Labour, Productivity, Wages in Italy
1270-1913

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Despite its industrial growth since the 1880s, 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-fourth that of the United Kingdom.[1] Although over the last 30 years its industry had regained much lost ground, its industrial labour productivity was still much lower than that of Belgium, France, Germany, Sweden, and less than half that of Great Britain. Industrial wages were, as a consequence, also lower.[2] Gone were the times when Italian real wages had been among the highest in Europe.[3] As we know, they had already started to decline in the late Middle Ages and to begin a slow recovery only at the end of the 19th century.[4] However, many uncertainties still remain as regards their movement during the centuries from the late Middle Ages onward.

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.[5] We still lack reliable series of wages for a period going from the end of World War I to very recent times.[6] We do have several more or less good series for individual regions or cities before the 19th century. They have, however, not yet been connected, and, as a consequence, cannot provide evidence for long-period trends, and tell much more than short-period local stories.

The purpose of the present essay is, first of all, to collate the existing dispersed series of wages and single out the main phases and trends in

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[1] O' Brien-Prados De La Escosura (1992), p. 531.

[2] Zamagni (1989), p. 119.

[3] Zanden (1999).

[4] Allen (2001).

[5] See, however, Vigo (1974).

[6] A series from 1861 is published by Ercolani (1969).

wage movement within a long-period macroeconomic perspective, from the late 13th century –when 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 the beginning of its modern take-off. I will focus on central and northern Italy,[7] because they are better represented than southern Italy in published studies.[8]

Important microeconomic topics, such as the working of the labour market and the formation of the price of labour, are outside the scope of this investigation.

The present essay is divided into two parts. The first is a general outline of wage movements in the 1270-1913 period. The second deals with the relationship between wages and productivity. Moving from concrete yearly changes, I will go on to a more abstract macroeconomic analysis. I will start with three annual series respectively concerning Tuscany, Lombardy, and Italy as a whole, and spanning a very long period, from 1270 to 1913 (§ 1). I will then proceed to distinguish the main phases within this long period, viz., the pre-Modern phase –from the late Middle Ages until 1820- and the Modern phase –from 1820 until 1913 (§ 2). This analysis will enable us to connect these two phases in the history of the Italian wages to the main determinant of wage movement, viz., labour productivity (§ 3 and 4). We will see that wages clearly show a long-term decline from the late Middle Ages until 1820, followed by an initially slow, then faster growth.

I. Wages

1. *Three annual series.* Data on Tuscan prices and wages are available as early as the late 13th century (Figure 1 and 2).[9] In this case, as in many others, wage rates in the construction sector are much better documented than those in other kinds of activity. Only from the first decades of the 14th century onward, however, do they describe a continuous curve. It seems that in 1320, after a period of growth, they began to decline. From the middle of

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[7] The area we will examine will be, with few exceptions, the part of Italy from the southern borders of Tuscany, Umbria, and Marche to the Alps.

[8] Only data on wages in 17th and 18th century Tuscany are based on archival sources; see notes in Appendix.

[9] The sources and the elaboration of our series are presented in the Appendix.

the century onward, after the Black Death, a rapid growth is observable, in Tuscany as in the rest of Europe. Wage rates remain high, on average, until the second half of the 15th century, when a decline is observable for some decades, followed by a rapid recovery, then a fall from 1570 to 1600, when they are down to 40 percent less than in the previous century.

While data on wages in Tuscany are still available until the end of the 19th century, data on prices are insufficient to build the price index we need to deflate nominal wages. Thus, at the beginning of the 17th century we leave the Grand Duchy of Tuscany and turn to the annual history of wages in the Duchy of Milan. For Lombardy, both series of nominal wages and series of prices are available from that time until the unification of Italy in 1861. Building wages 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 in 1606-1620, when series of prices and wages are available for both areas.

Real wage rates show a clear recovery from the first decades of the century on, especially after the devastating 1629-30 plague epidemics, which caused 1,365,000 victims in the Centre and North.[10] They remained relatively high during that century and the first half of the following one, to decrease rapidly after 1733, especially from the Sixties onward. The lowest point was attained in 1800-20. While in Northern European regions the year 1820 marked a sharp turning point in wage series and the beginning of a long period of rapid increase, in Italy it was not so. Wage rates ceased to decline and began a slow recovery, with interruptions in years of bad cereal harvests and falls in the wine production, which caused steep increases in prices.

A noteworthy change in the passage from the Tuscan to the Lombard annual series is the diminution in the deviation of wage rates from the average (Table 1). Volatility in annual movement seems to decrease precisely from the beginning of the 17th century onward, when measured by standard deviation or, as is more appropriate, by the coefficient of variation. This change does not depend on the passage from Tuscany to Lombardy, but on a real change in the agricultural price series, and is observable in both areas at the same time. A discussion of this change lies outside of the scope of the present essay, since it is not a change in wages, but in the prices we use to deflate wages.[11] Still, it is important to notice that, whatever the reason, wage

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[10] Malanima (1998), p. 129.
[11] Persson (1999): even though the book by Persson examines the problem for a later period.

rates appear much more stable from year to year in the second series than in the first. Workers' income was lower in the 18th and 19th centuries than in, say, the 15th, but their poverty was much more stable.

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 building wages are available for all of the newly formed national state.[12] They can be deflated by means of a national price index. 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.

2. *Trends.* 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 wage rates. We must resist the widespread temptation of using annual series of prices and wages referring to a small area or a city as repre-

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[12] Although the similarity with northern Italian wages suggests that the series represents the North better than other parts of Italy.

sentative of much larger realities and working conditions; particularly when dealing with an area such as Central and Northern Italy, which until 1861 was divided into several distinct political units separated by frontiers and having different currencies. To the question whether under such condition 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 Italian states scarcely representative of the bigger picture.[13] Under this regard, scholars studying large national states have an advantage over those who examine the Italian economy. The long period under examination was characterised, in Italy as elsewhere, by frequent monetary debasements, which occurred at different times in different states. 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. Sometimes it resulted in stable prices; sometimes not.[14] The conversion of prices into precious metal does not eliminate the problem; it only facilitates comparisons between different series. The wage of a worker in a particular state should not be deflated by the yearly price index of a different state. For each political unit, its specific price index should be used, as we did in the case of Tuscany and Lombardy. The problem becomes less relevant as we proceed to the early Modern age, when debasements are less frequent, their magnitude is lower, and the circulation of several different currencies within the borders of different states in north-central Italy leads to the formation of what C.M. Cipolla defined as a common "monetary area"[15]; an area, that is, where currencies influenced each other and followed similar trends in their loss of value. If we express wages in one particular state by their silver content to compare them to those of other states, we do something similar to what contemporaries were already doing in the early Modern Italian states.

The problem of building an annual price series for north-central Italy appears much more serious when we look at the homogeneity of the basic data used to build price indices. In a recent article, G. Federico has pointed out the low correlation between different agricultural price series for pre-

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[13] For a broader discussion of this problem, see Malanima (2002), App. 4.
[14] An old, but still important, article on the subject, originally published in 1940, is Einaudi (1967).
[15] Cipolla (1975), p. 49.

unification Italian states.[16] In the first half of the 19th century, despite a probable growth of exchanges among the different states of Italy, which caused this volatility to diminish, differences were still deep. Harvest failures were not the same in different areas. Diverse levels of agricultural production did not compensate one another, because transportation costs were much higher in hilly and mountainous area such as Italy, where only by sea transports were relatively cheap. Frontiers between states and laws often forbidding the spilling over of agricultural produce from areas of plenty to areas of want contributed to the inhibiting of the convergence of prices. Only the most severe crises, determined by meteorological conditions affecting wide areas at the same time, resulted in similar agricultural prices in different states. Hence, 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 indices built 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 insurmountable 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, in the 16th century, price movements are not so different in Tuscany and in Naples (Figure 3).[17] And in the 18th century price trends were quite similar in Naples and Milan (Figure 4).[18] The correlation is higher than we would expect. The choice of a decadal processing of data on prices, and hence wages, highlights actual differences in prices in different Italian states much better than the unreliable annual series, and may enable us to deflate the nominal wages of different regions. The advantages of a much broader perspective on such an important topic as wages seem to more than justify the risks involved in this procedure.

Thus, a decadal price index can be created by combining the Tuscan, Lombard, and Italian data listed above. This index can be used to deflate wage series for all of North-Central Italy .

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[16] Federico (forthcoming).

[17] The curve for Naples is based on a series presented by Coniglio (1952). After 1610, the Tuscan index has been continued with data referring to Lombardy (and already presented in the previous par.).

[18] Data on Naples are from Romano (1965). A recent price index for the Kingdom of Naples from 1647 until 1860 has been constructed by Mantovani (2000).

By eliminating yearly variability, we obtain a better long-term view of masons' wages from the late Middle Ages until 1913. Since the series for Tuscany is based on better basic data and on information spanning a longer period, its curve provides a preliminary view (Figure 5).[19] This curve clearly follows a similar movement of other Western European series: the high 1350-1450 level, the ensuing decline, the slow 17th century recovery, the late 18th century fall, the 19th 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; the 16th century decline is not as strong; the 17th century recovery is considerable; the increase in the first half of the 19th century almost non-existent.[20]

In the long run, however, Italian building wages 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 purchase parity power of the several currencies (Table 2).

Table 2 Wage rates of building craftsmen in some European cities 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 (2001), p. 428. Data on Florence have been replaced with the series in the following App. II.

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 the early Modern times, were relatively advanced market systems where waged labour was widely diffused and opportunities for moving from

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[19] Data in the figure after 1890 refer to Italy as a whole.
[20] See the curves for several European countries in Allen (2001). See Appendix II for some differences between our series and those of Allen (2001).

one job to the other were not that 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.[21]

A comparison between different nominal wages is possible on a local scale; for example, in 16th-century Florence. This comparison shows that similar movements prevail both in the same and in different sectors of activity.[22] The wage movement of building workers and master bricklayers is almost equal,[23] 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.

If we compare the wages of different cities and states, instead, the resulting high correlation is, at least in part, spurious, since we are using a single price index to deflate different series. On a decadal scale, however, nominal trends are quite similar as the wages of building labourers in Venice and bricklayers in Florence (Figure 6), and of masons in Florence, Milan[24] and Genoa clearly show (Figure 7).[25]

The ratio between urban and rural wages is a different story.[26] Evidence on rural wages is still scanty and unreliable. Their trends are often considered to be similar under 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).[27] The relative decline of urban wages from 1350 to 1450 goes hand in hand with a low urbanization rate. It is a consequence of the declining number of rich buyers for luxury Italian 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. The urban recovery of the 16th century, also attested by in-

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[21] See especially Epstein (1998).

[22] Parenti (1939).

[23] Goldthwaite (1980), App.

[24] For an in-depth discussion of the reliability of Milanese data on wages, see Mocarelli (2004).

[25] The processed data for Venice, Milan, Florence and Genoa can be found in Malanima (2002), App. 4.

[26] The sources for the rural series are in App. II.

[27] 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 (1939), pp. 216 ff.

creasing urbanization 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 deepened. It diminished, instead, from the 17th century on, because of the decreasing vitality of Italian industry and commerce, which lasted until the late start of Modern Growth.[28]

The creation of a single weighted average wage index combining rural and urban wages indices could be regarded as arbitrary. A well-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 a few marginal families. How can the wages paid to a few 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 labourers in rural north-central Italy. What we do know is that they increased during the early Modern centuries, especially in the 18th and 19th.[29] In some areas of the Po Valley, by the end of the 19th century, the waged labour force was more than half of the whole population.[30]

On the other hand, what else was the quota of the harvest that peasant tenant families kept for themselves but a labour reward, paid for in kind, at least partially?[31] This quota 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. Reconstruction of tenant labour contracts and rural living standards point to the existence of similar trends in the rewards of tenant families, as revealed by changing contractual conditions, and the movement of real wages.[32]

By combining urban and rural wage rates in a single series, allowing for their relative magnitude (deduced from the urbanization rate), we obtain a

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[28] The relation of the ratio between urban-rural wages with urbanization is analysed in Malanima (forthcoming).

[29] For Tuscany see Malanima (1990), pp. 146 ff.

[30] Cazzola (1996), pp. 109 ff.

[31] 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 (1977).

[32] Giorgetti (1974).

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). Data presented by Zamagni and Fenoaltea for post-unification Italy are quite similar.[33]

The representation of wage rates and population movements in a single diagram allows to reach two simple preliminary conclusions:

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 -[34] were lower in Italy than in the late Middle Ages, and not by a few percentage points, but by about 30-40 percent. This is not a negligible discovery when we look at Italian history in a broad perspective. In the industrializing Italy of 1913, waged labourers' living conditions were worse than they had been 5-600 years before. Under this respect, 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, one observes an inverse correlation between population and wage rates, 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:[35]

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

(were w is the wage rate for 100 working hours, and P the population divided by 1000). This relation changes from 1820 on. 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:

$$w = -4,22 + 0.001P \ (R^2=0.79)$$
$$(0.00054)$$

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[33] Zamagni (1989) and Fenoaltea (2002).

[34] We will discuss the difference between wages and wage rates later.

[35] P-value in brackets.

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.

II. Wages and productivity

3. *1270-1820.* For the first decades after the unification, the structure of the Italian economy was basically the same as in the previous centuries. It was still prevalently agrarian, with a 60-70 percent of the labour force employed in the primary sector and 45-50 percent of the GDP produced in agriculture. The overall labour force has been estimated to have amounted to 52 percent of the population.[36] At the end of the millennium it was less than 40. We lack estimates for the centuries before the unification. However, a comparison with the age distribution in the same period in the populations of other countries with the same high mortality rate and natality as Italy indicates that the Italian population between 15 and 65 years of age was about 60 percent.[37] Yet the participation rate was lower, as always. Indeed, we must exclude from this calculation rich families, people unable to work, and part of the women. The conclusion is that in many pre-modern societies a labour force of 50-60 percent of population does not seem implausible.[38] In pre-modern agrarian societies the labour force was more or less stable as a percentage of the overall population, yet working time varied year by year, depending on the agrarian and non-agrarian conjuncture. Working time also shows long-period variation. More or less everybody able to work actually did work whenever this was possible or necessary. Indeed, many forms of underemployment existed rather than of unemployment. For late Medieval and early Modern Italy it seems reasonable to estimate the labour force as comprised between 50 and 60 percent of the overall population.[39]

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[36] Zamagni (1987).

[37] Coale-Demeny (1983).

[38] This percentage may also have been higher in the 19th century, considering the decline in fertility, which reduced the age class between 0 and 15 years.

[39] We assume 52 percent, as at the end of the 19th century; even though any other percentage between 50 and 60 could be also plausible.

To measure productivity levels, we would need to know how many hours workers actually worked. Output per worker is an incorrect estimate of productivity. The correct one should always be output per worked hour. As we will see, an indirect estimate is not impossible. Let us consider, for the moment, only the percentage of the labour force on the total population, independently of the actual working time; which is what is usually done in reconstructions of average productivity in the pre-industrial world.

To estimate the output per worker we now need to know the aggregate product. On this specific topic, some progress has been recently made, especially as regards Italy. Two long-period estimates of per capita GDP, from the 14th to the 19th century, have been worked out using different methods, but with very similar results.[40] Since population movement is relatively better known for Italy than for many other European regions, it is easy to provide an estimate of the total GDP. The GDP to labour force ratio provides us with a first approximation of the average product per worker from the late Middle Ages onward (Figure 11).

Throughout this period, productivity declined in Italy. This trend was interrupted in times of population decline, such as the century from 1350 to 1450 and the 17th century, when, that is, the denominator in the capital-labour ratio decreased sharply. For a long time, it was the plague epidemics that kept productivity from falling. An especially marked fall occurred in the second half of the 18th century. The lowest point was reached between 1810 and 1820.

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 for Italy over the long 1300-1820 period allows an estimation of marginal product.[41] Figure 12 A shows the aggregate production function in relation to labour. The resulting curve closely matches the theoretical curve of many neoclassical models. Rises in population are evidently accompanied by decreasing labour returns. If we assume product (Y) as the dependent variable and labour force (N) as the independent one, their relation can be expressed by the following equation:

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

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

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[40] Malanima (2003); Zanden (2004).
[41] The gross product is based on Malanima (2003).

$$\mathrm{MP_L} = \frac{dY}{dN} = -0.0996N + 822.06$$

Marginal product declines, reaching a very low level in 1810-1820. As we can see, the decline in $\mathrm{MP_L}$ entails a similar, albeit slower, decline in the average product ($\mathrm{AP_L}$). Decreasing labour returns characterise the economy, at least in the range of the changes in the labour force from 1300 until to 1820. When wage rates and marginal product are converted into indices (1480-90=1) they show the same slope; only the intercept is slightly different (Figure 13). Decreasing productivity appears to be the main determinant of wage rate trends, while we have already seen that the population, and hence the labour force (a stable percentage of it), is the main determinant of wage rates and stands in an inverse relation to them.

A classical approach can easily account for trends in the 1300-1820 period. In the long run, the rate of increase of capital - cultivated lands in-cluded - grows less than population. Capital per worker diminishes, as does marginal productivity. Since technical progress cannot counterbalance the diminishing capital-worker ratio, there is a downward trend of productivity and production. Only when population declines, the capital-worker ratio increases again and productivity grows, as do wage rates. Epidemics involve, so to speak, an accumulation of capital. The wealth of Italy's economy in the Ren-aissance was boosted by epidemic mortality. The sharp decline in excep-tional mortality in the 18th century determined a sharp decline in both produc-tivity and per capita GDP. A Ricardian explanation fits this long period well.

 One can hardly fail to remark that there was a stronger decrease in marginal productivity and wage rates than in per capita GDP and average productivity. The difference in their slopes depended, at least in part, on the fact that workers were paid lower hourly wages, but they worked many more hours. Wages and wage rates cannot be regarded as equivalent in long-term reconstructions. Wages are the result of wage rates times the hours worked per day. Unfortunately, when writing about wages in pre-modern Europe, his-torians 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 survival[42] –the poverty line- to the average per hour wage we deduce that in the 14th-15th centuries workers had to work 500-1000 hours per year, whereas in the 19th

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[42] Defined as the level of subsistence: Malanima (2003), p. 267. This level was about 170-180 Italian 1860-70 lire, while the per capita GDP was 300 lire in the same decade.

century about 1500 hours were necessary. It is a first information on a probable rise in working time, but does not tells us yet how many hours did workers actually work.

A rough estimate of working time could be computed as the ratio of the average yearly product of labour to the product per hour.[43] This would tell us how many hours of labour were necessary to the average worker to produce the yearly average product. Now, we know the value of the average product per year, but not that of the average product per worked hour. However, we do know the marginal product per hour and per year. Since, as we saw,[44] the marginal product per hour can be assumed to be equal to the wage rate (w_h), and we know the trends of the yearly AP_L and MP_L, both declining, but with different slopes,[45] we can calculate the average product of labour per hour (AP_{Lh}) as:

$$\frac{AP_{Lh}}{w_h} = \frac{AP_L}{MP_L}$$

and then

$$AP_{Lh} = \frac{AP_L}{MP_L} \cdot w_h$$

We have now only to divide AP_L by AP_{Lh}. The resulting curve is probably an acceptable representation of the change in working time over several centuries (Figure 14). It is a first attempt at quantifying a process that is hard to represent in quantitative terms.

We can try onother way to check these results on labour time.

Let's 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);
h   hours worked per year;

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[43] The GDP level and marginal productivity –and hence wages- can not furnish the result we are looking for, but only a rough view of the working time necessary to reach the GDP. For such an attempt to estimate the working time we would need a better estimate of the labour income per worked hour, including the salaries paid in professions, in trades and the incomes of the independent workers. Probably the result would be higher than the value of the wage rate per hour provided by Zamagni and Fenoaltea and hence the result of the hours of work would be lower.
[44] As Figure 13 shows.
[45] See Figure 12B.

q   the ratio between labour incomes and GDP;
then:

$$y = t \cdot w \cdot h \cdot \frac{1}{q} \qquad (1)$$

We have now two unknowns (h and q) in just one equation. q (the ratio, that is, between W –the total mass of wages- and Y – gross product -) may be drawn from what we already know:

$$\frac{W}{Y} = \frac{MP_L \cdot LF}{AP_L \cdot LF} = \frac{MP_L}{AP_L} \qquad (2)$$

where MP_L and AP_L are respectively marginal and averave product of labour and LF is labour force. The average value we find between 1310 and 1913 is 0.78.

To compute h, the equation (1) of labour time may be transformed into the following:

$$h = \frac{y}{w} \cdot \frac{q}{t}$$

The result we reach on labour time is similar to the one already reached with a different method and is certainly more reliable than that (Figure 15).

Many uncertainties remain. For example, the 16th-century rise appears perhaps stronger than it actually was. The most significant datum provided by this curve is that there was a general trend towards the intensification of labour. While in the 14th-15th centuries the yearly working time was probably around 2000 hours, it rose in the 16th century and, although it later decreased, it stabilized at around 2500 hours from the second half of the 18th century onward. We know that, at the end of the 19th century, industrial labour time was about 2940 hours per worker per year (10 hours per 6 days per 49 weeks).[46] As to the working time in agriculture, it varied with the seasons. An average of about 2000-2500 hours does not seem implausible for the same period. After all in Italy day hours are in a year around 5000 and we have direct information from inquiries[47] on peasant families and their work from the 1880s until 1938 on labour times showing that working times exceeding 3500 hours per year and sometimes even 4000 were far from exceptional both for males and for women and children.

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[46] Zamagni (1989), p. 113.
[47] These investigations have been used by Federico (1987).

It appears clear that over the centuries Italian workers had to work more and more. The "industrious revolution" J. De Vries[48] wrote of was actually a long process. While today we assume an upward bent curve of the aggregate supply of labour as regards the real wage, in past economies this curve was downward. When wages per worked hour diminished in real terms, people were forced to work more hours to avoid falling below the poverty line. The utility of free time diminishes sharply as the worker's standard of living approaches the level of the bare subsistence.

In theory, a decline of the capital-labour ratio, and the ensuing decline of labour productivity, results in diminished labour intensity. 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 lands, implements and livestock spend shorter hours at their occupations. Population and working time appear to be connected by an inverse relation. It has been shown, however, that in past agrarian economies population rises are often accompanied both by land intensification –more product per hectare- and labour intensification –more hours per worker-.[49] Intensification of labour is a normal reaction to offset the decline in returns per man-hour. Only in the following phase, when marginal labour product approaches zero and there is no more scope for intensification, underemployment appears as the inescapable consequence of a population too dense to be supported by the existing capital. Labour intensity describes a U-shaped turned curve, similar to the one shown in our figure.

What we know of the changes undergone by Italian economy in the early Modern period confirms the trend I have reconstructed for working time. In the countryside, the presence of fruit trees, olive trees and vineyards along the margins of the arables increased year by year. From the 16th century onward, the mulberry tree spread over wide Northern Italian areas -especially in the Po Valley from Veneto to Piedmont. Silkworm breeding raised labour intensity in spring, ordinarily a slack season in agriculture. The arrival of maize in the 16th century and its diffusion from the 17th century on meant a higher availability of calories, but at the price of a strong intensification of labour,

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[48] De Vries (1994).

[49] See especially Boserup (1965). Land intensification may be, however, a misleading concept. Since less and less land was exploited to have the same value of product, it would be more correct b speak of an intensification of labour: the productive process was becoming more and more labour intensive, and less and less land intensive.

since its cultivation required twice as much time as wheat. Protoindustrial activities grew, especially in the 18th and 19th centuries, largely as a results of attempts to mitigate poverty in rural areas. The progress of industry was diffuse, especially as regards the production of silk and textiles like hemp, wool spinning and weaving, straw working, and mining. It was, however, less diffuse in Italy than in Northern and Central Europe, probably because of the heavy involvement of all Italian workers in the agrarian production.[50] The dead seasons in agriculture were increasingly filled in with many collateral forms of employment.

We now understand why, at the end of the 19th century, Italy had the lowest agricultural labour productivity in Europe, but one of the highest land productivities.[51] In agriculture, 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.

4. *1820-1913.* In 1820, Italy's economy was not so far from the "stationary state" of classical economists. If we make equal to 0 the equation of the Italian marginal labour productivity before 1820, we discover that 0 would have been reached in the 1860-70 decade without any displacement of the production function. In Italy, however, as in northern Europe, a displacement to the left of the curve of the aggregate production function occurred after 1820. The Ricardian approach, useful to understand late Medieval and early Modern Italian economy, is no longer applicable when we reach the subsequent period. We already saw that, from 1820 onward, the population/wage rates ratio became positive for the first time. All over Europe, an epoch of increasing wage rates began. In Italy, it was rather a stabilization 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 19th century than in the previous one, 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:

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[50] This problem of labour intensification is discussed more in depth in Malanima (2002), ch. III.
[51] O' Brien-Prados De La Escosura (1992).

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

(rate of capital formation – where K is the capital, $\dot{K} = \dfrac{dK}{dt}$, and t time- is

higher than the rate of labour increase – where L is labour and $\dot{L} = \dfrac{dL}{dt}$ -;

then capital per worker and productivity are growing). Wage movement supports, then, the thesis proposed by Bonelli[52] and Cafagna[53] showing a long process of capital accumulation preparing the basis for the Italian Modern Growth.

As to the sources of capital in the half century before the 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 the unification, raw silk accounted for 30 percent of Italian exports; indeed, it was the most exported commodity.[54] With the expanding of sericulture, protoindustrial activities such as the processing of silk and other textiles certainly saw the light or strenghtened. While urbanization rates decreased, secondary production in the countryside grew.[55] The demand for labour in these protoindustrial activities was certainly among the main reasons for this stabilization 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.

The shape of the aggregate production function as to the input of labour in the period 1820-1913 is different than in previous periods (Figure 16A).[56] When the labour force increases, decreasing returns to labour are no longer the norm. The production function describes an exponential curve; or better the first part of the logistic of Modern Growth. The equation connecting labour force to gross product is now:

$$Y = 879{,}938 \; e^{\,0.0002N}$$

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[52] Bonelli (1978).

[53] Cafagna (1989).

[54] Federico (1979).

[55] Malanima (forthcoming).

[56] See data in Malanima (2002), App. 5. Italian national accounting is currently being revised, but this revision while certainly modify these data, but not the general trend.

(where Y is the gross product –000- and N the labour force –000-). The marginal product of labour (MP$_L$), as the derivative of the exponential curve of the aggregate product, is (Figure 15B):

$$\text{MP}_L = \frac{dY}{dN} = 175.99e^{\,0.0002N}$$

The shape is the same as that of the wage rate curve.

As we can see, however, only from the '80s onward does this wage rise gather momentum (Figure 17). As borne out by the recent results of S. Fenoaltea on industry and G. Federico on agriculture, this is precisely the decade when Italian economy starts its sustained growth.[57] While Italy had been involved only marginally in the First Industrial Revolution, it participated in full in the Second. The main reasons for this spurt must be sought espe-cially in the Italian economy's increasing global connections with European and non-European growing economies.[58] 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 she was rich in: first and foremost, human beings, through its increasing emigra-tion flows. Italy's growth began to intensify in the very last years of the cen-tury. Technical progress and particularly the adoption of the new energy sys-tem worked out during the first period of Modern Growth –coal, steam, rail-ways and later electricity- deeply contributed to this economic spurt. Italy quickly caught up with the most advanced European regions, even though in 1913 its industrial wage rates were still lower than in many other Western European countries, and much lower than in the USA, for the same labour in-tensity of about 3000 hours a year (Table 3).

Table 3. Industrial wage rates in some European countries and 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

[57] Fenoaltea (2003) and Federico (2003).
[58] As Toniolo (2003) has recently stressed.

Source: Zamagni (1989), p. 119.

5. *Conclusion.* The long-term movement of the Italian wage rates and wages is not the same (Figure 18). Both are downward bent. There slopes, however, are different. While wage rates were diminishing, an intensification of labour occurred to counterbalance the worsening standard of living. The success was only partial, as we saw, since the decreasing capital-labour ratio was, in the end, stronger than the opposition by the labour force. On the eve of the First World War the level of wages was the same than in the 15th century, but this level was reached working 6-700 hours more per year.

By tracing the long-term evolution of Italian wages, we have singled out two different periods:
- from the end of the 13th century to 1820: in this period an inverse relation exists between wage rates and population;
- from 1820 to 1913: here the classical, Ricardian approach is no longer valid. Both population and wage rates rise at the same time.

These two periods may, in their turn, be divided into several subperiods:

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.

Period 2:
- 1820-1880: very slight upward trend;
- 1880-1913: the beginning of Modern Growth also involves Italian workers.

APPENDIX

I

Price index and building wage rates
(annual data)

All of the five series presented here refer to Tuscany in the 1270-1605 period; to Lombardy from 1606 to 1860; and to all of Italy from 1861 to 1913.

A more detailed discussion of the criteria used to construct these series can be found in Malanima (2002), App. 3.

1. **The price index**. This is a Laspeyres index. The basket is the following (quantities per year):

Wheat	kg 120
Maize	kg 120 (from 1700 on; rye before)
Meat	kg 20 (veal)
Wine	kg 100
Eggs	50 units
Butter	kg 3
Soap	kg 2
Olive oil	kg 5
Textiles	13 Milanese lire in 1700-10
Firewood	kg 365
House Rent	10 Milanese lire in 1700-10 (data on house rents are available only from 1700).

In Malanima (2002), decadal series are presented, as well as elaborations on the price index based on the use of different baskets.

The price index for Tuscany (1270-1605) is based on data from the following works: De La Roncière (1982); Pinto (1993a) and (1993b); Parenti (1939); Tognetti (1995). Some items are missing in the 14th-15th century. Before 1286, only wheat prices are available for Pistoia (Herlihy 1967). When these are missing, I have interpolated rye prices based on a linear regression on wheat prices.

The price index for Lombardy (1606-1860) is based on data from the following works: De Maddalena (1949) and (1974); Sella (1968); Zanetti (1964).

The price index for Italy (1861-1913) is the one worked out by Fenoaltea (2002).

2. **Masons' wage rates**. *Tuscany*: (1280-95 and 1310-20) De La Roncière (1982); (1310-20 and 1340-1580) Goldthwaite (1980); (15th c.) Tognetti (1995); (1520-

1620) Parenti (1939); *Lombardy*: (17th c.) Sella (1968); (18th-19th c.) De Maddalena (1974); *Italy:* Fenoaltea (2002).

3. **Moneys:** *Florence*: (1270-1605): Cipolla (1982) (1987); Goldthwaite (1980); *Milan* (1605-1860): Sella (1979); *Italy:* the Italian lira was 4.5 gr. silver.

4. **Masons' nominal wage rates**: these are the product of col. 2 by col. 3.

5. **Index of real wages:** it is the quotient of col. 2 by col. 1 (1861=1).

	1	2	3	4	5
		Masons	Lira	Masons	Masons
	Price	**Nominal**	**Moneys**	**Nominal**	**Real**
	Index	**Wages**	(silver	**Wages**	**Wages**
	1861=1	**Tuscany**	grams	(in silver)	(2/1)
		(1286-1605)	per lira in 2)	(2x3)	1861=1
		Lombardy			
		(1606-1860)			
		Italy			
		(1861-1913)			
Tuscany					
1270			35		
1271			23		
1272	0.069		23		
1273	0.067		23		
1274			23		
1275			23		
1276			23		
1277	0.071		21		
1278			20		
1279	0.066		21		
1280			21		
1281	0.086		21		
1282			20		
1283	0.064		20		
1284	0.089		20		
1285	0.098		20		
1286	0.098	0.235	20	4.70	1.20
1287	0.098	0.235	20	4.70	1.17
1288		0.235	20	4.70	
1289		0.288	20	5.75	
1290	0.081	0.288	20	5.75	2.16

1291	0.081	0.288	20	5.75	1.94
1292		0.288	20	5.75	
1293		0.288	20	5.75	
1294		0.288	20	5.75	
1295		0.288	20	5.75	
1296		0.288	20	5.75	
1297		0.288	20	5.75	
1298		0.288	20	5.75	
1299	0.070	0.288	20	5.75	1.84
1300		0.288	20	5.75	
1301		0.288	20	5.75	
1302		0.288	20	5.75	
1303		0.288	20	5.75	
1304		0.288	20	5.75	
1305		0.288	20	5.75	
1306		0.288	19	5.46	
1307		0.288	19	5.46	
1308		0.288	19	5.46	
1309	0.077	0.288	19	5.46	3.08
1310	0.080	0.340	19	6.46	3.23
1311	0.098	0.358	19	6.79	2.03
1312	0.092	0.358	19	6.79	2.34
1313	0.092	0.358	19	6.79	2.34
1314	0.086	0.358	19	6.79	2.56
1315	0.077	0.358	19	6.79	2.82
1316	0.077	0.358	19	6.79	3.00
1317	0.089	0.358	19	6.79	2.40
1318	0.089	0.358	15.7	5.61	2.41
1319	0.083	0.358	15.7	5.61	2.72
1320	0.077	0.358	15.7	5.61	3.12
1321	0.074	0.358	15.7	5.61	3.22
1322	0.092	0.358	15.7	5.61	2.01
1323	0.107	0.358	15.7	5.61	1.67
1324	0.095	0.358	15.7	5.61	1.75
1325	0.083	0.358	15.7	5.61	2.00
1326	0.080	0.358	15.7	5.61	2.07
1327	0.089	0.358	15.7	5.61	1.86
1328	0.101	0.358	15.7	5.61	1.64
1329	0.137	0.358	15.7	5.61	1.21
1330	0.128	0.358	15.7	5.61	1.29
1331	0.089	0.358	15.7	5.61	1.86

1332	0.080	0.358	15.7	5.61	2.07
1333	0.098	0.358	15.7	5.61	1.69
1334	0.104	0.358	15.7	5.61	1.59
1335	0.107	0.358	15.7	5.61	1.55
1336	0.094	0.358	15.7	5.61	1.76
1337	0.085	0.375	15.7	5.89	2.05
1338	0.088	0.325	15.7	5.10	1.70
1339	0.114	0.385	15.7	6.04	1.56
1340	0.092	0.368	15.7	5.77	1.84
1341	0.073	0.368	15.7	5.77	2.32
1342	0.071	0.368	15.7	5.77	2.38
1343	0.106	0.368	15.7	5.77	1.61
1344	0.105	0.368	15.7	5.77	1.62
1345	0.092	0.350	12.3	4.31	1.75
1346	0.122	0.400	12.3	4.92	1.51
1347	0.114	0.500	11.1	5.55	2.03
1348	0.098	0.625	11.1	6.94	2.95
1349	0.106	0.670	11.1	7.44	2.94
1350	0.087	0.840	11.1	9.32	4.48
1351	0.129	0.915	11.1	10.16	3.29
1352	0.196	0.890	10.8	9.61	2.10
1353	0.159	0.890	10.8	9.61	2.58
1354	0.111	0.850	10.8	9.18	3.53
1355	0.108	0.830	10.8	8.96	3.57
1356	0.104	0.810	10.8	8.75	3.62
1357	0.093	0.845	10.8	9.13	4.18
1358	0.089	0.850	10.8	9.18	4.40
1359	0.112	0.685	10.8	7.40	2.83
1360	0.115	0.665	10.8	7.18	2.67
1361	0.090	0.725	10.8	7.83	3.73
1362	0.086	0.665	10.8	7.18	3.60
1363	0.103	0.800	10.8	8.64	3.61
1364	0.092	0.740	10.8	7.99	3.74
1365	0.089	0.890	10.8	9.61	4.64
1366	0.105	0.850	10.8	9.18	3.76
1367	0.095	0.790	10.8	8.53	3.84
1368	0.149	0.770	10.8	8.32	2.39
1369	0.145	0.820	10.8	8.86	2.62
1370	0.186	0.805	10.8	8.69	2.01
1371	0.146	0.785	10.8	8.48	2.48
1372	0.121	0.795	10.8	8.59	3.04

1373	0.113	0.895	10.8	9.67	3.65
1374	0.209	0.790	9.6	7.58	1.75
1375	0.149	0.815	9.6	7.82	2.53
1376	0.109	0.850	9.6	8.16	3.61
1377	0.098	0.750	9.6	7.20	3.53
1378	0.128	0.900	9.6	8.64	3.25
1379	0.136	0.675	9.6	6.48	2.29
1380	0.120	0.705	9.6	6.77	2.72
1381	0.145	0.785	9.6	7.54	2.50
1382	0.145	0.775	9.6	7.44	2.47
1383	0.171	0.750	9.6	7.20	2.03
1384	0.179	0.880	9.6	8.45	2.28
1385	0.164	0.865	9.6	8.30	2.44
1386	0.167	0.800	9.6	7.68	2.22
1387	0.127	0.800	9.6	7.68	2.91
1388	0.181	0.823	9.6	7.90	2.10
1389	0.216	0.845	9.6	8.11	1.81
1390	0.200	0.840	9.6	8.06	1.95
1391	0.195	0.850	9.6	8.16	2.02
1392	0.223	0.850	9.6	8.16	1.76
1393	0.163	0.850	9.6	8.16	2.41
1394	0.118	0.860	9.6	8.26	3.37
1395	0.128	0.800	9.6	7.68	2.89
1396	0.142	0.845	9.6	8.11	2.76
1397	0.145	0.810	9.6	7.78	2.59
1398	0.156	0.815	9.6	7.82	2.42
1399	0.150	0.805	9.6	7.73	2.48
1400	0.123	0.810	9.6	7.78	3.04
1401	0.123	0.900	9.6	8.64	3.39
1402	0.135	0.920	9	8.28	3.16
1403	0.106	0.905	9	8.15	3.97
1404	0.112	0.865	9	7.79	3.59
1405	0.149	0.920	9	8.28	2.87
1406	0.139	0.920	9	8.28	3.05
1407	0.150	0.900	9	8.10	2.77
1408	0.157	0.895	9	8.06	2.64
1409	0.152	0.845	9	7.61	2.57
1410	0.123	0.895	9	8.06	3.37
1411	0.166	0.920	9	8.28	2.57
1412	0.205	0.925	9	8.33	2.08
1413	0.083	0.800	9	7.20	4.46

1414	0.100	0.875	9	7.88	4.06
1415	0.126	0.895	9	8.06	3.30
1416	0.163	0.955	9	8.60	2.71
1417	0.146	0.910	9	8.19	2.88
1418	0.112	0.955	9	8.60	3.93
1419	0.125	0.955	9	8.60	3.53
1420	0.159	0.890	9	8.01	2.59
1421	0.127	0.945	9	8.51	3.44
1422	0.097	0.945	9	8.51	4.49
1423	0.104	0.945	9	8.51	4.19
1424	0.095	1.000	9	9.00	4.86
1425	0.114	0.925	8.8	8.14	3.75
1426	0.119	0.850	8.8	7.48	3.30
1427	0.116	0.905	8.8	7.96	3.60
1428	0.091	0.910	8.8	8.01	4.63
1429	0.092	0.925	8.8	8.14	4.65
1430	0.100	0.880	8.8	7.74	4.06
1431	0.141	0.880	8.8	7.74	2.89
1432	0.166	0.825	8.8	7.26	2.30
1433	0.115	0.825	8.8	7.26	3.33
1434	0.110	0.820	8.8	7.22	3.46
1435	0.117	0.920	8.8	8.10	3.64
1436	0.141	1.065	8.8	9.37	3.50
1437	0.121	1.080	8.8	9.50	4.15
1438	0.117	0.850	8.8	7.48	3.37
1439	0.153	0.905	8.8	7.96	2.73
1440	0.153	0.980	8	7.84	2.97
1441	0.158	1.075	8	8.60	3.14
1442	0.196	1.000	8	8.00	2.36
1443	0.118	1.020	8	8.16	4.01
1444	0.136	1.040	8	8.32	3.55
1445	0.116	0.955	8	7.64	3.81
1446	0.121	0.815	8	6.52	3.11
1447	0.094	0.980	8	7.84	4.81
1448	0.101	0.915	8	7.32	4.20
1449	0.100	0.915	8	7.32	4.22
1450	0.122	0.850	8	6.80	3.23
1451	0.124	0.945	8	7.56	3.51
1452	0.115	0.975	8	7.80	3.92
1453	0.113	0.900	8	7.20	3.67
1454	0.120	0.900	8	7.20	3.47

1455	0.136	0.825	8	6.60	2.81
1456	0.155	0.750	8	6.00	2.24
1457	0.156	0.800	8	6.40	2.37
1458	0.110	0.755	8	6.04	3.19
1459	0.099	0.835	8	6.68	3.92
1460	0.090	0.890	8	7.12	4.58
1461	0.090	0.885	7.6	6.73	4.55
1462	0.098	0.860	7.6	6.54	4.05
1463	0.112	1.050	7.6	7.98	4.33
1464	0.149	0.800	7.6	6.08	2.49
1465	0.158	1.000	7.6	7.60	2.92
1466	0.151	0.745	7.6	5.66	2.29
1467	0.143	0.765	6.9	5.28	2.47
1468	0.127	0.850	6.9	5.87	3.09
1469	0.123	0.875	6.9	6.04	3.29
1470	0.105	1.000	6.9	6.90	4.40
1471	0.108	1.000	6.9	6.90	4.30
1472	0.122	1.000	6.9	6.90	3.80
1473	0.153	1.000	6.9	6.90	3.02
1474	0.158	0.875	6.9	6.04	2.56
1475	0.149	0.875	6.9	6.04	2.71
1476	0.159	0.750	6.9	5.18	2.19
1477	0.149	0.820	6.9	5.66	2.55
1478	0.124	0.755	6.9	5.21	2.82
1479	0.130	0.760	6.9	5.24	2.70
1480	0.125	0.780	6.9	5.38	2.90
1481	0.123	0.690	6.6	4.55	2.61
1482	0.162	0.700	6.6	4.62	2.00
1483	0.193	0.815	6.6	5.38	1.96
1484	0.154	0.825	6.6	5.45	2.48
1485	0.124	0.785	6.6	5.18	2.94
1486	0.140	0.800	6.6	5.28	2.64
1487	0.145	0.800	6.6	5.28	2.55
1488	0.143	0.885	6.6	5.84	2.86
1489	0.127	0.760	6.6	5.02	2.76
1490	0.135	0.795	6.6	5.25	2.73
1491	0.125	0.800	6.6	5.28	2.96
1492	0.127	0.700	6.6	4.62	2.54
1493	0.136	0.700	6.6	4.62	2.38
1494	0.176	0.810	6.6	5.35	2.13
1495	0.169	0.645	6.6	4.26	1.76

1496	0.244	0.580	6.6	3.83	1.10
1497	0.222	0.670	6.6	4.42	1.40
1498	0.171	0.570	6.6	3.76	1.54
1499	0.170	0.745	6.6	4.92	2.02
1500	0.182	0.725	6.6	4.79	1.84
1501	0.213	0.615	6.6	4.06	1.33
1502	0.240	0.710	6.6	4.69	1.37
1503	0.228	0.715	5.4	3.86	1.45
1504	0.312	0.790	5.4	4.27	1.17
1505	0.208	0.790	5.4	4.27	1.75
1506	0.086	0.790	5.4	4.27	4.24
1507	0.169	0.790	5.4	4.27	2.17
1508	0.117	0.790	5.4	4.27	3.13
1509	0.112	0.790	5.4	4.27	3.27
1510	0.096	0.790	5.4	4.27	3.80
1511	0.185	0.790	5.4	4.27	1.98
1512	0.164	0.790	5.4	4.27	2.23
1513	0.130	0.790	5.4	4.27	2.82
1514	0.167	0.790	5.4	4.27	2.18
1515	0.201	0.790	5.4	4.27	1.82
1516	0.188	0.865	5.4	4.67	2.13
1517	0.117	0.890	5.4	4.81	3.53
1518	0.106	0.875	5.4	4.73	3.83
1519	0.147	0.900	5.4	4.86	2.83
1520	0.145	0.855	5.4	4.62	2.72
1521	0.200	0.935	5.4	5.05	2.17
1522	0.211	0.935	5.4	5.05	2.05
1523	0.225	0.900	5.4	4.86	1.85
1524	0.150	0.900	5.4	4.86	2.78
1525	0.150	0.865	5.4	4.67	2.66
1526	0.214	0.865	5.4	4.67	1.87
1527	0.320	0.865	5.4	4.67	1.25
1528	0.341	0.865	5.4	4.67	1.17
1529	0.254	0.865	5.4	4.67	1.58
1530	0.382	1.500	5.2	7.80	1.82
1531	0.325	1.500	4.9	7.35	2.13
1532	0.287	0.920	4.9	4.51	1.48
1533	0.322	1.125	4.9	5.51	1.61
1534	0.186	1.195	4.9	5.86	2.98
1535	0.163	1.150	4.9	5.64	3.27
1536	0.177	1.125	4.9	5.51	2.94

1537	0.167	1.125	4.9	5.51	3.12
1538	0.236	1.125	4.9	5.51	2.21
1539	0.364	1.100	4.9	5.39	1.40
1540	0.308	1.188	4.9	5.82	1.79
1541	0.200	1.275	4.9	6.25	2.95
1542	0.180	1.150	4.9	5.64	2.96
1543	0.206	1.025	4.9	5.02	2.30
1544	0.205	1.108	4.9	5.43	2.50
1545	0.221	1.108	4.9	5.43	2.31
1546	0.178	1.108	4.9	5.43	2.88
1547	0.289	1.190	4.9	5.83	1.90
1548	0.278	1.080	4.9	5.29	1.80
1549	0.223	1.028	4.9	5.03	2.13
1550	0.282	1.028	4.9	5.03	1.69
1551	0.232	0.975	4.9	4.78	1.94
1552	0.187	1.295	4.9	6.35	3.20
1553	0.212	1.190	4.9	5.83	2.59
1554	0.357	1.180	4.9	5.78	1.53
1555	0.394	1.110	4.5	5.00	1.30
1556	0.304	1.155	4.5	5.20	1.76
1557	0.330	1.130	4.5	5.09	1.58
1558	0.314	1.410	4.5	6.35	2.08
1559	0.338	1.335	4.5	6.01	1.83
1560	0.286	1.475	4.5	6.64	2.39
1561	0.289	1.615	4.5	7.27	2.59
1562	0.396	1.325	4.5	5.96	1.55
1563	0.243	1.525	4.5	6.86	2.90
1564	0.303	1.540	4.5	6.93	2.35
1565	0.305	1.770	4.5	7.97	2.69
1566	0.284	1.770	4.5	7.97	2.89
1567	0.226	1.770	4.5	7.97	3.62
1568	0.280	1.770	4.5	7.97	2.93
1569	0.392	1.770	4.5	7.97	2.09
1570	0.306	2.000	4.5	9.00	3.02
1571	0.342	2.000	4.5	9.00	2.70
1572	0.336	2.150	4.5	9.68	2.96
1573	0.271	1.730	4.5	7.79	2.95
1574	0.281	1.750	4.5	7.88	2.89
1575	0.320	1.650	4.5	7.43	2.39
1576	0.298	2.000	4.5	9.00	3.11
1577	0.307	1.750	4.5	7.88	2.64

1578	0.349	1.985	4.5	8.93	2.63
1579	0.436	2.065	4.5	9.29	2.19
1580	0.383	1.790	4.5	8.06	2.17
1581	0.347	1.860	4.5	8.37	2.48
1582	0.341	1.750	4.5	7.88	2.37
1583	0.331	2.000	4.5	9.00	2.80
1584	0.353	1.890	4.5	8.51	2.48
1585	0.368	1.540	4.5	6.93	1.94
1586	0.387	2.000	4.5	9.00	2.39
1587	0.351	1.750	4.5	7.88	2.31
1588	0.349	1.750	4.5	7.88	2.32
1589	0.377	1.500	4.5	6.75	1.84
1590	0.438	1.875	4.5	8.44	1.98
1591	0.517	1.938	4.5	8.72	1.74
1592	0.494	2.000	4.5	9.00	1.87
1593	0.385	2.000	4.5	9.00	2.40
1594	0.433	2.000	4.5	9.00	2.14
1595	0.442	2.000	4.5	9.00	2.09
1596	0.586	2.000	4.5	9.00	1.58
1597	0.506	1.918	4.5	8.63	1.75
1598	0.427	1.835	4.5	8.26	1.99
1599	0.388	2.550	4.5	11.48	3.04
1600	0.415	2.000	4.5	9.00	2.23
1601	0.522	2.050	4.5	9.23	1.82
1602	0.512	2.150	4.5	9.68	1.94
1603	0.412	2.250	4.5	10.13	2.53
1604	0.469	2.000	4.5	9.00	1.97
1605	0.459	2.250	4.5	10.13	2.27
Lombardy					
1606	0.532	1.750	5.16	9.03	1.67
1607	0.512	1.750	5.16	9.03	1.77
1608	0.436	1.750	5.39	9.43	2.12
1609	0.420	1.750	5.39	9.43	2.21
1610	0.400	1.750	5.16	9.03	2.17
1611	0.434	1.750	5.39	9.43	1.87
1612	0.460	1.750	5.16	9.03	1.76
1613	0.473	1.750	4.77	8.35	1.71
1614	0.464	1.750	5.16	9.03	1.74
1615	0.496	1.750	4.7	8.23	1.63
1616	0.428	1.850	4.37	8.08	2.00
1617	0.461	1.850	4.03	7.46	1.86

1618	0.541	1.850	3.87	7.16	1.58
1619	0.569	1.850	5.39	9.97	1.50
1620	0.499	1.850	5.39	9.97	1.71
1621	0.424	1.800	5.39	9.70	1.96
1622	0.448	1.800	5.39	9.70	1.86
1623	0.455	1.800	5.39	9.70	1.83
1624	0.444	1.800	5.39	9.70	1.88
1625	0.399	1.800	5.39	9.70	2.09
1626	0.427	1.800	5.39	9.70	1.95
1627	0.492	1.800	5.39	9.70	1.69
1628	0.588	1.800	5.39	9.70	1.42
1629	0.632	1.800	5.39	9.70	1.32
1630	0.577	1.800	5.39	9.70	1.44
1631	0.459	1.800	5.39	9.70	1.81
1632	0.380	1.800	5.39	9.70	2.19
1633	0.381	1.800	5.39	9.70	2.19
1634	0.362	1.800	5.34	9.61	2.30
1635	0.537	1.800	5.25	9.45	1.55
1636	0.483	1.800	5.08	9.14	1.73
1637	0.427	1.800	5.34	9.61	1.95
1638	0.367	1.800	5.25	9.45	2.27
1639	0.364	1.800	5.16	9.29	2.29
1640	0.342	1.800	5.16	9.29	2.44
1641	0.338	1.800	5.16	9.29	2.47
1642	0.361	1.800	5.06	9.11	2.31
1643	0.442	1.800	5.06	9.11	1.89
1644	0.435	1.800	5.06	9.11	1.92
1645	0.387	1.800	5.06	9.11	2.15
1646	0.374	1.800	5.06	9.11	2.23
1647	0.440	1.800	5.06	9.11	1.89
1648	0.521	1.800	5.06	9.11	1.60
1649	0.578	1.800	5.06	9.11	1.44
1650	0.551	1.800	5.06	9.11	1.51
1651	0.379	1.800	5.06	9.11	2.20
1652	0.368	1.800	5.06	9.11	2.27
1653	0.381	1.800	5.06	9.11	2.19
1654	0.368	1.800	5.06	9.11	2.27
1655	0.364	1.800	5.06	9.11	2.29
1656	0.401	1.800	5.06	9.11	2.08
1657	0.390	1.800	4.96	8.93	2.14
1658	0.393	1.800	4.42	7.96	2.12

1659	0.393	1.800	4.42	7.96	2.12
1660	0.410	1.800	4.42	7.96	2.03
1661	0.379	1.800	4.42	7.96	2.20
1662	0.368	1.800	4.42	7.96	2.26
1663	0.374	1.800	4.42	7.96	2.23
1664	0.376	1.800	4.42	7.96	2.21
1665	0.364	1.800	4.42	7.96	2.29
1666	0.331	1.800	4.42	7.96	2.52
1667	0.329	1.800	4.42	7.96	2.53
1668	0.342	1.800	4.42	7.96	2.44
1669	0.382	1.800	4.42	7.96	2.18
1670	0.376	1.800	4.42	7.96	2.21
1671	0.358	1.800	4.42	7.96	2.33
1672	0.339	1.600	4.27	6.83	2.18
1673	0.333	1.600	4.27	6.83	2.22
1674	0.342	1.600	4.13	6.61	2.16
1675	0.413	1.600	4.13	6.61	1.79
1676	0.397	1.600	3.87	6.19	1.86
1677	0.453	1.600	3.87	6.19	1.63
1678	0.456	1.600	3.87	6.19	1.62
1679	0.418	1.600	3.87	6.19	1.77
1680	0.394	1.600	3.87	6.19	1.88
1681	0.362	1.700	3.87	6.58	2.17
1682	0.350	1.700	3.87	6.58	2.25
1683	0.340	1.700	3.87	6.58	2.32
1684	0.379	1.700	3.87	6.58	2.08
1685	0.447	1.700	3.87	6.58	1.76
1686	0.404	1.700	3.87	6.58	1.95
1687	0.338	1.700	3.87	6.58	2.32
1688	0.347	1.650	3.87	6.39	2.20
1689	0.351	1.650	3.87	6.39	2.18
1690	0.393	1.600	3.87	6.19	1.88
1691	0.390	1.600	3.87	6.19	1.90
1692	0.408	1.600	3.87	6.19	1.81
1693	0.421	1.550	3.87	6.00	1.70
1694	0.489	1.550	3.87	6.00	1.47
1695	0.518	1.500	3.87	5.81	1.34
1696	0.512	1.500	3.87	5.81	1.36
1697	0.480	1.500	3.87	5.81	1.45
1698	0.428	1.500	3.87	5.81	1.62
1699	0.413	1.500	3.87	5.81	1.68

1700	0.392	1.500	3.87	5.81	1.77
1701	0.405	1.750	3.87	6.77	2.00
1702	0.422	1.750	3.87	6.77	1.92
1703	0.403	1.750	3.87	6.77	2.01
1704	0.396	1.750	3.87	6.77	2.05
1705	0.392	1.750	3.87	6.77	2.07
1706	0.410	1.750	3.87	6.77	1.98
1707	0.421	1.750	3.87	6.77	1.92
1708	0.424	1.750	3.87	6.77	1.91
1709	0.535	1.630	3.87	6.31	1.41
1710	0.474	1.630	3.87	6.31	1.59
1711	0.395	1.630	3.87	6.31	1.91
1712	0.381	1.630	3.87	6.31	1.98
1713	0.380	1.630	3.87	6.31	1.98
1714	0.413	1.630	3.87	6.31	1.83
1715	0.429	1.630	3.87	6.31	1.76
1716	0.392	1.630	3.87	6.31	1.93
1717	0.381	1.630	3.87	6.31	1.98
1718	0.390	1.630	3.87	6.31	1.94
1719	0.356	1.630	3.87	6.31	2.12
1720	0.329	1.630	3.87	6.31	2.29
1721	0.343	1.630	3.87	6.31	2.20
1722	0.351	1.630	3.87	6.31	2.15
1723	0.314	1.630	3.87	6.31	2.40
1724	0.295	1.630	3.87	6.31	2.55
1725	0.330	1.630	3.87	6.31	2.29
1726	0.354	1.630	3.87	6.31	2.13
1727	0.338	1.630	3.87	6.31	2.23
1728	0.333	1.630	3.87	6.31	2.26
1729	0.329	1.630	3.87	6.31	2.29
1730	0.314	1.630	3.87	6.31	2.40
1731	0.349	1.630	3.75	6.11	2.16
1732	0.339	1.630	3.75	6.11	2.23
1733	0.423	1.630	3.75	6.11	1.78
1734	0.493	1.630	3.75	6.11	1.53
1735	0.465	1.630	3.75	6.11	1.62
1736	0.422	1.630	3.75	6.11	1.79
1737	0.374	1.630	3.75	6.11	2.02
1738	0.389	1.630	3.75	6.11	1.94
1739	0.388	1.630	3.75	6.11	1.95
1740	0.408	1.630	3.75	6.11	1.85

1741	0.431	1.630	3.69	6.01	1.75
1742	0.410	1.630	3.69	6.01	1.84
1743	0.421	1.630	3.69	6.01	1.79
1744	0.389	1.630	3.69	6.01	1.94
1745	0.396	1.630	3.69	6.01	1.90
1746	0.456	1.630	3.69	6.01	1.65
1747	0.491	1.630	3.69	6.01	1.54
1748	0.497	1.630	3.69	6.01	1.52
1749	0.449	1.630	3.69	6.01	1.68
1750	0.503	1.630	3.69	6.01	1.50
1751	0.505	1.630	3.58	5.84	1.49
1752	0.460	1.630	3.58	5.84	1.64
1753	0.388	1.630	3.58	5.84	1.94
1754	0.383	1.630	3.58	5.84	1.97
1755	0.416	1.630	3.58	5.84	1.81
1756	0.439	1.630	3.58	5.84	1.72
1757	0.454	1.630	3.58	5.84	1.66
1758	0.442	1.630	3.58	5.84	1.71
1759	0.446	1.630	3.58	5.84	1.69
1760	0.398	1.630	3.58	5.84	1.90
1761	0.387	1.630	3.58	5.84	1.95
1762	0.379	1.630	3.58	5.84	1.99
1763	0.405	1.630	3.58	5.84	1.86
1764	0.434	1.630	3.58	5.84	1.74
1765	0.460	1.630	3.58	5.84	1.64
1766	0.520	1.630	3.58	5.84	1.45
1767	0.517	1.630	3.58	5.84	1.46
1768	0.484	1.630	3.58	5.84	1.56
1769	0.462	1.630	3.58	5.84	1.63
1770	0.496	1.630	3.58	5.84	1.52
1771	0.512	1.630	3.58	5.84	1.47
1772	0.584	1.630	3.58	5.84	1.29
1773	0.566	1.630	3.58	5.84	1.33
1774	0.613	1.630	3.58	5.84	1.23
1775	0.644	1.630	3.58	5.84	1.17
1776	0.526	1.630	3.58	5.84	1.43
1777	0.600	1.630	3.58	5.84	1.26
1778	0.695	1.630	3.58	5.84	1.08
1779	0.570	1.460	3.58	5.23	1.19
1780	0.500	1.460	3.58	5.23	1.35
1781	0.556	1.460	3.5	5.11	1.22

1782	0.592	1.460	3.5	5.11	1.14
1783	0.620	1.460	3.5	5.11	1.09
1784	0.588	1.460	3.5	5.11	1.15
1785	0.563	1.460	3.5	5.11	1.20
1786	0.533	1.460	3.5	5.11	1.27
1787	0.602	1.460	3.5	5.11	1.12
1788	0.545	1.460	3.5	5.11	1.24
1789	0.550	1.460	3.5	5.11	1.23
1790	0.574	1.460	3.5	5.11	1.18
1791	0.525	1.460	3.5	5.11	1.29
1792	0.557	1.460	3.5	5.11	1.21
1793	0.655	1.460	3.5	5.11	1.03
1794	0.647	1.460	3.5	5.11	1.04
1795	0.664	1.460	3.5	5.11	1.02
1796	0.686	1.460	3.5	5.11	0.98
1797	0.726	1.460	3.5	5.11	0.93
1798	0.740	1.460	3.5	5.11	0.91
1799	0.843	1.460	3.5	5.11	0.80
1800	1.191	1.460	3.5	5.11	0.57
1801	1.154	1.560	3.5	5.46	0.63
1802	0.884	1.630	3.5	5.71	0.85
1803	0.779	1.630	3.5	5.71	0.97
1804	0.695	1.630	3.5	5.71	1.08
1805	0.718	1.630	3.5	5.71	1.05
1806	0.755	1.630	3.5	5.71	1.00
1807	0.725	1.630	3.5	5.71	1.04
1808	0.678	1.630	3.5	5.71	1.11
1809	0.666	1.630	3.5	5.71	1.13
1810	0.856	1.630	3.5	5.71	0.88
1811	1.007	1.630	3.5	5.71	0.75
1812	0.919	1.630	3.5	5.71	0.82
1813	0.817	1.630	3.5	5.71	0.92
1814	0.842	1.630	3.5	5.71	0.90
1815	1.026	1.630	3.5	5.71	0.73
1816	1.098	1.630	3.5	5.71	0.69
1817	1.059	1.630	3.5	5.71	0.71
1818	0.776	1.630	3.5	5.71	0.97
1819	0.663	1.630	3.5	5.71	1.14
1820	0.698	1.630	3.5	5.71	1.08
1821	0.749	1.630	3.5	5.71	1.01
1822	0.710	1.960	3.5	6.86	1.28

1823	0.704	2.000	3.5	7.00	1.31
1824	0.640	2.000	3.5	7.00	1.44
1825	0.675	2.000	3.5	7.00	1.37
1826	0.649	2.000	3.5	7.00	1.43
1827	0.689	2.000	3.5	7.00	1.34
1828	0.768	2.000	3.5	7.00	1.21
1829	0.782	2.000	3.5	7.00	1.18
1830	0.712	2.000	3.5	7.00	1.30
1831	0.716	2.000	3.5	7.00	1.29
1832	0.688	2.000	3.5	7.00	1.34
1833	0.679	2.000	3.5	7.00	1.36
1834	0.658	2.000	3.5	7.00	1.41
1835	0.671	2.000	3.5	7.00	1.38
1836	0.761	2.000	3.5	7.00	1.22
1837	0.851	2.000	3.5	7.00	1.09
1838	0.790	2.000	3.5	7.00	1.17
1839	0.827	2.000	3.5	7.00	1.12
1840	0.832	2.000	3.5	7.00	1.11
1841	0.771	2.000	3.5	7.00	1.20
1842	0.766	2.000	3.5	7.00	1.21
1843	0.797	2.000	3.5	7.00	1.16
1844	0.793	2.000	3.5	7.00	1.17
1845	0.766	2.000	3.5	7.00	1.21
1846	0.795	2.000	3.5	7.00	1.16
1847	0.880	2.000	3.5	7.00	1.05
1848	0.792	2.000	3.5	7.00	1.17
1849	0.806	2.000	3.5	7.00	1.15
1850	0.763	2.000	3.5	7.00	1.21
1851	0.761	2.000	3.5	7.00	1.22
1852	0.808	2.000	3.5	7.00	1.14
1853	0.890	2.000	3.5	7.00	1.04
1854	1.234	2.000	3.5	7.00	0.75
1855	1.171	2.000	3.5	7.00	0.79
1856	1.147	2.000	3.5	7.00	0.81
1857	0.987	2.000	3.5	7.00	0.94
1858	0.852	2.000	3.5	7.00	1.09
1859	0.953	1.960	3.5	6.86	0.95
1860	0.967	2.090	3.45	7.21	0.98
Italy					
1861	1.000	1.610	4.5	7.25	1.00
1862	0.973	1.660	4.5	7.47	1.06

1863	0.950	1.680	4.5	7.56	1.10
1864	0.905	1.710	4.5	7.70	1.17
1865	0.924	1.760	4.5	7.92	1.18
1866	0.986	1.800	4.5	8.10	1.13
1867	1.060	1.830	4.5	8.24	1.07
1868	1.037	1.870	4.5	8.42	1.12
1869	1.009	1.880	4.5	8.46	1.16
1870	1.057	1.940	4.5	8.73	1.14
1871	1.198	1.990	4.5	8.96	1.03
1872	1.276	2.040	4.5	9.18	0.99
1873	1.338	2.070	4.5	9.32	0.96
1874	1.246	1.970	4.5	8.87	0.98
1875	1.189	2.000	4.5	9.00	1.04
1876	1.132	2.010	4.5	9.05	1.10
1877	1.193	2.020	4.5	9.09	1.05
1878	1.234	2.030	4.5	9.14	1.02
1879	1.230	2.090	4.5	9.41	1.06
1880	1.189	2.140	4.5	9.63	1.12
1881	1.170	2.200	4.5	9.90	1.17
1882	1.117	2.240	4.5	10.08	1.25
1883	1.070	2.280	4.5	10.26	1.32
1884	0.998	2.330	4.5	10.49	1.45
1885	0.956	2.370	4.5	10.67	1.54
1886	0.935	2.400	4.5	10.80	1.59
1887	0.939	2.430	4.5	10.94	1.61
1888	0.955	2.420	4.5	10.89	1.57
1889	0.986	2.420	4.5	10.89	1.52
1890	1.013	2.420	4.5	10.89	1.48
1891	1.014	2.350	4.5	10.58	1.44
1892	0.987	2.280	4.5	10.26	1.43
1893	0.930	2.210	4.5	9.95	1.48
1894	0.915	2.210	4.5	9.95	1.50
1895	0.919	2.230	4.5	10.04	1.51
1896	0.950	2.260	4.5	10.17	1.48
1897	0.948	2.290	4.5	10.31	1.50
1898	0.944	2.310	4.5	10.40	1.52
1899	0.942	2.310	4.5	10.40	1.52
1900	0.940	2.310	4.5	10.40	1.53
1901	0.942	2.380	4.5	10.71	1.57
1902	0.949	2.420	4.5	10.89	1.58
1903	0.939	2.450	4.5	11.03	1.62

1904	0.958	2.450	4.5	11.03	1.59
1905	0.951	2.470	4.5	11.12	1.61
1906	0.958	2.590	4.5	11.66	1.68
1907	0.962	2.720	4.5	12.24	1.76
1908	0.998	2.940	4.5	13.23	1.83
1909	1.028	3.030	4.5	13.64	1.83
1910	1.040	3.150	4.5	14.18	1.88
1911	1.063	3.170	4.5	14.27	1.85
1912	1.076	3.260	4.5	14.67	1.88
1913	1.079	3.330	4.5	14.99	1.92

II

Decadal series of prices and wage-rates

1.   **Price index:** based on the yearly price index in App. I: the decadal averages are the central values of a weighted 11 year average.

2.   **Urban wage rates**: decadal averages of Tuscan masons' wage rates based on: (1280-95 and 1310-20) De La Roncière (1982); (1310-20 and 1340-1580) Goldthwaite (1980); (1580-1620) Parenti (1939); (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 (1960).

3.   **Rural wage rates**: nominal wages for Tuscany are from Tognetti (1995), (1320 to 1500) and Parenti (1939) (from 1500 to 1620); for Piedmont from Doria (1968) (from 1610 to 1720) and Pugliese (1908) (from 1710 to 1860).

4.   **Urban-rural wage rates**: the weighted average (1860-70=1) is based on data on urbanization rates from Malanima, *Urbanization and Economy in Italy. The last Millennium* (forthcoming). Data from 1861 are based on Fenoaltea (2002) (I have recalculated the urban-rural series as a weighted average, whereas Fenoaltea only calculates it as an arithmetic mean).

5.   **Wage rates**: the series of average per hour wage rates is based on Fenoaltea (2002) and is expressed in 186070 lire.

Comparison of two indices of prices and building wages:

	Price Indices		Building Wages	
	Allen	*Malanima*	*Allen*	*Malanima*
1500-49	1	1	1	1
1550-99	1.52	1.66	0.88	1.06
1600-49	1.97	2.17	0.93	1.07
1650-99	1.71	1.88	0.82	1.19
1700-49	1.44	1.89	0.77	1.11
1750-99	1.79	2.57	0.56	0.83
1800-49	2.52	3.79	0.44	0.62
1850-99	4.15	4.90	0.52	0.73
1900-13	8.24	4.73	0.97	1.08

Note: some comparisons between price and wage indices presented in this Appendix and other partial indices are discussed in Malanima (2002), App. 3. Here is a comparison between the series in this Appendix and the ones elaborated for Italy by Allen (2001). In both indices, the main difference concerns the data for 1900-13. If we take the period 1400-50 as the basis of both series (from the Figures in Allen, since his series starts with 1500-50), the difference is especially strong in the price index. The data for 1850-1900 can be found in Allen 4.98; Malanima 8.57.

	1	2	3	4	5
	Price	Urban	Rural	Urban-	Wage Rates
	Index	Wage	Wage	Rural	(per hour)
	1860-70=1	Rates	Rates	Wage R.	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

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