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Population and environment in Northern Italy during the 16th Century.

(working paper)

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Abstract

“Population and environment in Northern Italy during the 16th Century”

No general consensus has been reached, as yet, on how to interpret 16th Century Italian demographic dynamics. Such divergences imply different convictions about the relationship between population and resources.

On the base of 164 series of baptisms celebrated in Northern Italian parishes and adopting a comparative perspective, this paper progressively evaluates the demographic weight of environmental factors (placement in lowland, mountain or coastal areas; urban or rural environment; for rural areas, different settlement patterns and crop regimes), and permits us to get a better insight on the relationship between population and resources (Malthusian, “Boserupian”, or something else?). The paper reveals a complex situation, where environmental and socio-economic factors have an impact not only on the demographic trend but on the very logics of population, and where advancements in agrarian technology does not always play a demographically positive role.

Introduction

Studies in historical demography based on time series have often given the impression that it is only possible to give an account of Italian population history starting from the middle of the 17th century. However, if we take into account works based on sources other than those traditionally used by demographers, we come upon excellent studies on the Middle Ages characterised by particular methods. Anyway, both types of study neglect almost entirely the 15th and the 16th Centuries, which are decisive for the interpretation of Italian economic and social history. Clearly, there are objective limits to the documentation available and this complicates the task of applying consolidated methods of historical demography to populations in the early modern age. However, this is not sufficient to account for a more generalised omission, especially considering that the history of the 16th century in Italy is full of unresolved questions as far as demographic trends and their relationship with the economic cycle are concerned.

It is striking that, to date, there are two different estimates of the size of the Italian population in the course of the century to which reference is made from time to time in an uncritical manner. One is that of K.J. Beloch (1937-1961), and the other is by C.M. Cipolla (who presents it as a revision of the former) which appeared for the first time in the famous volume “Population in History” (Glass et al. 1965); both have been cited in various other publications¹. Although the estimates at given points in time may seem very similar, on a closer look, clear differences emerge which have been interpreted as the consequence of a different vision of the mechanisms of population at work. Levi (1991) noted that the estimates of Italian population put forward by Cipolla for Northern Italy between the 16th and the 18th centuries were significantly lower than those of Beloch². He also expressed the opinion that the literature on which Cipolla based his estimates seemed inadequate for the purpose³; consequently he felt that the revisions made were unjustified. Levi hypothesized that the two groups of estimates implied different interpretations of the ways in which cereal production can influence demographic trends. In particular, Cipolla’s estimates betray his conviction that the relationship between population and resources is of the Malthusian⁴ type while those of Beloch would fit in to a Boserupian model⁵; the two theories imply a very different idea of the relationships between population, resources and technology (as explained in paragraph 4). Thus Levi underlined an important theme, the population patterns and the nature of the connection between population patterns and crop regime. Although difficult to tackle (especially for the earlier periods) this question is of primary importance; my task here will be to investigate it, also taking into account the problems posed by innovations in agricultural techniques introduced in some Italian areas during 16th Century. At this end, after having briefly examined the characteristics of the data set and discussed some methodological issue (paragraph 1), I shall evaluate the relevance of variables that

may have caused different demographic dynamics, such as the different population patterns of the mountains and the Po plain (paragraph 2), or of cities and countryside (paragraph 3); in a second time I shall examine in deeper detail the countryside of the Po plain where the aforementioned agricultural innovations took place (paragraphs 4) and on the base of the evidence I shall present some hypothesis on the logics of population at work and on the demographic role of technological innovation (paragraph 5). In the last paragraph I shall reconstruct the general trend of births in Northern Italy between 16th and early 17th Centuries, in order to check what set of population estimates (that by Beloch or that by Cipolla) is more coherent with my data.

1. The sources and the methods

This paper presents key results obtained within a research project whose main aim was to catalogue and collect sources, elaborate methods, discuss reasons for resuming investigations on 16th Century demographic dynamics and on their influence on the economy (Alfani 2004a). The need to delimit the research field led me to concentrate on Northern Italy, an area which at the time was characterised by wide geographic, social, political and institutional variety. From a chronological point of view, the oldest data at my disposal date back to the second half of the 15th century and I decided to stop my investigation in 1629, eve of the most serious epidemic that Northern Italy had experienced since the return of the black death to the continent in 1348.

From the viewpoint of the availability of demographic sources, the 16th Century is a moment of transition. While the Middle Ages are characterized by the lack of sources, and in particular of those allowing time series analysis, during 16th Century a type of serial data which is fundamental for research in historical demography becomes available, i.e. series of baptisms, in much greater abundance than commonly believed. These series constitute a close approximation to those of births (Wrigley and Schofield 1981) and can be reconstructed from baptismal records (*libri baptizatorum*), in a context in which other important series, such as those of deaths and marriages⁶, are almost completely absent. Only starting from 17th Century the availability of all three types of series is assured; this is the reason why usually researches in Modern Age population dynamics do not start before 1650 or at the earliest 1600.

The birth data available for 16th Century is so abundant that I think it is worth using even at the cost of facing some methodological problems. I was able to collect 164 series of baptisms celebrated in Northern Italy starting from 15th or 16th century (see the Appendix for geographic and chronological composition of the database), characterized by a balanced distribution for geographic area, settlement pattern and economic and social context⁷. For reasons of space, it is impossible to give here full information about the sources from which I have drawn each series; in this regard see

Alfani (2004a). Suffice to note that 41,5% of the series have been published in books or journal articles, 44,5% come from unpublished post-graduate theses preserved in a variety of Italian university archives, 7,3% are unpublished series lent to me by their authors, 6,7% (i.e. 11) have been reconstructed by myself and are currently being published.

Having to work exclusively on baptismal series I was forced to use methods capable of fully exploiting the possibilities offered by demographic data based solely on births. I have discussed the matter elsewhere (Alfani 2003), here suffice it to say that I aimed to exploit the strong points of the available data (in particular, the abundance of demographic “points of observation” i.e. the local series), in an attempt to get round the obstacles and to extract as much as possible from sources which are useful indicators not only of demographic dynamics but also of economic, social and cultural phenomena.

This approach is well-known to those who are familiar with the great theses of economic and social history of the 1960s and 1970s, in particular those of the French school known as *Annales*. At the beginning of the 1960s, Baehrel (1961) demonstrated how, for the purposes of an economic historian of the *ancien régime*, the trend of births is an adequate proxy for complete population data. On the other hand, the attempt to use birth data to evaluate population trends *tout court* is not new even to those historical demographers more oriented towards statistics when they are faced with a serious lack of documentary information about deaths (for instance, Perez Moreda 1999): the alternative would be to lose entire centuries to historical demography. Recently, another kind of series, i.e. grain price, has been used to study the relationship between macro-economic trend and demographic response (Breschi et al. 2002). Anyway, I shall not use grain price series here because, while available since at least the second half of 16th century, they are much fewer than birth series and are related almost only to urban environments. Furthermore, their use rises theoretical problems that would unnecessarily complicate my analysis.

Using birth trends as a proxy for population movement means hypothesizing that birth rates are constant, or at least that they change little and slowly in time. While this is usually the case looking at pre-transitional long-run trends, many researches have underlined important short-term fluctuations of the birth rate (ex. Wrigley and Schofield 1981). Given the sources available, this problem can not be completely solved, but can be somewhat circumscribed by using the comparative method and focussing the analysis and interpretation of the data on short periods, i.e. by posing questions such as: at the moment of the terrible famine that struck much of Europe in the 1590s, what communities suffered more? What kind of environment revealed the most sensible to the crisis, probably suffering from a bad population-resources ratio?, and so on. Replacing original indexes with series of moving averages is also of some help.

It is obvious that, when considering for example a famine, a reduction in births can be caused by many different factors: a diminished population (because people died from hunger or emigrated), a diminished fertility etc. However, if we are interested in the balance of population and resources, this is a minor issue because a (comparatively) greater or smaller reduction in births, whatever its causes, suggests a (comparatively) worse or better balance, the reaching of the load capacity or the availability of surplus resources (or, as I shall explain, of different resources).

While much of the analysis shall be focussed on short periods and especially on years of crisis, sometimes I shall analyze long-run trends. It is possible that in this case a changing in birth rates, of which we have presently no proof, influenced the series in a sensible way, but given the status of our knowledge this is unavoidable. Furthermore, as shall be seen, serial data suggests that the available *status* estimates are not so reliable, so I am convinced that by using birth series we can significantly improve our knowledge of 16th Century Italian demographic trends, even if much will remain hypothetical and will require further research.

The aggregate series I shall use have been reconstructed from the local series using a statistical method developed for analogous purposes, also used to process the series found in *Histoire de la Population Française* (Dupâquier et al 1988). The method was introduced and discussed by Biraben et al. (1982; 1985), and allows to assess the problem of series progressively disappearing while moving towards earlier periods (a particularly important problem in my case given that the majority of the series begin during the period under examination). When possible, small gaps in the original local series (up to a maximum of 6 years) have been closed before aggregation by using the method developed by Scalone (Scalone 2001; Del Panta et al. 2002) for solving problems of “partial completeness” of a data set (the gap is closed by interpolation based on data concerning neighbouring communities or communities having similar characteristics).

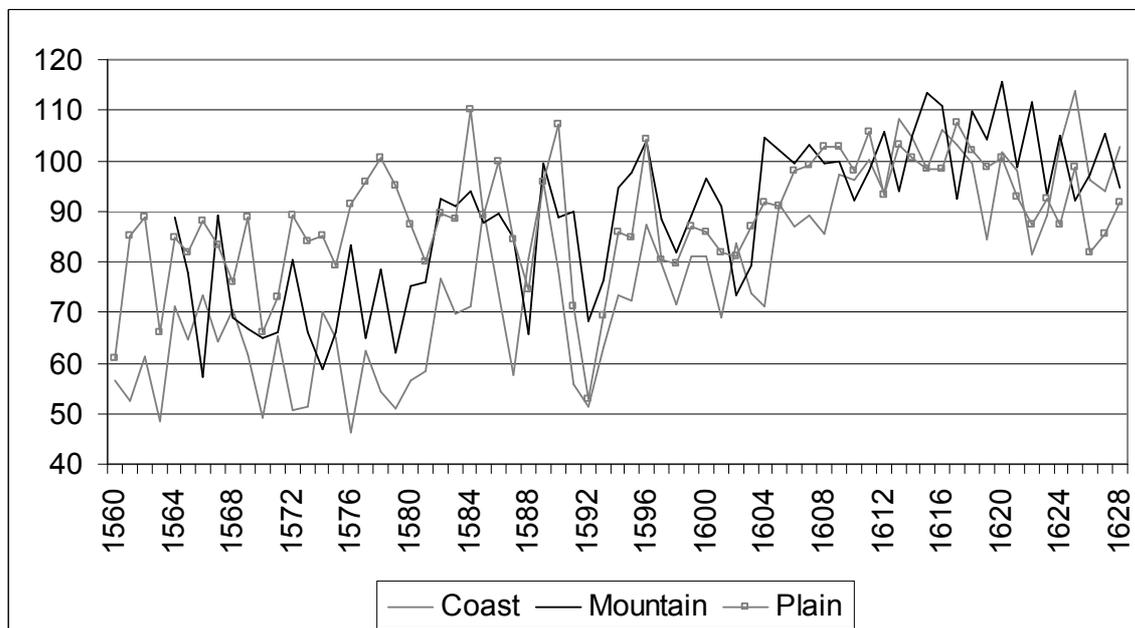
When building aggregate series, I weighted the local series so that to give the maximum possible importance to each single place as a demographic point of observation. In practice, I first replaced the real values of each local series with indexes based on the average of the years 1610-1614 in such a manner that the numerically more consistent series were not given a greater weight compared with the others. I then calculated the simple average of the indexed data, giving a weight of 1 to each series. Some empirical tests proved that this method when applied on my data did not distort results as compared to the alternative one of using “natural” (not-indexed) data, while guaranteeing a better territorial and “environmental” representivity.

2. Plain, shore or mountain: the demographic weight of environmental factors

In the case of “ancien régime” populations, constantly (or almost) in precarious equilibrium with the available resources, it is clear that some environmental factors play a primary role in determining the sustainable demographic load, i.e. the carrying capacity of the system. It would be wrong, nevertheless, to believe that rigid, unchangeable relationships exist over time between population, resources and territory. The reflections of Boserup (1981), who stressed the role of demographic pressure in stimulating introduction of micro-innovations capable of increasing food output, as confirmed by recent studies on the population of the alpine areas (Mathieu 2000; Fornasin and Zannini 2002), induce us to distrust a “naïve Malthusianism”, i.e. a fatalistic view of populations that, being unable to check their growth, are bound to periodically face disaster. This view, while still widespread among social and economic historians, has actually been softened and thoroughly redefined by recent Malthusian approaches (ex. Livi Bacci 1991); I shall return on the matter later.

To investigate the weight of the environmental factors, I will make use of some aggregate series created using the most complete and reliable local series. The general principle which I follow is that of territorial representativity. One of the series is related to the Alps, one to the Tyrrhenian and Adriatic coasts and one to the Po plain⁸. In this phase I excluded urban series from the analysis so that I could concentrate on smaller places for which it is easier to determine the importance of environmental factors. The results are shown in figure 1.

*Figure 1. Parishes of Lowland, Mountain and Coastal areas in comparison, 1560-1628
(averages of the indexes of baptisms based on 1610-1614)*



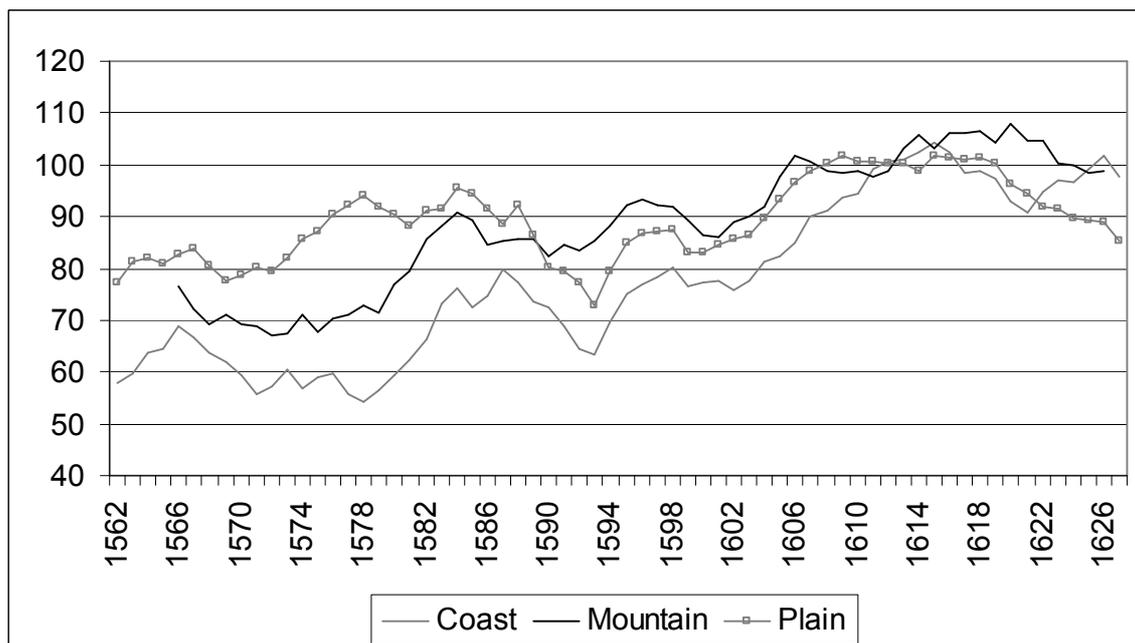
On a first reading, the three curves show similar trends; significant differences, however, can be noticed⁹:

1) both the shores and the inland plains are harshly stricken, and in similar measure by the 1590-1593 famine (the worst Italian episode of the European crisis of the 1590s. Clark 1985), particularly in its acute phase (1591-1592), while mountain settlements seem to be much less affected. The other important crisis that stroke Northern Italy in this period, i.e. the plague of 1576-1577, has not an evident impact on the series. This is mainly due to the fact that plague is a phenomenon that has not a geographic coherence comparable to that of famine; with the exception of the most serious outbreaks (such as that of 1629-1630) plague strikes some places and spares others so it is better appreciated at the level of local instead of aggregate series;

2) in the 1620's, which are characterized by food shortages which, in a certain sense, are a prelude to the pandemic of 1629-1630, the communities on the plain seem to suffer more than those in the mountains or on the coast.

The most interesting comparison is, without doubt, that between the mountain series and the other two. As already mentioned, the former is subject to smaller fluctuations, and also during the years 1591-1592 (the peak of the famine) the drop in births is limited and the voids that it creates are quickly refilled. For a better appreciation of the trend, it is useful to resort to five-year moving averages (figure 2).

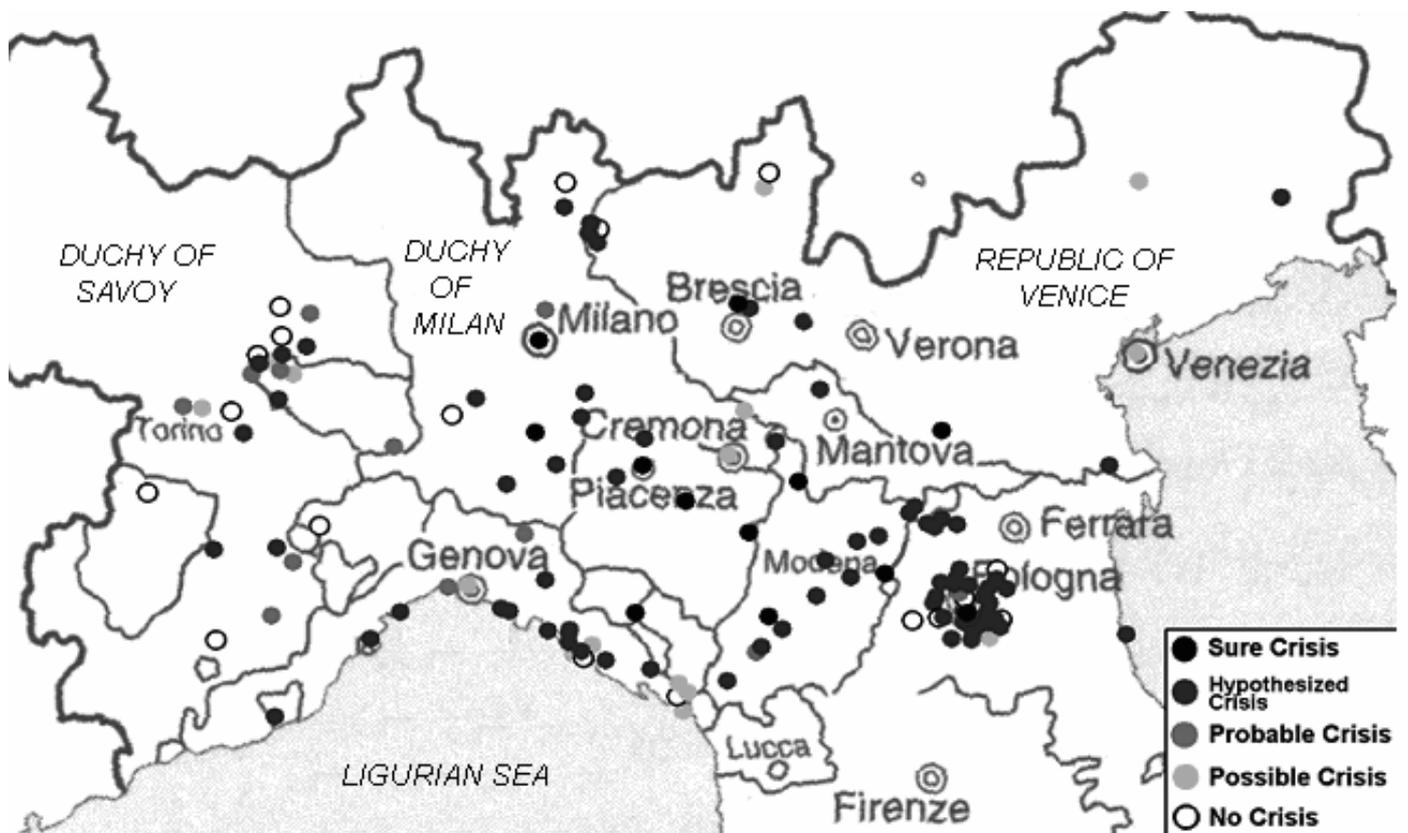
Figure 2. Parishes of Lowland, Mountain and Coastal areas in comparison, 1562-1626 (quinquennial moving averages of the indexes of baptisms based on 1610-1614)



The crisis of 1590-1593, which was very acute in coastal areas and in the inland plain, was much less serious in the mountains. The fact that the drop in births in these areas is noted only in 1592 at the peak of the crisis, while in the previous year they are stationary is significant. One can hypothesise that a lesser dependence on the grain harvest enables the population to resist the famine for a certain period but not indefinitely. It is also probable that mountain dwellers suffered less than others from typical complications of famine such as typhus epidemics, more severe in crowded areas such as cities and the rich lowland countryside.

From a demographic point of view, this famine was by far the most important event that occurred in the period under consideration. To better appreciate its extent, it is useful to refer to a map (figure 3) in which the presence of the crisis had been hypothesized in many places, by taking as a reference localities that surely suffered because of it, as confirmed by historical research. In these localities I found an average reduction in births of 44%¹⁰ and on the basis of this I formulated hypotheses about the occurrence of the crisis elsewhere¹¹.

Figure 3. The 1590-1593 famine



The above map well illustrates the generalized extension and the gravity of the famine: in those years, finding wheat in Italy must have seemed nigh impossible, a sort of nightmare for the provision authorities. Looking at the few blank circles corresponding to places where the reduction

in the births was modest (inferior to 4%) or non-existent, we note that the places spared are concentrated at the edge of the Po plain, along the alpine arc and in certain areas of the Ligurian Apennines; in almost every case these are mountain villages, especially if we neglect some parishes of the suburbs of Bologna where the evaluations may have been distorted by the small number of annual baptisms (the lower the number of baptisms per year, the greater is the influence on the demographic trend of random factors).

The geographic position explains why these places escaped the crisis: the relationship with the territory established by mountain dwellers is very different from that of plain dwellers, being characterised by a lower population density and a different crop regime. The second point is decisive, since the 1591-1592 crisis was essentially due to a grain shortage. Mountain populations based their nutrition on animal husbandry, horticulture, and the growth of specialized crops more than the populations in the lowlands and obviously suffered less from a lack of grain. Furthermore, the importance of arboreal crops typical of low and mid-mountain must not be neglected, above all the chestnut, which is very resistant to adverse climatic factors and whose fruits are highly calorific. Returning to the graphs, looking at the series as a whole we can note that the trend in the mountainous areas is towards a slow, but constant growth which leads to an increase in births of approximately 35-40% in the period between 1565 and 1605. This tendency doesn't seem consistent with Braudel's interpretation of the mountain as "factory producing men", a place closed in on itself, condemned to be in a state of underdevelopment "without history" characterized by few resources and harsh living conditions, making it an exporter of manpower to the lowland and the city (Braudel 1949). My observations, on the other hand, correspond very well to some recent studies of Alpine demography, which arrive at the conclusion that in the long period, the logic that has governed the history of the Alps has been that of a slow but continuous growth, much more than that of the expulsion of a surplus of population (Mathieu 2000; Fornasin and Zannini 2002). Crucial, to achieve such result, was the precocious establishment in the mountains of a "low pressure" demographic regime, characterized by moderate birth and mortality rates, not greater than 30-35 per thousand (Viazzo 1990). This phenomenon has been described many times in research studies beginning from the first years of the 18th century (ex. Albera et al. 1988) but the few available studies for earlier periods suggest that it would be possible to backdate it at least to the second half of the 16th Century (Maggi 2002). Its interpretation still has some unclear aspects, but many elements have been underlined, such as the regulatory role of nuptiality, the forms of organization of the family, the way the work force is employed, etc¹².

In the case of the mountains, therefore, environmental peculiarities impose a particular attention on the relationship with the available resources, favouring the establishment of social customs that

reduce the birth rate¹³. The result is a more gradual, but surer demographic growth, which, along with a diet, crop regime and settlement pattern different from that of the plain, guarantees less vulnerability to subsistence crises (at least those caused by a shortage of grain), mitigating their effects. My data support such conclusions confirming the applicability of this model to the 16th century.

On the whole, the series presented suggest that in the first two decades of the 17th Century the population reaches a new ceiling in the plain as well as on the shore and in the mountains: as revealed by the flat lines in the graphs, there is a level that the population is not able to cross increasing further. Recently it has been suggested that this level represents the maximum carrying capacity of Italy since the times of the Roman Empires, lost during the early Middle Ages, regained around 1300 then lost again due the outbreak of plague in 1347-1348, in the same way as the 16th Century growth was cancelled by the plagues of 1629-1630 and 1656-1657 (Lo Cascio and Malanima 2005), but my data do not allow me to judge such hypothesis. What I can say, is that the ceiling of population reached at the beginning of 17th Century doesn't represent a situation of "stable" equilibrium everywhere. After the recovery from the 1591-1592 subsistence crisis there is a risky reduction of resources compared to population, of which the lowlands seem to suffer more seriously than other areas. After a decline in the years 1618-1623 which also involved the shore (in that period there were frequent food shortages caused by bad weather conditions) the coastal areas recovered quickly while the plains didn't seem able to get out of the negative spiral with a consequent erosion of a good part of the recovery that occurred at the turn of the Century. In fact, the crisis seems to hit certain types of settlement models and crop regimes, based on cereal growing. To this point we shall return later¹⁴.

3. Cities and countryside

In the modern age cities and countryside are closely linked by complex social, economic, institutional and demographic relationships. From a demographic viewpoint, historical criticism provides us with a consolidated image of the city as a "man eater" or "demographic grave", because of its high mortality. In the cities, growth closely depends on the force of attraction exercised on the countryside, the hilly areas and the mountains. I now propose to evaluate if, in 16th Century Northern Italy, the urban settlement context was characterized by a different birth trend compared to non-urban habitats and, particularly, in comparison to the countryside.

Many believe that, for the cities in general, the early modern age was a moment of crisis (ex. Braudel 1949). In 16th Century Northern Italy, this judgment is not appropriate. Indeed, thanks to the political fragmentation of the territory, that century was often a period of great vitality for the

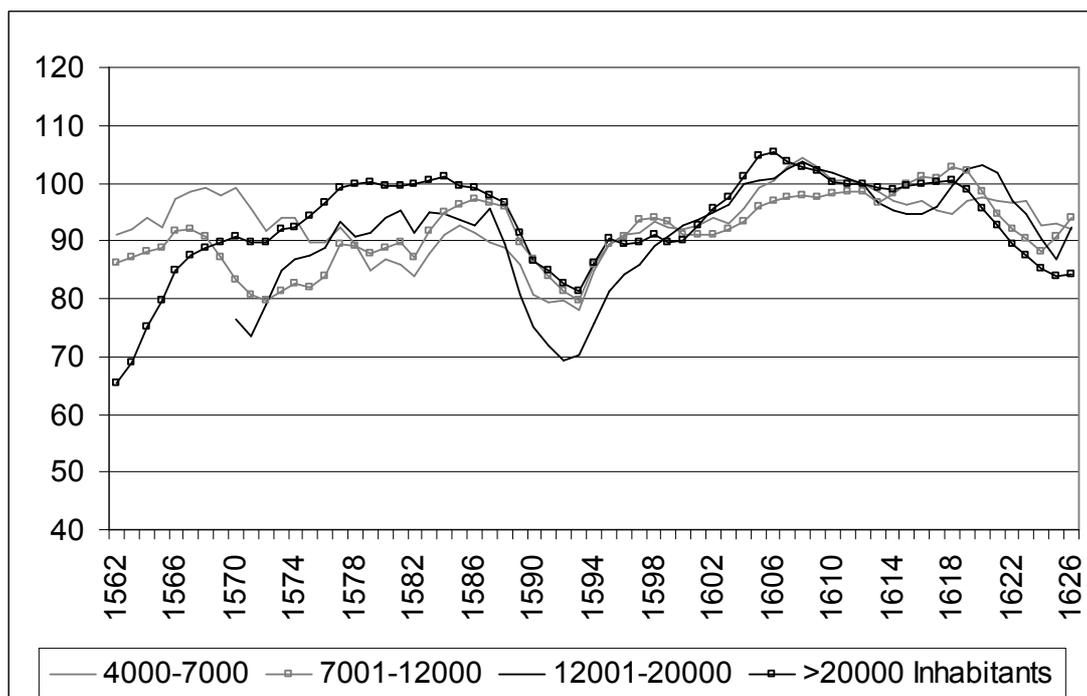
urban centres, many of which, recently promoted to the rank of capitals, began to grow vigorously. Things change in the following century, for which numerous local studies have highlighted a relative decline in Northern Italy, due mainly to the crisis of the urban economy (Belfanti 1990).

The identification of the status of “city” is a particularly delicate matter in the case of Northern Italy, since due to the elevated political fragmentation and other reasons, many places perform typically urban functions, but have a population of modest dimensions¹⁵. A definition of city must take into consideration juridical, functional and social factors as well as questions of size and, at the same time, it must not be so complex as to lose all operational utility. In the analyses that follow, although the local series have been aggregated on the basis of dimensional criteria, the choice of which to include also considered the above factors.

It is evident that cities like Ivrea (4.467 inhabitants in 1612) and Venice (148.637 inhabitants in 1586) were incomparably different places, with greatly different problems of provisioning. Rather than building a single generic urban series, I have therefore introduced further subdivisions, corresponding to significant size bands¹⁶: 4.000-7.000 inhabitants (the small cities so abundant in Northern Italy), 7.001-12.000, 12.001-20.000, and finally the cities above the 20.000 inhabitants, the metropolises of the epoch. Figure 4 shows the demographic trend of the centres belonging to each size band.

Figure 4. The movement of births in Cities, 1562-1626

(quinquennial moving averages of the indexes of baptisms based on 1610-1614)



There are two moments in which the size of the urban centres seems to influence the course of the series:

- 1) the initial phase: comparing the level of births after the peace of Cateau Cambrésis (1559) with that found in the first decade of the 17th Century, the bigger the population the lower is the starting point;
- 2) the famine of the early 1590's: the drop in births is more pronounced in the bigger cities.

As regards the first point, one can suppose that the bigger cities suffered more from the negative conjunctural situation of the first half of the century, in which Italy was theatre of war in the struggle between France and Spain. Thus, when peace was stipulated they found themselves in conditions of relative depopulation. It is also true that bigger cities have a notable potential for growth. In a fifty-year period, cities with more than 20.000 inhabitants registered increases in the births of about 60%, against about 16% of the centres in the size-band 7.001-12.000 and 13% of those in the band 4.000-7.000. For cities with 12.001-20.000 inhabitants, the only possible comparison is with the early 1570's when the increase was about 29%¹⁷.

Figures of this kind certainly do not correspond to a picture of urban decline. It seems, rather, that the cities, and the bigger ones in particular are experiencing a phase of tumultuous expansion, reaching a high population level at the beginning of the new century which would enter into crisis only in the 1620's.

Such results, nevertheless, are not coherent with the most accredited estimates of the state of the population in the principal cities, which predict more modest increases or even slight decreases¹⁸. The remarkable degree of agreement of the series collected by myself induce me to believe that, at least in this case, the reality described by birth dynamics is more reliable than the population estimates used so far.

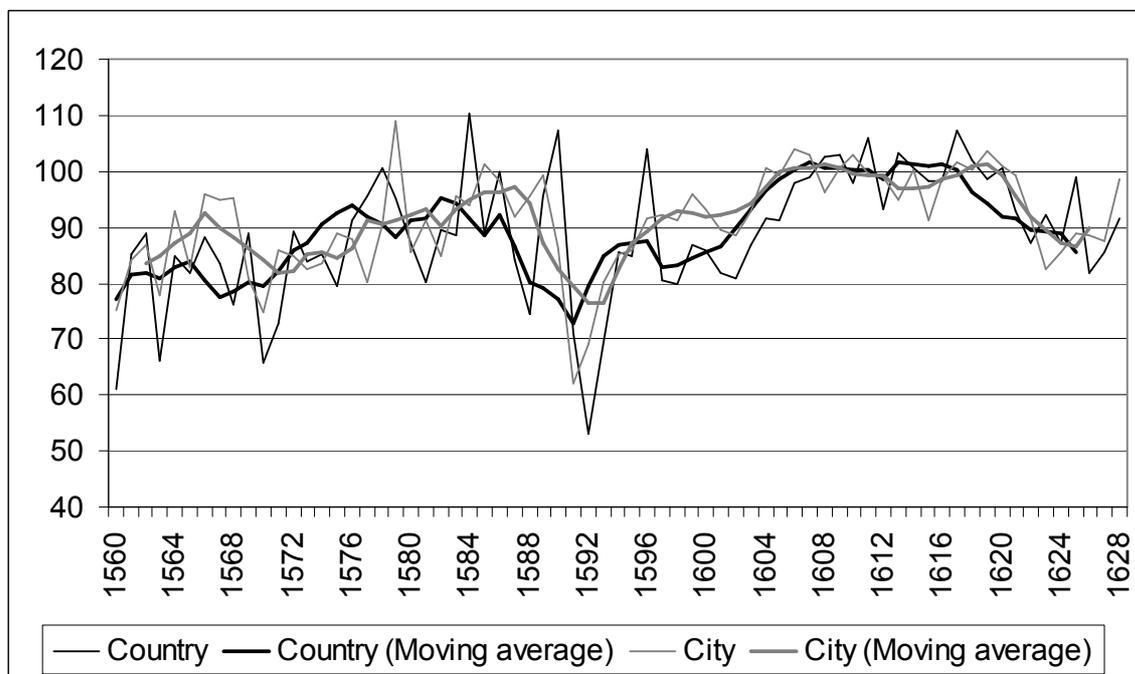
As regards the 1590-1593 crisis, the damage seems more serious as the size of the city increases. Comparing the average level reached in the most negative phase (1591-1592) with that of the years 1585-1589, I have found a drop in births of about a 29% in cities with more than 20.000 inhabitants, and of 39,5%, 28%, 24% in those of the bands 12.001-20.000, 7.001-12.000 and 4.000-7.000 respectively.

My data suggest that the movement of births is altogether more dynamic in the big cities both in phases of growth and crisis. Given the rhythms discovered, it is likely that growth is due to the influx of population from outside: from the countryside, from marginal areas, perhaps from smaller cities, certainly from those ex-capitals of which there are so many in 16th Century Italy. The metropolises, colossal "man-eaters", however, while they attract crowds of immigrants, are also quick to reject them. During the crisis, when it is clear that the provisioning authorities can't cope

with the shortage of resources, the lines of the fugitives are thickened by the expulsions of the *forestieri* (“outsiders”) from the cities, who often try to return to their places of origin. As we shall see in the comparison with the countryside, the rhythm of the re-entries also has the effect of prolonging the “void” of births.

In figure 5, I compare the series related to the countryside areas on the plain, already employed in precedence, with an urban series that approximately has the same territorial representivity; to build the urban series I considered only cities having more than 7.000 inhabitants. The series are interpolated with the quinquennial moving averages.

*Figure 5. City and country to comparison, 1560-1628
(averages of the indexes of baptisms based on 1610-1614)*



Although, in the acute phase of the crisis (1591-1592), the countryside areas of the Po plain reach a much more pronounced negative peak compared with the cities, it is also true that, in the latter, the depressive phase begins earlier, and ends later. This depends both on the “food reserves cycle”¹⁹, and on the rate of re-entries. In fact, when the crisis has passed, those who fled the city to survive linger on in the places in which they found shelter, slowing down the restoration of the “normal” levels of births. Apart from these details, the two series show a good degree of concordance both as regards the trends, and the levels reached.

In reality, to better compare urban and rural demographic trends it would be necessary to exert greater control over the geographical areas actually being compared. For this purpose a comparison

of the movement of births in the cities with that of their “contado” (surrounding countryside) has proved particularly useful. For reasons of brevity, I will not report the results obtained here. I shall limit myself to noting that the examined cases suggest a remarkable conclusion: faced with a relative decline of the urban centre, we systematically find a demographic increase of the contado, thanks to the reduction of the direct migratory flows towards the city from the surrounding countryside. Analogous phenomena have been found in other areas and in other epochs, but for the 16th Century they have been studied very little. Such circumstances take on great importance when we consider that, until now, all available evaluations of the movement of the population during the century have been based almost exclusively upon data of urban origin.

4. Which countryside? Demographic dynamics, settlement models and crop regimes.

Till now I have treated the ample plain created during the course of millennia by the river Po and its tributaries as a homogeneous whole. Nevertheless, during the modern age, the Po plain, far from constituting a vast area endowed with common characteristics, presented a fragmented nature from various viewpoints: 1) political-institutional (numerous States divided the territory among themselves); 2) social-cultural; 3) physical-morphological; 4) settlement patterns and crop regimes in their widest sense.

Here, I shall consider the physical characteristics, settlement patterns and crop regimes of areas of the Po plain for which I have both demographic data, and studies of agricultural history concerning the period under examination. Going from West to East the countryside areas in question are the Canavese, the Pavese, the Milanese-Lodigiano, eastern Emilia (particularly the countryside of S. Felice) and part of the Bolognese “contado”. It is worthwhile remembering some peculiar characteristics of each of these areas:

1) eastern Emilia (Sanfeliciano): in this period, no appreciable innovations are found in agricultural techniques or type of production. Compared with the priority given to the production of bread and wine, the importance given to breeding is negligible (Cattini 1978). The irrigation system of the area is extremely complex but doesn't work in a satisfactory manner: from the first half of the 16th Century there are signs of a deterioration in the environmental situation, which is the origin of innumerable disputes, whose solution was subsequently complicated by the political fragmentation of the territory (Cattini 1984). The series used here relate to the countryside in the communes of S. Felice and Massa Finalese where, in the 16th Century, the territory was subdivided into “chiusure” which, towards the turn of the century, evolved into “piantate”, a more intensive form of farming²⁰. This type of organisation of the fields, which in other areas of Emilia is associated with

sharecropping, in the countryside of San Felice was associated with small and medium land ownership.

2) Bolognese: although the ample suburban band of land around Bologna is not homogeneous from a morphological, settlement model or crop regime viewpoint, here we shall limit our analysis to the part characterised prevalently by estates organised according to the sharecropping principle²¹. As in the San Felice area, in the Bolognese there are no significant developments in farming techniques or the crops grown: in both places bread and wine are the privileged products.

3) Milanese and Lodigiano: they represent the heart of the irrigated area of Lombardy, endowed with the most evolved network of water of the epoch. From the crop point of view these areas are characterized by the large number of meadows (23,7% of the general territory in the Milanese lower part, over 35% in the Lodigiano) and, at least in the Milanese, of the paddy field (over 7% of the territory), which is almost totally absent in the Lodigiano (Chittolini 1988). From the viewpoint of agricultural contracts, forms of leasing of large estates where wagers provided the workforce are very widespread, and this state of affairs is “singularly suited to irrigated crop farming, and able to exalt to the utmost its productive abilities” (Chittolini 1988, p. 213). Alongside the lease of large extensions of land the settlement model of the “cascina” (a sort of large farmhouse) began to assert itself in the course of the 16th Century (Chittolini 1984).

4) Pavese: in comparison to the central part of the State of Milan, in good part of the Pavese there was a less effective control of the waters. Because of the proximity to the Ticino and the Po, the countryside was often drier, and contemporarily subject to becoming marshy and flooding. In these areas, meadows constituted about 18% of the territory. The northern part of the province, on the borders of the Milanese, was part of the irrigated Lombardian plain: meadows accounted for 24,5% of the territory and paddy fields for 2,2% (Chittolini 1988; Crosia Fiocchi 1980). To this variety of crop regimes corresponded a similar variety of agricultural contracts with the diffusion of forms of agricultural labour and large-scale leases in the most fertile lands, while, in less fortunate areas more traditional production systems prevailed. Given this variety of situations, the Pavese represents a sort of intermediary case between the Milanese and the areas of the lower Po plain where, at least at that period, there was not a particular diffusion of irrigated farming.

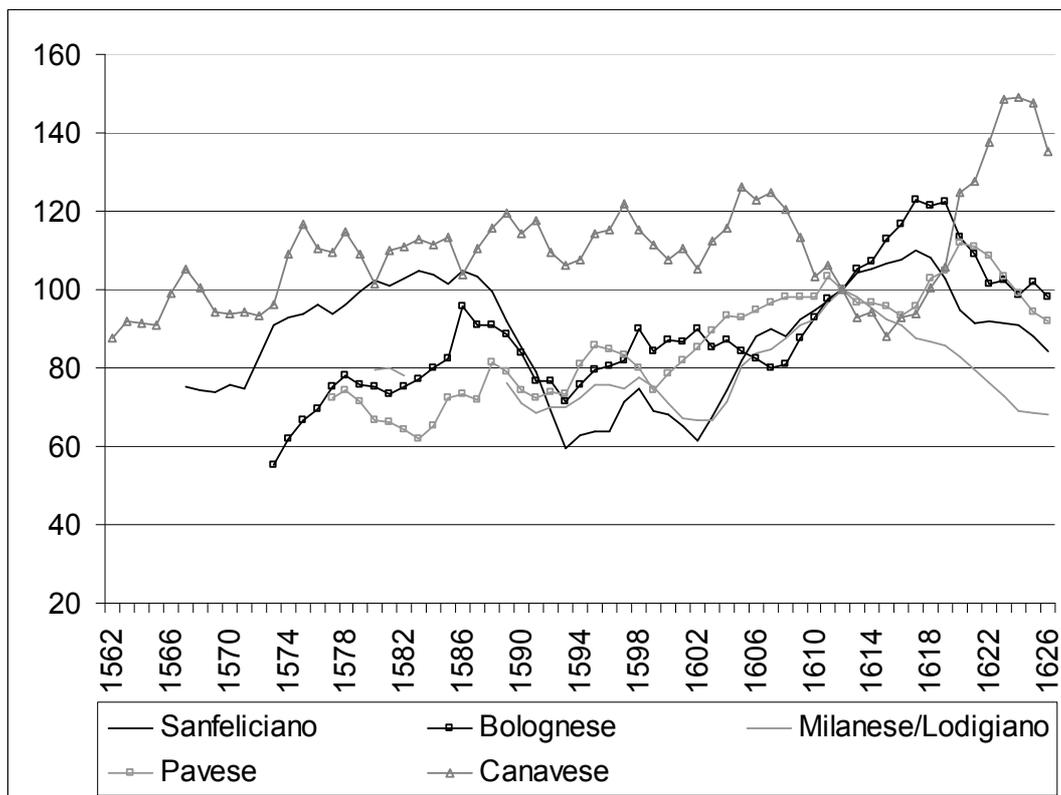
5) Canavese: the plain that extends around the city of Ivrea, bordered by the morainic hills produced by the Valle d’Aosta glacier is an example of the “upper” Po plain, characterized by land which is much less fertile than the areas mentioned above and situated at a markedly higher altitude. We know that rice never succeeded in penetrating this area and wheat remained predominant at least until the spread of maize. Other food resources, such as chestnuts, typical of the alpine and pre-alpine areas were also available. An examination of the land registers indicates the prevalence of

small fragmented properties, as a rule directly worked by the owners, but sharecroppers are not totally absent²². The settlement pattern of the area is characterized by a myriad of small towns and villages where the majority of the population live: the housing model of the “cascina”, so well adapted to rice-growing areas, is rarely seen here.

However approximate, the description given to the various countryside areas which will be the object of study suggests right from the beginning the extreme difficulty of a comparison of their demographic course, which would certainly benefit from further information other than the simple number of births: for instance, their seasonality or the characteristics of the nuptial regime. Given the available data, I shall have to limit myself to an examination of the rhythm of the births, of the levels reached and of the responses to the crises.

In figure 6 I introduce the quinquennial moving averages of the aggregated series for the five rural areas²³ above described.

*Figure 6. The movement of births in the countryside, 1562-1626
(quinquennial moving averages of the indexes of baptisms based on 1610-1614)*



From the comparison among the series it emerges, in the first place, the low sensitivity of the Canavese to the food crises of the 1590's and the 1620's, a fact which differentiates it from all the other areas examined. This is due, probably, to a number of causes: the serious damage suffered

during the Italian Wars which led to depopulation; the demographic attraction exercised by Turin, that limited the possibilities of immediate recovery and contributed to the maintenance of a more balanced relationship between population and resources; finally, the geographical position in proximity to mountains and hills, producers of food products less sensitive than wheat to adverse climatic conditions.

Secondly, concentrating on the subsistence crisis of 1590-1593 and the years that followed, it would seem that the demographic damage was more serious in the Emilian countryside than in the Lombardian countryside. This doesn't emerge so much observing the reduction of the births in the acute phase 1591-1592 as by examining the recovery capacity after the crisis. In the countryside of Pavia, Milan and Lodi the re-establishment of the previous levels of births was reached much more quickly than in the Bolognese and, above all, in the lower Modenese. An explanation can be individualized in the geographical position of such areas. Emilia, in fact, is one of the parts of Italy that felt most acutely the shortage of food, which often lasted in a serious manner for all of 1593. It is possible to hypothesize that the part of the decline of the births attributable to temporary migrations is greater in the Lombardian countryside than in the Emilian countryside, where many episodes of high mortality are known. This would give Lombardy an increased capacity of recovery once the fugitives had returned to their abodes.

The geographical position cannot explain what happened during the 1620's. In the Milanese and in the Lodigiano, the crisis seems to begin before, and to be more serious, than at Sanfeliciano, in Bolognese and also in the bordering Pavese. This circumstance constitutes the key to propose a preliminary interpretation of the incidence of crop regimes and settlement models on the general movement of the population in the countryside.

The Milanese and the Lodigiano, in fact, are undoubtedly, among the areas under examination, those characterized by the most modern agriculture just as the Canavese has the most "archaic". It is not just by chance, I believe, that the birth trends in these two areas at the beginning of 17th Century are at opposite extremes. One could hypothesize that the introduction of new crop regimes together with the expansion of irrigation and the intensification of animal husbandry in stables improved the diet and reduced the susceptibility of the population of the area to crises caused by "cereal shortages". The data at my disposal suggest that such a hypothesis is completely unfounded and that indeed the connection should be overturned: the expansion of irrigated farming increases the vulnerability vis à vis cereal shortages.

For the moment this is just a hypothesis which could be verified only by extending the investigation to at least the whole of the 17th Century²⁴ and expanding the database. However, I can already put forward some considerations in support of my conclusions. First of all the cattle raised directly on

the farms, even those with good meadows were rare²⁵ and did not provide a regular flow of alternative food supplies. Secondly, in the words of a contemporary observer “ It would be better, especially for the poor, to lack meat and cheese rather than bread. Before the Lodigiana had water brought by the [canal] Muzza there was an abundance of all types of cereals; now that the majority of fields have been transformed into meadows because water has become so easily available, if the harvest is slightly less abundant than normal the city does not have bread for the entire year, so that the more this territory has become rich in income, the scarcer is the primary food resource of its inhabitants...²⁶”. The expansion of irrigated meadows accelerated between the 16th and 17th Centuries during that “Indian summer” of Italian economy in which urban capital flowed copiously into the Lombardian countryside and helped to change its appearance (Bolognesi 1984). This chronology corresponds well to the course of the births: in their incompleteness, the series show nevertheless a more serious disquiet in the 1620’s than in the aftermath of 1590-1593 famine: which is when agriculture in Lombardy had realized its greatest “progress.”

It is a very strange picture that emerges from observing these populations that, pursuing the principles of the maximization of profit (a rare case, in the countryside of the epoch), create for themselves the conditions of crisis of their own *habitat*. The matter introduces important aspects also of a theoretical order, so it is worthwhile dedicating particular attention to it.

5. The logics of population: Malthus or Boserup?

The two macro-demographic theories that constitute essential points of reference for those who intend to deal with the relationship between population and resources, were elaborated in their original forms by Malthus (1798) and (much more recently) by Boserup (1965, 1981). Such theories implicate radically different ideas of the relationship between levels of population and agricultural technologies in use.

In extreme synthesis, for Malthus, the level of population corresponds to a given technological situation, as well as to social and cultural factors. Despite the fact that imbalances periodically occur between population and resources as a result of their different rhythms of growth (geometric for the former, arithmetical for the latter), overall the system oscillates around an equilibrium, maintained through repeated episodes of super-mortality. So in order to bring about a lasting growth in population, there must be a substantial improvement in agricultural technology.

For Boserup, on the other hand, the population itself, by promoting technological micro-innovations to traditional practices in response to demographic pressure, permits a slow increase in population by starting a chain reaction and it is not necessary to have a periodic re-equilibrium of population

and resources. According to this theory therefore, the demographic pressure stimulates technical innovation in a continuous manner; population is not a dependent variable whose maximum amount is determined by technology and environmental conditions (as in the Malthusian model), but in its turn exerts an influence on technology.

In this simple formulation I chose to underline the main differences between the two theories, but it should be remembered that they can be thought of as complementary rather than contradictory, and that efforts have been made to conciliate the two positions (Lee 1986). Surely my data seem to confirm this complementarity, given that they do not perfectly match with only one of the two theories. Rather, according to the place, time and circumstances, they suggest that the underlying logic is Malthusian or Boserupian: with a clear prevalence, at least in the area and time I'm dealing with, of the former over the latter.

Even if more cautious positions are not lacking (Souden 1985), generally historians agree that the serious 1590-1593 famine was a Malthusian-type crisis in the sense that such a level of demographic pressure on the resources had been reached that a few consecutive years of bad, at times very bad, harvests caused the whole system to short-circuit, not only from a demographical, but also from an institutional, economic, social and cultural point of view (Cattini 1984; Romani 1975).

Nevertheless, comparing different territorial aggregates, it turns out that, despite the impressive extension of the crisis, some people were spared: first of all, the inhabitants of the mountains, the Alps particularly (the Apennines were stricken by famine in a lesser manner, but they were by no means spared). In these areas, the lower housing density, linked to the fact that food supplies depended less on cereals than in the plain, enabled them to overcome bad years without too many traumas.

Until here, nothing is unusual: on the other hand, the measures precociously adopted by the mountaineers to limit their own fertility (for example, deferment of marriages) would certainly have met the approval of the same Malthus. Nevertheless, if we consider the slow, but constant increase of the Alpine population, that led to its trebling between 1500 and 1900 (Mathieu 2000) and which can already be intuited in the period under consideration, Malthusian logic no longer works very well. It was not some "alpine agricultural revolution", some sudden innovation in farming techniques that produced such a result. Rather, there seems to have been a progressive improvement in crops, a better exploitation of, and adaptation to, the meagre resources available. The slow increase of the population suggests therefore that Boserupian forces were at play.

Why were there such different results in the mountains and on the plain? One causal factor seems decisive: the relative rapidity of demographic growth as shown by the course of the birth indexes. In

the Alps, thanks to the social conventions which moderate birth and mortality rates, there is a slower growth. The increase of the population happens therefore at a very inferior rhythm to the geometric rhythm suggested by Malthus. On the plain, and particularly in the most fertile lands, the rates of growth are rapid as can be seen from the graphs presented for the years 1560-1589. Probably, there is not the time to increase the available resources by improving the crops, through interventions that, as a rule, require years and great quantities of labour. Furthermore, the results are not always positive (the countryside of the Po plain abounds with stories of “water disasters” due to badly designed canals). Certainly in the case of the 1590-1593 subsistence crisis, the population of the Po plain unknowingly brought the disaster upon itself.

The only way out would have been, probably, to follow the precepts of Malthus and to imitate the customs of the “uncivilised mountain-dwellers”. Evidently this was not a practicable choice, since it required a lot of time, even more than that required to dig new canals and farm new lands.

This doesn't mean that the farmers of the Po plain didn't try to react to the pressure, ever more apparent, on their resources. For example, in the countryside of San Felice the passage from the “chiusura” to the more intensive “piantata” seems linked to the need to produce greater quantities of food, even at the cost of sacrificing variety and focusing on two fundamental resources: grapes and wheat (Cattini 1984).

In any case, technical innovations in farming techniques did not always go in the direction of permitting a greater density of population, as Boserup's theory would have it. In the countryside of the lower Milanese and Lodigiano, indeed, there appears to be a worsening of the ratio population/resources in concomitance with elevated investments and rapid transformations of the agrarian landscape. This is due, in substance, to the fact that men can't eat hay.

As noted in the pages before, the increase in the number of irrigated meadows takes place at the expense of wheat fields. Why do we encounter such different processes in two areas of the Po Plain (Sanfeliciano and Milanese-Lodigiano) at the same time? Probably, the reason must be sought in the people who took the decisions about crop innovations. In Emilia, these were the small-holding farmers, who, obviously, had a direct interest in not starving and therefore, were careful about subsistence. In Lombardy, they were the new haute bourgeoisie owners anxious to exploit their land investments to the utmost, according to a logic of profit, bearing in mind the proximity of Milan, the biggest outlet for meat and dairy products of the Po plain.

Some interesting conclusions can be drawn from this. In the first place, it does not necessarily follow that a “modernization” of agriculture, the adoption of the best available techniques, leads to a greater availability of food resources: in fact it is necessary to pay attention to the purposes for which such techniques were adopted (profit or subsistence). Secondly, in this case at least the

stereotype of the stubborn farmer adverse to innovation becomes confused with the image of a “rational actor” who knows full well what is best for himself and his family and sets himself a fundamental objective- to survive²⁷.

The implicit rationality of some traditional agricultural structure, has recently become a topic of discussion in certain branches of economic science, in particular in that known as “neo-institutionalism”. These researchers have found that such traditional structures operate according to logics of moderation and division of the risks²⁸. It is not possible to explore this matter here but suffice it to recall the words of Innocenzo Malvasia who, at the beginning of the 17th century, motivated as follows the preference granted to sharecropping compared with other ways of farming: “[land run by sharecropping] although it doesn't give a big yield, almost never fails to give a moderate yield, and of everything²⁹”.

On the basis of what is shown in the preceding pages, in 16th and 17th century Northern Italy a Malthusian-type pattern seems to be prevalent. However in well defined areas, and notably in the mountains, the Boserupian theory seems more apt at describing population dynamics. The prevalence of one population logic or the other does not depend simply on the introduction of new techniques as opposed to a lack of innovation, but is due to the complex interaction of factors such as the type of technical innovations put in place, the social characteristics and economic aims of the innovators, the environment and the available resources, the prevalent social and reproductive customs, etc.

6. The general trend of births in north Italy from 1500 to 1628

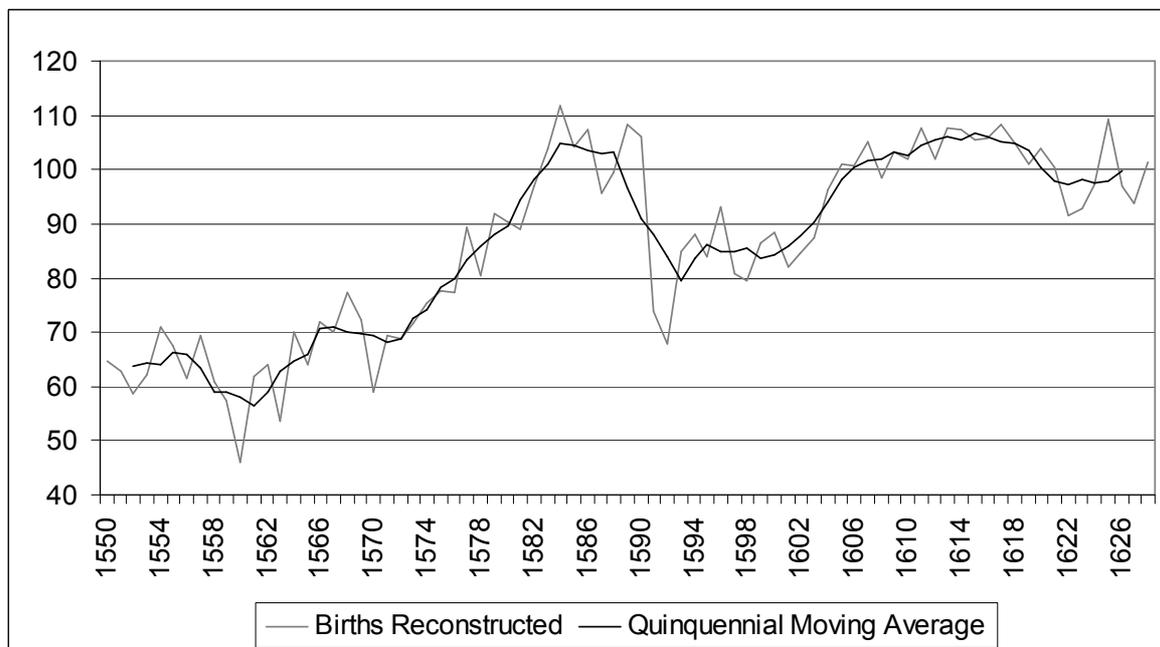
Comparing different areas and environments, I found a considerable variety of “histories” of the population, which often did not present even a minimal degree of concordance (just compare the Alps with the Emilian plain). The intention of estimating birth trends for the whole of Northern Italy, appears to be a very delicate task which would require as a starting point a minute division of the territory into homogeneous areas according to those profiles which demonstrated their power to influence demographic trends. It would also be necessary to know the precise extension of each area and its population density.

At the actual state of knowledge, we don't have enough data to proceed in such a way. I can only present an approximate result suitable for suggesting some important elements. However I think that my data, simply because of their quantity, enable me to propose an evaluation of the number of births in the period and in the area which is more solidly based than those available to us in the past³⁰. Indeed, if, for a moment, we suppose that the estimates of the population of Northern Italy made by Beloch for the year 1600 (5.412.000 inhabitants) were accurate, and keeping in mind the

fact that, between 1599 and 1601, in the parishes in my samples an average of about 22.300 baptisms were celebrated, we obtain an overall quota of births of between 11,8% (assuming a birth rate of 35 per thousand) and 9,2% (corresponding to a birth rate of 45 per thousand): a decidedly consistent sample.

For the sake of brevity, in this paper I shall not describe in detail the methods used to estimate the total number of births, aimed to take account of what emerged during the study of the single places and of the homogenous aggregates I spoke about above³¹. I shall thus limit myself to presenting the results, in figure 7.

*Figure 7. Reconstruction of births in northern Italy, 1550-1628
(indexes of baptisms based on years 1601-1628)*



Combining the analysis of the above graph with what emerged in precedence and with the results of further investigations which I have not been able to deal with in this work (in particular as regards the first half of the 16th century), it is possible to propose the following division into periods:

- 1) 1500-1559: demographic stasis. The stimuli to growth, although present, are compressed by a negative conjunctural situation due to the contemporary presence of war, plague and famine. Rather than producing a contraction of the population, in the mid-term this prevents a substantial breaching of the levels already reached at the end of the preceding century.
- 2) 1560-1589: rapid demographic growth, already concluded toward 1585 and followed by a brief period of stasis, that seems to prepare for the successive crash.

3) 1590-1593: serious crisis of subsistence, which brings about a lasting contraction in births of about 25-30% . Furthermore, famine has a redistributive effect on local populations.

4) 1594-1619: after a phase of gradual recovery, which ends around 1610, the population of Northern Italy approximately returns to levels corresponding to those preceding the famine. This fact suggests that precise limits of population had been reached, closely linked with the availability of food resources.

5) 1620-1628: signs of a tension between population and resources become evident again. Famines and the fact that the “empty generations”, born in the 1590’s, reach reproductive maturity concur to determine a contraction of the births, which represents a sort of prologue to the 1629-1630 tragedy. This reconstruction represents a sensitive revision of the image so far put forward to explain population trends in Northern Italy during the entire 16th century: not so much looking at the volumes of the secular growth, but at its rhythm. In fact, far from developing slowly and gradually during the course of the entire 16th century³², the population, which remains compressed during the first half of the century, makes a great leap forward in the period 1560-1589, with an increase in births of 60-70% (corresponding to an yearly average increase of between 15,7 and 17,7 per thousand). The following crisis seems to be the ineluctable result of a growth that was too rapid and too consistent. I believe that the 1590-1593 famine should not be considered, as some historians do (Belfanti 1984; Bellettini 1973), the end of sixteenth-century growth and the beginning of the “demographic crisis” of the 17th century, and this because the levels of births of the 1580’s are again reached within a 20-30 year span, and because the crisis unquestionably constitutes a “sixteenth-century” event. Indeed, it represents the occasion to resolve the population imbalances produced by the complex events, also those of a political-institutional nature, of the preceding decades³³.

The rich cohorts of births in the 1580’s contribute to sustain the births of the first years of the 17th century (at least until about 1615), as the reduced cohorts of the 1590’s subsequently depress the demographic course of the 1620’s: the alternation of these demographic waves is evident and suggestive. Nevertheless, the “baby boom” of the years 1560-1589 is an event that doesn't find any explanation in the consistence of the preceding generations. It is possible to hypothesize that this is due to an increase of the birth rate, related perhaps to the temporary regress of epidemics and favourable crop cycles, and probably also to an increase in the marriage rate once the wars finished.

Conclusions

In this paper, I have described a rather complex *ancien régime* demographic situation, whose various aspects can only be highlighted by a continuous movement of analysis going from the

general to the particular and vice versa. On the one hand, the single series constitute useful indicators of important local demographic dynamics, linked to political, military and institutional events etc. On the other hand it is only by overcoming localism (intended without any negative meaning, since the criticism of the local series constitutes an essential point of departure) that it is possible to show, by extended comparisons of several series, the importance in the long term of variables which places that do not belong to the same territory often have in common.

After a situation of stagnation due to difficult conditions in the first half of the Century, rapid demographic growth began in the 1560's (a real "baby boom") which led in thirty years to a population ceiling which was impossible to overcome: the Malthusian crisis of 1590-1593 only temporarily re-balanced the situation. The creeping crisis of the 1620's seemed to herald the need for a further adjustment, which arrived punctually with the terrible 1629-1630 pandemic.

The 1590-1593 famine constitutes an exceptional occasion to show the dynamics of population at work. Comparing the capacity of reaction to the crisis of different parts of Northern Italy, one obtains the image of populations that are prey to the known "positive Malthusian checks", with the exception of the inhabitants of the mountains. These latter, thanks to a different relationship with their *habitat*, manifest the rare ability to adjust their own numerical growth to the rhythm of increase of the food supplies available, according to mechanisms entirely analogous to those postulated by Boserup. Besides, although all the populations of the Po plain, on the occasion of famine, see a drastic drop in their food supplies, some seem to face up to the crisis better than others. In this respect particularly significant is the comparison between different populations when faced with the creeping crisis of the 1620's. The results, in some respects surprising, showed that the best performances corresponded to those areas that had remained faithful to traditional crop regimes; the worst were in areas where some of the most advanced agronomic techniques in Europe had been introduced. This leads us to reflect on contractual forms and land ownership (rent, sharecropping or ownership of small pieces of land) and consequently suggests the importance of clearly identifying who the decision takers were. If my preliminary results are confirmed by other data, the comparison with the studies produced by the neo-institutional economists on many developing Countries would certainly constitute an interesting direction toward which to address future research.

APPENDIX

Composition of the sample of Baptismal Series

Composition of the sample by date of beginning of series		
Series beginning before:	Cumulative sum	% on Total
1480	2	1,3
1490	4	2,5
1500	6	3,8
1510	7	4,4
1520	8	5,0
1530	11	6,9
1540	17	10,6
1550	27	16,9
1560	35	21,9
1570	62	38,8
1580	117	73,1
1590	144	90,0
1601	160	100

Composition of the sample by geographic area (contemporary administrative regions)		
Region	Number of Series	% on Total
Emilia-Romagna	67	40,9
Piemonte	30	18,3
Lombardia	29	17,7
Liguria	26	15,9
Veneto	10	6,1
Valle d'Aosta	1	0,6
Friuli Venezia Giulia	1	0,6
Trentino Alto Adige	0	0,0
TOTAL	164	100

¹ For example, Beloch is cited by A. Bellettini (1973) while Cipolla is cited in the “*Histoire générale de la population mondiale*” (Armengaud et al 1968).

² In Levi’s reconstruction, including small corrections to uniform the reference territories, it results that for 1550 Beloch estimated for Piedmont 0.8 million inhabitants compared to the 0.6 of Cipolla, for Lombardy 0.8 compared with 0.5, for Veneto 1.8 compared with 1.6 and for Liguria both estimated 0.4 million inhabitants. For 1700, Beloch estimated for Piedmont, 1.1 million inhabitants compared with 0.9 of Cipolla, for Lombardy 1.2 compared with 1.1, for Veneto 1.8 compared with 1.6 and for Liguria 0.5 compared with 0.4. I have deliberately limited myself to estimates for Northern Italy. Please note that the estimates for Piedmont include the Valle d’Aosta and those for Veneto include Friuli-Venezia Giulia and Alto Adige (Levi 1991).

³ In fact Cipolla himself notes that: “*The slight differences between the population totals... and those calculated by Beloch should not be taken too literally.*” In particular, Cipolla claims that the margin of error for pre-1800 estimates is $\pm 15\%$ i.e. greater than the difference that separates his estimates from those of Beloch (Cipolla 1965, p. 572). It doesn’t seem however to me that this reasoning is persuasive in as much as, although it is possible that the divergences are due to this margin of error, this doesn’t alter the fact that Cipolla sensibly shifts the centre of the confidence interval and (above all) doesn’t give any indication about the techniques used to obtain the data he proposes. Looking at the estimates on a regional basis, the divergences are even bigger: for instance in the case of Lombardy in 1550 they are equal to 60%.

⁴ According to the “classical” Malthusian interpretation there is an equilibrium between available resources (given the technological level) and the population, which is maintained by means of the periodic repetition of a series of episodes of super-mortality. In order for there to be a lasting growth in the population a substantial improvement in agricultural technology is required (Malthus 1798).

⁵ According to Boserup (1981), demographic pressure promotes technological micro-innovations, starting from known traditional practices. This establishes a chain reaction which however does not involve a continuous re-equilibrium of population and resources as per the Malthusian theory. Rather the demographic pressure tends to stimulate technical innovation in a continuous manner.

⁶ From my research it emerges that in Northern Italy at least there was a widespread custom of recording baptisms long before the publication of the edicts of the Council of Trent (1563). The Council stated that parish registers for both baptisms and marriages had to be kept, but usually the latter don’t begin before the 1580’s.

Parish registers of burials were only made obligatory by the *Rituale Romanum*, in 1614, and registers preceding this date are very rare. More abundant information can be inferred from “city books of burials” which, however, have the serious limit of being linked to very particular types of settlement (the biggest cities of the epoch), totally ignoring the great majority of the population, resident in the countryside.

⁷ Often historians have worked on urban data, skipping the countryside, where the greater part of the population resided, or they have concentrated on particular geographical areas where apparently there is more data available (as is the case with Tuscany), integrating the data with a few series from a wider territorial area and thus claiming to generalize the conclusions reached.

⁸ The aggregate series for the Alps includes the data of 11 places. Few of them can be defined “mountain villages” *tout court*; nevertheless, a careful examination of the geographical position of the parishes of the samples has enabled us to select places definable at least as “low mountain” or “valley bottom”. For my goals, the essential aspect is that they are places not on the cereal growing plain but characterised by at least a partially different diet (in which, for instance, animal husbandry has a greater influence) and capable of making use of the albeit limited food surplus produced at higher altitudes where cereal cultivation is not much important.

For the coasts, the relative shortage of data for the coastal area of Friuli, Veneto and Romagna forced me to work with a sub-sample that was not perfectly balanced, containing, as it does, 7 series from the Tyrrhenian side and only 4 from the Adriatic.

For the Po plain, I have used 3 series from Piedmont, 4 from Lombardy and 5 from Emilia or Romagna. For Veneto I only had one sufficiently old rural series from the plain, that of Cerea (VR). As far as possible I have tried to assure a good coverage of the territory, concentrating however on the “low” plain and avoiding places situated in hilly positions.

⁹ It is inevitable that the three series for the years immediately following 1610 are very similar and close to the level of 100 because the initial data were indexed with respect to the average of the years 1610-1614.

¹⁰ This figure was obtained by comparing the average level of births in the years 1586-1590 with that of 1591-1592.

¹¹ I have hypothesized the presence of a crisis where the fall of the births was equal or superior to 22% (half the average value found where a crisis is certain). I have defined “probable” the recurrence for reductions of between 15% and 21,9% and “possible” between 4% and 14,9%. Where the births dropped less than 4% or increased, it is extremely probable that there was no famine or that it was very mild.

¹² See, for a brief synthesis, Fornasin et al. (2002), pp. 11-15.

¹³ For a general synthesis and a careful examination of the importance of the environmental factors in alpine areas, see Mathieu (2000).

¹⁴ It is not possible to say if the slow decline found in the plains could have led to a more solid equilibrium, on a lower level in comparison to the first decade of the century; surely, a prolonged *deficit* of food resources with a consequent impoverishment of diet would weaken the immune defences and the physiological ability of recovery of the populations on the Po plain, preparing a weak response to the 1629-1630 pandemic. In such circumstance, nevertheless, the plague came into Italy from the mountains, to which it was of no benefit having survived unscathed the preceding depressive cycle.

¹⁵ In this perspective, the threshold of the 10.000 inhabitants proposed by De Vries (1984) as a limit under which there would not be cities, appears entirely inadequate. Others have set the limit at 5.000 inhabitants; for instance, Bairoch et al. (1988). As we shall see in the case in question it seemed opportune to me to further lower this limit to 4.000 inhabitants.

¹⁶ I obtained the data about the state of the population, principally from the mass of secondary sources from which I also extracted the relative baptismal series. Secondly I integrated the missing data from Bairoch's database (1988), but above all with the information supplied by Beloch (1937-1961).

¹⁷ For cities in the size-bands 4.000-7.000 and 7.001-12.000 I compared the average level for the years 1560-1564 with that of the years 1606-1610; for cities in the size-band 12.001-20.000 I have compared the average of 1570-1574 with that of 1606-1610.

¹⁸ See, for instance, Beloch's chart (1937-1961). For a synthetic comment on static estimates, unfortunately relative to a later period, albeit not much later, see Del Panta et al. (1996), pp. 81-84.

¹⁹ In Modena, for instance the population suffered from hunger at least until 1593: despite the fact that elsewhere the crops had been decent, the purchase of wheat was expensive and difficult.

²⁰ "Chiusure" and "piantate" are surrounded by hedges, fences or ditches to keep out animals grazing in surrounding fields. The changeover to the "piantata" is characterised by the progressive reduction of the grazing area in favour of the cultivated area with the consequent abandonment of semi-nomadic animal husbandry (Cattini 1984, pp. 28-37).

²¹ The classification of suburb in different areas according to the economic-agricultural structure is discussed by Bellettini et al. (1977). I will deal particularly with the "zone III" (according to the classification of the authors), where the percentage of sharecropping families on the total of the population is maximum (38% looking at the number of families, 63% looking at the number of individuals: sharecropping families are bigger than "normal" families).

²² Of the 936 declarants that appear in the 1612 census for the Ivrea area, 112 are indicated as "massari" (sharecroppers).

²³ I have excluded all urban centres, even those like S. Felice, where the majority of the population was involved in agriculture. For the Sanfeliciano, I have resorted to the series of S. Biagio, Rivara and Massa Finalese; for the Bolognese, to those of S. Donnino, Calamosco, Cadriano, Villolo and Quarto Superiore; for the Pavese, to data relative to Mortara, Broni and S. Pietro in Verzolo; for the Milanese-Lodigiano, I have considered Ossago, Villavesco, Codogno and Seregno; for the Canavese, Parella, Perosa, Romano, Scarmagno, Strambino and Azeglio. Given the different availability of data for the various areas, unfortunately, I had to build the aggregate series beginning from a varying number of local series.

²⁴ This is the Century in which, among other things, maize began to be widely cultivated, causing important changes in the diet of the majority of the population of the Po plain.

²⁵ The breeding was entrusted, principally, to "bergamini", owners of herds or simple breeders that brought their beasts to winter in the farmhouses, purchasing hay from them etc. (Chittolini 1988). In the other moments of the year, the herds were not present on the property.

²⁶ The quotation is by Bellabarba (1986), but I take it from Chittolini (1988). My translation.

²⁷ "Inside an agrarian world which operates a polyculture aimed at simple subsistence, the predominant *forma mentis* (cultural conformism is a characteristic of all the backward societies) organises farming so as to have a constant annual income (in real terms), to guarantee complete economic independence (they consume what they produce) both of the owners and of the sharecroppers. In a such environment it is clear that the worry of maximizing the proceeds (monetary) and minimizing costs doesn't matter. On the other hand, why try agronomic innovations when everybody knows that an alteration of the crop equilibrium might bring tragic consequences as regards the volume of the harvest? The aim is thus to maintain a balanced relationship between numerous components: food, consumer goods and investment goods necessary for the owners and the farmers at the start of each year. In this light, we can certainly speak of an «economic» management of the sharecropping property...", my translation (Cattini 1978, p. 871).

²⁸ For a brief synthesis see Stiglitz (1989).

²⁹ I resume the quotation from Bolognesi (1984, p. 89). My translation.

³⁰ And particularly, that of P. Galloway (1994), for the years after 1580.

³¹ Since, during the study, the existence of an important geographical variability has emerged as regards birth trends, in order to limit the influence of this factor the aggregate series for Northern Italy consists of a weighted average of the series built on a regional basis. The weighting criterion is based on the static estimates on a regional basis as put

forward by Cipolla. It is also possible to use Beloch's estimates for this purpose but the differences are marginal. To simplify the interpretation of the graph, I have not included this second possibility.

Every regional series in its turn represents the weighted average of three series, one related to rural settlements, one to small cities (4.000-9.999 inhabitants) and one to big cities with more than 10.000 inhabitants. The weighting criterion has been deduced from the work of De Vries (1984). Note that a preponderant weighting has been attributed to the rural series since the majority of the population lived in the countryside.

Each of the "base" aggregate series was reconstructed from the local series using the method introduced by Biraben et al. (1982; 1985), as discussed in paragraph 1.

³² This is suggested, among others, by Del Panta et al. (1996).

³³ Even if it is difficult to compare static and dynamic data, it has to be said that my data supports Cipolla's revisions of the estimates by Beloch. This results from the rate of growth: the course of the births suggests an increase of the population of about 35-40% in the period 1550-1600, while Beloch's estimates imply one of just 14% (note that an increase of 40% or 14% within a fifty-years period respectively corresponds to a 6,7 annual average increase for thousand or of 2,6 per thousand); it is indisputable that the hypothetical rhythm of growth is much closer to that implied in Cipolla than in Beloch. My data, therefore, seem to support the conclusions of the former, at least as regards the XVI century and looking only at the rhythm of growth, not at the dimensions of the population. Furthermore, while my data support to a large extent Cipolla's vision of the demographic trend, it is not so for his interpretations of XVIth and XVIIth Centuries macroeconomic trend. For a full discussion of the matter, see Alfani (2004a; 2004b).

BIBLIOGRAPHY

- ALBERA, D., DOSSETTI, M., OTTONELLI, S. 1988. Società ed emigrazione nell'alta valle Varaita in età moderna, *Bollettino Storico Bibliografico Subalpino* n. 86, pp. 117-169.
- ALFANI, G. 2004a. *Nascite naturali e rinascite spirituali. Dinamiche demografiche e sistemi di relazioni sociali nell'alta Italia dalla fine del XV all'inizio del XVII secolo*, PHD Thesis, Tutor prof. M. Cattini, Co-tutors professori L. Del Panta, R. Merzario, G. Vigo, Università Bocconi, XVI ciclo
- ALFANI, G. 2004b. La dinamica della popolazione dell'Italia settentrionale nel Cinquecento. Dal generale al particolare e viceversa: casi, comparazioni, questioni, accepted for publication in *Cheiron*
- ALFANI, G. 2003. Il secolo dimenticato. Primi contributi per una riscoperta demografica del Cinquecento nell'alta Italia, *Popolazione e Storia*, n. 2, pp. 9-30
- ARMENGAUD, A., DUPAQUIER, J., REINHARD, M.R. 1968. *Histoire générale de la population mondiale*, Paris : Éditions Montchrestien
- BAEHREL, R. 1961. *Une croissance: la Basse-Provence rurale (fin 16. siècle - 1789) : essai d'economie historique statistique*, Paris : S.E.V.P.E.N.
- BAIROCH, P., BATOU, J., CHEVRE, P. 1988. *La population des villes européennes. Banque des données et analyse sommaire des résultats, 800 à 1850*, Genève : Librairie Droz
- BELFANTI, C.M. 1984. Aspetti dell'evoluzione demografica italiana nel secolo XVII, *Cheiron* n. 3, pp. 77-99
- BELFANTI, C.M. (ed.) 1990. *Cheiron*, n. 11
- BELLABARBA, M. 1986. *Seriolanti e arzenisti. Governo delle acque e agricoltura a Cremona fra Cinque e Seicento*, Cremona: Annali della Biblioteca statale e Libreria civica di Cremona XXXVI/1
- BELLETTINI, A. 1973. La popolazione italiana dall'inizio dell'era volgare ai giorni nostri, in *Storia d'Italia Einaudi*, vol. V, Torino: Einaudi
- BELLETTINI, A., TASSINARI, F. 1977. *Fonti per lo studio della popolazione del suburbio di Bologna dal secolo XVI alla fine dell'Ottocento*, Bologna: Istituto per la Storia di Bologna
- BELOCH, K.J. 1937-1961. *Bevölkerungsgeschichte Italiens*, Berlin-Leipzig: Walter de Gruyter & Co.,
- BENGTSSON, T., SAITO, O. (eds.) 2000. *Population and Economy*, Oxford: Oxford University Press
- BIRABEN, J.N., BLANCHET, D. 1982. Le mouvement naturel de la population en France avant 1670. Présentation d'une enquête par sondage, *Population*, 37, 6, pp. 1099-1132
- BIRABEN, J.N., BONNEUIL, N. 1985. Le point de l'enquête sur le mouvement de la population en France avant 1670, *Population*, 40, 1, pp. 47-70

-
- BOLOGNESI, D. 1984. Le campagne dell'Italia padana nel Seicento, *Cheiron*, n.3, pp. 77-99
- BOSERUP., E. 1965. *The conditions of Agricultural Growth*, London: Allen and Unwin
- BOSERUP, E. 1981. *Population and technology*, Oxford: Blackwell
- BRAUDEL, F. 1949. *La méditerranée et le monde méditerranéen à l'époque de Philippe II*, Paris: Armand Colin,
- BRESCHI, M., MALANIMA, P. (eds.) 2002. *Prezzi, redditi, popolazioni in Italia: 600 anni (dal secolo XIV al XX)*, Udine: Forum
- CATTINI, M. 1978. In Emilia orientale: mezzadria cinquecentesca e mezzadria settecentesca. Continuità o frattura?, *Quaderni Storici*, n. 3, pp. 864-881
- CATTINI, M. 1984, *I contadini di S. Felice. Metamorfosi di un mondo rurale nell'Emilia dell'Età moderna*, Torino: Einaudi
- CHITTOLINI, G. 1984. Avvicendamenti e paesaggio agrario nella pianura irrigua lombarda (secoli XV-XVI), in A. Guarducci (ed.), *Agricoltura e trasformazione dell'ambiente (secoli XIII-XVIII)*, atti della "Undicesima settimana di studio", Le Monnier
- CHITTOLINI, G. 1988. La pianura irrigua lombarda fra Quattrocento e Cinquecento, *Annali Cervi*, 10, pp. 207-222
- CIPOLLA, C.M. 1965. Four Centuries of Italian Demographic Development, in D.V. Glass e D.E.C. Eversley (eds.), *Population in History*, London: E. Arnold
- CLARK, P. (Ed.) 1985. *The European crisis of the 1590s : essays in comparative history*, London: Harper Collins
- COLEMAN, D., SCHOFIELD, R.S. (eds.) 1986. *The State of Population Theory: Forward from Malthus*, Oxford: Blackwell
- CROSIA FIOCCHI, R. 1980. Le campagne lombarde tra Cinque e Seicento: il caso della Bassa Pavese., *Annali di Storia pavese*, 2/3, pp. 37-48.
- DEL PANTA, L., LIVI BACCI, M., PINTO, G, SONNINO, E. 1996. *La popolazione italiana dal Medioevo ad oggi*, Bari: Laterza
- DEL PANTA, L. , REGINATO, M., SCALONE, F. 2002. Un tentativo di ricostruzione dell'evoluzione demografica del Piemonte tra XVII e XIX secolo, in *Dinamiche di popolazione, mobilità e territorio in Italia (secoli XVII-XX)*, Udine: Forum
- DE VRIES, J. 1984. *European Urbanization 1500-1800*, Cambridge: Harvard University Press
- DUPAQUIER, J. (ed.) 1988. *Histoire de la Population Française*, vol. 2, Paris: Presses Universitaires de France

-
- FORNASIN, A., ZANNINI, A. (eds.) 2002. *Uomini e comunità delle montagne. Paradigmi e specificità del popolamento dello spazio montano (secoli XVI-XX)*, Udine: Edizioni Forum
- GALLOWAY, P., 1994. A reconstruction of the population of North Italy from 1650 to 1881 using annual inverse projection with comparisons to England, France and Sweden, *European Journal of Population*, n. 10, pp. 223-274
- GLASS, D.V. , EVERSLEY, D.E.C. (eds) 1965. *Population in History*, London
- LEE, R. 1974. Estimating series of vital rates and age structure from baptisms and burials: a new technique, with application to pre-industrial England, *Population Studies*, 28, 3, pp. 495-512
- LEE, R. 1986. Malthus and Boserup: a Dynamic Synthesis, in D. Coleman and R.S. Schofield (eds.), *The State of Population Theory: Forward from Malthus*, Oxford: Blackwell
- LEVI, G. 1991. L'energia disponibile, in *Storia dell'economia italiana*, vol.2, Torino: Einaudi
- LIVI BACCI, M. 1991, *Population and Nutrition: an Essay on European Demographic History*, Cambridge: Cambridge University Press
- LO CASCIO, L., MALANIMA, P. 2005 Cycles and Stability. Italian Population before the Demographic Transition, *Rivista di Storia Economica*, 3, pp. 197-232
- MAGGI, G. 2002. Popolazione e risorse in una valle alpina: la Valsassina dell'età moderna, in A. Fornasin, A. Zannini, (eds), *Uomini e comunità delle montagne. Paradigmi e specificità del popolamento dello spazio montano (secoli XVI-XX)*, Udine: Edizioni Forum
- MALTHUS, T.R. 1798. *An Essay on the Principle of Population, as it affects the Future Improvement of Society*, J. Johnson
- MATHIEU, J. 2000. *Storia delle Alpi 1500-1900*, Bellinzona: Casagrande
- PEREZ MOREDA, V. 1999. La evolución demográfica española en el siglo XVII, *La popolazione italiana nel Seicento*, Bologna: Clueb
- ROMANI, M.A. 1945. *Nella spirale di una crisi*, Milano: Giuffré
- SCALONE, F. 2001, *Tendenze evolutive e fattori del regime demografico in alcune aree dell'Italia Settentrionale (secoli XVII-XIX): un'analisi basata sull'impiego di dati seriali*, PHD Thesis, Università di Bari
- SOUDEN, D. 1985, Demographic Crisis and Europe in the 1590s, in P. Clark (ed.), *The European crisis of the 1590s : essays in comparative history*, London: Harper Collins
- STIGLITZ, J.E. 1989. Sharecropping, in J. Eatwell (ed.), *The Next Palgrave: Economic Development*, London: Macmillan, pp. 308-315
- VIAZZO, P.P. 1990. *Comunità alpine. Ambiente, popolazione, struttura sociale nelle Alpi dal XVI secolo ad oggi*, Bologna: Il Mulino

WRIGLEY, E.A. SCHOFIELD, R.S. 1981. *The population history of England 1541-1871: a reconstruction*, London: Edward Arnold Publishers