

**LABOUR PRODUCTIVITY IN ITALIAN AGRICULTURE
1000-2000**

*Giovanni Federico
Paolo Malanima*

1. Urbanization and labour productivity
2. Methods
3. Prices and income
4. Per capita agricultural product
5. Population and gross agricultural product
6. The agricultural workforce
7. Labour productivity in the long run
8. Conclusion : Italy and the others

*XIII International Congress
of Economic History*

Buenos Aires, July 2002

Giovanni Federico, Department of History and Civilization, European
University Institute, Fiesole E mail: Giovanni.Federico@iue.it

Paolo Malanima, Università <<Magna Graecia>> di Catanzaro
Email: malanima@stm.unipi.it

LABOUR PRODUCTIVITY IN ITALIAN AGRICULTURE 1000-2000

*Giovanni Federico
Paolo Malanima*

For Italy, as for many other Western European regions, data on agricultural production and employment are available only from the mid-19th century onwards. Direct estimates for previous centuries are possible for some farms and some small areas, in a few lucky cases, when documents are particularly plentiful; usually from the early Modern Age. No estimate from the output-side is possible for long periods and wide areas. Thus this paper will use new series for urban population, prices and wages to estimate output,¹ hence labour productivity, from the consumption-side until 1860. The resulting series are then linked to the available output-side estimates from 1860 on.

We fully realize that, at the moment, only a preliminary outline is possible for such a topic. We believe, however, that even a first approximation, based on clear and verifiable assumptions, may be useful as a starting point for further research on the issue.

The following reconstruction covers the last millennium. As regards the area under examination, we have decided to limit our analysis to Central and Northern Italian agriculture: from the Southern borders of the current regions of Tuscany, Marche and Umbria, to the Alps.² This wide area -161,000 sq. km.- includes many different agricultural sub-regions, with specific soil and climate conditions. The hilly terrain of the Centre obviously differ from the plains of the Po Valley. Yet there are much greater differences between the Central-Northern Italian agriculture, on the one hand, and the Southern, on the other; not only because they belonged to diverse political units, but primarily because of the differences in physical conditions, in historical evolution, in prices, in wages, in urbanization, etc. A unitary profile for the Italian economy is almost meaningless. Two Italies already existed in the late Middle Ages, just as they do today.

Section 1 presents a rough estimate of agricultural labour productivity from AD 1000, based on changes in urbanization. Section 2 lays

¹ The reconstruction of statistical series before 1861, presented in the following pages, is fully explained in Malanima, *L'economia italiana*.

² The area corresponds only partially to the current distinction between North and Centre. This latter, in fact, usually includes Latium, which we exclude.

out a methodology for the estimation of agricultural production from the demand-side. Section 3 outlines the long-term trends in prices and wages. It then becomes possible to reconstruct the curve of agricultural production in per capita -section 4- and aggregate terms -section 5-. Section 6 presents an attempt to estimate agricultural employment. It is thus possible to obtain a series for agricultural labour productivity -section 7-, which is compared with similar series for other countries in the last section.

1. *Urbanization and labour productivity.* The more the urban population rises, the more the primary sector has to be productive to support not only agricultural workers, but also an increasing number of people employed in secondary and tertiary activities. Urbanization, therefore, may be used as a proxy of agricultural productivity under extreme, but not wholly implausible assumptions:³ i.e. that the aggregate agricultural Output (y) equals per capita consumption of agricultural goods (C) by the whole population (P) and that agricultural employment equals the whole population minus the urban population (P_u):⁴

$$y = \frac{C \cdot P}{P - P_u} = \frac{C}{1 - P_u} \text{ or } \frac{1}{1 - P_u} \cdot 100$$

The equation holds true if:

- i. agricultural consumption and agricultural production are equal: foreign trade is negligible;
- ii. agricultural per capita consumption is constant and thus unaffected by any change in prices or income;
- iii. the activity rate -active population/total population- and the share of agriculture on total employment are constant.

Fortunately for Central and Northern Italy an urban database, including all centres with 5000 inhabitants or more from 1300 to 1800, is available.⁵ For 1861 it is possible to draw data on urban populations from the first Italian census after Unification.⁶ Since then, the rapidly increasing size of cities might make the 5000 inhabitant threshold misleading. Henceforward we rely, afterwards, on estimates already worked out by statisticians and geographers.⁷

Before 1300 only rare and unreliable quantitative data are available. We know that Italian cities were the largest in Europe. We also know, from many indirect sources, that urbanization was on the increase, at least from the

³ A first attempt to reconstruct agricultural productivity from series for urbanization was proposed for England by Wrigley, *Urban growth*.

⁴ C disappears in the equation since we are interested to build, in this first attempt, an index of productivity -percent- and not a series of monetary values.

⁵ Malanima, *Italian cities 1300-1800*.

⁶ *Popolazione. Censimento generale (31 dicembre 1861)*.

⁷ Carozzi, *Il processo di urbanizzazione*, pp. 321-47, and Vitali, *L'evoluzione rurale-urbana in Italia*.

10th-11th centuries on. From data concerning developments within the city walls and from some information on the population in Tuscany during the 13th century it is possible to draw some tentative, though not implausible, figures.⁸

On the basis of these assumptions it is possible to present a first estimate of agricultural productivity (Table 1).

Table 1. Urban percentages and index of agricultural productivity (1500=100) from 1000 to 1991 in Central and Northern Italy.

	Urban Percentage	Index of agricultural productivity (1500=100)
1000	[5-8]	84
1100	[8-9]	86
1200	[9-11]	87
1300	21.4	100
1400	17.6	95
1500	21.0	100
1600	18.4	97
1700	16.9	94
1800	17.5	95
1861	16.2	94
1901	26.8	108
1951	47.8	151
1991	66.6	235

This first attempt suggests the existence of three main periods in the millennial history of Italian agricultural productivity. During the first epoch – the three centuries from 1000 until 1300- agricultural productivity rose by about 20 percent. Then followed a long period of 600 years -from 1300 until 1900- in which Italian agricultural productivity stagnated or slowly decreased. From the beginning of the 20th century a fast increase took place.

The obvious advantage of a reconstruction based on physical estimates, is that we can avoid the many dangers involved in monetary values and price indices. Furthermore the results are not in conflict with the available information on Italian agricultural history. We know that all over Europe there was a period of agrarian intensification after the 10th-11th centuries and that agricultural labour productivity increased. We also know that Italian agriculture was not particularly innovative from the late Middle Ages onwards. The conventional wisdom reckons that technical progress started only at the turn of the 19th century or at the beginning of the following one.

On the other hand, the profile we get from urbanization is not wholly convincing. The index shows a decline in the 15th century, since the epidemics, in Italy as elsewhere, were much more severe in the cities than in the countryside. However epidemics destroyed men and not capital and land.

⁸ This theme too is widely discussed in Malanima, *L'economia italiana*.

Everywhere in Europe, as far as we know, agricultural productivity rose during the 15th century and did not decline as our preliminary reconstruction suggests. Furthermore, urbanization under-estimates productivity growth in the last two centuries. It suggests a 2.5 times increase between 1860-70 and 2000, while actually labour productivity rose by almost 50 times.

There is no doubt that we need more realistic assumptions to deepen and modify this first long-term profile.

2. *Methods.* For the period to 1860, production is calculated as per capita consumption times the total population, taking into account the net balance of trade in agricultural products (R):

$$Y=R \cdot C \cdot P$$

The parameter R is the ratio of agricultural production to agricultural consumption.

Since the stability over time of per capita agricultural consumption, assumed in the previous attempt based on urbanization, is an extreme and unrealistic assumption, C is now calculated as depending on income and prices:

$$C=W^a Z^b$$

where W and Z are indices of real per capita income and prices of agricultural products relative to those of other goods.

For the period 1860-2000, we rely on output-side estimates of total production.

These series on total output are then divided by an estimate of the agricultural workforce to obtain an estimate of labour productivity.

When trying to reconstruct the agricultural production from consumption, we implicitly assume that no import or export of agricultural products intervenes to influence the profile. In other words, we assume the parameter R=1. If the economy we are examining were characterized by remarkable imports of agricultural products –such as cereals or raw materials– domestic consumption would evidently be higher than agricultural production. If, on the contrary, our economy were characterized by big exports of agricultural goods, then internal production would exceed internal consumption.

We know that in the late Middle Ages, Central and Northern Italian urban economies already imported industrial raw materials, such as wool, cotton, silk, and agricultural goods such as wheat, oil, wine, sugar. All these imports were certainly of considerable importance for particular Northern cities and for particular areas. Much harder to specify is what the quantitative importance of such imports actually was in relation to the agricultural gross product. An estimate is possible for the period 1560-80, when agricultural imports in the Centre and North were particularly substantial.⁹ Population was rapidly rising and the pressure on resources was thus intensifying. Yet imports of raw materials and agricultural goods –almost entirely from the South-

Comment:

⁹ Malanima, *La fine del primato*, Ch. 2 and pp. 70-5.

accounted for little more than 5 percent of the agricultural production of the Centre and North.

We also know that during the 17th and 18th centuries these imports from the South decreased. In the 19th and early 20th centuries interregional trade was low, and North and South were poorly integrated.¹⁰ Cereals continued to be exported from the South to the North even during the 19th century. Just before Unification, about a half million people -3 percent of the whole population of the Centre and North- could be fed thanks to wheat imports mainly from the South, but also from the plains near the Black Sea.¹¹ Imports of agricultural goods (mainly cereals, but also timber, wool, cotton and colonial goods) were to become quite large only after the 1880s -the so-called agrarian crisis-. After this, agricultural production and consumption diverged considerably.

As to the exports from the Centre and the North, the main agricultural product was silk thread -raw and thrown silk-. Its importance in the Italian trade balance rose after the 17th century. In the 19th century it represented about 30 percent of the Italian export.¹² Silk was a semi-manufactured product: the purely agricultural raw material, the cocoons, accounted for 2-3 percent- of the gross Italian agricultural product.¹³ Since these exports roughly correspond to the estimated value of the agricultural imports we may conclude that imports and exports balanced out. Our attempt can only aim at establishing a long-term trend, we may neglect these agricultural exchanges and assume the equivalence of agricultural consumption and agricultural production.

3. *Prices and income.* Until not long ago we had price indices only for relatively recent periods. A long-term pre-industrial price index was available only for England. Reconstructions of pre-industrial price movements largely relied on agricultural prices, especially wheat prices. The construction of two price indices for Central and Northern Italy and for The Netherlands now allows a clearer view of pre-industrial price movements (Figure 1).¹⁴

The Central and Northern Italian index is based on two different indices referring to Tuscany -from 1280 until 1620- and to Lombardy -from 1610 until 1860. The similarity of the baskets used to build such indices and the high correlation of the price movement in Tuscany and Lombardy allow us to build just a single series for the period from the end of the 13th century until 1860.¹⁵

¹⁰ Cafagna, *La questione* and Zamagni, *Ferrovie ed integrazione*.

¹¹ Correnti-Maestri, *Annuario* II, 1864, pp. 417 ff.

¹² Federico, *Il filo d'oro*, tab.1.

¹³ Federico, *Una stima del valore aggiunto*, tab.1.

¹⁴For England, Phelps Brown-Hopkins, *Seven centuries* pp. 179-96; for The Netherlands, Van Zanden, *The prices*.

¹⁵ Appendix, Column 1. The reconstruction of the Italian price index is widely presented in Malanima, *L'economia italiana*.

Many similarities exist, at least in long-term movement, between English, Dutch and Italian prices. The differences are easily explained with reference to the performance of these different regions. Some main phases may be clearly distinguished in the Italian price index. After the late medieval increase, we can single out a long-term decrease from 1350 until the middle of the 15th century. This is followed by an upward movement lasting until the end of the 16th century; a stagnation and decline during the 17th century and a new rise from 1730-40 on peaking in 1810s. From then on a slow decline takes place.

Since, with a view to reconstructing the agricultural production, we are particularly interested in the movement of agricultural prices, we can build two separate indices for agricultural¹⁶ and non-agricultural¹⁷ goods – in particular textiles-(Figure 2). These rose from 1 at the beginning of the 15th century to 2.28 in 1850-60. This (relative) stagnation of non-agricultural prices, in Italy as well as in other European countries, is not surprising. Productivity in trade and industry rose much more than in agriculture, where innovations were rare and slow to spread. Decreasing returns in agriculture heavily contrast with increasing returns in industry and trade.

It is much harder to get reliable information on income. The only available long-term series refer to wages, usually in building, which scholars have widely used as proxy for per capita income. Here too wages have been assumed as proxies to describe income trends on the basis of the following checks:

- i. where a comparison is possible, in Italy, as in other European regions, the few available data on per capita product follow the same long-term movement as wages;
- ii. in a long-run perspective, data on wages in the building sector are confirmed by the available (however scattered) information on other industrial sectors and on agriculture as well;
- iii. correlation between wages in diverse Central and Northern Italian cities –Florence, Genoa, Milan and Venice- is high and long-term trends are quite similar. We use the series of bricklayers' wages in Tuscany because they are based on more reliable and more continuous data.¹⁸

As in the case of the price index, the curve of Italian wages¹⁹ reveals many similarities with those available for other European regions. In Italy too real wages increased after the Black Death and remained on a relatively high level for about a century. Wages started to decrease as early as the second half the 16th century (Figure 3), earlier than in England. The rise, in the 17th century, was mainly due to the two plague epidemics which struck Northern and Central Italy in 1575-80 and particularly in 1629-30 (1,365,000 deaths out of a population of 8,000,000; 17 percent). Typhus epidemics also

¹⁶ Appendix, Column 2.

¹⁷ Appendix, Column 3.

¹⁸ See Malanima, *L'economia italiana*.

¹⁹ Appendix, Column 4.

contributed to the decrease in available manpower in the mid-17th century. Wages remained relatively high until the mid-18th century. They declined in Italy, as well as in the other European regions, to a particularly low level between the end of the 18th century and the two first decades of the following. The diffusion in Italy of maize and its lower price in comparison with wheat permitted the reduction of real wages without endangering the survival of workers. From 1820 on, the diverse trend of English and Italian wages is evidence of the different performance of the two economies.

4. *Per capita agricultural production.* The trends of agricultural prices and real wages suggest the existence of a long-run decline of per capita agricultural consumption, at least from the late Middle Ages, with interruptions during the 15th and the 17th centuries. The lowest level was probably reached during the decades from about 1790 until 1820. We have already seen that the rate of urbanization –a good 5 percent points less from 1300 until 1860– confirms this trend.

A more accurate representation may be obtained assigning a parameter value to the elasticity of demand to prices and income. As from budget research for developing countries, we have assumed a price elasticity of –0.6 and an income elasticity of 0.4.²⁰ Sensitivity tests show that our results are not deeply affected by changes in these parameters. We thus obtain a series of per capita agricultural consumption from 1300 until 1860 (Figure 4).

The index²¹ describes a downward trend, lasting from the beginning of the 14th century until the end of the 19th, and two interruptions, after 1360 and after 1630, each one lasting about a century. While in the first part of our curve ten-year averages fluctuate between 120 and 140, from the middle of the 18th century to 1860 they settle around 100.

The fall in consumption during the late 18th and early 19th centuries may seem too sudden, but it is confirmed by some recent work in anthropometric history. Heights in the North declined as in many other parts of Europe.²² They were to rise only in the second half of the 19th century.

Studies conducted on other European regions suggest that the Italian profile is not at all an exception and that a long-term downward trend affected many other European regions.²³ The negative slope of the trend is probably more pronounced in Italy than elsewhere.

5. *Population and gross agricultural product.* The estimates on Italian population before 1300 are admittedly speculative, but thereafter they are

²⁰ For a similar procedure see Allen, *Economic structure*.

²¹ Appendix, Column 5.

²² A'Hearn, *Living standards*; cf. on the European trends Komlos, *Shrinking in a growing economy*.

²³ This profile does not contrast with the one proposed for all of Europe by Allen, *Agricultural productivity*.

probably among the least uncertain for any region in Europe.²⁴ While the level of population is doubtful, the trend is relatively reliable, and supported by evidence regarding specific areas. Since the 16th century, reliable censuses for some Italian states, such as Tuscany, allows more precise results. In past centuries, Centre and North accounted, as they still account, for about 55-60 percent of the entire Italian population (Table 2).²⁵

Table 2. Italian population and inhabitants in the North and the Centre from 1300 to 1991 (000).

	Total	Centre-North
1000	5,200	
1050	5,800	
1100	6,500	
1150	7,300	
1200	8,500	
1250	10,100	
1300	12,500	7,750
1350	9,500	5,605
1400	8,000	4,720
1450	7,500	4,425
1500	9,000	5,310
1550	11,500	6,785
1600	13,273	7,828
1650	11,500	6,230
1700	13,481	8,051
1750	15,500	9,300
1800	18,092	10,212
1861	26,900	15,950
<i>1951 borders</i>		
1901	33,370	19,330
1951	47,756	26,622
1991	57,103	31,023

For Italy, as for the rest of Europe, it is possible to decompose the whole movement into three phases of about 300-350 years each (Figure 5):²⁶

- i. *increase*: starting in the 10th-11th centuries and lasting until the middle of the 14th;

²⁴ Thanks particularly to Beloch, *Bevölkerungsgeschichte Italiens*.

²⁵ Appendix, Column 6. Data before 1861 include the population of Nizza, Monaco, Istria, Corsica, Malta. After 1861 the series refers to Italy within the current borders.

²⁶ The curve in Figure 5 refers to the whole Italy and not only to the Centre and the North, because before 1600 it is hard to disaggregate population per region. Long-term trend is, in any case, the same. The series presented in Table 2 is only a first attempt at such a disaggregation. Data for Table 2 and Figure 5 are based on Beloch, *Bevölkerungsgeschichte Italiens*; Bellettini, *La popolazione italiana*; Del Panta-Livi Bacci-Pinto-Sonnino, *La popolazione italiana*.

- ii. *stability*: from the middle of the 14th century until about 1650 (with two epochs of decline between 1348 and 1420 and between 1629 and 1650);
- iii. *increase*: from the second half of the 17th century: fast especially in the 19th and 20th centuries until the 1970s, and increasingly slower afterwards.

The outline we get by multiplying the per capita agricultural output by the population is greatly influenced by the demographic movement.²⁷ The series is linked to the output-side estimate for the period following 1860.²⁸

From 1300 until Unification the trend shows a long increase. The rise is interrupted by the two epidemics in 1348-49 and 1629-30 (Figure 6). The downward slope after 1730 derives, on the contrary, from the decline of the per capita production. Rise in population is not supported by the simultaneous, steady increase of the agricultural product, despite the diffusion of maize cultivation, particularly in the Po Valley. The output went on falling until 1820. At the beginning of the 19th century, the gross output barely exceeded the late Middle Ages peak by 5-10 percent. After that time, the production began to rise again while per capita consumption remained constant. The growth accelerated at the end of the century, clearly outpacing the increase in population. It was quite fast during the so-called “boom giolittiano” -until World War I-, slowed down a bit in the inter-war years and then picked up speed again after the World War II (Figure 7).

6. *The agricultural workforce*. There are no data on the agricultural workforce until 1861, the date of the first Italian census. We might, following others, use changes in urbanization as a proxy for employment outside agriculture. From 1300 to 1861 rural population increased relatively to the total population by some 5 percentage points.²⁹ On the other hand, rural employment in secondary activities probably increased from the late Middle Ages on. As a proto-industrial region, Italy cannot match many Northern European regions from the 17th century on. However, especially in the hilly region near the Alps, some industrial activities flourished; cotton and woollen manufactures developed; the straw industry spread in Tuscany and Emilia in the 18th century.³⁰ Most importantly, the production of silk -reeling and throwing- grew in many Northern areas during the 17th, 18th and 19th centuries. In any case, if we calculate, the employed rural population in silk

²⁷ Appendix, Column 7.

²⁸ From 1860 to 1913 the series is estimated by one of the authors (Federico, *Another Italian miracle?*), while since 1913 it is taken from standard official sources (ISTAT, *Indagine*; ISTAT, *Annuario statistico*; ISTAT, *Il valore aggiunto*). The share of Centre-North on the total output until 1951 is computed from regional data in Federico, *L'agricoltura*. For later years, ISTAT itself provides the regional breakdown. Finally per capita output is computed from the figures of the Italian population from ISTAT, *Lo sviluppo* (to 1951) and ASI.

²⁹ See Table 1.

³⁰ For a general outline on the theme see Belfanti, *The proto-industrial heritage*.

preliminary manufacture, we discover that in 1861 it hardly exceeded 200,000 people: less than 1 percent of the whole population. Even if we add the other rural inhabitants employed in secondary activities, we hardly reach 5 percent of the total population. It thus appears that the diffusion of manufacturing in the countryside at best compensated the decrease of urban population. Thus, as a first approximation, we assume that the agricultural workforce had remained a constant proportion of the total population in the Centre-North.³¹ The curve we get for the period before Unification is thus the same of the per capita agricultural product.

After the first Italian census, held in 1861, immediately after Unification, censuses have followed every ten years (except 1891 and 1941). The original data underestimate the female workforce, but O. Vitali has carefully revised them from the 1881 census onwards. It is possible to extend his work back to 1861.³² At that date, agricultural workers accounted for about 40 percent of the total population in the Centre-North – some 5.28 million. Until the end of the century, the proportion declined very slowly, and the total number rose to a peak of just below 7 million in 1901. It remained roughly constant (within 1913 borders) until World War II and the start of the boom in urbanization. Already in 1961, at the end of the so-called “Italian economic miracle”, the number of agricultural workers in the Centre-North was down to 2.8 million, a mere 10 percent of the population. Nowadays only half million workers are employed in agriculture: less than 1 percent of the total population.

7. Labour productivity in the long run. The millennial trend of Italian agricultural productivity is featured by two periods of growth, the Medieval and the Modern- separated by a 500 year decline –though with reversals after the 1348-49 and 1629-30 epidemics (Figure 8). It corresponds only in part to conventional knowledge on the history of the Italian agriculture.

The exact dates of the Medieval growth period are uncertain, as we have to rely exclusively on imperfect estimates of urbanization. The starting point has to be placed before 1000 and the end at the beginning of the 14th century. The rate of growth was only about 0.06 percent per year. It is an epoch of population growth, of the colonization of new spaces, of changes in agricultural organization, of urban expansion and of industrial and commercial development within the cities. It has been suggested several times that by the beginning of the 14th century this upward economic movement had already begun to weaken. The arrival of the plague in 1348 caused population to fall - about 40 percent between 1348 and 1400-, and engendered, at the same time,

³¹ Appendix, Column 8.

³² Vitali, *La popolazione attiva*. The agricultural workforce in 1861 and 1871 is calculated as the original census times the ratio between Vitali and original census data in 1881. The yearly series is obtained interpolating the census figures, taking into account, when necessary, territorial changes (e.g. the annexation of Venetia in 1866).

an increase in agricultural productivity. According to our series, the level attained in the 15th century, was reached again only at the start of the 20th century.

The second epoch is an age of stagnation and slow decline. Returns decreased in agriculture as a consequence of the steady rise in population in the 16th century. This time too the spreading of the plague was, all things considered, beneficial to agricultural productivity. This started to rise just after the 1629-30 plague and went on for about one century. Resources were once more abundant because at the same time the density of population declined. The diffusion of the cultivation of the mulberry tree in the Centre and the North and the spread of maize, especially in the Po Valley, contributed to this increase. The disappearance of the plague from the second half of the 17th century and the population rise once more provoked decreasing returns in agriculture. Productivity declined to reach the lowest level in this millennial history between about 1760 and 1820: one third less than in 1420-30, the late medieval peak. A recovery, though a modest one, took place from about 1820.

In fact, according to this reconstruction, the level of labour productivity in mid-19th century Italian agriculture was more or less the same as before the late Medieval rise, probably lower. This conclusion may surprise the scholar of 19th century Italian economy, but not the scholar interested in long-run comparisons such as the ones proposed here. In a 10th-11th century Italy,³³ rich in land and forests, and poor in labour, where peasants did not have to work a lot, and could resort to hunting to cover their family needs, labour productivity was higher and living standards in the countryside were better than in the overcrowded 19th century countryside, where peasants had to work hard on scarce per capita land and with the help of poor fixed capital.

The third phase started at the end of the 19th century (Figure 9). Labour productivity began to grow, but as late as the 1930s it exceeded the early 15th century peak by just a quarter. Technical progress was heavily biased towards land-saving innovations, notably fertilizers, and any increase in labour productivity was largely a consequence of production growth. Things changed dramatically after World War II. The great migration of workers away from the countryside was matched by massive mechanization. Output per worker soared, growing from 1947-49 to 1996-98 at 6.56 percent per year, a really astonishing achievement: a 25 fold increase in fifty years. The value added per worker increased a bit more slowly, as the modernization of agriculture entailed a huge rise in the purchase of inputs outside the primary sector –fertilizers, fuel etc.-. Nationwide it grew 5.2 percent p.a.; about 1 point less than the output per worker. An impressive performance indeed.

9. *Conclusion: Italy and the others.* How did Italy's performance compare with that of other countries? Data on output and productivity are not easy to find for such a long period of time. Allen provides an estimate of output per

³³ For the centuries just before 1000 Toubert, *Les structures*, wrote of a "golden age" of the Italian peasant.

worker for the centuries from 1300 until to 1800 for nine European countries (including Italy).³⁴ From the mid-19th century onwards, productivity can be calculated from the series of gross output and census data on agricultural workforce, which are available for all the main Western countries.³⁵ Unfortunately, in most cases, there are no data on agricultural productivity in the first half of the 19th century, and this gap makes it impossible to piece together a long-term series. Our long-term series for Centre and North Italy may be compared to a series for France, three series for the United Kingdom, and one for the United States. Of course, the latter starts only in 1800. It is, nevertheless, useful in a comparative perspective, as the United States set the pace of labour-saving technical progress in the 19th and 20th centuries.³⁶

Table 3. Gross output per worker in agriculture in Italy CN, United Kingdom, France, USA 1300-1998 (1800=100).

	Italy CN	UKa	UK b	UK c	France	USA
1300	1.29		0.56			
1400	1.37		0.64		0.92	
1500	1.15	0.86	0.70		1.00	
1600	1.13	1.03	0.53		0.87	
1700	1.17	1.03	0.80		0.89	
1750	1.20	1.06	1.08		0.96	
1800	1.00	1.00	1.00	1.00	1.00	1.00
1850	0.98	1.18	1.43	2.19	1.37	1.15
1880	1.12	1.54	1.74	2.49	1.47	1.65
1910	1.45	1.71	2.03	2.90	2.15	2.22
1940	1.89		2.24	3.21	3.21	3.45
1980	34.00		10.59	15.15	27.67	39.05
1998	48.80		15.11	21.62	69.53	64.25

³⁴ Cf. Allen, *Economic structure*. His series for Italy broadly tallies with our estimate. However, it rises more from 1300 to 1400 (by 24 percent instead of by 6) and as a consequence, falls more later. Furthermore, the decline is slower until 1700 and much faster than in our series in the 18th century. According to Allen, the output per worker fell by 30 percent –by 15 percent in our series.

³⁵ Federico, *How did they feed us?*

³⁶ *UK a*: Clark, *Land values*; *UK b*: until 1800 Allen, *Economic structure*; output and workforce 1800 and 1851 from Allen, *Agriculture during the industrial revolution*, tab 5.1 and 5.3; *UK c* 1800-1880 Deane and Cole, *British economic growth*, output tab. 37 (deflated, as suggested by the authors, with the Rousseaux price index) and workforce tab. 31; *UK b and c*: 1880-1940 output Feinstein, *National income* and workforce Mitchell, *British statistics*, Labour force tab. 2; 1940-1980 Hayami-Ruttan, *Agricultural development* tabb. B.1 and B.5; 1980-1998 FAO (www.fao.org) *1800-1940 France*: gross output (three-year moving averages) from Toutain 1987, *La croissance*, workforce (males and females) Marchand-Thelot *Deux siecles; 1800 and 1850 USA*: Weiss, *Economic growth* tab.1.1, 1880, 1910 and 1940 (three-year moving averages) estimate by the authors (cf. GF 2000).

Here it is not possible to discuss in depth all these results. However, three points seem worth stressing :

- i. long-term decline before 1800 is not uniquely Italian. Productivity decreased in most European countries -Spain, Belgium, Germany, Austria-; remained almost stable in Poland and France and rose in the United Kingdom and the Netherlands. The series by Clark –col. UK a- somewhat downplays the British performance. However, the time profile of the long-term decrease differs from one country to another. Only in Italy productivity fell in the 18th century;
- ii. from 1800 to 1940 Italy was decidedly the worst performer. To be sure, labour productivity grew, but less than in the United Kingdom, France or the United States. Its performance was particularly modest during the first half of the 19th century. Even later, however, growth was not striking by international standards;
- iii. the impressive productivity growth after World War II compares well with France and the United States, and exceeds the growth in the United Kingdom.

The discussion so far has dealt with trends. How did Italian productivity compare in levels? The original Allen data are expressed in comparative terms, with England in 1500=1. In 1400, output per worker in Italy was on a par with the English one. From then to 1800, the combined effect of growth in England and decline in Italy caused the relative productivity to fall to about 0.4. In the 19th century the level fell further to 0.28.³⁷ This figure is very close (almost unbelievably so) to the outcome of the careful estimate by O'Brien and Prados on relative labour productivity around 1910.³⁸ Italian productivity was then less than a third of the British or American, and half of the French. In the 20th century Italy caught up with Britain, but not with the United States or with France.

The evidence so far would suggest that Italy's performance was relatively modest, especially over the last three centuries. The productivity fell in the 18th century and subsequently it failed to recover as much as it should have done. Before rushing to blame Italian farmers and landlords, one should pause, and remember that Italy has always been a densely populated country, with very little good land available. Thus, technical progress has been land-saving and labour-intensive. In fact performance in terms of Total Factor Productivity, since the 1870s at least, was not that bad. The rate of growth was not inferior to that of other European countries.³⁹

³⁷ The figure is computed using the series UK b in tab.3, which reproduces an estimate by Allen himself.

³⁸ O'Brien-Prados, *Agricultural productivity*, tab.1.

³⁹ Federico, *L'agricoltura italiana*, which updates the table in Federico, *How did they feed us?*

APPENDIX

**Product and productivity in Italian agriculture 1280-2000
Centre-North**

Figures for 1860-70:

agricultural workforce: Centre-North 5,327,700;
per capita agricultural output (1861 lire): Centre-North 163.7;
agricultural output per worker (1861 lire): Centre-North 393.6.

	1	2	3	4	5	6	7	8	9
	Price	Price	Price	Wages	Per c.	Population	Gross	Agric.	Output per
	Index	Index	Index		agric.	Italy CN	Agr.	workforce	Worker
	Total	Agric.	Non agric.		product	(000)	Product		
Centre-North									
1280-90	4.0	3.6	12.6	187.2			58.1	45.6	127.3
1290-1300									
1300-10						7,750		48.4	
1310-20	6.2	5.5	12.6	187.2	127.2	7,900	62.9	49.4	127.3
1320-30	7.2	6.4	12.6	164.1	122.1	7,900	60.3	49.4	122.2
1330-40	8.2	7.3	12.6	151.3	119.3	8,000	59.7	50.0	119.3
1340-50	9.3	8.3	12.6	187.2	127.2	7,700	61.3	48.1	127.3
1350-60	12.4	11.4	34.2	230.8	134.5	5,600	47.1	35.0	134.6
1360-70	11.0	9.8	34.2	217.9	134.1	4,500	37.7	28.1	134.2
1370-80	10.1	12.6	36.8	271.8	111.2	4,800	33.4	30.0	111.3
1380-90	16.3	15.1	38.1	166.7	119.9	4,500	33.7	28.1	120.0
1390-1400	16.2	14.9	39.4	171.8	121.6	4,500	34.2	28.1	121.6
1400-10	13.0	11.8	40.7	230.8	135.4	4,720	40.0	29.5	135.5
1410-20	13.2	11.8	43.3	235.9	137.3	4,250	36.5	26.6	137.4
1420-30	11.2	10.0	43.3	276.9	147.2	4,200	38.7	26.3	147.3
1430-40	13.2	11.7	43.3	235.9	138.1	4,200	36.3	26.3	138.2
1440-50	14.4	12.8	43.3	230.8	136.9	4,250	36.4	26.6	137.0
1450-60	13.2	11.8	44.6	220.5	133.9	4,425	37.1	27.7	134.0
1460-70	13.2	11.8	44.6	225.6	135.1	4,730	39.9	29.6	135.1
1470-80	14.1	12.8	45.9	212.8	131.6	4,950	40.7	30.9	131.6

1480-90	14.6	13.2	45.9	182.1	125.5	5,200	40.8	32.5	125.5
1490-1500	17.2	15.8	47.2	138.5	114.4	5,250	37.6	32.8	114.5
1500-10	18.5	16.5	47.2	125.6	113.6	5,310	37.7	33.2	113.6
1510-20	15.6	13.9	47.2	192.3	128.4	5,670	45.5	35.4	128.4
1520-30	22.8	21.2	51.1	133.3	112.3	6,050	42.5	37.8	112.4
1530-40	25.7	23.9	55.8	153.8	116.8	6,460	47.2	40.4	116.8
1540-50	25.6	23.7	61.0	151.3	116.5	6,600	48.1	41.3	116.6
1550-60	31.8	29.7	67.5	128.2	111.0	6,785	47.1	42.4	111.0
1560-70	33.3	31.0	74.9	153.8	116.7	6,900	50.3	43.1	116.7
1570-80	39.3	36.5	85.3	166.7	119.5	7,200	53.8	45.0	119.5
1580-90	43.0	40.4	81.4	141.0	113.2	7,200	51.0	45.0	113.2
1590-1600	51.5	48.8	76.2	135.9	111.4	7,500	52.2	46.9	111.4
1600-10	52.3	49.8	74.0	138.5	111.7	7,828	54.7	48.9	111.7
1610-20	48.5	46.2	72.7	159.0	116.0	7,980	57.9	49.9	116.1
1620-30	47.9	45.8	64.5	159.0	115.8	8,100	58.6	50.6	115.9
1630-40	45.5	41.1	75.3	159.0	120.0	6,500	48.8	40.6	120.1
1640-50	44.0	38.7	75.8	179.5	126.6	6,600	52.2	41.3	126.6
1650-60	42.7	38.9	71.9	187.2	125.5	6,230	48.9	38.9	125.6
1660-70	39.9	34.7	75.8	184.6	128.5	6,700	53.8	41.9	128.6
1670-80	40.4	36.2	72.7	182.1	125.6	7,000	55.0	43.8	125.7
1680-90	39.5	36.2	68.4	200.0	127.9	7,400	59.2	46.3	128.0
1690-1700	47.6	45.2	72.7	166.7	117.8	7,800	57.4	48.8	117.8
1700-10	47.0	43.2	72.7	143.6	115.3	8,051	58.1	50.3	115.4
1710-20	40.5	35.4	74.9	169.2	124.6	8,270	64.4	51.7	124.6
1720-30	35.1	29.6	73.2	194.9	133.3	8,630	71.9	53.9	133.3
1730-40	43.5	38.5	75.3	156.4	121.0	9,000	68.1	56.3	121.1
1740-50	48.4	43.6	79.2	141.0	116.3	9,150	66.5	57.2	116.3
1750-60	46.8	41.2	81.8	143.6	118.5	9,300	68.9	58.1	118.5
1760-70	49.3	44.3	81.4	138.5	115.7	9,450	68.4	59.1	115.8
1770-80	62.7	58.8	86.6	107.7	106.1	9,300	61.7	58.1	106.2
1780-90	60.5	55.7	92.2	112.8	108.6	9,740	66.1	60.9	108.6
1790-1800	80.0	77.8	93.5	89.7	99.8	10,050	62.7	62.8	99.8
1800-10	85.1	81.3	105.2	79.5	98.8	10,212	63.1	63.8	98.9
1810-20	97.4	95.4	108.7	82.1	97.7	10,600	64.7	66.3	97.7
1820-30	77.2	72.7	104.8	92.3	102.5	11,400	73.1	71.3	102.6
1830-40	82.0	77.4	107.8	97.4	103.4	12,280	79.4	76.8	103.5
1840-50	84.5	81.3	101.3	97.4	102.2	14,800	94.5	92.5	102.2
1850-60	99.3	98.8	98.7	84.6	97.1	15,200	92.3	95.0	97.2
1860-70	100.0	100.0	100.0	100.0	100.0	15,950	100.0	100.0	100.0

1870-80	118.7	114.6	103.3
1880-90	128.3	115.7	110.9
1890-1900	146.1	122.3	119.1
1900-10	168.4	125.3	134.2
1910-20	175.7	127.0	143.8
1920-30	202.2	125.4	161.5
1930-40	217.2	117.9	183.4
1940-50	187.4	101.2	187.4
1950-60	278.2	73.3	390.7
1960-70	342.4	39.8	917.1
1970-80	422.0	21.9	1965.4
1980-90	497.9	15.0	3363.1
1990-98	476.0	10.9	4829.9
Italy			
1860-70	100.0	100.0	100.0
1870-80	119.2	108.9	109.4
1880-90	132.4	111.7	118.6
1890-1900	147.9	118.8	124.3
1900-10	167.9	122.2	137.3
1910-20	170.7	122.1	139.7
1920-30	191.3	123.5	155.2
1930-40	201.0	118.5	169.1
1940-50	170.5	106.0	162.6
1950-60	256.3	83.8	311.9
1960-70	333.2	52.4	666.4
1970-80	417.0	31.5	1347.7
1980-90	489.6	21.9	2264.7
1990-98	466.9	15.3	3387.4

REFERENCES

- Allen R., *Agriculture during the industrial revolution*, in *The economic history of Britain since 1700*, ed. by D. McCloskey and R. Floud, 2nd ed., Cambridge, Cambridge Univ. Press, 1994, I, pp.96-122.
- Allen R., *Economic structure and agricultural productivity in Europe, 1300-1800*, "European Review of Economic History", 4 (2000), pp.1-26.
- A'Hearn B., *Living standards of Northern Italians during Europe's industrial revolution: new evidence on heights in Lombardy*, unpublished ms., Sept. 2001.
- Belfanti C.M., *The proto-industrial heritage: forms of rural proto-industry in northern Italy in the Eighteenth and Nineteenth centuries*, in *European proto-industrialization*, ed. by S.C. Ogilvie and M. Cerman, Cambridge, Cambridge Univ. Press, 1996, pp. 155-70.
- Bellettini A., *La popolazione italiana dall'inizio dell'età volgare ai nostri giorni*, in *Storia d'Italia*, a c. di R. Romano e C. Vivanti, 5, T. I, Torino, Einaudi, 1973, pp. 487-532.
- Beloch K.J., *Bevölkerungsgeschichte Italiens*, Berlin-Leipzig, De Gruyter, 1937-1961.
- Cafagna L., *La questione delle origini del dualismo economico italiano*, in Id., *Dualismo e sviluppo nella storia d'Italia*, Venezia, Marsilio, 1989, pp. 187-220.
- Carozzi C., *Il processo di urbanizzazione*, in *Urbanizzazione e modernizzazione*, pp. 321-47, in *Urbanizzazione e modernizzazione: una prospettiva storica*, a c. di G. Germani, Bologna, Il Mulino, 1975.
- Clark G., *Land rental values and the agrarian economy: England and Wales, 1500-1912*, in "European Review of Economic history", (2002).
- Correnti C.-Maestri P., *Annuario statistico italiano*, Torino, Tipografia letteraria, I, 1857-58; II, 1864.
- Deane P.- Cole W.A., *British economic growth 1688-1959*, 2nd edition, Cambridge, Cambridge Univ. Press, 1967.
- Del Panta L.-Livi Bacci M.-Pinto G.-Sonnino E., *La popolazione italiana dal Medioevo a oggi*, Roma-Bari, Laterza, 1996.
- Federico G., *Another Italian miracle? Heights, calories and economic growth in Italy, 1860-1910*, unpublished (Dec. 2001).
- Federico G., *Il filo d'oro*, Marsilio, Padova, 1994.
- Federico G., *Una stima del valore aggiunto in agricoltura*, in *I conti economici dell'Italia. 3.2 Il valore aggiunto per il 1891, 1938 e 1951*, a cura di G.M. Rey, Roma-Bari, Laterza, 2000.
- Federico G., *L'agricoltura italiana: successo o fallimento?* In *Storia economica d'Italia* a cura di P.L. Ciocca e G. Toniolo, Roma-Bari, Laterza, forthcoming.
- Federico G., *How did they feed us? The growth of world agricultural output, 1800-1938*, Working paper n. 103 Agricultural history Center University of California, Davis, 2000.
- Feinstein C.H., *National income, expenditure and output of the United Kingdom, 1855-1965*, Cambridge, Cambridge Univ. Press, 1972.
- Hayami, Y.-Ruttan V., *Agricultural development*, 2nd ed., Baltimore-London, John Hopkins University Press, 1985.
- ISTAT, *Annuario statistico italiano*, ISTAT, Roma.
- ISTAT, *Il valore aggiunto dell'agricoltura per regione anni 1980-1994*, Collana d'informazione n.15, 1995.
- ISTAT, *Il valore aggiunto ai prezzi di base dell'agricoltura per regione*, Informazione n.5, 2000.

- ISTAT, *Indagine statistica sullo sviluppo del reddito nazionale dell'Italia dal 1861 al 1956*, "Annali di Statistica", serie VIII vol. 9, ISTAT, Roma, 1957.
- ISTAT, *Sviluppo della popolazione italiana dal 1861 al 1961*, "Annali di Statistica", serie VIII vol. 17, Roma 1965.
- Komlos J. *Shrinking in a growing economy? The mystery of physical stature during the Industrial revolution*, in "Journal of economic history", 58, 1998, pp. 778-795.
- Malanima P., *Italian cities 1300-1800. A quantitative approach*, in "Rivista di storia economica", XIV, 1998.
- Malanima P., *L'economia italiana dalla crescita medievale alla crescita contemporanea*, Il Mulino, Bologna, forthcoming.
- Malanima P., *La fine del primato. Crisi e riconversione nell'Italia del Seicento*, Milano, Bruno Mondadori, 1998.
- Marchand O. - Thelot C., *Deux siècles de travail en France*, Paris, Etudes INSEE, 1991.
- Mitchell B., *British historical statistics* Cambridge, Cambridge Univ. Press, 1988.
- O'Brien P.-Prados de la Escosura, L. *Agricultural productivity and European industrialization*, in "Economic History Review", 51, 1992, pp. 514-36.
- Phelps Brown E.H.-Hopkins S.V., *Seven centuries of the prices of consumables, compared with builders' wage-rates*, in *Essays in economic history*, ed. by E.M. Carus-Wilson, London, Arnold, 1962.
- Toubert P., *Les structures du Latium médiéval*, Roma, Ecole française de Rome, 1977.
- Toutain J.C., *La croissance française 1789-1990. Nouvelles estimations*, in "Economies et sociétés. Cahiers de l'ISMEA. Serie Histoire quantitative de l'économie française". Series HEQ n.1, Paris, 1997.
- Vitali O., *L'evoluzione rurale-urbana in Italia*, Milano, F. Angeli, 1983.
- Vitali O., *La popolazione attiva in agricoltura attraverso i censimenti italiani (1881-1961)*, Roma, Istituto di demografia, 1968.
- Weiss T., *Economic growth before 1860: revised conjectures*, in *American economic development in historical perspective*, ed. by T.Weiss and D. Schaefer, Stanford, Stanford University Press, 1994, pp.11-27.
- Wrigley E.A., *Urban growth and agricultural change: England and the Continent in the early modern period*, in *Population and economy. Population and history from the traditional to the modern world*, ed. by R.I. Rotberg e T.K. Rabb, Cambridge, Cambridge Univ. Press, 1986, pp. 123-168.
- Zamagni V. *Ferrovie ed integrazione del mercato nazionale nell'Italia post-unitaria*, in *Studi in onore di G. Barbieri*, Verona, IPEM, 1980, III, pp.1635-49.
- Zanden J-L. Van, *The prices of the most important consumer goods, and indices of wages and the cost of living in the western part of The Netherlands*, in www.iisg.nl/hwp.html

[Click here to see Tables.](#)