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From Gini's Approach to Present-day Demography: "Tempo Effects" on Demographic Insights (?)

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Since the first decade of the twentieth century, Italian demography, in jointly dealing with both quantitative aspects – with the benefit of an excellent training in statistics and mathematics – and the qualitative aspects of demographic development, has sought a synthesis in this mutual tie. Corrado Gini may have been the first to fully understand the need to combine the analysis of demographic phenomena with the study of social, economic and biological factors. This new approach was called "*Demografia Integrale*" (Integral Demography), which much of Gini's own work is an example of, as is that of almost all the demographers of that period, as well as those who were, directly or indirectly, his "pupils". What is left of that approach among the "grandchildren" and "great-grandchildren", those who arrived from the 1960s onwards? Amid all the continuities and discontinuities, has demography in the second half of the twentieth century and after kept alive Gini's teaching, whether in its content or in its approaches? In what follows we shall try to answer the questions raised, following the main lines of the long development of demographic research from Gini to the present. In the first part of this essay we shall try to outline the main points of Gini's demographic work in sequence, considering what is the main object of his enquiry, the research that proved so important both nationally and internationally. In the second part we shall give a broad account of Italian demography in the years following the second world war down to our own day, trying to point out the continuities and discontinuities with the past, both in relation to topics and analytic approaches, and to methodological developments. The last part will deal with a conclusion to commemorate the fiftieth anniversary of Gini's death.

Keywords:

Demography and Demographers: An Introduction

Little more than one and a half billion individuals on the earth in 1900, two and a half billion in 1950, and seven billion in the first decade of this century. Eight hundred million Africans on the eve of the third millennium, and probably three times that in forty years time. Humankind under threat from a Third World population *"explosion"*. Industrial societies enfeebled by *"depopulation"* and the opposing risk of a "*population implosion*". Pension systems hard-pressed by ageing populations. Northern societies living in entrenched fear of invasions from the East or South, be it history's "*yellow peril*" or the more recent "*open floodgates*" from across the Mediterranean or the Rio Grande, turning a convenient blind eye to their own ancestral past as invaders, with their most overwhelming wave (towards North America) being a matter of recent history. For the past fifty years, population issues have dogged our contemporaries and they remain as

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live an issue as ever (Caselli et al., 2006, p. i).

There is nothing new in this. Populations have been counted since the start of recorded time, but in the calendar of the history of sciences, the corpus of methods that makes it possible to do so with precision came much later. The foundations of the scientific edifice of demography were laid in the seventeenth and eighteenth centuries by a series of scientists working along the same lines: England's John Graunt (1662) and Edmond Halley (1693), Germany's Peter Süssmilch (1775), Holland's Willem Kersseboom (1742; INED, 1970), France's Antoine Deparcieux (1746), Sweden's Per Wargentin (1766). This nascent science as yet had no clear name or object. It was often referred to as "*political arithmetic"*. In fact, while its founding fathers came from quite different backgrounds (a cloth merchant, an astronomer, a theologian, an actuary and two mathematicians), they were agreed on one point at least: the need to address their *political* questions (the study of human populations) with *numerical* sciences – mathematics, statistics and probability theory. And that is precisely what Achille Guillard meant by linking his neologism "Eléments de statistique humaine ou démographie comparée" with the expression "*elements of human statistics*" (1855). Demographers, too, must start by reducing reality to calculable and measurable elements in order to describe, analyze and understand the mechanisms which govern the composition and development of a population. This is the foundation on which Alfred Lotka (1934, 1939) developed his general theory of *population dynamics*. This process is central to demography, even if it also seeks to study the dynamic of population from all angles connected with the various qualitative and quantitative aspects of the population at the level of both the individual and society (Caselli et al., 2006).

Demography, or, rather, the demographer, has the task of understanding the population dynamic and its relations (causes and consequences) with its environment – natural, economic, social, political or cultural … In other words, we need to deal not only with the science (*demography*), but also with its object (*the population*); and not only with the knowledge we can obtain of the latter, but also how to use it.

Knowing, understanding, predicting and controlling population development – can all this be done in isolation from other disciplines like history, geography, economics, sociology, psychology, medicine, biology and genetics? Absolutely not. But attempting to rope in every discipline would be as doomed to failure as limiting our study to the techniques of demographic analysis alone: co-opting everything potentially related to demography would lead us off course and risk muddying the paths we are trying to clarify. That is why we need to be clear about the concepts of demography and population we are dealing with here.

Demographic behaviour – or, in other words, the fact of giving birth, dying, or migrating to or from the area in question – is, clearly, a characteristic of the individual, although it is conditioned by contextual factors. The aggregation of these events leads to population movements and structural changes. The search for possible causes of demographic behaviour involves going beyond individual factors and considering human beings as belonging to a family, a social category, or an ethnic group … *The individual and the society* in which he or she lives are the objects of demographic research. Explanations focused just on individual behaviour (micro-demography), like the rational behaviour of economic agents beloved of economists, cannot encompass the broad spectrum of influences and incentives that rule human needs and motives, and the same would apply to a purely macro-demographic explanation (Caselli et al., 2006).

This long preamble might seem, *a priori*, superfluous, but it is justified by the need to define the progress of demographic research, from how Gini and his contemporaries saw it in the early twentieth century, down to its more recent developments, both nationally and internationally.

Since the first decade of the twentieth century, Italian demography, in jointly dealing with both the quantitative aspects – with the benefit of an excellent training in statistics and mathematics – and the qualitative aspects of demographic development, has sought a synthesis in this mutual tie (see Benini, 1901). Corrado Gini may have been one of the first to fully understand the need to combine the analysis of demographic phenomena with the study of social, economic and biological factors. According to Nora Federici (1966), Gini deserves credit for initiating this kind of research (particularly after the establishment in 1928 of the CISP[1] and during his presidency of Istat from 1926 to 1932). This new approach was called "*Demografia Integrale*" (Integral Demography[2]), which much of Gini's own work is an example of, as is that of almost all the demographers of that period, from Livio Livi to Giorgio Mortara, as well as those who were, directly or indirectly, his "pupils" (*in primis* Nora Federici, but also scholars from the Universities of Bologna and Padua, such as Italo Scardovi and Bernardo Colombo). What is left of that approach among the "grandchildren" and "great-grandchildren", those who arrived from the 1960s onwards? Amid all the continuities and discontinuities, has demography in the second half of the twentieth century and after kept alive Gini's teaching, whether in its content or in its approaches? As regards content, there is a general conviction that contemporary demographic, social, economic and political events are, as in the past, essential features in choosing what to study. For example, contemporary demography, like statistics and the other social sciences, is watching closely events in the rest of the world, following the so-called "fashions" in terms of research threads and, above all, methodological applications, while pre-war demography, conditioned by the regime's ideology, often ignored and sometimes impeded the acquisition of new international trends. The same is true for all methodological studies. As Ugo Trivellato (2004, page 86) reminds us, *impeding, rather than encouraging, communications with Anglo-Saxon thinking was a serious obstacle to statistics and demography in our country*.[3] In fact, most of the Italian statisticians in the twenties and thirties preferred "exhaustive" enquiries – whether censuses or the complete gathering of administrative data, and this conditioned their methodological approaches, making them suspicious, for example, if not hostile, to the kind of statistical inference proposed by Ronald Fisher (1932) (see Trivellato, 2014, page 85).

In what follows we shall try to answer the questions raised, following the main lines of the long development of demographic research from Gini to the present. In the first part of this essay we shall try to outline the main points of Gini's demography in sequence, considering what is the main object of his enquiry, the research that proved so important both nationally and internationally. There are, however, three preliminary remarks to be made: first, the quick glance at the content of Gini's work is intended for the younger members of the SIS, as the less young will already be familiar with it; secondly, while agreeing with everything that has been written by numerous scholars on Gini, demography and the regime (Nobile, 1989; Ipsen, 1997, 1998, 2002; Maiocchi, 1999, 2004; Israel and Nastory, 1999; Favero, 2002; Sori, 2002; Treves, 2001; De Sandre and Favero, 2003; Dalla Zuanna, 2004; De Sandre, 2004; Sonnino, 2004; Trivellato, 2004; Cassata, 2006, 2015), it is for historians to take up this topic in the present SIS conference; third and last, it should be made clear that, even when we are praising some aspects of Gini's approach, that does not mean we are justifying its more controversial

[1] CISP- Comitato italiano per lo studio dei problemi della popolazione (Italian committee for the study of population problems).
[2] It has expanded in line with new, broader confines, rather than absorbing the content of demographic dynamic within a more integrated framework.
[3] "… l'aver ostacolato, invece che favorito, le comunicazioni con la cultura anglosassone ha pesato moltissimo sul percorso della statistica e della demografia nel nostro paese."

aspects, and, still less, that we are trying to rehabilitate a scholar who committed to the fascist regime.

In the second part we shall give a broad account of Italian demography in the years following the second world war down to our own day, trying to point out the continuities and discontinuities with the past, both in relation to topics and analytic approaches, and to methodological developments, but referring the reader to the papers given in the specialist sessions of the Conference for more detailed consideration of its present characteristics.

The last part will deal with a conclusion to commemorate the fiftieth anniversary of Gini's death.

Gini's Research Interests are of his time, but Dealt in a Wholly Original Approach

All young demographers know the "Gini index" (1909, 1914b, 1914c, 1921), used all over the world to measure social an economic inequalities; some know the "Gini heterogeneity index", which he proposed as an indicator of variability – statistical mutability due to qualitative variables (1912b, 1939a, 1939b, 1955a); but very few have heard of the index of homophily (1914a,1915b), which is often applied in analyzing endogamic unions.

Even among those less young, knowledge of Gini's demographic work is often limited, and so presenting a complete outline of the research interests of a scholar who spent more than fifty-five years of intensely committed work on demographic problems is objectively a difficult undertaking. It is particularly so for those who only knew him indirectly, through the many anecdotes of Nora Federici, and, above all, for those who have to admit that they have never read some of Gini's research or have forgotten it, whether because they read it so long ago, or because they decided to examine only that part of it which was closest to their own research interests.

It is difficult even to list all the items in Gini's research. Like many scholars of the Italian school of statistics in that period (from Vilfredo Pareto to Rodolfo Benini, from Alfredo Niceforo to Franco Savorgnan, from Giorgio Mortara to Marcello Boldrini, from Felice Vinci to Livio Livi) he was simultaneously a sociologist, a statistician, a demographer and an economist, and so it is *often difficult to distinguish his methodological contributions to statistics from the results of his actual research as a demographer, an economist or a sociologist, without falsifying the essential characteristic of the scientific contribution of a scholar for whom it is almost always the need for a tool to analyze a concrete problem that leads him to perfect and refine a measurement that is already known, or suggests the introduction of a measurement, even when the procedures thus developed prove to have wider application. Similarly, it is even more difficult to establish if a theory of his should be regarded as belonging to Demography and Economics, or whether it should rather be seen as part of Sociology, which it belongs to anyway, given the breadth of the field of vision in which the theory is set* (Federici, 1966, page 8)[4].

For all these reasons, this work will concentrate only on his more specifically demographic contributions, following the suggestions of Nora Federici in her valuable essay *L'opera di Gini nell'ambito della demografia*

[4] "È spesso difficile sceverare i contributi metodologici dello statistico dai risultati delle ricerche concrete condotte dal demografo, dall'economista e dal sociologo, senza falsare il carattere precipuo dell'apporto scientifico di uno studioso per il quale è quasi sempre l'esigenza di uno strumento atto all'analisi di un problema concreto che dà l'avvio al perfezionamento e all'affinamento di una misura già nota o suggerisce l'introduzione di una misura, anche quando i procedimenti così elaborati si riveleranno di più larga applicazione. Ed è altrettanto, e ancor più difficile, stabilire se una sua costruzione teorica debba considerarsi di pertinenza della Demografia e dell'Economia, o debba piuttosto farsi rientrare nell'ambito della Sociologia, nella quale si inquadrerà, comunque, per l'ampiezza della visuale in cui la teoria viene ad essere prospettata".

e delle scienze sociali, which appeared in Volume XXII of *Genus* in 1966, published after the death of her Master, when she was made editor of *Genus* (which Gini had founded in 1934) and president of the CISP (which Gini had founded in 1928).

It may be interesting to begin by looking at a table (Table 1), created along the lines suggested in the two volumes of the "Bibliography of demographic studies in Italian" (Golini in 1966a, and Golini and Caselli in 1973). This Table provides a classification by subject of the 300 contributions on demographic contents[5], selected from the 921 in Gini's bibliography, published by the journal *Metron* (1965) on his death. One is first struck by the sheer number of Gini's works on demography in the three historical periods indicated, which have been defined bearing in mind the title of this essay, aiming to put into evidence the "tempo effects" on both contents and methods of demography.

Table 1

Bibliographic classification of demographic works by Corrado Gini following the schema suggested by Golini(1966a) and Golini and Caselli (1973)

Bibliographical Classification	Number of publications in different periods			
	1908-1924	1925-1940	1941-1945	1946-1965
1- General studies	8	32	12	19
Treatises, University textbooks, Bibliographies, Sources	--	6	3	3
General population studies and History of Demography	2	3	2	4
Population Theories and History of population doctrines	4	12	3	10
Population policy	2	11	4	2
2 - Problems and Methods of demographic analysis and Demographic models	11	10	--	4
3 - Research in Historical demography	--	2	--	1
4 - Regional studies and Spatial distribution of population	--	2	--	3
5 - Studies of particular groups	1	9	1	7
6 - Population trends, Forecasts	--	6	1	5
7 - Population characteristics by age and gender	5	1	--	10
8 - Marriage and family		19		1
9 - Fecundability, Fertility and Reproductivity	1	24	2	4
10 – Mortality	4	16	--	2
11 – Migrations	--	3	1	12
12 - Relations between demographic variables and other variables	7	33	7	14
All headings (*)	37	157	24	82

(*) Overall total 300 works. Source: Our processing of information to be found in Castellano, 1965

There are 37 contributions in the period 1908-1924; 157 in the period 1925-1940; and 106 in the year from 1941 till his death in 1965, but, of these, 24 appeared during the war (1941-45) and 82 afterwards. As we can see, his most fertile period coincided with the years of his "maturity", which was when Gini had taken on important public positions (such as the presidency of Istat), but it is, above all, when demography gradually parted company with statistics (De Sandre and Favero, 2003). After the foundation of the CISP and during his period as president of Istat, Gini did much strictly demographic research, using both macro-data and survey data, which allowed him to describe and often explain population dynamics.

[5] All contributions of "Eugenics" and many methodological contributions that do not concern genuine demographic questions have been excluded. Obviously, each contribution is indicated in the table under one heading only. All the versions of articles published in different languages have been counted.

Following the stages of his work and considering its importance, we shall try to identify the topics characterizing each period and understand from its content the significance of his contribution to the development of demography. From this point of view, let us try and see if Gini's demography responds to the schematic view of it set out in the first part of this introduction and how perfectly it answers to the definition of "*Demografia Integrale*" which he suggested and which was often recalled by Nora Federici (1942, 1968, 1971, 1977, 1987a, 1987b, 2001).

From 1908 to 1924

As is generally known, Gini graduated with a law degree in 1905 at the age of 21, with a thesis on *Il sesso da un punto di vista statistico*, published in 1908 as *Il sesso dal punto di vista Statistico: le leggi della produzione dei sessi*. This subject was also to have a fundamental effect on much of his research after the second world war (1950,1951, 1955b, 1960, 1961a). From the very beginning, studying the causes that determine sex-ratio at birth – a subject with a long tradition of population studies behind it going back to Süssmilch – Gini demonstrates a notable interest in the biological problems connected with demographic phenomena as well as an excellent methodological training for dealing with them. His very first work bears the marks of his statistical approach in examining a phenomenon on the basis of probability and classification. In 1908 he reaches the conclusion that "… *as for every other characteristic, there is also an individual variability in the tendency to reproduce the two sexes*,[6] but, like other authors (Geissler, 1889, in particular), he cannot *refrain from asking whether or not the probability of the birth of one gender is independent of the sex distribution in previous births and from noting the methodological inadequacy of the analyses that have been conducted so far* (Scardovi, 1966, page 63). And in a piece from 1911 *Considerazioni sulla probabilità a posteriori e applicazioni al rapporto dei sessi nelle nascite umane (rpt 1949)* he tackles *ex novo the problem, showing how the question of individual variability in the reproduction of sex composition becomes a problem of "a posterior probability*"[7]. After this work, all the scholars who have dealt with the topic have had to bear in mind Gini's theories and results, as well as his reflections on the fact that different results obtained by other authors are usually due to the use of inadequate data to explain the phenomenon. He demonstrates, for example, that the result can be distorted if we consider families that have not concluded their fertile period (what would later be called the truncation effect), or others that, for example, have practised birth control. To fully appreciate Gini's work on the subject the reader needs to study it; here we wish only to draw attention to the fact – well known in the past – that, from the first, Gini was strongly convinced of the need to conceive statistical methods as functional to what was being investigated and to the cognitive ends, so that: *each investigation has meaning if a critical vision of the formal-methodological tools is accompanied by an awareness of the process of forming the empirical data* (from Scardovi, 1966, page 77)[8].

Despite all the literature on the subject, demographers today regard the sex-ratio at birth as the average for a population and stubbornly insist on its being unchangeable. Indeed, we should recognize that, in general, the number of male births has always been higher than that of females (105-106 males for 100 females), and that

[6] "… esiste anche per la tendenza a produrre i due sessi, come per ogni altro carattere, una variabilità individuale"… egli non può non porsi il quesito se la probabilità di nascita di un sesso sia o no indipendente dalla distribuzione dei sessi nelle nascite precedenti e non avvertire l'inadeguatezza metodologica delle analisi fino a quel momento compiute.

[7] In 1911 Gini " … affronta ex novo il problema, mostrando che la questione della variabilità individuale nella riproduzione dei sessi si traduce in un problema di "probabilità a posteriori".

[8] … ogni investigazione ha un senso se alla visione critica degli strumenti metodologico-formali si accompagnerà la consapevolezza del processo di formazione dei dati empirici.

only the higher mortality of the former helped re-establish the balance towards the end of the female reproductive age. Today, however, in some societies where there is a marked preference for a male child, this fine balance is seriously challenged by the possibility of pre-natal diagnosis of the gender, which opens the gates to selective abortion. Accordingly, in some parts of India or China, the sex ratio at birth reaches values of 120/100 or 150/100, and even higher. Would Gini regard the present-day data as adequate for developing his analyses? A similar question is raised for Western societies where birth control is normal. Perhaps that is why demographers and statisticians deal less and less with the subject and leave the field to biologists and geneticists, who, with rare exceptions (as, James and Rostron, 1985; Zonta et al., 1996; Davis et al., 1998), using clinical data or data from surveys (as Nager et al., 1999), seek only to identify the numerous factors – biological, behavioural, environmental (in the broadest sense of the term) – that may influence the male/female ratio at birth.

Gini's reputation as a statistician, which is still recognized all over the world, is also connected with his methodological studies in demographic domain too. In his early work, his methodological training allowed him to formalize some statistical indicators that could be applied to the study of fecundability (1924a, 1924c, 1925, 1926), a subject he certainly handed down to the School of Padua where he worked for no less than 10 years (from 1913 to 1923) establishing the Institute of Statistic in 1920 and founding the international journal of statistics *Metron* (1921) (see Colombo and Masarotto, 2000; Colombo et al., 2006; Rizzi et al., 2005; and the Bibliography of Bernardo Colombo by De Sandre et al., 2014).

His studies on "Population Theories and History of Population Doctrines" include such important essays and articles as *I fattori demografici dell'evoluzione delle Nazioni* (1912a, 1912b), *Il neo-malthusianesimo* (1922a) and *Leggi di evoluzione delle popolazioni* (1924b). In these works, when the statistician and the economist meet the demographer and sociologist, we can already see the more wide-ranging theories in which, many years later, Gini would combine demographic development with the economic development of human groups in a more ambitious sociological perspective (Federici, 1966). It was in an article on eugenics, dating from 1909, that Gini formulated his *theory of social replacement* (for further details, see Della Vida Levi, 1936) in opposition to Pareto's theory of the *circulation of aristocracies* (Pareto, 1902, 1916). Starting from the thoughts expressed in his article of 1909, in 1912 he formulated his better-known *cyclical theory* of population development, in which he described for the first time the connection between demographic development and biological development (1912c and an English version, 1913)[9]. This theory differs both from the *evolutionary* one of Spencer (1852) and his followers (Galton, 1869; Nitti, 1894; Pearl, 1923; Wolfe, 1926-27) and from the *periodic* one of Brownlee (1908) – which would later give rise to the mathematical models of Pearl and Reed (1920), Lotka (1922) and Volterra (Lotka and Volterra, 1927; Volterra, 1931) – in that it considered birth control as a decisive cause of the reduction in fertility and because it explained its diffusion in biological terms (prevalence of reason over the reproductive instinct when the latter is attenuated as an effect of biological decadence). The phenomenon of reproduction differences in social classes is the fundamental element behind Ginis' *cyclical theory (*1930a, 1945).

In the endless number of studies of the demographic effects, direct and indirect, of the first world war we can include those on the increase of total and infant mortality (Gini and Livi, 1924), and those – no less

[9] We can find the first formulation in Contributi statistici ai problemi dell'Eugènica (1912c); an English version: The Contribution of demography to Eugenics, 1913.

important, though more sociological – supporting demographic theories on the causes of the wars (1918, 1921), collected in a volume entitled *Problemi sociologici della guerra* (1922b). In the immediate aftermath of war in the 1920s he saw many demographers turning to data collection and the analysis of mortality due to the war, as well as to the effects of the war itself. There was the excellent work of Livio Livi (1920, 1926; Gini and Livi, 1924) and Giogio Mortara (1925), for example, the latter of whom wrote the fine work analyzing the war dead and the number of soldiers who returned wounded or diseased.

The studies of "mortality" are certainly those that best explain the influence of "tempo effects" on demographic insights, but they are not the only ones. "population theories", which had already been widely studied in the nineteenth century and the early twentieth century, in Italy and abroad, became an essential part of the knowledge of scholars from various disciplines (see Livi, 1941 rpt 1974).

These theories, along with population policies, have a very important role in Gini's studies during the fascist period.

From 1925 to 1940

Population theories and, still more, population policies were very much part of the cultural and political context of the period, and between 1925 and 1940 Gini produced no less than 23 studies on the subject. In his work, *Nascita evoluzione e morte delle nazioni: teoria ciclica della popolazione e i vari sistemi di politica demografica*, his *cyclical theory* was described in detail, supported by empirical evidences (1929a).

In Gini's view, the biological-demographic cycle of population development is accompanied not only by a cycle of differentiation of social classes determined by the varying intensity of social replacement, but is also connected to a demographic-economic cycle which also corresponds to a political cycle of the forms of government (see Federici, 1987a). Gini not only assimilates the demographic development of groups to individual organic development, but also conceives the life of the economic-social community as governed by laws similar to those governing the life of the individual. In his vision there is an organicist conception of society. Livio Livi recalls that Gini, like the most extreme, old-style organicists, does not say: societies are *assimilated* or comparable to living organisms; but, rather, that societies are living organisms (1941). On this view, peoples (the inhabitants of a country) follow the same life cycle as an individual – youth, maturity and old age, with death as the inevitable end (Gini, 1924b, 1927b, 1929a, 1930a).

The reader must see the works cited for further information, here we simply wish to recall that Gini's theories were generally accepted by Italian scholars of that period. Different approaches came from Rodolfo Benini with his more strictly sociological theory of social cohesion, and Livio Livi, who linked the interpretation of demographic phenomena with the organization of natural life, on which associative life is based. In his Trattato di Demografia Livi writes: *we wish to point out that, though Gini's renewed organicism tends to extend the individual's life cycle to society and not that of the historical-biological development of the species, the latter conception is visible as a hypothesis implicitly accepted* (Livi, 1974 rpt, page 21)[10]. In this period there was a lively discussion of the theoretical premises of population theories in international contexts. The positions of Italian demographers on Gini's *cyclical theory* and the positive assessment of *optimum density* (1927b, 1929b, 1929c) and Livi's *structural optimum* (1936) was met with the *economic-demographic optimum*

[10] "… desideriamo far presente che, pur tendendo il rinnovato organicismo del Gini ad estendere alle società il ciclo vitale dell'individuo e non quello dell'evoluzione storico-biologica delle specie, quest'ultima concezione traspare come ipotesi implicitamente accettata".

(see Teitelbaum and Winter, 1987) of the Anglo-Saxon school, well represented by the logistic 'law' of Raymond Pearl and Lowell Reed (1920). As regards the Italian theories, note that demographers of the period were, to a greater or lesser extent, all agreed on the need to halt the declining trend of the population, encouraging an increase in fertility in Italy, while the Anglo-Saxon theories, which had a following from demographers in many countries, considered the essential aim as being to achieve stationary population in the long term, and, hence, contain demographic growth through a self-regulation of fertility.

The natural connections with the population theories are scientific and political in nature. The development of demographic forecasts is a scientific continuation of the theories themselves (De Sandre and Favero, 2003). Gini entered the international scholarly debate on population forecasting showing he knew how to combine theoretical innovation with the most practical methodological suggestions (1930b, 1931a, 1931b; Gini and De Finetti, 1931). This took shape in the years when an international debate was developing[11] on the rejection of Malthus' natural law (1798) of exponential population in favour of Pearl and Reed's logistic growth (1920) and Alfred Lotka's mathematically formulated theory of a stable population (1922), as we have mentioned. It was also the period of new empirical proposals based on forecasts by "demographic components", using the greater knowledge about fertility and survival and the new methodological proposals based on the relations between population dynamics and structure (forecasts of Bowley, 1924 and models of Lotka, 1922). Perfectly in line with the international literature, in 1931 Gini and De Finetti developed forecasts of the Italian population, following three different types of analysis: extrapolation of the total population by logistic law; extrapolation – linear and logistic – of the number of births and deaths; and the estimation of the population age distribution on the basis of hypothetic future trends of mortality, fertility and migrations. An *a posteriori* evaluation of the results obtained by the two authors shows (1931, page 5) that, starting from the population in the censuses of 1881, 1901, and 1921 and extrapolating future trends by logistic curve, the Italian population of 2001 would be 2.2% lower than the actual data that emerged from the census eighty years later (population estimated equal to 58,145 million and population census equal to 59.434 million). Was this due to the application of a logistics model? Some might object that the population in question was that registered in the census considered, referring to different territorial boundaries from those of the present day. It is easy to show that this is quite irrelevant, as the population registered in 1921 was 38,449 million, while that revised by Istat to the present boundaries is of 37,856: a difference of less than 600 thousand. Equally interesting is the result for the forecasts of the population by age and components. In this case, however, the last forecast year is 1961. Assuming the hypothesis of decreasing fertility and mortality, one of the four hypotheses adopted by the authors, their values underestimate by 1.8% the total population registered thirty years later. If the two genders are considered separately, the men are overestimated by 0.7%, while the women are underestimated by 4.4%. This differential accuracy is to be expected if we bear in mind that, at the time of Gini and De Finetti, it was practically impossible to conjecture that there would be a greater decline in female mortality, that would lead to a life expectancy gender gap of 5.3 years in 1961, against the 2.1 years of 1931. But what is most extraordinary is the surprising similarity of the structure by age of the populations estimated in 1951 and 1961 with that of the populations registered in the same years (Table 2). The authors' estimates predicted perfectly the gradual ageing of the population: the proportion of those over sixty-five for Gini and De Finetti moves from 7.9% in

[11] World Population Congress of Geneva in 1927; Congress of ISI in Tokyo, 1930, Population Congress of Rome in 1931 organized by the CISP, and London Congress of the IUSSP-International union for the scientific study of population in 1931 (IUSIPP-**International union for the scientific investigation of population problems,** until 1947).

1951 to 9.1% in 1961 (forecast with emigrations), while the actual data vary from 8.1% to 9.5% in the same period. That their estimates were so accurate is perhaps not just chance, but due to the fact that, for at least one of their forecast hypotheses, the authors' knowledge and scholarly curiosity had the better of political interference. Indeed, in their forecasts Gini and De Finetti used not only surprisingly adequate and modern methods, but, in formulating hypotheses for the development of fertility, they bear in mind that between 1921 and 1928 there was a reduction in the birth rate (1931, page 26). The total population forecast for 1961, conjecturing decreasing fertility, is thus little more than 50 million, well below the 60 million indicated by Mussolini as the goal to be reached in 1960.

Table 2

Structure by age of the Italian population in 1951 and 1961, estimated by Gini and De Finetti in their forecasts in 1931 and as registered in the data of the two censuses.

Age groups	Census	Gini-De Finetti estimate with emigration	Gini-De Finetti estimate without emigration
	1951		
0-14	26.2	26.6	25.0
15-64	65.7	65.5	67.3
65+	8.1	7.9	7.7
Tutte le età	100.0	100.0	100.0
	1961		
0-14	24.6	24.7	24.4
15-64	65.9	66.1	67.5
65+	9.5	9.1	8.1
Tutte le età	100.0	100.0	100.0

Source: Our elaboration on data in Gini and De Finetti, 1931.

It is an exception that does not prove the rule. Gini used empirical studies to draw normative theories and also policy implications (De Sandre and Favero, 2003). Between 1930 and 1940 science and politics became indistinguishable in his research work, and he actually theorized in an article of 1940 (1940b), the authoritarian implementation of the scientific basis of a pro-natalist demographic policy: it was the policy of the fascist government – a policy that needed to develop and claim its validity on an empirical basis. Istat therefore became the reference point for demography in that period, as the Institute was responsible for establishing the data sources needed to support its policies. In that period Gini realized how important it was to be able to count on a serious number of demographers and statisticians, on new research centres, and, primarily, on places for discussing and spreading scientific activity. Gini became the real protagonist of the new trend, promoting the creation of Schools of Statistics (1927) at the Universities of Padua and Rome, and, later, the Faculty of Statistic, Demographic and Actuarial Sciences in Rome (1936). He gave new vigour to demographic studies by founding CISP (1928) and *Genus* (1934). In 1939 the Italian Society of Statistics (SIS) was founded in Padua as a result of lobbying from Gini, Pietra, Boldrini, Fortunati and others (see Leti, 1993), in opposition to the Italian Society of Demography and Statistics (current SIEDS), which was founded in Florence with the support of Livi, Vinci and Savorgnan. On the eve of the second world war, there were also schools of statistics in Bologna, Florence, Milan and Palermo, while complementary courses in demography were set up in many faculties of economics and political science, with no fewer than 23 courses in demography in Italy during the academic year 1934-1935 (see Maffioli, 1994).

In the years when Gini was president of Istat, there was an enormous deployment of forces and financing: as we said, population studies could count on excellent statisticians and demographers; on more and better information, both from censuses and administrative sources (one of the richest sources is that on births and large families), and on the data surveys (there was an important retrospective survey on births from women registered in 1931 census) (see De Vergottini, 1936, 1937). To complete the gathering of information and developing demographic studies, there was the CISP, whose investigations made it possible to move from mere description to identifying factors (biological and otherwise) influencing demographic behaviours. Actually, looking at the researches carried out in that period, CISP seems to have had specific goals: the first was to verify Gini's population theories, and the second to study current problems that the government regarded as particularly important (including population studies in the colonies). Both goals, however, concerned questions that interested Gini. For example, to complete his analyses of the fertility of numerous families, he asked the CISP to collect data on the anthropometric information on the somatic make-up of the parents of these families.

To grasp how much work was done, both theoretical and empirical by the CISP, we can refer to the many papers presented to the International Population Congress in 1931 (organized in Rome on the 7-10 September, almost at the same time as that of the IUSSP **in London)**, the proceedings of which were published in 10 volumes along with Gini's own inaugural speech (1934f and 1935c).

This flourishing activity in Italy went hand in hand with the development of much research on the family and the fertility of marriages and on reproductive behaviour, whose results, as we have noted, were a reference point for the regime's birth policies. In Table 1, we can count no fewer than 43 contributions from Gini on these topics. Many scholars have used these studies as giving an exhaustive account of his work as a demographer, relegating it to his total involvement with the regime's policies (see the bibliographical references in this text). Anyone who wants to examine these aspects only needs to read the extensive literature on the subject. We do not wish to add any more to the question, just to underline that studies on the fertility and the family, as the approach followed in their analyses, are evidently the result of a "tempo effects". On the contrary, one cannot say that the methodological developments in many of these contributions – for example, those on marital fertility by age and birth order – are conditioned by studies of the most famous international scholars of the time, from Kuczynski, to Dublin and Lotcka. In fact, Gini's proposals are wholly original. Using the data on legitimate births collected in 1927 (1927a, 1927c) and classified by order of birth and year of marriage, for example, he proposed a very ingenious and innovative method of analysis, close to the sum of the "reduced events", presented only many years later by Roland Pressat in his work *L'analyse démographique* (1961). Other interesting methodological developments in the demographic field are those he used to measure the average number of legitimate children per marriage (1932a, 1932b, 1932c, 1933a, 1934b) and marital fertility and reproductive behaviour (1927a, 1927c, 1933a, 1934b, 1934c, 1935a). On the eve of the second world war, many demographers of the generation of Gini, as well as his pupils, were studying reproductive behaviours (Fortunati, 1937, 1942; Federici, 1939; Del Chiaro,1940), producing innovative research, both theoretically and, above all, methodologically (Parenti, 1938).

Obviously, Gini's interest in the determinants of demographic behaviours also increased the number of his contributions aimed at explaining demographic processes: in Table 1 there are no fewer than 33 works on the "relationships between demographic variables and other variables". In particular, after the CISP was founded, there were many research projects to study the demographic, anthropological and medical-biological characteristics of particular population groups. Istat, too, conducted a survey in 1938 on persons of mixed race

in Italian East Africa in relation to the measures in defence of the race (Savorgnan, 1939). On these questions, which were suggested or encouraged by the regime's colonial policies, Gini involved many young scholars – demographers and otherwise as Nora Federici, Franco Rodolfo Savorgnan, Mario De Vergottini and Vittorio Castellano (Federici and Gini, 1943, Castellano, 1948) – and in this period alone published six important contributions, some of them through the *CISP's Bulletin*, *Geographical review* (1933b, 1935, 1936a, 1938) and through *Genus* (1934a), and presenting his work at various international congresses (1935-37, 1936b). Once again, Gini's scientific curiosity, seizing the favourable conditions of the period, added new topics to demography that were to be abandoned by contemporary demographers.

The years from 1926 to 1940 were an extremely good period also for studies on mortality. From the point of view of information-gathering, there was important work in reconstructing mortality tables for the Italian population for the years 1891-1892, 1899-1902, 1910-1912, 1921-1922, 1930-1931, which were almost always carried out in collaboration with Luigi Galvani (1931a, 1931b, 1933c). Since then, scholars both from Italy and abroad, including some contemporaries, have been able to rely on a most valuable data base, as well as interesting and innovative methodological proposals. As regards this last aspect, we would mention Gini's contribution on *Su la determinazione dei quozienti di eliminazione ed in particolare sui metodi delle durate esatte e delle durate medie nell'ipotesi di saggi istantanei di eliminazione costanti* (1935b), presenting an innovative method for making actuarial life tables.

As early as the 1930s, using the new series of mortality tables, Gini and other demographers could study mortality profiles by age and gender and, above all, begin fresh research on infant mortality (Gini, 1934d; Del Chiaro, 1937; Federici, 1938) and youth mortality (Gini, 1932d; Livi, 1937; Federici, 1940). Once again, these studies contain new and interesting methodological proposals, both regarding the study of infant mortality (1934d), and mortality for some specific causes of death (1933c, 1934e, 1935c). As regards the content, Gini's characteristics as a bio-demographer clearly emerge if we read two of his works on mortality: *Sul rialzo della mortalità maschile dai 20 ai 25 anni e sulla minore resistenza vitale dei nati da padri di tale età* (1932d) and *Sulla selettività delle cause di morte durante l'infanzia* (Gini 1935c; Gini, De Bernadis and Galvani, 1933).

From 1941 to 1965

During the second world war, while involving himself mainly in economic questions, Gini did not lose his interest in demographic theories (1943a, 1943b, 1945) as well as in population policies, with special attention to questions most closely connected with the conflict (1941a, 1941b). And so, again, the demographic content of his studies reflects the influence of the political and economic questions of the period (1942). As we have said, he continued to contribute to the debate on demographic policies, taking part in the Congress of Bucharest in 1941 with a paper on *Le rôle du facteur démographique dans la politique internationale* and writing an article on the importance of the demographic factor in colonial policies (1941a). In 1940 he published an interesting work on statistical surveys among "primitive population", which had great international success (1940a). It was later published in various languages both during and after the war (1942, 1948-49). In the war years he published, in various languages, an article on the demographic aspects of wars (1942). A glance at his bibliography also reveals that there were no publications in 1944, when he was suspended from all academic duties.

He resumed his research work in 1946, and he remained prolific until his death. However, he dealt less and less with demographic questions directly or indirectly linked to population policies, while he returned to his

early "loves", resuming his studies on the sex ratio at birth (1949, 1950, 1951, 1955b, 1960, 1961a, 1963a, 1963b) and guiding the work of young scholars on this topic (Boldrini, 1955; Scardovi, 1962, 1964, 1966; Colombo, 1955, 1957).

Table 1 reveals an equally prolific interest in "relationships between demographic variables and other variables", "population theories and history of population doctrines" and "migrations". In both of the first two categories, his work mainly focused on the study of migratory questions. In his post-war work, the determinants of demographic behaviour became exclusively economic and social, and, in line with the demographic problems of the period, his attention turned to migratory movements. Migratory movement attracts the interest of the "*demografo integrale*" because, as Nora Federici recalls (1966), ... *while it* [migratory movement] *contributes to determining variations in the size and composition of the population and, by doing so, it alters the characteristics and tendencies of the rate of marriage, birth and death, and while it has particularly marked economic effects, it is in turn profoundly influenced by the intrinsic dynamics of demographic groups and their economic and social conditions*[12]. In fact, the greater or lesser intensity of migratory movement traditionally derives from the more or less accentuated imbalance between population increase, and increase and distribution of income (imbalance later indicated as differential demographic pressure: Tapinos, 1974; Federici, 1968a, 1979; Golini and Bonifazi, 1987).

After the second world war, demographic studies of migrations had a dual purpose: defining their causes and investigating their effects. This second aspect is certainly the one that most interested Gini: taking up the thread of studies by Beneduce, Pareto and Colletti, he considered, for example, the wealth brought to America from European immigration (1948). Thus, evaluating the effects of population movements, Gini countered the "American" theory of international migrations with a "European" one, while, linking causes and effects of migration, he established the limits of the validity of the two, only apparently antithetical, interpretations (1946b, 1955c, 1961)[13]. Actually, Gini's neo-organicist conception allowed him to interpret migration as beneficent, bringing advantages both to the place of origin and the place of destination, thus reconciling the two antithetical theories on international migrations (D'Agata, 1948-49; Federici, 1966). Gini later showed that the same was true for internal migrations as well, a topic to which he gave much attention in his later years (1955d). He also returned to the discussion of the selective aspects of population movements, taking up again his theory of adaptive migrations (1927). Following this theory, individuals who move are those most dissimilar from the "typical" individual of the place of origin, and similar to the "typical" individual of the place of destination (1954, 1955e, 1956, 1959). The concept was indirectly taken up in the 1960s by Francesco Alberoni and Guido Baglioni with their theory of *anticipatory socialization*, which they proposed as a model of immigrant integration in industrialized societies, an integration favoured by the similarity between the social system of origin and of arrival (1965).

In the 1950s and 1960s Gini turned once again to the study of particular population groups – this time, not those of colonized Africa, but those living, for more or less time, in some parts of Northern European regions (1957).

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[12] "… mentre questo concorre a determinare variazioni nell'ammontare e nella composizione della popolazione e, per tale via, altera le caratteristiche e le tendenze della nuzialità, della natalità e della mortalità e mentre provoca effetti economici di particolare rilievo, è, a sua volta profondamente influenzato dall'intrinseca dinamica dei gruppi demografici e dalle condizioni economico-sociali di questi".

[13] Linking economic and demographic aspects, Gini documents how American prosperity should be regarded as largely determined by the free contribution of wealth that Europe supplied with the huge mass of its emigrants (1948).

A sharp observer of the events of his day, towards the end of his life he began to trace, without having time to fully outline it, a theory of *decolonization*, which indicated the demographic, economic and cultural aspects of the new ongoing process (1959, 1961d).

Gini also displayed particular interest in topical questions seemingly unconnected with demography, in an article entitled *Cause e carattere adattivo dell'evoluzione delle forme viventi* (1961d), in which he re-examines current theories of the evolution of living forms, particularly in their mechanisms of adaptation, in the light of the influence of the external environment, considering that the characteristics of an individual depend on the combined action of heredity and environment. This article is still surprisingly relevant, particularly if read in the light of the recent literature on longevity, with special reference to studies on Danish twins. It is a shame that it is written in Italian and unknown by the group of scholars dealing with the subject, as its suggestions could have contributed much to the hypotheses and contents of their research (Christensen et al., 1999).

In the same article there is a phrase of Gini's that deserves quotation to bring to a close this brief and incomplete summary of his demographic research, as it clarifies, if there were need, how little he had accepted some of the criticisms directed at him: *When, in 1940, I published this theory of "adaptive mutations" some biologists objected that it was a theoretical speculation unsupported by factual data. That was true. And, specializing as I do in statistics and sociology, I had neither time nor means, in dealing with biological problems, to become an experimenter. I was waiting therefore for experiments by biologists to supply the elements to prove or reject my theory*. It sounds like the acceptance of the criticisms, and at the same time a justification. But the following sentence shows this was not the case: ... *Unless I am mistaken, there is now no shortage of elements to prove it* (his theory) (1961d, page 16)[14]. And, obviously, he lists a large number of experimental works supporting it.

Italian Post-war Demography: The Master's Influence and the Shadow of the "Original Sin"

The Difficult path of Italian Demography after the Second world War

With the end of the second world war, then, Gini's research interests changed, and also those of demographers who had been working during the fascist period, as demography was associated with the disgraceful policies of the regime. In 1974 Massimo Livi Bacci, in his fine preface to the Treatise on Demography by his father, Livio Livi, wrote: *it was as if, with the fall of a demographic policy, the problems linked to population and demographic phenomena no longer existed; this had serious consequences, which partly remain, on research, teaching and basic information*[15]. Effectively, Gini's demographic research slowed down too: after 1946 only 82 of his 455 contributions dealt with demographic questions.

Demographers of the same generation as Gini, from Franco Rodolfo Savorgnan to Marcello Boldrini, Livio Livi and Paolo Fortunati, occupied important positions in Italian universities, but almost all changed their research interests and, often, like Livi, even the topic of their university courses. Obviously, while steering

[14] Quando nel 1940, io ho emesso questa teoria delle "mutazioni adattive" fu obiettato da qualche biologo che si trattava di una speculazione teorica, non confortata da dati di fatto. Ed era vero. Né d'altra parte, dedito essenzialmente alla statistica e alla sociologia, io non ho il tempo e i mezzi, quando mi occupo di problemi biologici, di diventare uno sperimentatore. Attendevo, perciò che gli esperimenti eseguiti di biologi sperimentatori mi fornissero gli elementi per ammettere o respingere la mia teoria". … Se non erro, elementi per ammetterla (la sua teoria) ormai non fanno difetto.

[15] … fu come se, caduta una politica demografica, fossero venuti meno i problemi legati alla popolazione ed ai fenomeni demografici; ciò ebbe pesanti conseguenze, che in parte perdurano, sulla ricerca, la didattica e l'informazione di base.

clear of some compromising subjects, their "multidisciplinary" approach in studying population questions remained unchanged and of the highest quality, but their contributions to demography, particularly in the cases of Gini and Livi, decreased numerically in favour of statistics and economics. As we have said, the flight from demography involved Savorgnan and Boldrini too, while only Giorgio Mortara, who had certainly not committed himself to the regime and was far from his country, continued to study the same research questions which always interested him. These are the relations between demographic and socio-economic factors (1912a, 1920, 1930, 1960), to which is added the interesting studies on the demography of Brazil (see Dipartimento di Scienze Demografiche, 1985). On his return to Italy, his volume *Economia della popolazione* was one of the most important contributions in that period to demography, and to other disciplines too. In 1954 Mortara received an important international recognition with his nomination as President of the IUSSP.

The old Italian school formed new demographers. The generations of the second quarter of the twentieth century, who had grown up mainly in the universities of Padua, Bologna, Florence and Rome (but also of Palermo and Bari), and had already been influenced by their Masters and published before the war, continued their work in demography, despite being penalized by their so-called "original sin" in the topics they had dealt with. Demographers in that period did not dare tackle burning questions and, when they did, almost always stopped at a description of the phenomena. We need only read the Bibliography on demographic studies in Italian, edited by Antonio Golini, to realize that, down to 1965, for example, while there are many university texts and manuals of demography (Boldrini, 1956; Mortara, 1960; Federici, 1955; to name but a few), or works on the structural characteristics of populations. There were also 78 contributions on the birth rate and fertility in the twenty-year period 1945-1965, against the 139 for the fifteen years of 1930-1945. And yet, in that period there were extremely productive scholars of national and international fame who had been trained in the school of Gini, such as Nora Federici and the new pupils acquired in the 1950s, such as Bernardo Colombo and Italo Scardovi. The "first grandchildren", who had arrived in the late 1950s and early 1960s were also printing their first interesting articles. Some of these were later to become famous, such as Massimo Livi Bacci and Antonio Golini.

Our own personal opinion is that, with few exceptions, the most interesting works on demography, at least until 1965, are those of Gini and his contemporaries. The exceptions concern, on the one hand, those who remained on the sidelines of demography, tackling subjects or methodological questions that were sometimes only indirectly connected with population dynamics, as for example (see Scardovi, 1962, 1964 e Castellano, 1951, to name but a few), and, on the other, the group of scholars interested in historical demography (for example, Bellettini, 1961). These exceptions certainly include Nora Federici, too, whose research was largely carried out in close contact with her Master – partly in the CISP –, and Bernardo Colombo, who, in the 1950s, was already tackling the study of marital fertility with great seriousness (1953).

In the twenty years following the second world war, while demographic studies temporarily slowed down in Italy and Germany, they made rapid progress in the rest of the world. In Europe the "French school" supplied some of the most distinguished names in the field in this period, as Alfred Sauvy, Adolph Landry, Paul Vincent, Sully Ledermann, Jean Sutter, Louis Chevalier, Jean Bourgeois Pichat, Luis Henry. The new course of French demography began to speak of "demographic analysis" (Henry, 1960; Pressat, 1961). French and English-American demography suggested some interesting new methodological developments, starting from Lotka's theory of the stable population (1939), from which derived the "mathematical demography" able to produce important contributions to the knowledge of the relations between the structure and dynamics of a

population and also to reconstruct the history of populations where data were missing (see: Leslie, 1945; Lotka, 1956; Sauvy, 1956; Coale 1957; Bourgeois-Pichat, 1958, 1966; Keyfitz, 1964; but also Natale, 1967). Almost everywhere in the world, university chairs were set up and specialization courses, research units and Departments of Demography created (at Berkeley, for example). Moreover, demographic journals were founded[16], scientific societies formed or reorganized (Societé de Démographie Historique in France, for example) and international population meetings and conferences organized (IUSSP, United Nations and Council of Europe).

Italy was slow to adapt, despite the efforts of Nora Federici and Giorgio Mortara, who together founded the first Institute of Demography in Rome (1957). The first Italian chair of demography was given to Nora Federici (1962), while some scholars of other universities who were already active in the field were still assigned to the teaching of statistics. In the academic year 1934-35 there had been, as we said, 23 courses of demography, while in 1955-56 there were just 14. The grandchildren, for whom the school of Gini was a distant memory, had to wait until the 1970s to receive national recognition, and, of them, only a few went abroad to find a position.

The Long years of Reconstruction

By the 1970s the history had almost been forgotten, including even those things in the past that should have been preserved as unique, both from a theoretical and conceptual point of view, and for its important methodological developments. Italian demography in the 1970s did not enter the field of studies that was developing around new theories and interpretative paradigms that produced new ideas and much particularly interesting research, such as the paradigm of demographic transition in the study of fertility (Notestein, 1945; Coale 1973) or that of epidemiological transition in studies of mortality (Omran, 1971), or, again, in the field of interpretative models of the relations between population and economy suggested by some American scholars (Kuznets, 1973). Only the Italian school of historical demography, rather late in the day, took to heart the interpretative models of mortality crises proposed by the Anglo-Saxon school (Mackewn, 1976; Livi Bacci, 1984).

It seems incredible, but in that period Italian demographers were not absolutely clear as to whether demographic studies should be limited to a descriptive analysis of phenomena, and their interpretation left to other disciplines or, whether the causes should be examined, investigating the determinants of demographic processes (Golini, 1966b, page 93; Federici, 1970). In the late 1970s, and even in the 1980s, demography had to be given denominations, such as economic demography or social demography, giving it an interdisciplinary character.

Nora Federici and Massimo Livi Bacci (1969; 1994) clearly understood that the crisis of demography was becoming serious. Federici tackled the problem in many of her writings, seeking solutions and proposing an interesting scheme illustrating the relations between demography and other human sciences (1968b, 1970, 1971, 1973, 1977, 1987a, 1987b, 2001). The deductions she draws from her interesting analysis of the crisis of statistics and its impact in determining the crisis of demography is extremely convincing. In this analysis she specifies that, because demography is both a human science and a discipline in which the application of statistical methods and techniques is more extensive, it is even more affected by the ongoing crisis than

[16] Some of the most famous were Population in France (1946); Population Studies in the UK (1947) and Demography in the USA (1964)

statistics itself. Federici's argument, quite rightly, does not apply just to Italian demography only. Antonio Golini (1984) brings this out clearly in his analysis of extracts from the *Population Index*. He shows that the most prestigious English and American demographic journals contained only articles whose main contribution was methodological. In Italy too, following in the wake of what was happening abroad, methodological studies were increasing (Chiassino, 1971; Lombardo, 1968; 1971; Maisano, 1969; Petrioli, 1971; Vitali, 1967). These contributions, however, while interesting, with rare exceptions (Keyfitz and Golini, 1975) have not had proper international recognition, often because they were written in Italian and published in Italian journals or proceedings of Italian conferences.

It is certain that demography is a science whose content is influenced by the demographic behaviour of the populations it studies and, as indicated in the title of this essay, the role of the "tempo" factors in which demographic phenomena unfold has an effect on the themes and approaches of the research itself. Nevertheless, Italian demography did not seem to recognize the ongoing demographic changes and that is why its prestige suffered and it was slow to follow the new trends. For years it was trying to cancel its past, and for years it tried to start again with a clean slate, steering clear of any topic or approach that might suggest the present-day demographer had not freed himself from his conservative roots (see on this topic the volume edited by Dalla Zuanna, 2004). And so, looking at the Bibliography of demographic studies in Italian for the period 1966-1972 (Golini and Caselli, 1973), there are just 114 out of around 3000 contributions dealing exclusively with analyzing the birth rate, fertility and fertile behaviours in general. The situation did not change when, in the mid 1970s, fertility began to diminish, nor later when the number of births in Italy became lower than that of deaths, and the levels of fertility became the lowest in Italy and, indeed, the world. As late as 1992[17] fertility studies come last in the list of subjects covered by demographers (3% of the total of subjects dealt with) and in 1993 they were equal to those on mortality (5.1 e 5.3 respectively) (see the Report of the *Gruppo di Coordinamento per la Demografia,* 1993, and Caselli, 1997, 2000, 2002). If we bear in mind the significant changes that had taken place in Italy, with the introduction of abortion and divorce, the scarce interest in fertility, and in nuptiality and family is very surprising. If we consider how much the reduction in the number of births abets the ageing of the Italian population, it is remarkable that Italian researchers in the 1980s and 1990s were taking less and less interest in the relationships between decreasing fertility and ageing. And yet, in that period Italy was the first country in the world where the population over the age of 65 surpassed that of those under the age of 15 (15% and 16% of the total population, respectively). Steering clear of these dangerous subjects, the 1990s revealed even lower interest in population policies. The lack of interest in these themes among demographers seems to reflect that of the country's political class for many years, even though the *Council for Population Problems*[18], set up in the Prime Minister's Office, has been operating in Italy since 1976.

As we have mentioned, the crisis of Italian demography was also discussed by Massimo Livi Bacci as early as 1969: in an article he tried to identify its causes, advancing concrete suggestions for reviving it. Only a few years later (1971), Livi Bacci rightly spoke of historical demography as a rapidly developing discipline. The studies of historical demography are a field in which Italian demography has always kept in touch with the rest of the world, later occupying a prestigious position on the international scene. Apart from the individual merits of its scholars, it has been able to count on a wealth of material and sources that is unique in the world,

[17] Although Anna Treves regards demographers in the 1980s as too involved in analyzing fertility; see Sonnino's criticism in Dalla Zuanna, 2004.
[18] Comitato per i problemi della popolazione.

and on long, well-tried experience in multi-disciplinary research. The studies of historical demography, recalls Massimo Livi Bacci (1994), produced extremely interesting global interpretations of the relations between society and demography (see Schiaffino, in Corsini and Del Panta, 1993). The reconstruction of families for demographic purposes, "reinvented" by Henry in the 1950s, made possible the detailed reconstruction of how traditional demographic systems functioned – at least for the "stable", non-"submerged" part of the population (Corsini et al., 1969; Livi Bacci, 1990). No less interesting, though partial, are the studies that related the crises of mortality with the factors that determine them (Livi Bacci, 1984). Again, in historical studies, both past and present, the themes of the relation between production, farming system, consumption, nutrition, family models and demographic growth have proved to be full of possibilities, following the example of the "Demografia Integrale" of Gini's time, without drawing on the Master's studies. They did, however, refer to Gini's work, making use sometimes of the valuable material in Istat's 6 volumes on the archive sources, material which Gini has made to collect and catalogue in the 1930s – through a Commission for Historical Demography – to have available sources for the study of problems concerning the Italian population down to 1848.

In 1987 a conference was organized in Rome in homage to Nora Federici, with the title *Demografia: scienza insegnamento professione* (Sonnino et al., 1987). The many Italian and foreign scholars who attended used the occasion to take stock of the situation, recognizing that the number of Italian demographers had increased notably: there were more publications, and of higher quality, from the so-called "grandchildren", and the "great-grandchildren" had now arrived. As is generally known, in the 1980s some important Italian universities opened new faculties of Statistical Sciences and degree courses in Demographic Sciences were set up. Because of the subjects it dealt with and the methodological developments, demography enjoyed a fairly extensive disciplinary space in these faculties. In many other universities demography was included in the courses of the faculties of Economics, Political Sciences, Sociology, and even in those of Law, Italian Literature and History. In the early 1990s demography was taught in more than 80 university courses, 50 of which were at institutional level, while the rest examined particular methodological and thematic aspects (Maffioli, 1994). In the early 1980s, the IRP-CNR (the Institute for Research in Population-National Research Council) had begun working, Antonio Golini director. The first Italian research doctorate in Demography was set up in 1983-84 as a collaboration between the universities of Florence, Padua and Rome "La Sapienza": it lasted three years, and there were a limited number of posts, usually four or five each academic year. Apart from this, there were two other doctorates at Bari University, which, however, were thematic in content: one in Demography and Economics of Population, and the other in Historical Demography, entitled "Population, Family and Territory", with three posts a year for each.

The Doctorate in Demography aims to train the new researchers in the discipline. The underlying idea of the teachers of this doctorate is well expressed in the definition by Livi Bacci (who was one of the promoters and teachers of the doctorate). The intention is to provide the broadest training possible, with solid statistical-mathematical bases and a multi-disciplinary vision of the problems, along the lines of the old school. The training work may also include study periods at universities and institutes abroad.

Towards the end of the 1980s demographers the world over found themselves faced with extremely important choices for the future of the discipline, whose development was set in the more general context of a strong impulse of all the sciences "of man", which the political, economic, social and demographic development at the end of the century imposed as an essential need, both cognitive and practical. The disappearance of the two blocks, marked by the end of socialism in Europe, faced societies with new political

and social problems. The extreme drive towards a market economy, benefiting more than ever those who already held most of the wealth and further penalizing the poorest, increased the distances between the population groups and the geographical areas of the same country. The sharp increase in the population of developing countries and the imbalances between North and South engaged more and more the attention of politicians to the great questions of population, while the political-economic union of the European countries and the population flow from third-world countries encouraged new contacts between different cultural contexts. Scientific development and the great technological devolution opened new fields of enquiry. In short, one can see in all the social disciplines the need to give a new dimension to research that would allow a more comprehensive vision of reality. For demography, this need was reflected in the period of specialization giving way to a period of more integrated projects. Indeed, the field of enquiry that had seemed over the last few decades to have gradually become restricted to some traditional questions and to the development of methodologies, is broadening notably and new experiences of multi-disciplinary research are being tried (Federici, 1987a, 1987b; Sonnino et al., 1987). In Italy this new direction was slow in taking off, with its lines still not wholly clear, apart from some experiences limited to very specific issues almost on the confines of demography, such as the studies on the family or those on labour forces or on migration. The awakening, anyway, was already in course in the second part of 1980s and in the early 1990s, when some interesting studies on mortality were published in international journals.

The Years of the Awakening

For Italian demography the 1990s were full of activity: a "Coordinating Group for Demography" was set up[19], whose priorities were promoting opportunities for meetings between population scholars – not just demographers – and encouraging the circulation of information useful to researchers. As part of the Group's activities, an archive was created of studies published or circulated in provisional form in 1992 and 1993, and a bibliographical survey was then published (GCD, 1993). Combining this survey with an analysis of the research projects of the period, we can comment on the new trends regarding the questions tackled and the approaches followed.

Details of the work produced in demographic studies in Italy in 1993 and 1994 can be found in an earlier work (Caselli, 1997). The overall number of works documented remains fairly stable in the two years considered: more than 600 a year from around 140 members of the Group. However, very few pieces of Italian research appearing either in international journals (only 3% of the 648 contributions) or in Italian ones (around 17%, and only 0.7% in: Caselli, 1997 page 303). This is not a minor matter as it indicates a limited exchange of information and ideas and could also mean that the work itself is not excellent, given that all journals have the articles read by reviewers before publishing them.

The most interesting aspect of this survey is certainly the range of subjects tackled. When Italy began to receive a large number of immigrants, Italian researchers began studying more closely migratory questions (from 20.7% in 1992 to 24.5% in 1993), particularly international ones. As we have mentioned, the number of studies on fertility, nuptiality and ageing is very disappointing and, apart from migratory studies, the subjects dealt with in that period certainly do not follow the suggestions of the temporal characteristics of the dynamics of demographic phenomena.

[19] GCD (Gruppo di coordinamento per la demografia) was transformed into AISP (Associazione italiana per gli studi di popolazione - **Italian association for population studies**) in 2008.

On the other hand, a more positive account can be given of the interest in studies that integrate demographic with social, economic and health variables (more than 15% of the total), though they are often works on the fringes of demography, carried out by scholars from other disciplines who were part of the Group of Demographers, or works of historical content. Historical demography is in line with the past, continuing to play a very important role both quantitatively and qualitatively in Italian demographic studies.

It is worth making a few remarks, too, on the importance of more general studies, indicated in the first item in the table 1 of Caselli's article (1997): fourth for importance in 1993 (making up more than 14% of the total), most of them are works of research carried out in territorial areas – regions, cities, special areas – which often denote the limits of analyses that are too circumscribed, deficient in content, and methodological and explanatory approach.

A glance at the research projects in that period gives a first impression of what is in progress for demography in the second part of 1990 an in 2000. The classifications have changed from those noted earlier (see Caselli, 1997, Table 2). There is greater attention to Italian demographic problems: questions of fertility, indeed, occupy the first places, along with those of migrations, while research exploring the inter-relation with economic and social aspects is actually in first place (around 22% of the subjects dealt with), further consolidating their position if we also consider the bio-sanitary characteristics of the population (equal to 3%).

Research projects aiming to verify interpretative hypotheses (Caselli 1997, Table 2. third-to-last column, p. 305) dominate the overall picture, even in those areas where descriptive topics long prevailed, such as mortality and health, migrations and ageing. In the field of mortality we can distinguish the differential analyses that start from individual data, while for the theme of health the most interesting developments concern the aspects of the quality of survival of old people. Some of the most interesting proposals concentrate on ageing, particularly those on the characteristics of old people (not just health, but also work, social security, poverty and family networks) and their implications at macro level (economic, social and for the health service).

Unlike previous years, projects involving migrations are wholly innovative in their approach and also in the use of sources and the methods of estimating flows (Blangiardo, 1996). These studies tend to concentrate on pressure factors and migratory disposition, the profile of immigrant groups, and the repercussions of immigration on the jobs market, while there are also studies of opinions and cultural behaviours relevant to individual rights and policies (De Sandre and Santini, 1993).

On fertility, there were many projects aimed at cohort and period reconstructions of data concerning particular regions and areas of the countries, all based on current data, in which a descriptive, rather than an explanatory, approach is preferred. If we exclude some original indications in the research plans relating to the new survey of fertility, analyses of the transition and estimates of the cost of children, the other projects on fertility still seem too anchored in traditional models that had long been left behind in international research. There is greater innovation, however, in research on the nuptiality and the family, particularly when these topics are tackled to analyze new reproductive behaviours and the behaviours of the young generations as regards leaving the family (De Rose and Rufo, 1994).

As we have underlined, an overall judgement of demographic research at the turn of the century clearly brings out the ample space Italian demographers now give to explanatory analyses, so much so that they are becoming clearly prevalent (Billari et al., 1999; De Sandre and Ongaro, 2000). Equally clear, in Italy, like the rest of the world, is the limited interest in a project that aims to construct a global system based on the theoretical elaboration of a valid interpretative schema. To be clear, *what is frequently missing is the approach*

of Gini and his contemporaries. There are still no answers to all the unsolved questions, because we are not going in the right direction to bring the partial "explanations" of individual phenomena inside a general model, paradigm, or interpretative theory (Livi Bacci, 1994). To do this, the demographer obviously needs to leave his limited discipline and work with scholars in neighbouring sciences, primarily those whose research involves population data (Gesano, 2011).

It is worth emphasizing the importance of the data, as, until the 1990s, the process of integrating demography with other disciplines had successful moments in those sectors where demographers found themselves working on data that were objects of shared analysis with other disciplines (historical demography is a case in point), or when the collection of the information began from a project of multi-disciplinary study, and so the information collected had to satisfy many different kinds of interest (as in studies on the family and reproductive behaviours, or those on the integration of immigrants). Research on international migrations and the immigrant/foreigner presence, for example, involves scholars from a wide range of different disciplines who often draw attention to distinct categories and specific phenomena or features, drawing on methodologies of data gathering and analysis typical of different areas of study. The most interesting proposal to emerge in the Italian literature was the samples for centres and areas of aggregation (Blangiardo, 1996; 2004; Baio et al., 2011), known internationally as "*centre sampling technique*".

In Italy, as elsewhere, the growing production of data has notably increased the capacity to describe the demographic system, multiplying the growth of studies and articles published, but it was necessary to think of integrating very different data systems (macro and micro) so as to move on from a phase in which descriptive studies dominated, to that in which explicatory analyses were most common. Unfortunately, as we have noted several times, Italian demography in this period forgot its prestigious tradition and was late in following this trajectory. In the meantime, it lost the necessary contacts with the most interesting developments in international demography, with consequences for theoretical and methodological elaboration and, hence, for content.

By the end of the last century there was an inversion in the trend regarding the delicate problem of data collection. A new culture of research was also making itself felt, expressing the need to insert all the variables in a complex system that can grasp the various facets of reality. This requires a profound revision of the world of information, both in the field of traditional data gathering and in that of sample surveys. This operation is taking place amid many difficulties, as, to obtain results adequate to the resources deployed, it needs to be conducted in close collaboration with scholars in the various disciplines and experts in the national statistical system.

The most important successes of this collaboration, partly for its impact on changes in research, have been obtained with the data of the "Multipurpose survey on families", which the National Institute of Statistics began in 1987. The possibility of utilizing together demographic and non-demographic individual data (such as the use of time, the structure of family networks, the condition of infancy, the state of health, the quality of life, and so on) has meant that we have been able to open new horizons of work, and radically change the traditional set of questions examined by a demographic enquiry, encouraging the researcher to go beyond the confines of his individual disciplinary expertise (see Sgritta, 1994).

This message had already been the hope of Gini's "grandchildren" and "great-grandchildren", and has been seized by demographers in the new century who have been trained in the Italian doctoral schools of demographics and statistics.

Some of Gini's "grandchildren" and many was self-enclosed in studying traditional subjects, and beginning to turn towards projects that involved a theoretical vision of the hypotheses that would connect all the features of demographic factors with the surrounding world in a more complete vision, following the way the Master suggested (Federici, 2001).

Demography for the Generations of the new Century

Italian demography was slow, then, to regain a prestigious position on the international scene. Nora Federici led the way, being for years, with Bernardo Colombo, a reference point of the Italian school. In the late 1970s they were followed by Massimo Livi Bacci and Antonio Golini, who became members of the Study Commissions and Advisory Councils of the IUSSP, and by some others (not many, really!) who were invited onto the councils of international scientific associations in 1980s (Graziella Caselli, Antonella Pinnelli) and international bodies (Raimondo Cagiano de Azevedo, Antonio Golini, Viviana Egidi). Livi Bacci became President of the IUSSP in 1985 and Nora Federici was the second IUSSP laureate (1992) in this Association's history. It was not until 2000 that Graziella Caselli, one of the "great-grandchildren" was nominated President of the EAPS[20] for the period 2000-2003. Since then progress has been more and more rapid. Many Italian demographers enjoy high international prestige and occupy important positions in world demography, gaining after 20 years a second IUSSP laureate in 2012 (Graziella Caselli), a second President of the EAPS (the present one), and front-ranking international research awards (Francesco Billari). Italian demographers have also found once again a political position in Italy (in the Senate) and abroad (in the UN), where they can present the problems of population and intervene on any demographic policies that need be activated. The "original sin" has now been wholly atoned for! Today, "causes and consequences of the decline in fertility" and "family studies" are central among the most interesting research questions in Italian demography.

Most articles by Italian demographers are now written in English, which means, obviously, that more and more of them are published in international journals. Graduate students have been enrolled with excellent results in the European doctoral school of demography (EDSD, which, for the period 2015-2017 will be located in Rome in the Economics Faculty of La Sapienza). Many of them later found positions in universities and international research centres. In short, the position looks good for Italian demography. The young certainly receive excellent methodological training, follow the course of world demography, which is frequently that of the American school, have data of all kinds available, use English freely, and know how to present the results of their work: what could go wrong?

The problem of the present-day demographer and his relation with the outside world may be that of having such a quantity of various, sophisticated individual data and analytical tools that he risks being isolated in a plethora of techniques, forgetting even what he is supposed to be studying - population (Caselli, 2002). Too many articles and doctoral courses offer a cold, bloodless vision of demography, and, after examining the thousand aspects of a statistical or mathematical model and after discussing the umpteenth *parameter* of a descriptive or explicative *model* of fertility or mortality (or a detail of one or other of the demographic processes), stop just when things start to get interesting from a demographic point of view: the explanation of the phenomena that have been measured like this and the evaluation of their consequences on population dynamics and other aspects of economic and social life.

[20] EAPS: European association for population studies.

Quite apart from the population studied, the demographer's centre of interest is its dynamics, and, in seeking its factors and bringing out its economic, social, cultural and political consequences, they are not *a priori* the centre of analysis, but just a useful tool for explaining the dynamics of populations and informing the state authorities and the social bodies of the impact they will have on the future of society. Despite this, with his sophisticated tools of analysis, the demographer has, *a posteriori*, acquired experience and expertise in fields in which the study can be equally useful outside the specifics of demography, but also in sectors that have no direct relation with population dynamics. Mortality, for example, a key variable in population dynamics, is clearly related to health, which was one of the great research topics dealt with by demographers even before the word "demography" existed. Demographic health studies are of interest to the highest social sphere and those with decision-making power, whether politicians or doctors, insurance organizations or charities. This leads the demographer to invest in studies or projects on topics quite apart from the interest he may have in the explanation of population dynamics or the consequences of its development. For example, when he has acquired expertise in measuring morbidity, whose incidence on mortality (and therefore on its dynamics) is the pathway for diseases like tuberculosis, cancer, or heart attacks, the demographer may (either because asked to, or because it is part of his research interests) study diseases or handicaps, such as the common cold, short-sightedness, or mental illnesses, which have a significant relation with mortality but are not his main interest of study.

Similarly, marriage, which enters *a priori* the field of demography, as it was, and still is in many societies, an important factor in the expression of fertility, remains *a posteriori* a subject of research for demographers even when the nuptiality and fertility are less and less linked to the increase in fertility outside marriage or contraception within marriage. Or rather, more and more often the demographers finds himself studying, with sociologists, psychologists, politicians or lawyers, different types of union, including ones, like homosexual unions, that, objectively, no longer have any link with fertility.The fact is that anything connected with fertility or mortality or migration, however remotely, can have a more or less direct bearing on population dynamics, and it is only well upstream (factors) or downstream (consequences) that it can be considered completely outside the specific field of demographic research.

Studies on mortality and longevity of populations are flourishing in the most developed countries, obviously, as people are surviving longer and longer, and when, as in Italy, according to the last table of mortality, 7.5 children out of 10 reach the age of 80. Today it is easier than ever to reach old age and, when it is reached, the age of death is being constantly postponed.

For fertility and the family, the characteristics were already changing in ways unthinkable immediately after the period when Gini died. Regarding migrations, for decades Italy has been no longer a country of prevalent emigration, but of significant immigration. As regards population questions, demographers are certainly faced with epoch-making changes, which require the imagination to tackle more and more varied and complex questions, without their work being subject now to any political or ideological pressure. As we have mentioned, they have access to enormous quantities of data, although much of it, unfortunately, is gathered with completely different aims. Sophisticated technologies and methods allow it to be processed in all sorts of ways, giving acceptable results that, if well presented, are, as we have said, easily publishable in international journals. After following in the wake of world demography for many years, Italians in the field have at last reached the head of the convoy. In a world classification, many are no longer second or last, but among the first. Fashions, however, particularly those concerning approaches to different themes and methods used, affect

Italian demographers along with those from other countries. Why? What do present-day demographers lack? With a few exceptions, the younger generation, who might fondly be called the "Shakers" (because they put the data in a computer and…shake them around using more or less sophisticated statistical models) often lack the will to think out a theoretical model before seeking the data or identifying the model suitable for verifying a hypothesis. Sometimes the intentions are good, but the young researchers, who normally cite only works published since the 1990s, do not realize that their studies recall those of other scholars still working in world demography. In this way they risk looking for explanations for their results (Salinari and De Santis, 2015) in previous works that were also published in international journals – several decades earlier!

Obviously, as I have just said, there are still exceptions, and, to find some, we need only read some proposals in the field of historical demography (see the Journal "Popolazione e storia; Livi Bacci, 2005) or migration studies (i.e. Bonifazi and Gesano, 2002; Bonifazi et al., 2012), or, to give a specific example, read the interesting article by Billari and Dalla Zuanna in Population and Development Review in 2013, and browse carefully the recent volume of *Population Studies* (2015) whose title is also a valuable suggestion for demography in the next decade: *New perspectives on major population trends and ways of analysing them.* Unfortunately, these exceptional Italian demographers are not really of the most recent generation (Livi Bacci, 2015). And, it should also be added that Philip Kreage has a contribution on *Population theory – A long view* in this volume, in which he does not once cite Corrado Gini.

If we want to be objective, we should acknowledge that the "tempo effects" or "fashion effects" also involves the most prestigious journals of demography, just as the world centres of demographic research and the content of the most important international conferences (see the programmes of the last few years of: PAA[21], IUSSP, EAPS).

A Conclusion to Commemorate the Fiftieth Anniversary of Gini's Death

In keeping with the title of this essay, and wanting to commemorate Gini on the fiftieth anniversary of his death, it seems important to remind young demographers of their history and some aspects of it that are often forgotten.

Until the second half of the nineteenth century fertility and mortality were natural phenomena about which man could do little or nothing. And so, for a long time, population studies tended to concentrate mainly on bringing out the biological matrices of the two phenomena. This approach changed only at the end of the century, when some important scientific discoveries and the social, cultural and health revolutions drew researchers' attention to new facts in demographic dynamics. The intervention of science and improved conditions of life eliminated some diseases and limited the lethal effect of others, allowing a significant reduction in mortality; at the same time, particularly in the cities, a culture of "rationalizing" births arose that determined the first significant decline in the birth rate. Consequently, many researchers began to study the social phenomenology of demographic processes, to the point that, after a few decades, the "social" approach prevailed over the "biological" one, and sometimes its supporters even denied that there were both biological and social elements behind these phenomena.

The new approach was initially controversial, meeting much opposition from scholars of various orientations. Extremely harsh criticism was directed at those who supported the biological approach, and they

[21] PAA-Population association of America.

were accused of scientific conservatism and, even, of championing reactionary ideologies. This position, which was in vogue till very recently, estranged demography from biology and all its neighbouring disciplines. As Nora Federici claimed (1971), an excessive "biologization" of the social sciences had given way to a "socialization" of the human sciences, and even the natural sciences. Thanks to its eminent scholars, Italian demography managed to resist, and for a long time maintained its connection with all the main human sciences – whether natural or social – but, in the end, underwent the influence of the profound scientific and cultural changes.

Today, while the ideological prejudices are falling away that for too long set up cultural barriers to explaining population dynamics, demography has, slowly but determinedly, been trying to win back its special status as a "bridging discipline" between the natural and social sciences (Federici, 1971). There was a sharp change of position and some sectors of demographic studies took a fresh interest in human biology and population genetics (see IUSSP Conference, 1984 or Max Planck Institute research topics). It was, in any case, a necessary rethinking, as many of the links tying the natural world (and, with it, the biological characteristics of man and the environment) to the social world are connected with demographic phenomenology, which has become particularly decisive in an age when the long-term evolutionary transformation of the natural environment (see a most interesting article by Rebecca Sear in *Evolutionary contributions to the study of human fertility*, 2015) has been notably accelerated by the influence on it of human social and technological development, which has altered equilibriums that have lasted centuries and, sometimes, millennia.

Recent population dynamics have created many lacunae to be filled, and has raised many questions needing a reply. For example, little or nothing is known of the long-term effects of a sharp reduction in births on the bio-genetic make-up of populations. Little or nothing is known of the effects of malnutrition or urban pollution on the bio-demographic aspects, and still less on the effects of improved nutritional conditions on longer survival. In addition, what consequences on individual longevity will follow from the recent discoveries of the presence of genetic components in many chronic degenerative diseases? Or what are we to think of the possibilities of defining the developmental prospects of different ethnic or social groups, and defining the outlines of future scenarios and the possible biological consequences? And the possibility of forecasting mortality, bearing in mind the biological factors of ageing? And the possibility of evaluating the bio-demographic effects of controlling and choosing a child's sex, following the increase of in vitro fertilization and pregnancy scans?

The list, obviously, can be extended to every component of the structure and dynamics of population. This opens wide spaces of research for the demographer who is able to dialogue with other disciplines, and, above all, return to questions of human biology and population genetics. There are, then, the conditions for a scientific reconciliation between the different schools of thought, which will allow us to benefit from a return to some traditional viewpoints of Italian demography and retrieve and reinsert the biological components in the underlying theoretical framework for an explicatory analysis of the changes in the social and natural environment (Lutz and Striessnig, 2015).

In addition, to understand the ongoing and future changes, no analysis, when possible, should refrain from referring to the historical dimension of the various processes. Long-term experience testifies to the profound changes in demographic phenomena in relation to economic and social changes, bringing out, particularly in comparisons between countries, a certain historical repetitiveness in the evolutionary processes. For example, the present dependence of developing countries on the influence of the economic power of the stronger

countries, even in relation to demographic problems, is nothing new in the history of the world. We might recall how much Italy's economic and demographic crisis in the seventeenth century depended on the emergence of other major players (England and Holland) on the scene of world trade and markets.

But whatever the demographic problems being studied, the developments in the discipline cannot ignore the attitude of the demographer towards his role. There is a lot of confusion here, particularly when demographic problems involve the intervention of population policies to find new equilibriums. Without wanting to start a debate on this point, we can say without fear of denial that one of the demographer's most important tasks is certainly that of carefully following ongoing processes, observing all their aspects and analyzing their characteristics and trends, but also that of creating sources of data that are adequate for understanding them and preparing analytical methodologies that allow us to describe and explain the different processes in their totality.

Recalling the commitment of the young, I think I should end this introduction with a concept dear to the Italian school of the Master and his pupils that has already been referred to: *each investigation has meaning if the critical vision of the formal-methodological tools is accompanied by an awareness of the process of forming the empirical data* and – let it be added – if each analysis is preceded by a theoretical model that leads to formalizing correctly hypotheses and applications, without ever losing sight of the fact that, to find its place in a demographic study, every aspect needs to be useful for understanding population dynamics. Some colleagues (as Livi Bacci, 1990; Santini, 1994; Billari, 2006, 2015; Caselli and Egidi, 2007) would say, we need to move from the macro to the micro to understand, and then return to the macro to do demography.

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