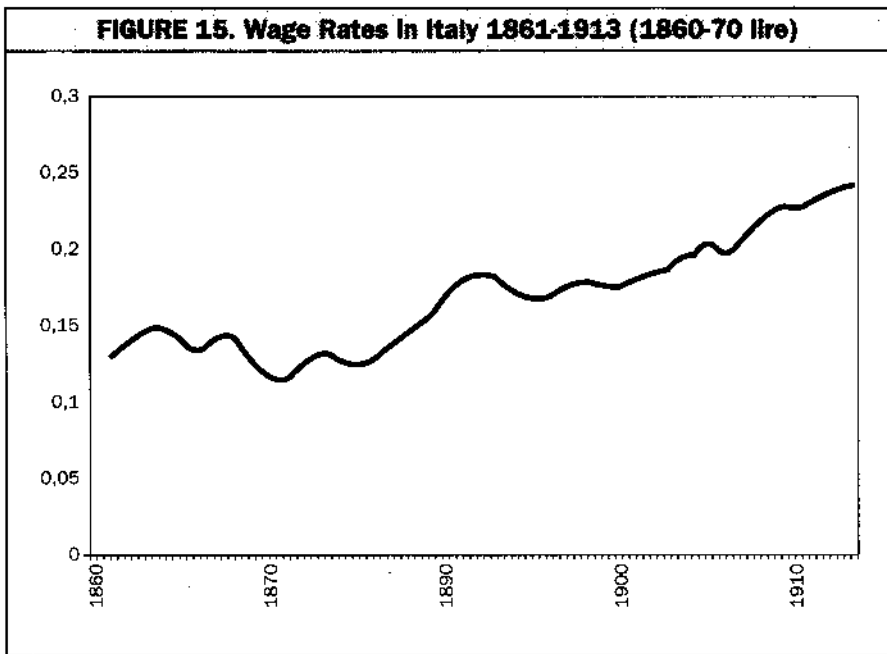
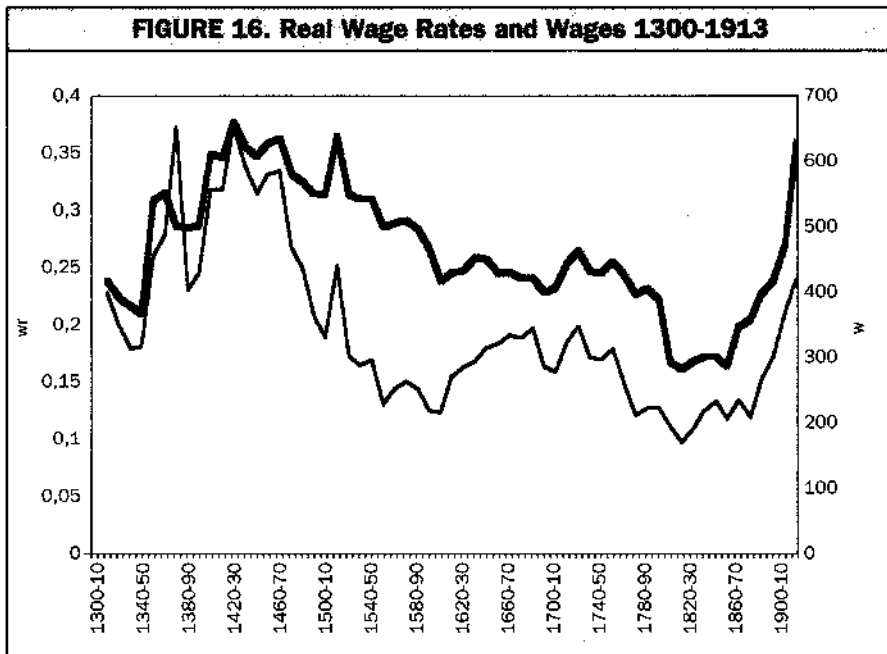


FIGURE 14. Working Time 1300-1913 (hours per worker per year)









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