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EVOLUTION OF POPULATION
AND DEMOGRAPHIC PROSPECTS
IN EUROPE

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ABSTRACT

“Evolution of population and demographic prospects in Europe” presenta l’andamento del sensiero della popolazione Europea fino ai giorni nostri, evidenziano i principali fattori che ne hanno determinato un preciso percorso. Vuole inoltre mettere in luce tutte le problematiche connesse agli andamenti demografici presenti e le prospettive future, focalizzandosi principalmente sui paesi dell’Unione Europea e sulle conseguenze che i comportamenti delle popolazioni di queste nazioni avranno sulla dimensione e struttura delle popolazioni stesse e sulla competitività economica dell’Unione, se protrate nel tempo. Discute inoltre le possibili soluzioni alle questioni sopra citate.

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INTRODUCTION

Nowadays while the population of the world continues to increase, the European population is undergoing a decline, in fact the growth is largely due to developing countries, especially the poorest countries. In fact, between developing and developed countries, we find enormous differences both in the size and on the demographic structure of population.

For many thousands of years, the world population has been a thousand times below the current level. After the Second World War, around 2,5 billion people lived in the world, in less than thirty years (around the 1980s) the population has almost doubled, in 2006 it exceeds 6.5 billion and United Nations World Prospect of 2019, estimates that then inhabitants of the Earth were 7.7 billion that year and will be from 9 to 10 billion in 2050. Looking at these data, the question that arises is, why has demographic growth, from past eras to the present day, followed such a path?

We will start by trying to understand what has determined the demographic dynamics in the various times and how several factors like climate change, natural disasters, epidemics and wars, migration, economic development, technology, and culture affect it. Thus, we will talk about the population development, highlighting the change in the demographic regime that has occurred through the Demographic transition, then we will analyze the process of convergence and

divergence, describing the “contrast” between regions in demographic growth and regions in demographic stagnation.

While there is a steady decrease in growth in developed countries, in developing countries there has been an inversion of the growth rate, which after a surge in 1950s-1960s has then seen a reduction. After an overview of the consequences of the demographic transition, we will first focus on the European population in general, showing its east-west dualism and then, because of its political and economic importance, to the European Union and its trends on the behaviors related to the formation the family.

The European Union has the particularity of having a significantly low average number of children, far from about 2.1 children per woman which would be the replacement level. The persisting of this reality in the long term threatens the size of EU population, in particular the size of workforce and consequently, the European Union competitiveness with respect to the demographic giants could be compromised.

The prospects for the future highlight the main problems of EU demography.

To some solutions will try to give an answer.

CHAPTER I

-CONSTRAINT AND CHOICE-

1.1 INTRODUCTION

In the very long period (in the millennia), the numerical growth of humanity has occurred in balance with the growth of resources, but this balance has not always been maintained due to catastrophes that have altered the population-resource equation. Moreover, population changes slowly and does not easily adapt to rapidly changing environmental conditions, so much so that some entire populations disappeared. Therefore, the self-regulation mechanisms which the human species should be provided with and which should allow the rapid search for the balance between number and resources are actually imperfect. In the short and medium term, the population must adapt and adjust the growth and number to live with the constraining factors. These adaptations occur, in part automatically, in part by social choices.

As for automatic adaptation, an example is the fact that in the face of prolonged famines, body growth slows down, producing adults with lower nutritional needs; then there are the social choices such as the age at marriage which, also corresponded to the age of reproduction in the ancient demographic regime and was used as the main means for controlling growth. Therefore, the rebalancing

mechanisms are partly automatic but mainly connected to actions of choice such as nuptiality, fertility and migrations. In essence, conceptually speaking, the population demographic development moves compressed between these two great systems of forces that are constraints, and variables of choice.

Among the forces of constraint, we find all those factors connected with environment and resources, such as space, alimentation, climate, pathologies, land and so on; while, as regards the choices, we find marriage, fertility, and migration. In this chapter we will see how these forces acted and interacted in the ancient demographic regime.

But first we have to clarify what is a demographic regime; the particular combination of interrelated demographic characteristics that pertains in a given population is named demographic regime and it is not just a list of parameters, but a dynamic system of control. It refers to interrelated demographic characteristics, and a system of relationships with their socio-economic and cultural determinants. There exists a system of relationships between the fertility, mortality and nuptiality characteristics of a community and its socio-economic circumstances so that any movement away from an initial position of equilibrium tends to provoke changes elsewhere in the system which restore the original state.

1.2 CONSTRAINT FACTORS

1.2.1 Space

In ancient demographic regimes, the population depended almost totally on the land, from which food, raw materials and energy were obtained. Until the 13th century, traditional techniques with crop rotation and long rest of the Earth did not allow high yields, most of the population was forced to self-sufficiency in food.

Precisely for this reason it is essential to understand in what ways the conquest of open spaces took place.

Geographically speaking, Europe has two favorable characteristics for population: the extensive coastal and fluvial development in relation to the surface of the territory, which has made the continent's degree of accessibility high for people and things; and the Atlantic influence, which favors a temperate climate throughout the western part.

Between the beginning of the first millennium and the 18th century, the population tripled. As there is no reason to believe that the food level had improved, it is thought that the tripling of the population is due to greater availability of arable land.

The extension of the cultivations was divided into three directions, which move towards the east: the southern one, along the natural path of the Danube, towards

the plains of Hungary; the intermediate one, which developed in the territories to western Russia in the Netherlands, and finally the northernmost one, which avoided the swampy territories and forests of Germany which made migrations and settlements difficult and ran along the Baltic coast.

The process of gradual reconquest by the Germans of the territories occupied by the Slavic ethnic groups, and of the Spanish Reconquista, takes place around 1300. This is the culmination of the process that led to the foundation of a large number of urban settlements in Central Europe; suffice it to say that in the last decade of the 1300s, more than 250 new cities were created. Internal migratory movements cease. At the end of the Middle Ages end the human geography of the continent was stabilized.

With the end of the 18th century, the conquest of the continent space was definitively concluded. There are no longer any open and depopulated spaces except in the far North; The human geography of Europe is stabilized, and only violent military upheavals can change it. In the absence of large empty spaces, it was necessary to act within an already organized space to recover land, therefore it was necessary an intensification of the settlement¹.

¹ By intensification of the settlement, we mean the deforestation, the recovery of uncultivated areas and the reclamation. The territorial configuration has sometimes made these artificial works indispensables to allow agriculture

To summarize, the increase in land to be cultivated could essentially take place in three ways: first, through the expansion of existing crops on an individual initiative, at the expense of the woods or uncultivated areas near the settlements; secondly, through the foundation of villages or castles by lords, monastic and knightly orders, municipalities; in third place with the reclamation of marshy lands and, in any case, unsuitable for cultivation.

1.2.2 Alimentation

We know that in the old regime almost all the income of most of the population went to food. Thomas Malthus² said, that food is necessary for the survival of man, but the capacity that the population has to grow is greater than the capacity of the earth to produce means of subsistence for man, whose lack or scarcity cause misery.

The multiplicative capacity to increase of the population causes the relationship between resources and inhabitants to deteriorate to that dangerous limit which, once exceeded, triggers repressive checks such as hunger, epidemics and wars that reduce the population size and restore a more adequate relationship with

² Thomas Malthus is an English economist and demographer. Known for the law of the population that takes his name (illustrated in *An essay on the principle of population as it affects the future improvement of society*, 1798)

resources. The only way to avoid repressive checks would be to use preventive checks that aim at delaying or avoiding marriage and therefore slowing down the multiplicative capacity of the population (we specify that at the time, birth control was not yet a popular practice)

The abundance or scarcity of food was therefore the main conditioning factor of the cycles of growth and contraction of a population. It affects the factors of choice, because the lack of food can push people to migrate to new territories or change jobs, as well as being the main cause of disease and consequently high mortality. As regards mortality, To sum it all up in a logical chain we can say that: Food availability is related to nutrition levels, nutrition levels determine the trend of mortality not only in the short term, but also in the long term, since malnutrition creates the conditions for the onset of diseases that increase the risk of death, and the alternating vicissitudes of mortality are the basis of the fluctuations and cycles of population growth rate.

There is a close relationship between levels of nutrition, infectious diseases and their severity; in essence, the high mortality of the past was linked above all to the incidence of these diseases which became higher in subjects with low immune defenses, therefore a malnourished population is a population more subject to infectious diseases and with less ability to counteract its spread.

In the same way, a transition from a situation of malnutrition to one of sufficient nutrition due, for example, to changes in agricultural productivity could lead to similar changes in the level of mortality³.

In ancient regimes, people almost always lived in food shortages, famine was well known in Europe and hit several times over the course of a generation.

The pre-industrial populations were mostly large consumers of cereals which in the form of bread, loaves, buns and whatever else represented the main food of the great mass of the population. But the social inequalities were very marked, in fact some exponents of the privileged classes ate up to 7000 calories per day, mostly consisting of meat, a food which the less well-off classes could not enjoy. When a year was unfavorable, prices rose sharply, and consequently so did mortality. But the famine also had other demographic effects: the fall of marriages and conception and, almost always, an increased mobility of the hungry, poor and beggars. To sum up, we can say that nutrition was a main component of the well-being of the populations of the ancient regime.

Sufficient nutrition led not only to lower mortality by relaxation of preventive checks but also the possibility of expansion through the removal of the Malthusian preventive checks that acted on marriages and reproduction (let us remember that

³ However, it should be noted that in the incidence and spread of the plague, smallpox and malaria, food insufficiency did not bear much responsibility; this was great in the case of intestinal and respiratory diseases.

a society constrained by severe limits in the production of resources grew less not only due to high mortality but also to the obstacles created to marriage and the formation of new families).

The introduction of new crops in the 18th century, such as potatoes and corn, made the difference; not only it improved the diet, it also increased resources and therefore, the capacity for population to grow.

1.2.3 Microbes

The mortality of the ancient regime is caused between two thirds and three quarters by transmissible diseases from person to person, therefore by the action of microbes (bacteria, viruses, etc.). The latter are therefore the greatest element of constraint of the demography of the ancient regime.

To get an idea of how powerful can be the microbes constraint factor, we will report the case of the Native Americans of America which will simultaneously highlight what has been said previously on the inefficiency of the population self-regulation mechanisms.

The tragic effects of contact between white Europeans and indigenous peoples of the New World were well known from the earliest explorations. Columbus landed in Santo Domingo in 1492 and to the first visitors the island appeared densely populated. According to a hypothetical count made by Columbus the population

must have been about one million⁴. What is certain is that in 1514 the "Repartimiento" (distribution of the indigenous to the conquerors as servants, labor in the fields and so on) counted only 26.000 Indians and that after the smallpox epidemic of 1518-19 only remained a few thousand on the way to extinction.

What brought about the rapid decline of the indigenous population in the 30 years following the Conquest and their extinction a few decades later? One of the main causes of the decline of indigenous populations of the New World was determined by not being immune to a number of diseases that were unknown in America but common in Eurasia and for which the European conquerors had developed a good adaption. Diseases that were relatively harmless in Europe such as measles, influenza and, for the immunized, smallpox) became fatal to the natives: this phenomenon is called the "virgin soil" effect. The 'virgin land' paradigm of the population and its consequent vulnerability to new pathologies provides an efficient and convincing explanation for the decline of the indigenous in the two centuries following the Conquest, but actually, we also have to notice that the 'virgin soil' paradigm tends to hide the other causes of demographic decline such as, for example, the obstacles to reproduction imposed by the profound social dislocation produced by the Conquest.

⁴ But there are several hypotheses about numbers

With the beginning of the second decade of the 16th century, the decline of the indigenous population became evident. In the debate on the causes of the ongoing demographic catastrophe, the search for gold at all costs and the system of *encomienda* (the practice of attributing indigenous to the Spanish in a state of servitude) were held by all to be the main causes of the catastrophe.

Too many Indians in the mines for too long periods, excessive work, food shortages, adverse climate and environmental conditions in mines, mistreatment, separation from families and the community resulted in high mortality among the Indians and low fertility of their women. The Spanish Conquest brought about a profound economic and social eradication and created the conditions for high mortality and reduced fertility.

Moreover, although not responsible for epidemic outbreaks, the diseases before smallpox further increased mortality, together with the economic and social system also the indigenous demography suffered the collapse. The first serious epidemic was that of smallpox which, having arrived in the Caribbean in 1518, had already exterminated what was left of the population of Hispaniola, Cuba, Puerto Rico, and Jamaica before moving on to Mexico. The second serious epidemic was of measles and between 1529 and 1535 it passed from the Caribbean to Mexico and Central America. So, the virgin soil effect is confirmed and was the is explanation of the indigenous demographic collapse, although violence, forced labor, social uprooting had as much weight.

1.3 CHOICE FACTORS

1.3.1 Nuptiality

Marriage is at the heart of the demographic systems of the old regime. In almost all of Europe, marriage establishes a sort of ownership of reproduction. A considerable part of marriages took place due to already full-blown pregnancies. However, the state of celibacy was, for almost everyone, an insurmountable barrier to reproduction. Hence the relevance of marriage as the main regulator of the flow of births in societies that had not yet discovered or adopted voluntary birth control. Malthus saw and defined the role of marriage as a prudential and preventive checks on growth because a considerable number of people who never married or married relatively late, and their late marriages are consequently less prolific than they would have been if they had married earlier. In fact, the nuptiality of a population can be broken down into two main factors: the speed with which a generation, exceeding the minimum age required by biology, by conventions, by law or by religion, and the proportion of those who do not marry during the reproductive life.

The first component can be summarized with the average age, at the first marriage, the second the proportion of those who did not marry before the age of 50 (in essence, bachelorette or celibacy).

Normal variations in nuptiality could have a noticeable effect on both fertility and growth rate. Two years more or less in the average age at first marriage could mean, in fact, one less or more birth, in the size of the offspring, a slower or faster succession of generations, and significant consequences on the natural growth rate of the population.

Thus, a proportion of unmarried women at age 50 that varied by 10 percentage points more or less, would have involved a similar variation in the flow of births. Nuptiality is strongly connected with family systems, with the land tenure regime, with the rules for the transmission of ownership, with economic and professional activities. Naturally, the social and well-being level of each society conditioned what was considered indispensable for founding a family. Although it was not a hard and fast rule, there was a close relationship between age at marriage and final marriage: populations with a higher average age also had a higher final bachelorette party and the general causes affecting the former also influenced the latter. We have good knowledge of the geography of nuptiality before the 19th century and something is also known about temporal dynamics and territorial or social differences. In the 19th century Europe was roughly cut by a line that unites St. Petersburg and Trieste: to the west of this line, a system of low nuptiality prevails, with a high age at first marriage (over 24 years for women and 26 for men) and high final bachelorette party (above 10 per cent). To the east of this line, an early and almost universal system of early marriage prevails; the

average age at first marriage of less than 22 for women and 24 for men, final bachelorette less than 5 per cent.

1.3.2 Fertility

As told before, most of births took place, in marriage and births outside marriage were only a few percentage points. Therefore, the level of the birth rate was almost completely dependent on legitimate fertility⁵. Before the end of the 18th century the European populations had a "natural" fertility, where voluntary birth control was practically absent. The concept of natural fertility involves that the behavior of couples was not influenced by the number of children already had, unlike the case of populations planning births. In other words, couples, at any age, behaved in exactly the same way whether they had not children, or they had 5 or more.

Populations with natural fertility are subject to two factors that influence their reproductive rhythm. The formers are linked above all to age: the woman's ability to conceive decreases after a certain age, to stop completely before menopause. The latter are linked to behaviors like the duration of breastfeeding (which have the effect, as long as it is practiced, of inhibiting conception) or refraining from sexual intercourse during certain periods.

⁵ Legitimate fertility rate refers to the total number of legitimate births (within the marriage)

The incidence of mortality crises as well as other economic or political upheavals had effects on the entire demographic system, and fertility within the marriage was surely affected. However, as regards the interaction with the other components of the demographic system, we have to say that a more or less high level of natural fertility depends, also on the level of child mortality, because, for example the death of a baby of a few months stopped lactation and consequently its inhibitory effect on fecundity. This detail is relevant because we know that infant mortality in the ancient regime was very high: about a quarter of births died within the first year of life.

1.3.3 Migration

The Europe of the modern age certainly is not an immobile society. The movements were activated by strong economic differentials, favored by the absence of political-juridical barriers and attracted by the voids created by wars or by great mortality. To these movements stimulated by forces that can be called market forces, it is possible to add those caused by political processes, in particular by religious intolerance.

It is difficult to give figures to the many migrations of religious origin that have crossed the continent in modern times. Furthermore, migration outside the

European continent into the empires created in Asia and Africa must be taken into consideration. There were many hundreds of thousands of European emigrants, especially in the 17th and 18th centuries, whose large offspring contributed to the demographic expansion of the two successive centuries. Transoceanic emigration opens the way to the great 19th century transmigration and has significant demographic consequences in the long term.

In the eastern part of the European continent, the settlement in the southern part of the Russian empire and the stabilization of the southern border paved the way for settlement beyond the Urals, which took on a mass character a century later.

CHAPTER II

- LONG RUN DEMOGRAPHIC PATH OF EUROPE -

2.1 INTRODUCTION

Let's start with some data. The world had 100 million inhabitants in the Bronze Age, one billion at the time of the Industrial Revolution and probably within the next century we could reach 10 billion. These data suggest that demographic evolution has not been uniform over time, it has developed through cycles of expansion, stagnation and even reduction. We will focus on the European path.

In the first part of this chapter, we will see that the action of the great factors of constraint and choice on the demographic processes of the ancient regime has marked a precise path of the population in the centuries preceding the industrial revolution. In the second part of the chapter we will see what happened from the industrial revolution until the present days.

We will see that with the 18th century, Europe entered a phase of economic, demographic, and social transformation of great importance. It is a transformation that radically changes the process that determine growth: birth and death rates that until that moment were generally very high, were reduced in the space of two centuries to the very low levels we know today; in essence, the forces of constraint have been efficiently brought under control.

So, we will trace the path of the demographic development in Europe, talking about the growth and regressions phases of population from the Middle Ages to the contemporary time.

2.2 A MILLENNIUM OF DEMOGRAPHIC DEVELOPMENT

At the beginning of the last millennium, our continent had a total of a few tens of millions of inhabitants, in 2018 we were almost 750 million. In the history of populations there are both cases of long and sustained growth and cases of long and sustained decrease. As explained in the previous chapter, demographic changes are the result of the contrast between the forces of constraint (space, climate, pathologies, earth, energy, food, settlements) and the forces of choice socially and culturally determined. At certain historical moments, the population adapts to the environment, adapting its rate of growth and its size to it.

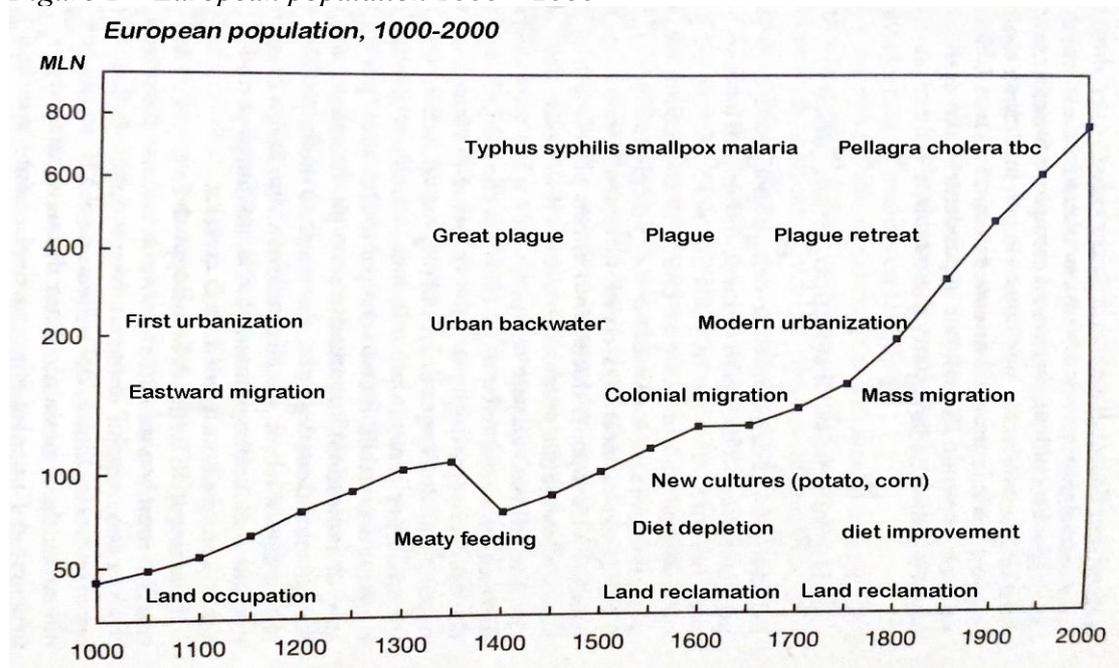
A phase of strong growth is certain between the beginning of the millennium and the 13th century, which is witnessed by the cultivation of new lands, the foundation of new castles and villages and the enlargement of the walls of the main cities. Around the end of the 12th century, a slowdown begins, caused by the decreasing yields of the land and the various subsistence and demographic crises. In 1347, the plague reached Europe, the successive waves of the epidemic made the population of the continent sharply retreat. After the recovery, the pre-plague

population size is exceeded as space occupation and intensification of exploitation are resumed. Europe was turning to emigration for the first time with the American opening borders and the strengthening of urban network.

The recovery came to a halt towards the end of the 16th century, fueled by the Thirty Years War, the revival of the cycle of the plague and the intensification of serious subsistence crises.

With the following century, the European population begins the modern cycle, thanks to the disappearance of the plague from the continent and from the production of resources with industrialization.

Figure 1 – European population 1000 – 2000



Source: M. Livi Bacci, *The population of Europe*, 1998

From *Figure 1* we can see that for Europe the millennium (years 1000 to 2000) breaks into three phases marked by periods of recession, the first period until the end of the plague, the second until the end of the 17th century crisis, the third until the advent of the present day (which corresponds to the advent of zero or negative growth).

While for the first cycle (1000-1400) and the second cycle (1400-1700) we find an expansion rate that allows almost a doubling of the population for both, in the third cycle (1700-2000) we find a growth of about six times.

Table 1 shows the date of the doubling of the population reached by some European countries, according to their size in 1550, 1770 and 1800.

For the entire European population of 1550, the doubling takes place in 1800, it took two and a half centuries, while for the population in 1800, doubling occurs after only 90 years.

In short, in the ancient regime, when subsistence come from the land, the time necessary for a doubling of the population varied from two to three centuries for the populations of the beginning of the 19th century, therefore during the industrial transformation, the times were reduced to about a century.

Table 1 – Doubling and doubling time of selected European countries 1550, 1700 and 1800

Countries	1550		1700		1800	
	Year of doubling	Number of years	Year of doubling	Number of years	Year of doubling	Number of years
England	1760	210	1810	110	1850	50
Holland	1825	275	1870	170	1886	86
France	1900	350	1920	220	1985	185
Italy	1840	240	1870	170	1886	86
Spain	1800	250	1850	150	1922	122
Norway	–	–	1827	127	1881	81
Sweden	–	–	1820	120	1886	86
Ireland	–	–	1795	95	mai	–
Germany	–	–	1838	138	1889	89
Russia	–	–	1780	80	1875	75
Austria-Hungary	–	–	–	–	1902	102
Switzerland	–	–	–	–	1904	104
Portugal	–	–	–	–	1923	123
Europe	1800	250	1835	135	1890	90

Source: M. Livi Bacci, The population of Europe, 1998

England and southern Russia double the population before 1850, other peripheral areas such as Scotland and eastern Russia double by 1870, while the Scandinavian and Germanic, Polish and Baltic areas double in 1890. Finally, the doubling comes only after the First World War or after the Second World War in a large part of the Mediterranean area and in France. In general we can say that the ancient demographic regime (that prevailed until the beginning of the industrial revolution) can be defined as marked by a slow long-term development if compared to the development and therefore the growth rates of the last fifty years.

The economies of the ancient regime were essentially based on agriculture⁶, and the slow progress of society therefore largely depended on its progress. These figures are consistent with the low rate of urbanization: in Europe as a whole, the proportion of the population living in cities with over 10,000 inhabitants did not reach 6 per cent in 1500 and was just over 9 per cent in 1700. The population living in small villages or scattered in the countryside was composed, in the vast majority, of farmers, sharecroppers and small owners; the population was land-bound and depended on the development of agriculture. Therefore, the limiting factor on growth was capital, especially the availability of land.

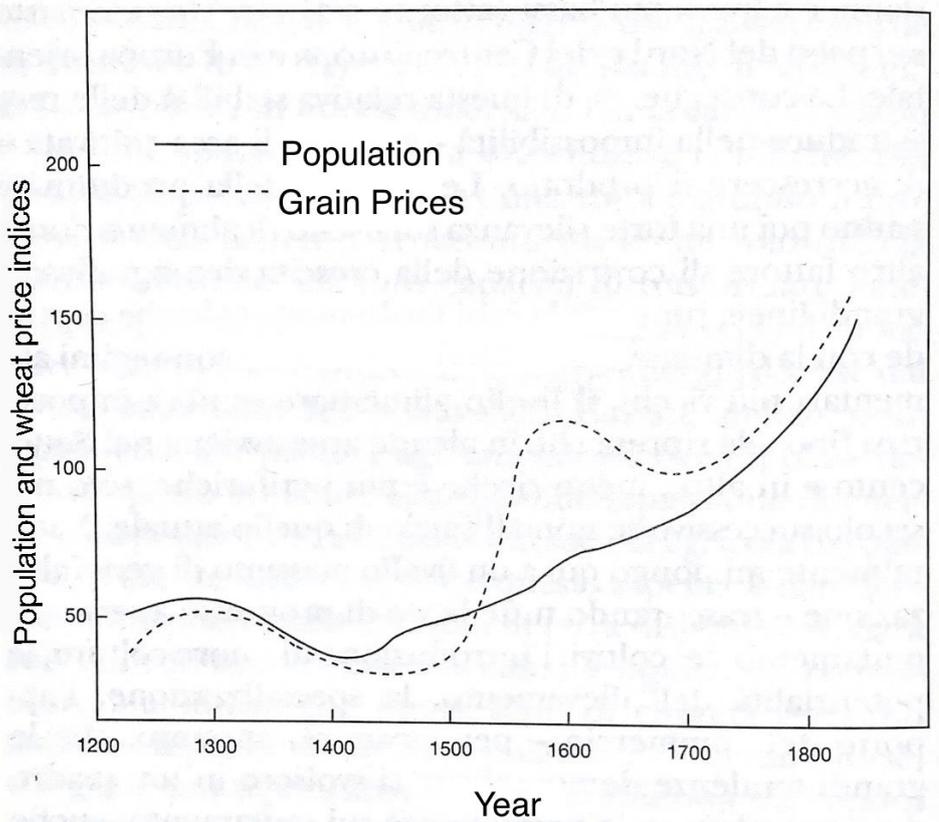
The European populations, once the settlement process matured, found only a limit and this limit was constituted by the energy available. It will be with the introduction of the steam engine, an inanimate converter, that new sources of energy will be made available to the population. And this, perhaps, is the most significant sign of the discontinuity between the modern and contemporary time. *Figure 1* shows that the great cycles of the European population from the late Middle Ages onwards were strongly influenced by the epidemic factor, but these cycles are also closely linked to economic forces that have acted on demographic systems, forcing them to change.

The historical series of prices and wages show strong fundamental changes and are linked to the great demographic cycles. As we can see from *Figure 2*, during

⁶ Three-quarters or four-fifths of the workforce were employed in agriculture

the negative phases of the demographic cycle, for example, after the plague or during 17th century, the decline or stagnation of the population, and therefore of the demand, contributed to the decrease in prices and, at the same time, in the demand for labor and wages; The population had been reduced by epidemics, and since the cultivated area was larger than the population to be fed, grain prices dropped. Due to the decrease in population size, work became scarce so that both nominal and real wages increased.

Figure 2 – Population and wheat price in Europe, 1200-1800 (1721-45=100)



Source: Source: M. Livi Bacci, *The population of Europe, 1998*

While, the strong recovery of the 15th century turned the tide: rising demand pushed up the prices of wheat and other foodstuffs while real wages declined, a trend that reached its critical phase in the early 17th century. The demographic slowdown of the 17th century and the catastrophe of the German populations in the Thirty Years War are among the causes of the new reversal of the cycle, which continued until the middle of 18th century, when the demographic acceleration once again reversed the cycle.

2.2.1 The impact of the plague in Europe

As told before, starting from around the year 1000, the European population was characterized by a phase of growth destined to last three centuries, so there was a solid population growth. Increase of settlements, new cities founded, abandoned areas were populated, crops expanded; during this phase, the European population grew by two or three times.

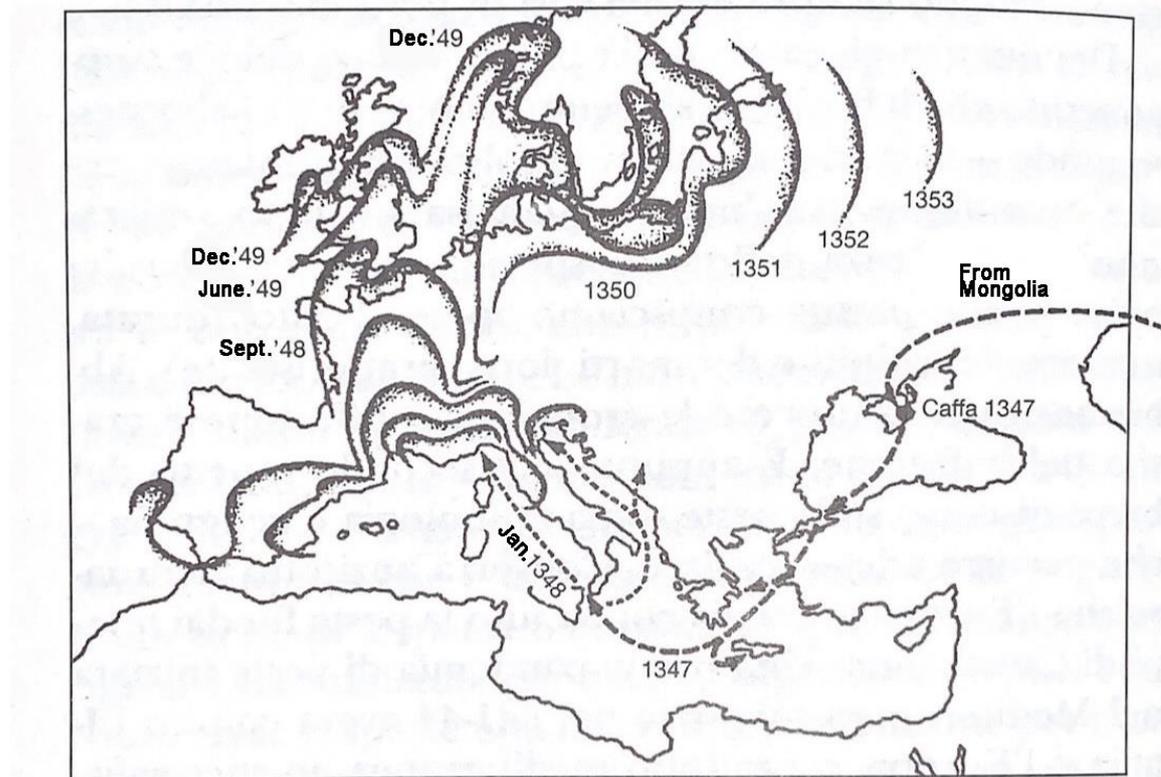
Due to increasingly frequent crises, such as the exhaustion of lands and the increase in famines due to increasingly unfavorable climatic conditions, between the end of the 13th and the beginning of the 14th century the growth cycle ends.

However, in theory it had to be just a historical phase of transition, but actually, what happened towards the middle of the 14th century was an event of devastating catastrophic nature and of long duration that caused a sharp decline in the

population which decreased by almost 1/3 between 1340 and 1400, and only in the mid-16th century, the population will be back to pre-crisis levels.

The catastrophic event is the plague; from its first appearance in Sicily at the end of 1347 until 1352 when it spreads in Russia, plague covers all the continent; Figure 3 illustrates its expansion.

Figure 3 – The spread of the plague in Europe



Source: Source: M. Livi Bacci, The population of Europe, 1998

As shown in the figure, by 1349 the epidemic had touched, besides Italy and Spain, France, England, southern Germany, Switzerland and Austria; by 1350 Scotland, the populations of the North Sea and the Baltic; finally by 1352 it had

also extended to Poland and Russia. After a series of waves, the plague withdrew from the continent in the second half of the 17th century. but limited episodes continued to occur until 1841, when the plague in Europe definitively ended.

In the ancient regime, life expectancy at birth was low as it were between 25 and 35 years. Only in exceptional cases, such as in periods free from epidemics, it reached 40 years. Between all the phenomena that had a demographic impact, none is better known than the plague.

Europe in the mid-15th century had a population reduced by one third compared to the previous century due to the various epidemic waves of plague after 1347. The plague is therefore the protagonist of the demography of the ancient regime.

. Normally, 2/3 to 4/5 of those affected died. The transmission of the plague occurred through the transport, even over long distances, of goods containing infected fleas or mice⁷.

There were no individuals immune to the plague, even those who contracted and recovered from it acquired immunity that is only short-lived. It cannot be ruled out that the successive waves of plague have contributed to the gradual selection of individuals who for some reason were less susceptible to contagion.

In the century following the Black Death of 1348, the European population retreated because of the first and literally more famous explosion of the plague,

⁷ The bacillus responsible for the plague is called yersinia pestis and it is essentially transmitted through the host flea of rats and mice.

but also as a consequence of the subsequent series of other epidemics. Only during the 16th century, the European population will reach the numerical dimensions of 1340, but the role of the plague's check on population growth continues to occur until its disappearance in the second half of the 17th century. There are no precise data on the extent of the decline between the period prior to 1348 and the first half of the 15th century but the indications of a 30-40% loss are supported by local surveys. The consequences were abandoned villages and deserted countryside.

Infectivity and lethality of the plague are not related to the state of health or age of the people, nor to the level of nutrition. The plague hit populations of cities and countryside with equal violence and the mobility of people and the traffic of goods were sufficient to spread it from one end of the continent to the other. During two or three centuries the plague dominated. *Figure 1* gives us an idea of the demographic cost of the plague, losses reached peaks of 60% in the countries of northern Europe.

In the long run, population tried to fight it with social adjustment, like quarantine measures for people and merchandise in case of danger, the isolation of infected or suspected people, the closure of their homes, some public hygiene measures until the plague disappeared from the continent, but it is certain that there is no single explanation for the disappearance of the plague but that indeed, a series of

facts have contributed to it. Another explanation of its disappearance could be selection: as mentioned before.

As regards the reaction of population system to plague we must distinguish between the short and the long term.

In the short term, a sharp rise in mortality has a double effect.

The spread of the contagion depresses by necessity, conception, births, and marriages. The decrease in births accentuates the negative demographic action of the epidemic. Furthermore, high mortality dissolves marriages, disrupts, or destroys, families. At the end of the crisis, a sort of backlash occurs which, slightly attenuates the epidemic impact. Postponed marriages are recovering, and marriages of widowers increase; in some cases, there has also been a recovery in the fertility of couples. All these factors translate into a transitory resumption of the birth rate. But mortality also tends to be lower than normal due to the decreased weight of the infant classes and any selective effects linked to the epidemic. The balance between births and deaths improves and the gaps, for a few years, are partially filled until a new crisis occurs.

As regards the long run, other factors intervene: the depopulation caused by plague diffusion across Europe creates land abundance and demand for work. New households have easier access to the resources needed to support themselves. The bonds imposed on marriage tend to loosen, nuptiality increases and thus the capacity for growth of the population is strengthened.

Once the plague is retreated in the Europe, other diseases continued to haunt the population, such as typhus and smallpox. All these epidemics have confirmed that the populations of the ancient regime were subject to systems of high mortality due to the syndrome of backwardness of epochs poor in material means and knowledge; but these systems were also very variable due to the changing circumstances that determined the spread, intensity and lethality of communicable diseases. It is not possible to summarize these circumstances in a single model for the various pathologies, but it seems generalizable that the introduction of a new pathology in a "virgin" population has devastating effects in a first phase and can even cause extinction (as we have already seen with the case of Native Americans) and that there is the emergence of biological adaptations.

2.3 TOWARD CONTEMPORARY EUROPE: THE DEMOGRAPHIC TRANSITION

Between 1750 and 1850 the population in Europe underwent a sharp acceleration; the annual growth rate of increase, equal to just 1.5% between 1600 and 1750, increases to 6.3% between 1750 and 1850 as we can see from *Table 2*. This acceleration concerns all the major countries that are shown in *Table 3*, even if it is more sustained in some like England than in others like France.

French Revolution and Napoleonic Wars devastate Europe for 20 years; the famine of 1816-17 and the typhus associated with it, affected all Europe, cholera run throughout the continent. Nonetheless, the population increased vigorously, with the start of the great transoceanic trans- migration, towards America.

Table 2 – Population of the continents (400 BC-2000; data in millions)

Years	Asia	Europe	ex Soviet Union	Africa	America	Oceania	World
400BC	95	19	13	17	8	1	153
0	170	31	12	26	12	1	252
200	158	44	13	30	11	1	257
600	134	22	11	24	16	1	208
1000	152	30	13	39	18	1	253
1200	258	49	17	48	26	2	400
1340	238	74	16	80	32	2	442
1400	201	52	13	68	39	2	375
1500	245	67	17	87	42	3	461
1600	338	89	22	113	13	3	578
1700	433	95	30	107	12	3	680
1750	500	111	35	104	18	3	771
1800	631	146	49	102	24	2	954
1850	790	209	79	102	59	2	1.241
1900	903	295	127	138	165	6	1.634
1950	1.376	393	182	224	332	13	2.520
2000	3.611	510	291	784	829	30	6.055
0-1750	0,06	0,07	0,06	0,08	0,02	0,06	0,06
1750-1950	0,51	0,63	0,82	0,38	1,46	0,74	0,59
1950-2000	1,90	0,53	0,97	2,51	1,83	1,67	1,75

Note: Last three lines: Average Annual Growth Rates (%)

Source: M. Livi Bacci, Storia minima della popolazione del mondo, 2002 (translated)

Table 3 – Development of some European populations (1600-1850)

	Population(MLN)			Indices			Density (inhab. / sq. Km)	Distribution (%)		
	1600	1750	1850	1750 (1600 = 100)	1850 (1750 = 100)	1850 (1600 = 100)	1750	1600	1750	1850
England	4,1	5,7	16,6	141	286	405	48	7	8	14
Holland	1,5	1,9	3,1	127	163	207	63	3	3	2
Germany	12,0	15,0	27,0	125	180	225	42	21	21	22
France	19,6	24,6	36,3	126	148	185	45	34	34	30
Italy	13,5	15,8	24,7	117	156	183	52	24	22	20
Spain	6,7	8,6	14,8	128	172	221	17	12	12	12
Total	57,4	71,7	122,5	125	171	213	44	100	100	100

Source: M. Livi Bacci, Storia minima della popolazione del mondo, 2002 (translated)

In the period from the early 19th century to the outbreak of the First World War, Europe abandoned the ancient demographic regime and begins the rapid transition towards a system characterized by high survival and low reproductive performance levels and entered a new one. From 1800 to 1914 the population increased from 188 to 458 million inhabitants, thus multiplying by almost two and a half times. The demographic dynamics of the 19th century can be interpreted as a result of the weakening of the constraining factors and the strengthening of the ability to choose.

The set of technological changes produced by the industrial revolution entail a rapid change in the way of life.

The steam engine allowed the multiplication of energy per capita that was previously limited to human or animal muscle, this has therefore allowed the expansion of the production of goods and the circulation of goods and people.

The general improvement in the standard of living can be summarized in the *Table 4*, showing GDP per capita measured in constant dollars for 14 European

countries from 1820 to 1913. In less than a century, Europe's per capita income triples. Income is strongly linked to the living conditions of the population and as a consequence to survival rates. The increase that has occurred can therefore translate into better nutrition and clothing, more hygienic housing, more energy to keep warm, a progress strongly linked to the increase in survival.

Table 4 – Gross domestic product per capita in European countries, 1913-92 (1990 dollars)

Countries	1913	1950	1973	1992	Ratio 1992/1913	Average annual% variation		
						1913-50	1950-73	1973-92
Austria	3.488	3.731	11.308	17.160	4,9	0,2	4,8	2,2
Belgium	4.130	5.346	11.905	17.165	4,2	0,7	3,5	1,9
Denmark	3.764	6.683	13.416	18.293	4,9	1,6	3,0	1,6
Finland	2.050	4.131	10.768	14.646	7,1	1,9	4,2	1,6
France	3.452	5.221	12.940	17.959	5,2	1,1	3,9	1,7
Germany	3.833	4.281	13.152	19.351	5,0	0,3	4,9	2,0
Italy	2.507	3.425	10.409	16.229	6,5	0,8	4,8	2,3
Holland	3.950	5.850	12.763	16.898	4,3	1,1	3,4	1,5
Norway	2.275	4.969	10.229	17.543	7,7	2,1	3,1	2,8
Sweden	3.096	6.738	13.494	16.927	5,5	2,1	3,0	1,2
Switzerland	4.207	8.939	17.953	21.036	5,0	2,0	3,0	0,8
UK	5.032	6.847	11.992	15.738	3,1	0,8	2,4	1,4
Greece	1.621	1.951	7.779	10.314	6,4	0,5	6,0	1,5
Ireland	2.733	3.518	7.023	11.711	4,3	0,7	3,0	2,7
Portugal	1.354	2.132	7.568	11.130	8,2	1,2	5,5	2,0
Spain	2.255	2.397	8.739	12.498	5,5	0,2	5,6	1,9
Arithmetic average	3.316	5.077	12.095	16.973	5,9	1,2	4,3	2,0

Source: Source: M. Livi Bacci, The population of Europe, 1998

Another fundamental aspect is the transition from a rural society to a form of social order, in which agriculture is an important but secondary component. Before the industrial revolution, the active population in agriculture is estimated

to constitute between 69-80% of the total active population and that an even greater percentage lived in the countryside; on the eve of the First World War in most European countries this value halved⁸. Agricultural transformations together with the income growth influenced the demographic evolution of the century, by the contribution to the relaxation of those constraints that allowed the strong expansion of the European population.

The rate of increase that exceeds 10 per thousand between the beginning of the 20th century and the First World War, was three to four times higher than that of the continent in the period 1500-1800, testifying to a completely changed regime. Between the beginning of the 19th century and the beginning of the 20th century life expectancy increases almost everywhere by 15-20 years; fertility instead reduced from a minimum of 10% to a maximum of 40%.

As regards emigration, still in the same period, net losses are estimated to 35 million people in Western Europe and almost 10 million in Eastern Europe.

All these data summarize the great demographic revolution that took place, which is defined as a demographic transition and implies the complex transition from the ancient regime to the contemporary one with high birth rates and mortality rates for the former and low ones for the latter.

In general, the decline in mortality was the primary driver of change; this decline took place partially due to the decrease in epidemics but above all thanks to the

⁸ These data point to the rapid weight loss of the agricultural sector

increase in agricultural productivity and the consequent attenuation of subsistence crises, the growth of per capita resources, changes in social behavior and the obstacles to the transmission of diseases.

The decrease in mortality had as a consequence the acceleration of growth. The greater pressure on resources stimulated the rebalancing mechanisms of the system to decrease the birth rate thanks to the restriction of marriage, but above all thanks to voluntary birth control. The increase in the relative cost of children, despite the presence of increasing resources, would have been the mainspring of the fertility regulation, also accompanied by the lesser social control exercised by traditions, institutions, and religion.

The fluctuations in crops and therefore in the prices of cereals continued to occur in the period in question, however subsistence crises are increasingly rare and less serious in demographic terms. This also led to an improvement in nutrition. Furthermore, the increase in household income brought down the share of food expenses which brought about an improvement in the standard of living.

However, even in this period, the population has continued to suffer by plagues such as tuberculosis, malaria, and pellagra, which will be attenuated by the improvement in the standard of living. At the end of the 19th century, the biological and medical sciences had already laid the foundations for a series of defenses against infectious diseases, later these defenses were reinforced by the discovery of vaccines.

With regard to infant mortality, it must be pointed out that a greater number of surviving children favors the limitation of the offspring. The higher the infant mortality the shorter the intervals between the parts, but the limitation of births allows more care in upbringing and this is itself, an improvement in survival. It can therefore be concluded that infant mortality and fertility are closely related.

At the beginning of the 20th century, in much of Europe, birth rates had therefore suffered a certain decline, the number of children per woman compared to 1870 had dropped from 4.7 to 3.4 and the immediate cause of the decline of fertility lies above all in the spread of voluntary birth control which was taking on a mass character. With the retreat of mortality, the Malthusian check par excellence, the control of marriage, is no longer enough to moderate growth. With the braking capacities of nuptiality exhausted and the emigration encountering limits in the absorption capacity of destination countries⁹, the adoption of birth limitation was the only way to moderate demographic expansion. In the 20th century the expansion cycle that began with the industrial revolution come to the end. An era of abundance of human resources comes to the end and a new one begins, of scarcity; the great demographic transition is over.

⁹ In 1924 the United States put a brake on immigration with the National Origin Act which imposed a quota on the annual number of immigrants.

Last century has continued to be characterized by an improvement of mortality which can be summarized by the increase in life expectancy at birth which passed from around 50 years on the eve of the First World War to around 80 years today. The lengthening of life which was initially due to the lowering of infant, adult and mature mortality, in the last few decades was due to the improvement in survival of older ages. Much of the life expectancy gains are due to the gradual domination of infectious diseases thanks to vaccines and medications, beyond prevention and better hygiene. From First World War to the present days has continue the strong restructuring of women's reproductivity with a lower fertility, in the contemporary world, women who bear only one child or none, are more than those who have two or more, but we will address this issue in detail in the next chapter.

Here we will limit to say that various policies have tried to influence demographic trend of fertility; some European government has tried with the means available to favor marriages, birth rates and numerous families, but the latter had relatively modest effects overall. Demographic changes have also affected economic ones. From the eve of the First World War to the beginning of the 1990s, the European economic transformation has been extraordinary despite the cost of the two conflicts: per capita income multiplied by five.

The demographic evolution of the last two centuries has led to the strengthening of the population's capability to choose and there have been many advantages from an economic point of view:

First, the decline in mortality has mitigated the risk of premature death and made relationships and work schedules between people more stable over the long term, secondly, thanks to the general improvement in health there are less frequent temporary incapacitations greater physical efficiency also demonstrated by the increase in height.

Third, the decline in fertility has reduced the time spent raising children which corresponds to an increase in extra-family work for women.

Fourth, the increase in mobility, thanks to the expansion of labor markets and the improvement of communications, has favored a better allocation of resources.

Fifth, the change in the age structure that we talked about earlier allowed for a greater proportion of the workforce.

Finally, the increase in population has produced positive effects of scale, as the size of the markets has increased, stimulating the formation of large infrastructures, and encouraging innovation.

CHAPTER III

– RECENT DEMOGRAPHIC TRENDS–

3.1 INTRODUCTION

In this chapter we will expose all the changes brought about by the Demographic Transition by first, taking a look to general trends for the developing and developed countries in order to understand if there is a convergence among their demographic behaviors and then focusing previously on European continent in general and then in the EU-27 that have the heavier weigh in the continent for political and economic reasons.

We will see that for the developed regions of the world such as Europe, in the last decades, there has been a continuous decrease in growth, while for the developing countries, over time there has been an inversion of the growth rate, that after an increase and a peak among the 1950s and 1970s went down.

Nowadays, the world population continues to increase but the increase of the more developed countries is happening to a very limited extent, all growth is therefore taking place in developing countries and particularly in the poorest regions.

The levels of fertility, mortality and migration directly influence, alongside the size and structure of the population, the number of demographic events: births,

deaths, and the number of people exiting or entering in a population. The average length of life, measured by the Life expectancy, and the average number of children per woman, measured by the Total fertility rate, represent the fundamental indicators of survival and fertility to measure the behaviors that influence the components of the natural demographic dynamics. Economic, social and cultural factors induce different behaviors with respect to these phenomena in different world regions and as we will see, also in the different European regions. We will explain how the demographic dynamics have been heterogeneous within Europe, also from the point of view of timing, trying to identify the main macro-groups of countries in the continent that have shared the same dynamics; then, we will understand the reasons that led the EU-27 to have the structure of population we know today, to lose more and more weight if compared to the rest of the world, and to be the group of countries with the highest average age in the world.

3.2 POPULATION CHANGE AND ITS COMPONENTS: THE POPULATION EQUATION

To better understand the next paragraphs, it is good to have clear in mind what are the factors that influence the size of population. The demographic equation summarizes the contribution made to regional demographic variation over time by the combination of natural change (difference between births and deaths) and net migration (difference between immigration and emigration). There are two ways to enter in a given population that are birth or immigration and there are two ways as well to leave a given population: death or emigration.

Population can change only through the processes of fertility, mortality, and migration¹⁰. Thus, population changes only for a limited counted number of events, in the next paragraphs we will see how and to what extent these factors have contributed to changing the size of the population, for the moment we will just explain the basic population equation, which show us that the size of present population depends on the size of the population in the past (stock) plus the flow events. The formula of demographic equation is the following:

$$P_t = P_{t-1} + B_{t-1,t} - D_{t-1,t} + I_{t-1,t} - E_{t-1,t}$$

Where:

¹⁰ Migration is defined the geographic movement of people for the purpose of establishing a new permanent residence

B = Births; D = Deaths; I = Immigration flows; E = Emigration flows; t = time

$[B_{t-1,t} - D_{t-1,t}]$ Is the natural component

$[I_{t-1,t} - E_{t-1,t}]$ is the migratory component, named Net migration

So, the number of births and deaths within the population of a geographic area indicate only part of the demographic change.

Migration involves the long-distance movement of individuals from one place to another. When such a shift takes place between the borders of different political entities, it affects the demographic structure of both origin and destination countries. In general, nowadays we observe a positive net migration in developed countries and a negative net migration in developing countries.

3.3 CONVERGENCE OF DEMOGRAPHIC BEHAVIORS IN THE WORLD

The idea that societies move towards a state of similarity and converge in one or more aspects is a common feature of various theories of social change. The convergence theory refers to the supposed link between economic development and concomitant changes in social organization. The basic notion of convergence theory is the idea that when different countries reach similar levels of economic development they must transform, becoming more and more similar in the different elements of the demographic system and the functions of social life. The mechanisms of family formation in most cases have shown an evolution towards a common level, while other aspects of family life, such as relationships between generations and between genders, seem to present a more complex image, with a great variability from one culture to another¹¹.

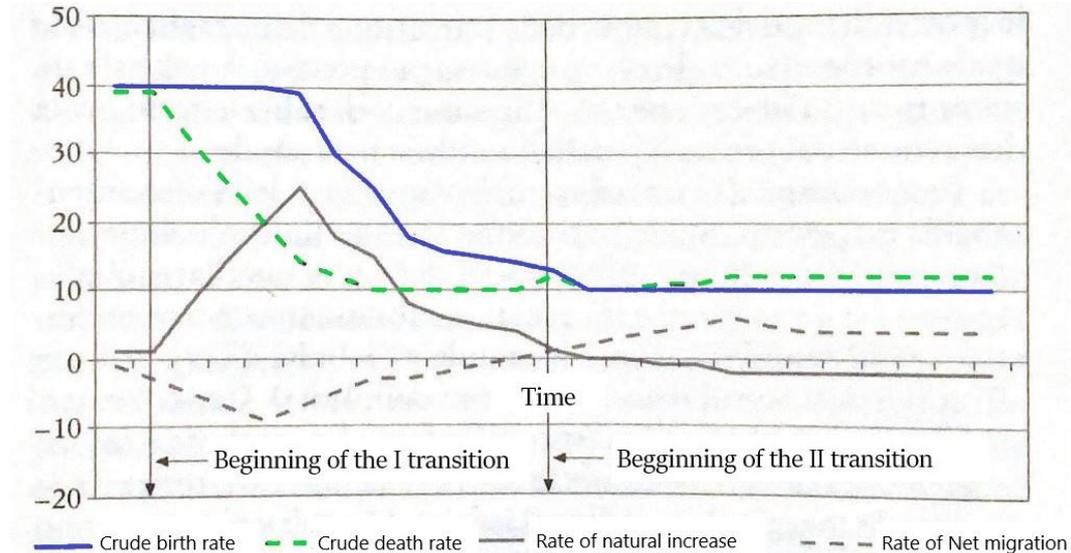
As we have seen in the previous chapter, Demographic transition refers to the process whereby occurs the transition from an equilibrium situation characterized by high levels of mortality and fertility to a long-term equilibrium with low mortality and fertility.

¹¹ For instance, in Muslim countries and some states of India.

From the observation of European demographic history it was allowed to identify the various stages of the process: in the pre-transitional phase, both mortality and fertility are high with infant mortality affecting about a quarter of live births and an average number of children per woman equal to 5-6. In the first phase of the demographic transition, mortality decreases while fertility levels remain high and it is precisely in this phase that the rate of natural growth increases. The period of continued growth can be shorter or longer. In the next phase, fertility also begins to decline, so that the rate of natural growth, albeit positive, starts to decline and the populations are characterized by an aging structure. But, what happened in most of European countries, starting from the mid-60s of the 20th century, was a new further phase, characterized by an even more drastic decline in fertility that led the birth rate to fall a lot below the level of generational replacement¹²; this phase, due to its characteristic of breaking with the model of the past, has been defined by many scholars as the "Second demographic transition". The Figure 4 shows the schematic representation of what happened with the first and second demographic transition.

¹² Total fertility levels of about 2.1 children per woman. This value represents the average number of children a woman would need to have to reproduce herself by bearing a daughter and who survives to childbearing age. If replacement level fertility is sustained over a sufficiently long period, each generation will exactly replace itself in the absence of migration.

Figure 4 - Schematic representation of the phases of the Demographic transition



Source: Angeli A., Salvini S., *Popolazione e sviluppo delle regioni nel mondo, 2007 (translated)*

The demographic transition theory places historical change within a model of equilibrium, in fact at the end of the transition, both phenomena (mortality and fertility) should converge to a state of equilibrium and in the initial and final equilibrium situation, the rate of natural increase should be slightly positive or close to zero. But in the case of Europe, where fertility has dropped to the replacement level, it has not only stopped at this level, on the contrary, extremely low fertility rates have emerged in many post-transitional societies. Thus, the new demographic transition was driven by fertility decline, instead of mortality decrease.

The current levels are so low as their persistence could eventually threaten the existence of some European populations, in the absence of a significant immigration that is very difficult to implement. As for short-term, economic problems related to shrinking workforce and rapidly aging populations can emerge.

Starting from the second post-war period, European countries showed an arrest in the fall of fertility with a rise between the mid-50s and the mid-60s, it is the so-called baby-boom.

From the 1960s onwards, substantial changes took place in reproductive behavior and in European family structures. The changes would be of such magnitude as to suggest a division of the greater demographic transformation process into two phases, as mentioned before, called the first and second demographic transition.

In Central-Northern Europe, the baby boom ended during the second half of the 1960s, but even if for Southern Europe this event ended later, the decline in births was of such magnitude as to overtake the of the Center-North countries.

Fertility is today well below the level that ensures generational replacement; the reasons are attributable to several factors: starting from the 1970s, divorces and cohabitations spread, and from the mid-1980s this reality was consolidated, although there was a recovery in fertility for women after age 30.

Family formation was characterized by a rise in cohabitation and living alone, of prolonged residence in the parental household, of postponement and less

propensity to marriage, reduction in childbearing but increase in childbearing within consensual unions. Thus, marriage lost its value as an institution¹³.

Rising divorce rates and high separation rates of cohabitants have contributed as well in lowering fertility, but the most important role that characterized the second demographic transition, was played by contraceptive practices; there was the shift from inefficient contraceptive methods to new efficient methods¹⁴. Contraception changed from an instrument mainly used to avoid unwanted births, to an instrument for reach a greater personal realization. Contraceptive methods were introduced in the second half of 60s and were promptly adopted. Starting from the beginning of 1970s, in Western societies, abortion was legalized thus marriage as a remedy declined and age at first marriage started to increase, also undesired pregnancy of married women could be interrupted and this led to a further decrease of fertility rate that felt well below the equilibrium level.

The whole change in family formation can be resumed in an evolution from homogeneous to heterogeneous pattern¹⁵, in the sense that the traditional old pattern of married couples living together with their children today is only one of the great varieties of family forms. The idea of sexual intercourses was completely disconnected from procreation; thus, cultural changes are the most

¹³ Children have the same likelihood to be born by married or in a cohabiting couple

¹⁴ Shift from the first to the second contraceptive revolution according to Ryder and Westoff 1977

¹⁵ According to Van de Kaa 1987

important factors explaining the second demographic transition that have also seen a growing female autonomy, which led to the reduction of the economic benefits of marriage and the growth of job opportunities for women. The demographic transition is the greatest example of how population size has come to depend more on choice than on constraint factors, especially with the Second Demographic transition the course of demographic events is no longer at the mercy of nature and therefore of the forces of constraint but can be conditioned and guided.

As for developing countries, in many countries the involvement of the state in promoting the control of fertility has contributed a lot to its reduction, which instead, as we have seen in the previous chapter, is not valid for the transition in European countries, where institutions opposed to different degree to the decline in fertility rates and many of which were characterized by true pro-natalist attitudes. Thus, each country reacts with its own evolution strategy in the face of the variation of one of the demographic components. In some developing countries, fertility levels similar to those in industrialized countries have already been reached; in others, where the transition process of mortality is almost complete, there is a phase of decline in fertility.

In many countries where cultural and religious traditions contributed to the permanence of a traditional context, after an initial phase of decline, fertility stopped at levels higher than the level of generational replacement.

If the concept of convergence therefore refers to a trend of equilibrium, we find at the extremes on one hand the developed countries with a permanence on levels of fertility much lower than generational replacement; on the other hand, developing countries which are divided in some that find themselves in a situation of stagnation at still high fertility levels and some others that are at the end of the first stage of the demographic transition; thus, we can talk of a sort demographic disorder.

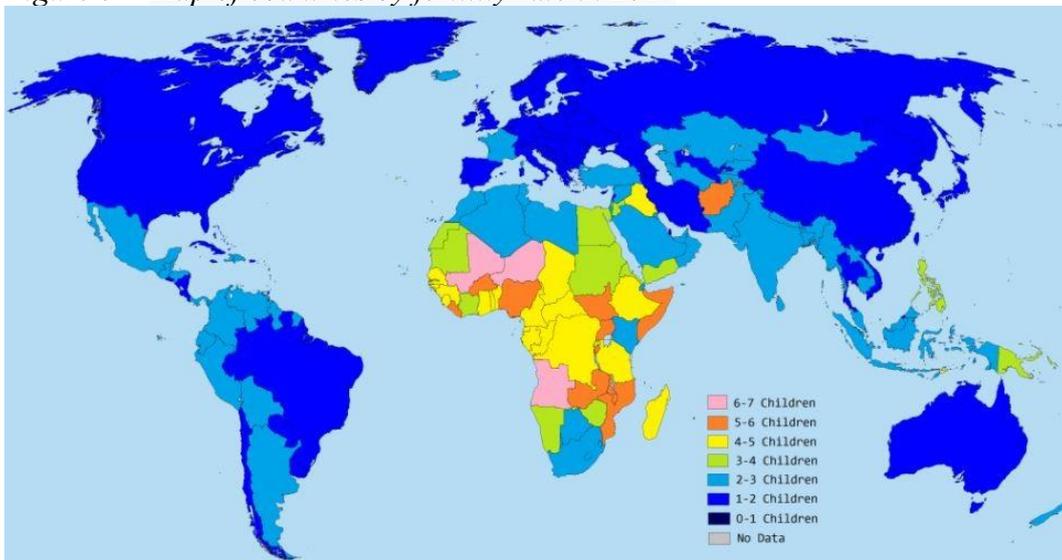
In Europe, the demographic transition has spanned 2 centuries and the slight delay in the decrease in fertility, compared to the decline in mortality, has led to fairly moderate growth rates. In developing countries, on the other hand, the speed with which the lowering of mortality occurred and the considerable delay with which the change in reproductive behavior took place, led to very high rates of increasing population.

In the period 1950-55 most of the world population lived in a context characterized by a very high fertility: at least 50% lived in a country where total fertility was equal to or greater than 5.4 children per woman and only 10% he lived in a demographic regime where fertility was equal to 2.5 children per woman (only the industrialized part of the world population).

At the beginning of the 1950s there were two distinct fertility regimes, the one of the developed world, including almost all European populations with a fertility lower than 3.5; and the one of the developing world with high fertility.

At the end of the 1970s, the world population almost aligned itself in terms of fertility and the median value was 3.6 children per woman, today this number is 2.4. In 1950 only one country was characterized by a fertility level of less than two children per woman and it was Luxembourg (TFR=1.98), in 2010 more than 40% of the world population has this characteristic, In 2017 world fertility looked like in the *Figure 5*.

Figure 5 – Map of countries by fertility rate in 2017



Source: external-preview.redd.it

The figure above displays a sort of globalization of demographic regimes that seem to characterize the world in recent decades but there are still many populations, especially the poorest and most disadvantaged in which very high levels of fertility persist. In particular, we refer to sub-Saharan populations.

3.4 THE PROCESSES OF DEMOGRAPHIC TRANSITION FOR THE TWO EUROPEES

At the beginning of 2020 the population of the European continent is estimated to be about 748 million inhabitants, more than half live within the countries of the European Union which, due to its political importance, gives the entire western sub-continent the main demographic characteristics. While in Eastern Europe the most important role is played by Russia.

The weight of the European population on the total world population is nowadays declining, passing from 25% at the beginning of the 20th century to about 10% today. This decreasing trend is also expected in the future, in particular a decline of 25% of the East population is expected by 2050.

The European continent is currently a mosaic of 47 countries that are at different stages of demographic development. Usually the continent is universally divided into North, South, East, West; having to talk about demographic trends we consider the division of Europe into two zones: a western one where the European Union is dominant and an eastern one in which Russia is the most important country.

In a general view, the demographic regime prevailing in Western Europe extends to the eastern part in a trend of convergence between the two areas. Let us remember the demographic transition took place between the end of the 19th and

the beginning of the 20th century; the fall in fertility and mortality was not simultaneous throughout the continent and this led to a diversified situation which continued until the Second World War.

After the Second World War, the differences diminished, especially in mortality levels, but the demographic division of Europe continued for a long time.

In general, Northern Europe has historically shown lower mortality and fertility levels compared to the South and the differences disappeared during the post-war period while a general trend is the lowering of infant mortality.

Regarding mortality and survival, the decline in mortality in the early part of the 20th century was caused by decreases in infant and middle age mortality, whereas in recent years in most European countries, mortality has decreased faster in older ages. Until about the mid-1970s, Southern Europe was lagging compared to the North-West but to date, there are no more differences between the two areas.

When we compare East-West instead, we find a more complex situation: at the beginning of the 20th century the Eastern countries had higher mortality levels than the West and still in 1950 the Mediterranean and Eastern regions showed a very accentuated delay, but by the first half of the 70s the countries of the South and East had already made up for most of the delay and the situation seemed more homogeneous.

During the mid-1960s the situation changed again due to the health crisis that hit the countries of Eastern Europe, at that time, under the Soviet regime, which once

again slowed progress in survival and led to a new separation between the two European areas. Thus, in several countries of Eastern Europe, in the 1980s, mortality did not follow the downward trend that was considered a natural development, but rather suffered a stagnation, and for middle-aged men in particular mortality even increased.

This transition from a period of general convergence that ended in the mid-1970s to a phase of East-West divergence led, at the end of the 20th century, to an extremely heterogeneous European mortality.

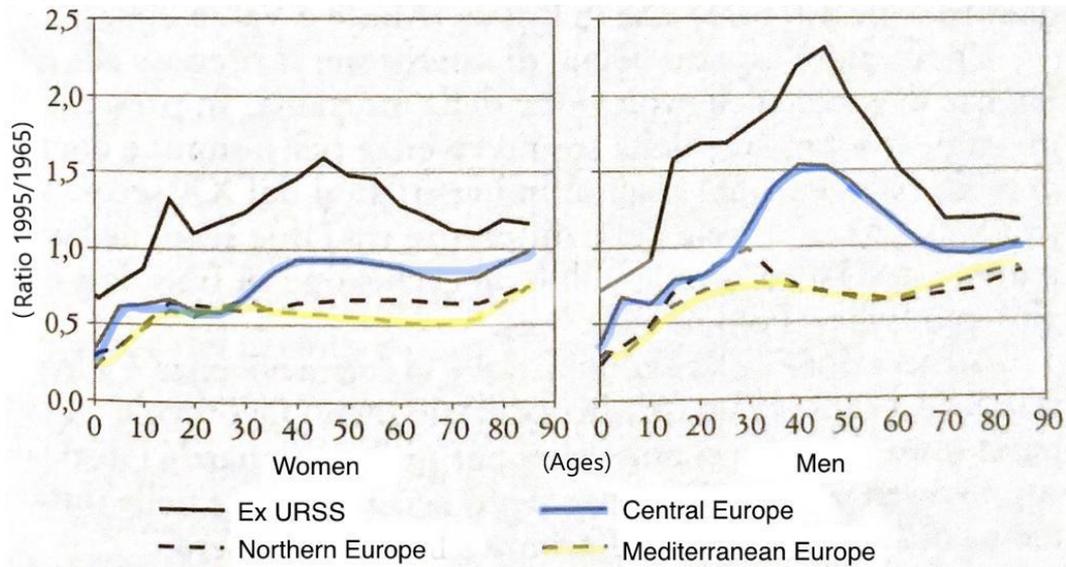
The main factor of divergence in mortality profiles was therefore the evolution of the risk of death in adulthood. Analyzing the trend of mortality rates in the period 1965-1995, within the East-West dualism, four geographical subsets have been identified that can be considered homogeneous especially for male mortality which, ordered from higher to lower levels, are: the countries of Mediterranean and Alpine Europe, the Nordic countries, the countries of Central Europe and the countries of the former Soviet Union.

The trend in mortality by age in these groups of countries shows that while in 1995 the levels were almost the same for women, for men there was a specificity of the countries of the former USSR with a super mortality between 20 and 60 years compared to the other three groups of countries that instead presented a more homogeneous profile between them.

In 1965 the picture is very different in that for both men and women, the gap has considerably increased between the countries that were part of the Soviet Union and those of Mediterranean and Northern Europe, practically in all ages. The countries of Central Europe had a trend in mortality by age coinciding with that of Mediterranean Europe in the age interval between 10 and 30 years, while in subsequent ages they are halfway between the countries of the former Soviet bloc and the other two groups.

Figure 6 shows how the profile of mortality by age has changed, worsening is noted in Eastern countries in all ages after 10 years for men and women and, only for men in Central European countries. Cardiovascular diseases determine the differences in mortality between East and West, in fact at the end of the 20th century in some Western countries we find a mortality rate from cardiovascular diseases 3-4 times lower than in Eastern countries.

Figure 6 – Ratio between mortality bay age ratio in 1995 an 1965, women and men



Source: Angeli A., Salvini S., *Popolazione e sviluppo delle regioni nel mondo, 2007 (translated)*

Since 1990, life expectancy in EU member states has increased by more than six years, from 74.2 years in 1990 to 80.9 years in 2014; yet inequalities remain both between one country and another. In Western European countries that boast the highest life expectancy, people continue to live over eight years longer on average than in Eastern European countries, characterized by the lowest life expectancy levels. In addition, within individual countries there remain strong inequalities in terms of health and life expectancy between those with the highest levels of education and income and the most disadvantaged. This is largely due to different exposure to health risks, but also to inequalities in access to high quality care

As regards fertility, European countries have experienced profound social changes that have involved contraceptive sexual behavior and the patterns of couple formation and dissolution. Among the most important and also considered irreversible transformations we find the mechanisms of family formation and couple behaviors; there has been a growing instability of unions that has characterized and is still characterizing Western countries, which, albeit with different timing, have seen the Second demographic transition take place.

The transformations began in the Nordic countries and then spread to the center and southern Europe. Since the early 1980s in Western Europe there have been substantial changes in the perception of the family, caused by the social acceptance of divorce and free unions. Over the course of a few decades, new behaviors have emerged such as the postponement and decrease of marriages, the growth of divorce rates and single-parent and single-person families, the decline in fertility rates and the increase of the proportion of births born outside marriage. Therefore, there has been a change in the cultural context, a decreasing regulatory control and an increase in individualism in the sense that the preferences and the choices of individuals overwhelmed social expectations.

The custom that expects women to leave their parents' home to get married, then to have children and continue to live in couple with the same partner until death, has been for the most generally abandoned. This custom that seemed immutable

has been replaced by a multitude of life situations of couple observable within the same population.

Thus, there is a rather uniform trend among Western European countries with regards to fertility and the formation and union disruption. It must be specified that the factors that influence the behavior of fertility in the various countries of the two western and eastern areas are different and are a combination of the political, social and economic context of the countries themselves. In Eastern Europe, pro-natalist and family aid policies were pursued in the socialist period, and contraceptive methods were less frequent and were often compensated through use of induced abortion¹⁶. In the 1960s the fertility level was lower in Western countries than in the rest of the European macro-groups. When the effects of the Second World War wore off, the social and economic conditions typical of the post-war period were favorable in Western countries, so there was an increase in fertility.

In the mid-1980s we find an Eastern Europe characterized by the prevalence of families with 2.1 children, low rates of childless women, earlier marriage and first birth compared to Western countries, low use of modern contraceptive methods, strong recourse to abortion and rare births out of wedlock. But with the 1990', due to the political and economic upheavals that have marked the countries of Eastern

¹⁶ At the time legalized almost everywhere in Eastern Europe

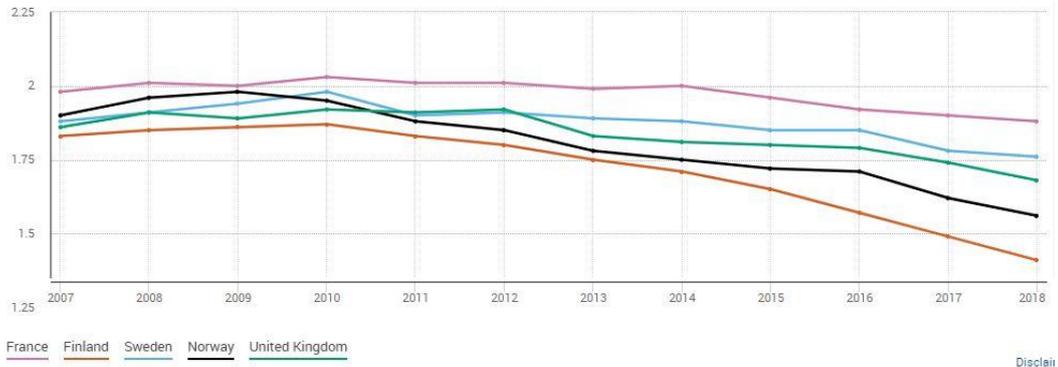
Europe, there has been an apparent convergence towards the family and reproductive behaviors of Western Europe¹⁷.

In the early 1990s, Italy and Spain were the first European countries where fertility fall to particularly low levels of fertility, less than 1.3 children per woman and in 1994 all the states of the European Union were below the replacement threshold (TFR=2.1 under conditions of low mortality levels) except for Cyprus. The trends of the 21st century were quite interesting, as some countries that in the 1960s and 1970s were the first to experience fertility below the replacement level seemed to begin to converge again towards the replacement level during the first decade of the second millennium and then started to decline again during the second decade. This path is clear in the Figure 7 where we find the trend in Total fertility rate¹⁸ (TRF) of France, Sweden, Norway, the United Kingdom and Finland that are the example of five countries that after having almost touched the level of replacement last decade, have seen again a relapse in the last decade.

¹⁷ For example, the increase in cohabitation in Eastern Europe, more than a choice as in the Nordic countries, was caused by economic difficulties in contracting marriage

¹⁸ The mean number of children that would be born alive to a woman during her lifetime if she were to survive and pass through her childbearing years (from 15 to 49) conforming to the fertility rates by age of a given year and under the assumption of no migrations

Figure 7- TFR trend of some European countries, 2007-2018



Source: Eurostat Elaboration data

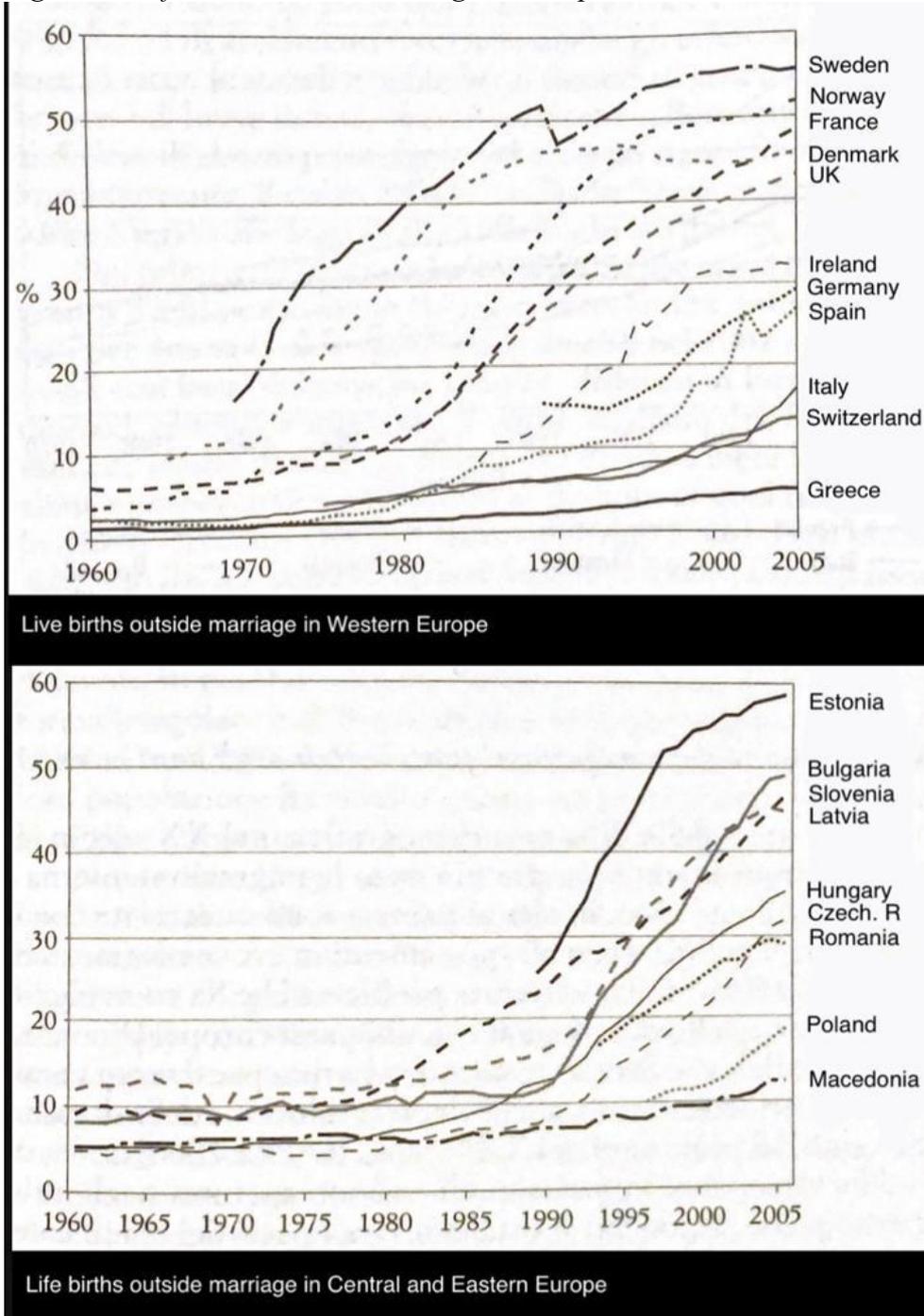
We are in a situation of ongoing convergence among European countries, it seems that part of the common decline essentially depends on the postponement of births which then lead to the recovery of only a small part of the postponed births.

The proportion of women without children is of particular interest also for future trends; according to some estimates, in Western Europe about one in five women of the generation born in mid-60s will have no children and in Eastern Europe this share is even higher.

Among the most important changes in the new European socio-demographic regime in recent decades, we find even a sharp increase in the share of births out of wedlock. The Figure 8 shows how different trends have been, both between geographical areas and within the areas themselves; at the top we find the graph relating to Western Europe, while at the bottom the one relating to Central and Eastern Europe. In general, we notice a growth trend which is characterized by

very variable timing and intensities. For Western countries, changes have been made in a movement of liberalization of customs which began at the end of the 1960s in Nordic countries, which took place through 4 four stages: the separation of sexuality from marriage, the separation of marriage from procreation and finally the loss of its character of obligatory.

Figure 8 – Life births outside marriage in Europe



Source: Angeli A., Salvini S., *Popolazione e sviluppo delle regioni nel mondo, 2007* (translated)

In the countries of the European Union, the share of births out of wedlock which was equal to 5% in 1960 has risen to 42% in 2020. The increase is 17 percentage points compared to 2000, but the largest increase has occurred in most cases, in the period 1980-2000. These data confirm the overcoming of the traditional family in which first get married and then have children. These extramarital births occur in non-marital relationships, between cohabiting couples or parents who choose to raise their children alone.

In 2018, extra-marital births were more numerous than births within marriages in eight EU Member States: France (60%), Bulgaria (59%), Slovenia (58%), Portugal (56%), Sweden (55%), Denmark and Estonia (both 54%) and the Netherlands (52%). Also, in Eastern Europe, the rapid increase in the share of births out of wedlock is one of the characteristic features of the transformation of fertility, albeit, again lagging compared to the trends in Northern Europe.

Among the factors that can explain these behaviors, culture and religion play an important role. The increase was in fact more rapid in countries with a strong Protestant tradition as in the case of the countries of Northern Europe, or more secularized as the former socialist states.

While in more traditional and religious countries such as Croatia, Lithuania and Poland over 70% of births have occurred within marriage, in this we find these countries more similar to the Southern Europe.

To sum up, the European countries present themselves at different stages of demographic development, in recent decades the differences have become less and less pronounced: the fertility levels differences between Western and Eastern Europe are increasingly limited but taking into consideration individual states rather than averages, the picture is more complex, as we have seen, many Western countries seemed to be achieving a recovery of fertility but then it was not so. Furthermore, the furrow in mortality levels is still deep and unfavorable in Eastern countries.

In Europe, therefore, we find a situation of low fertility which leads to the prospect of an aging population and its decline in the long term.

3.5 DEMOGRAPHIC TRENDS IN EUROPEAN UNION

The most important event that took place in Western Europe after the Second World War is undoubtedly the constitution of the European Union (EU), this Union, first commercial and then also political, has taken on common characteristics over time with regard to demography.

It all began with the 6 founding countries (Belgium, France, Germany, Italy, Luxembourg and the Netherlands) who signed the Treaty of Rome in '57, founding the European Economic Community (EEC) which allowed the free circulation of goods and services, people and capital. The trade barriers between

these member states were therefore removed in order to achieve a common market. At the end of the 1960s Western Europe found itself with three European Communities, the EEC, the ECSC (European Coal and Steel Community) and EURATOM (European Atomic Energy Community).

In 1967, these three European Communities merged, sharing a single Commission, a Council of Ministers and a European Parliament. The birth of the Union therefore, took place in the last decades of the 20th century but the structure of the population and the demographic behaviors of the individual countries at the beginning of 2000 highlight a situation of divergence within the Union.

Following the Union of the three European Communities, the European Union carries out various stages, including in 1979 the entry into force of the European Monetary System (EMS), aimed at maintaining the stability and balance of exchange rates between the various national currencies; then the construction of the Economic and Monetary Union in 1999 which led to the entry into force of the stability pact and the introduction of a single currency, the Euro.

The 1992 Maastricht Treaty initiates the member states towards political integration and transforms the European Economic Community into the European Union.

The Union we know today, started in 1957 with the population of the first 6 founding countries which had 167 million inhabitants, following the various enlargements, the Union is in 1st January 2021 with a population of almost 446

million of inhabitants that would have been 513 if the approximately 67 million inhabitants of the United Kingdom had also been included¹⁹.

To join the Union, countries must respect the Copenhagen criteria, i.e. the political and economic conditions that require stable democracy, respect for human rights and the law, protection of minorities, a functioning market economy and the adoption of common laws and policies that form European regulations. The Union assists candidate countries in acquiring EU laws and provides a range of financial aid to reduce regional disparities and improve economic and social convergence; in fact, this financial commitment represents more than a third of the Union's policy budget.

With the enlargement of the borders of the Union, issues concerning the rights of citizens, security, justice, the labor market, immigration, etc. have entered the competence of the Union.

An article of the Maastricht Treaty states that the Union is founded on the principles of freedom, democracy, respect for human rights and fundamental freedoms; this treaty was a turning point as it led to the concept of European citizenship but the meaning is of a social nature and not of a communion of rules, laws and languages.

The fact is that in the 1990s free movement within the Union became easier and easier for people, thanks to the abolition of customs controls which led to greater

¹⁹ Brexit was completed in February 2020

mobility for many categories of European citizens, including young people who thanks to the support of the Union, were able to attend study courses abroad, for example through Erasmus grants.

Obviously, over time, the relative weight of the six founding countries has been decreasing and to date represents a 53% share of the EU-27 (taking into account Brexit) and a 46% share of the EU-28. Italy, which in the EU6 included just under 30% of the population, today represents 13% of the EU-27 and 11% of the EU-28. The size of the population of each state is of great importance in determining the balance, not only economic but also political within the Union. In 2018 the 5 most populous countries of the EU-27, Germany, France, Italy, Spain and Poland include more than 66% of the total population, so the other 22 countries represent only the remaining 34%. This imbalance in the demographic weight of the countries can create different political problems, for example with regard to how decisions are made.

Table 5 gives us a sort of photography of the 2018's demography indicators in all EU-27 countries. The positive changes in population have been highlighted and what catches the eye is that most of the values that have been underlined are in the Net migration column, to indicate that it contributed a lot to many positive values of the Total population change column; without migration Estonia, Finland, Germany, Slovakia and Spain would have had a negative total population change.

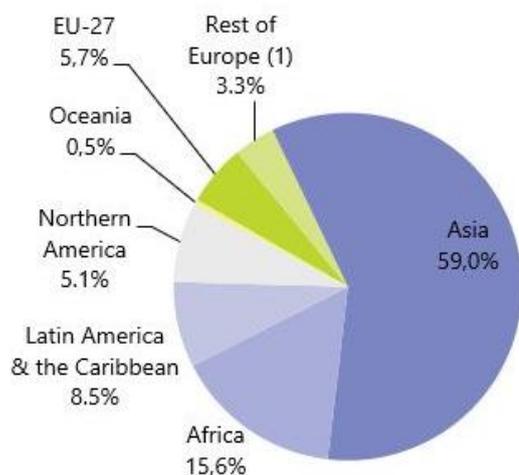
Table 5- Some demographic indicators in EU-27,2018

County	Tot. populatin	Population in % of EU	Population share by age gorups (%)			TFR	Life expectioncy	Natural change	Net migration	Tot. population change
			0-24 years	25-64 years	65+ years					
Austria	8.822.267	2,0	25,6	55,7	18,6	1,47	81,8	0,2	4,0	4,1
Belgium	11.398.589	2,6	28,4	52,9	18,7	1,62	81,7	0,7	4,3	5,0
Bulgaria	7.050.034	1,6	23,3	55,6	21,	1,56	75,0	-6,6	-0,5	-7,1
Croatia	4.105.493	0,9	25,6	54,4	20,1	1,47	78,2	-3,9	-3,3	-7,1
Cyprus	864.236	0,2	29,4	54,7	15,9	1,32	82,9	4,1	9,3	13,4
Czechia	10.610.055	2,4	25	55,7	19,2	1,71	79,1	0,1	3,6	3,7
Denmark	5.781.190	1,3	29,4	51,3	19,3	1,73	81,0	1,1	3,2	4,3
Estonia	1.319.133	0,3	25,9	54,5	19,6	1,67	78,5	-1,0	5,3	4,3
Finland	5.513.130	1,2	27,5	51,2	21,3	1,41	81,8	-1,3	2,1	0,9
France	67.026.224	15,0	29,9	50,4	19,6	1,88	82,9	2,2	0,0	2,3
Germany	82.792.351	18,6	24	54,6	21,4	1,57	81,0	-2,0	4,8	2,7
Greece	10.741.165	2,4	24,5	53,7	21,8	1,35	81,9	-3,2	1,6	-1,5
Hungary	9.778.371	2,2	25,4	55,6	19,	1,55	76,2	-3,9	3,3	-0,6
Ireland	4.830.392	1,1	33,2	52,9	13,9	1,75	82,3	6,1	9,0	15,2
Italy	60.483.973	13,6	23,1	54,4	22,6	1,29	83,4	-3,2	-7,9	-11,1
Latvia	1.934.379	0,4	25,1	54,9	20,1	1,60	75,1	-4,9	-2,5	-7,5
Lithuania	2.808.301	0,6	26	54,3	19,6	1,63	76,0	-4,1	-1,2	-5,3
Luxembourg	602.005	0,1	27,9	57,7	14,3	1,38	82,3	3,2	16,3	19,6
Malta	475.701	0,1	25,2	55,9	18,8	1,23	82,5	1,6	35,3	36,8
Netherlands	17.181.084	3,9	28,4	52,8	18,8	1,59	81,9	0,9	5,0	5,9
Poland	37.976.687	8,5	25,9	57	17,1	1,46	77,7	-0,7	0,6	-0,1
Portugal	10.291.027	2,3	24,4	54	21,5	1,42	81,5	-2,5	1,1	-1,4
Romania	19.533.481	4,4	26,3	55,5	18,1	1,76	75,3	-3,1	-3,0	-6,1
Slovakia	5.443.120	1,2	26,4	58	15,5	1,54	77,4	0,6	0,7	1,3
Slovenia	2.066.880	0,5	24,4	56,2	19,4	1,60	81,5	-0,4	7,2	6,8
Spain	46.658.447	10,5	24,7	56,2	19,2	1,26	83,5	-1,2	7,1	6,0
Sweden	10.120.242	2,3	29,2	50,9	19,9	1,76	82,6	2,3	8,5	10,8
EU-27	446.208.557	100,0	25,9	54,2	20	1,55	81,0	-1,0	1,5	0,5

Source: Eurostat Elaboration data

As regards World comparisons, the relative weight of the European Union population has continued to decline in recent decades; by 2020, only one in 17 people in the world lives within the EU-27 which represents less than 6% of the world population as can be seen in Figure 9; a value more than halved if compared to 12% in 1960. Furthermore, due to Brexit the European Union has lost from a statistical point of view, about 13% of its population.

Figure 9- World population share, 2020



(1) Albania, Andorra, Belarus, Bosnia and Herzegovina, Croatia, Faeroe Islands, Iceland, Liechtenstein, the former Yugoslav Republic of Macedonia, Republic of Moldova, Montenegro, Norway, the Russian Federation, Serbia, Switzerland, United Kingdom and Ukraine.

Source: Eurostat Elaboration data

As for the structure of the European population, the accession of the new 10 countries in 2004 slightly rejuvenated the population of the Union, but overall, it led to a slowdown in population growth because for the new arrivals, fertility was extremely low.

Consistently low birth rates and increased life expectancy are reshaping the EU-27 age pyramid, which is shown in Figure 10 and compares the population structure of 2008 to that of 2018, we must specify that these years have been difficult for the European Union which has been hit by the financial crisis born in the United States which has further lowered the birth rate due to uncertainty about

future prospects. The most notable change is the marked aging of the demographic structure, which is already evident in several EU-27 Member States. The percentage of people of working age in the EU-27 decreasing while the share of the elderly in the total population increased and it is expected to continue significantly in the coming decades. This will weigh on people of working age, who will have to provide for the social expenses generated by the aging of the population to provide all the services related to it.

Figure 10 – EU-27 Age pyramid 2008 and 2018 (% of total population)

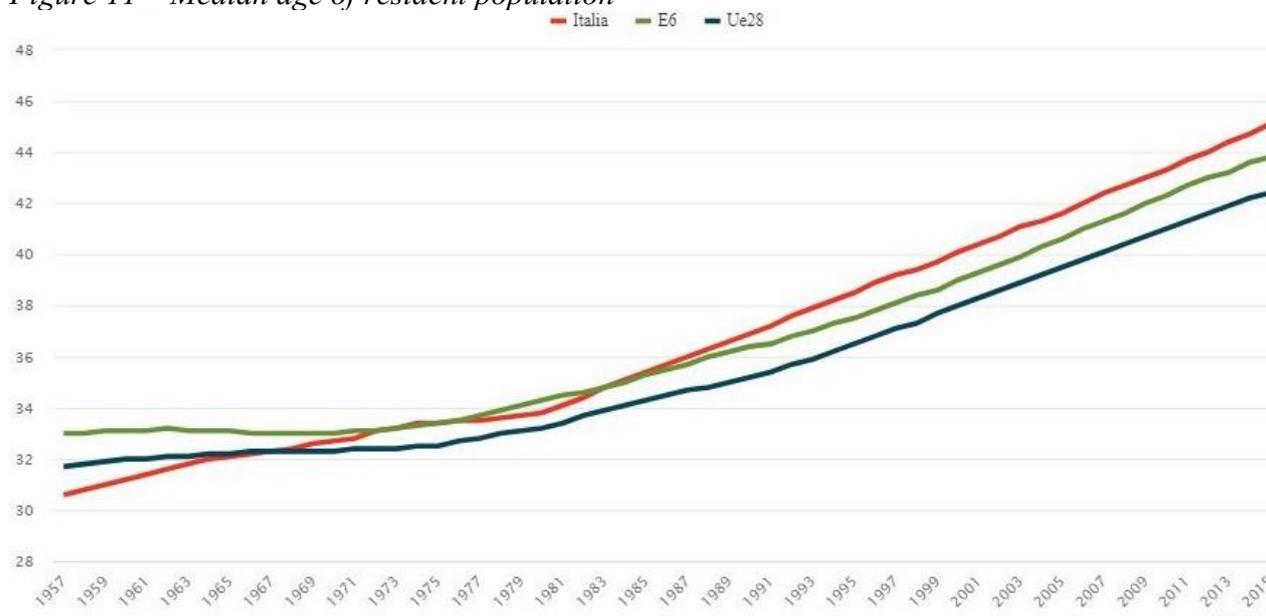


Source: Eurostat

In 2018, on average the old-age dependency rate²⁰ which compares number the number of people aged 65 and over to people of active age between 15 and 64, was 29.9%, equal to 3.3 people who produce income for a retired or otherwise inactive person, ten years earlier the ratio was over 4 to 1.

Figure 11 shows the aging of the population of the European Union, from the time of the establishment of the EEC, up to 2015. The graph shows the 'trend of the median age of the population of the founding countries (EU6), of the EU-28 and of Italy which to date has the oldest population in Europe. On average, the median age compared to 1957 has increased by about 10 years for EU countries.

Figure 11 – Median age of resident population



Source: Istat calculations on Eurostat and United Nations data

²⁰ The age dependency rate is the measure of dependent persons - children or elderly persons - on the number of working-age persons

In the context of an aging population, the aspect of migration is becoming increasingly important. The natural change of the EU population has been negative since 2012, with more deaths than births recorded in the EU, thus migration has now become a fundamental component of European demographic dynamics. For instance, during 2019 the total EU-27 population change was positive with 0.9 million more inhabitants due to net migration.

The disparities are also found in the long-term trend of the total fertility rate, which at the beginning of the 21st century is below the replacement level in all countries but particularly low in the more recent member states. Furthermore, none of the countries that seemed to be starting to converge again towards the replacement level have maintained this trend over the past decade. The aging of the European population is therefore partly due to the low birth rates, but also to the fact that the numerous post-war generations are reaching old age and they survive longer than past generations.

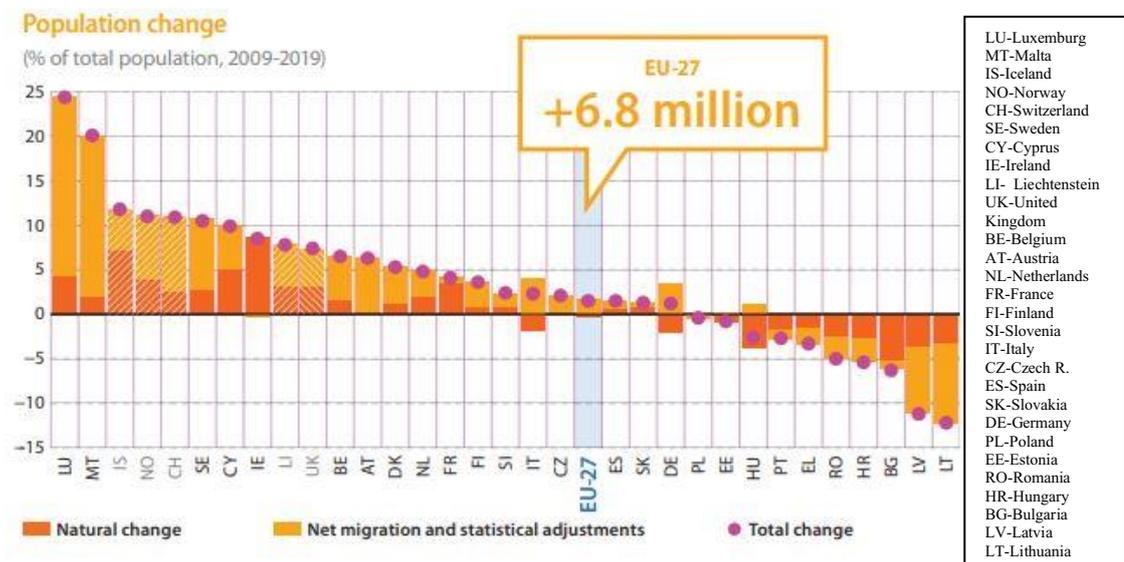
According to data made available by Eurostat, at the beginning of 2015 there were 34.3 million people of resident foreigners in the 28 countries of the European Union (EU). In particular, 19.8 million of these were citizens of a non-EU state (3.9% of the total population), while the remaining 15.3 million were citizens of another EU state. It has to be noticed that there are considerable variations between countries: in absolute terms, the countries with the highest number of foreigners present in their territory are Germany (7.5 million), the United

Kingdom (5.4 million), Italy (5 million), Spain (4, 5 million) and France (4.4 million), which together account for 76% of foreign citizens in the EU. In relative terms, the share of the foreign population out of the total resident population in the country is higher in Luxembourg (46%). Analysis of the age structure shows how the foreign population is generally younger than the national population, with a higher proportion of young adults of working age. Immigrants in EU countries in 2014 were younger than the already resident population. In fact, at the beginning of 2015 the median age of the resident population in EU countries was 42, while the median age of immigrants in 2014 was 28.

Between 1 January 2009 and 2019, the EU-27's population rose by 6.8 million (or 1.5%) according to Eurostat data in *Figure 12* which shows the weight of each component on population change. The number of inhabitants grew most in Luxembourg, with the overall population increasing by almost one quarter (24.4%), as we can see, almost 20% of this change is due to net migration (more immigrants than emigrants); at the other end of the range, the biggest reductions in percentage terms took place in Latvia (-11.2%) and Lithuania (-12.2%), for these two countries as well, much of the change is due to net migration that in this case is negative. Thus, the natural decrease in the number of inhabitants (more deaths than births) in Latvia, Lithuania, Bulgaria, Croatia, Romania, Greece and Portugal was reinforced by net outward migration (more people emigrating than immigrants arriving) leading to a decline in population numbers. For Germany

and Italy, we find a situation of negative natural change and positive net migration, thus the positive population change is due only to migration; but while for these countries, migration seems to have compensated the losses, for Hungary, net migration has not been sufficient to achieve a positive population change.

Figure 12



Source: Eurostat

CHAPTER IV
– COMPARED PROSPECTIVES OF EUROPEAN UNION
AND ITS COMPETITORS –

4.1 INTRODUCTION

To fully understand the role that the European population will play in the future, it is good to first understand the weight and prospects of the Asian demographic giants and that of North America, in order to have terms of comparison and a more global vision. The Chinese and Indian population increase will be described, both shared a high population growth but are characterized to date by two population pyramids with a very different structure (atypical for China, typical for India) and by an equally divergent total fertility rates. The differences between the demographic situation of the two countries can be traced back to different family planning programming policies. The path of the United States will also be shortly provided in order to make a comparison between these different regions and that of the European Union of which we will see in detail what are the demographic forecasts for the coming decades.

We will also discuss the feasibility of a couple of solutions to the further reduction of the European population that is expected to be. In particular, we will consider the solution of migration as a replacement, discussing rather this possibility is

applicable or not. Then we discuss a second solution, which consist on the possibility of raising TFR thanks to institutional actions. In fact, fertility, as well as for various cultural reasons, is low also for unfavorable economic reasons that do not allow families to reconcile adequately professional and family life or to raise children serenely.

4.2 ROLE AND PROSPECTS OF THE DEMOGRAPHIC GIANTS AND USA

When we talk about demographic giants, we refer to the Asian countries of China and India, the two Asian countries now together represent 36% of the world population but until recently they did not appear in the world economic scenario as main players. In 2020, the population of China with more than 1.43 billion people alone represents about 20% of the world population, that of India has now reached 1.38 billion so it almost touches the Chinese levels. Both countries had identical real GDP growth rates of 6.1% in 2019, based on early estimates by the IMF, and are characterized by an advanced stage of demographic transition. China in particular, has fertility and mortality indicators very similar to those of the West, the latter in fact has experienced a rapid and marked transition process in recent years, while in India, despite the decrease in fertility, the decline has been much more content. For both countries, both family planning programs and socio-

economic development have contributed to the decline in fertility, but the cultural and religious differences and the political history of the states that compose them represent significant discriminating factors. Around the 1950s, India became independent from United Kingdom, and China completed the socialist revolution. Since then, both countries have undertaken social and economic development programs and introduced family planning. Although the countries have taken steps almost simultaneously to the interventions in the field of propaganda and dissemination of contraception, the Chinese government has achieved the goal more effectively. The level of fertility in China in the period after the revolution was very close to that of India in the period of independence, with a Total fertility rate of 6 in the early 1950s but in the following decade, China's Total fertility rate declined by over 50%, reaching 2.7 children per woman in the 1980s.

In 1990, the Total fertility rate reached the level of generational replacement until it drops to the current level of 1.7.

Regarding India, on the other hand, since the 1970s fertility has been maintained at ever higher levels and has currently fallen to a value very close to the level of generational replacement. Therefore, the Indian population has maintained a high growth rate, exceeding one billion people in 2001 and establishing itself as the second country in the world in terms of number. The average variant of the projections of United Nations states that between 2025-2030 India will be the most populous region in the world with more than 1.5 billion inhabitants. India had a growth rate of 1.14% in 2018, compared to 0.5% in China.

As regards socio-economic changes, in both countries there has been an increase in the literacy rate, but the gaps have remained, as they have high gender differences, more evident in the Indian population. In the last decades of the first millennium, the per capita income of developing countries quadrupled and in China between 1990-1998, the poorest individuals²¹ have gone from 70% to 50% and this share is less than 20% to date.

However, it must be pointed out that in India there remain marked internal differences²² and although the inequalities are lower than in India, this phenomenon is not negligible in China either. These economic inequalities are also accompanied by those of gender, in fact women are placed by Asiatic history, culture and traditions in a position that is often subordinate to men.

As mentioned above in India, family planning programs date back to 1951, but were not very efficient, so much so that Prime Minister Gandhi received a note that the problem was so serious that it required elements of compulsory nature in the national interest. In 1976, Gandhi announced the urgency of lowering the birth rate. The main means to reduce fertility was the use of female sterilization, which however led to massive popular reactions, the use of contraceptives showed only a slight increase. After the Gandhi rule, in 1977 the new government renounced the control of fertility and announced a new voluntary family planning program:

²¹ On the verge of survival, with an income below \$ 2 a day

²² Important inequalities between states and different social groups

sterilizations decreased by 87% to 1 million compared to 8.1 million of the previous year. The number of couples that used contraception increased by 44%, from 18 million to 26 million.

That experience led the government to be extremely cautious in family planning for fear of dissent. In 1981, the Indian population continued to grow at an annual rate of more than 2%.

In China as well as in India, family planning services started around the 1950s, well in advance of the rest of the developing countries. At the end of the 1950s there was an economic crisis caused by famine which led to the reduction of the population, a consequence of an increase in deaths and a reduction in nuptiality. Once the crisis was over, however, they returned to the previous high levels, close to natural fertility with over 7 children per woman. Therefore also in China as well as in the United States and more timidly in Europe, these are the years of the baby boom.

The family planning campaign of the 1970s in China was based on three phrases as slogans: late marriages, longer intervals between births, fewer children. The result was positive as there was a shift from a propaganda action based on individual level motivations to collective level motivations which insisted above all on the benefits of containing population growth in the realization of socialism. The results were immediate, and fertility went from 5.4 children per woman to 2.7 in 1979. The propaganda involves a change in the dominant mentality and

reproductive choices other than national directives were considered deviant behavior.

With the one-child campaign, in 1979 the radicalization of the interventions already underway took place; the goal of the one-child policy allowed for the encouragement of most Chinese families to have only one child.

Between the 1980s and the first decade of the 21st century there was an anomalous decrease in births, especially for girls, which led to the phenomenon of missing women and the imbalance of the marriage market. The causes are attributable to the preference of the male child as it is considered more suitable for the family's provision, therefore in China female infanticides and selective abortion were frequent. Today, at least from a regulatory point of view, this discrimination would seem to be overcome and China would seem to be in a demographic regime substantially similar to that of Western countries. However, the sex ratio continues to show discrimination by gender. There is, therefore, that several generations must pass before couples become neutral with respect to the sex of their children.

In China, the population bomb has now been defeated and the one-child policy is no longer effective since 2016, but the price to pay has been a rapid aging of the population and strong imbalances in the relationship between sexes. Without the necessary measures, this process will lead to an even faster aging of the population and worrying dependency rates. China therefore suddenly found itself,

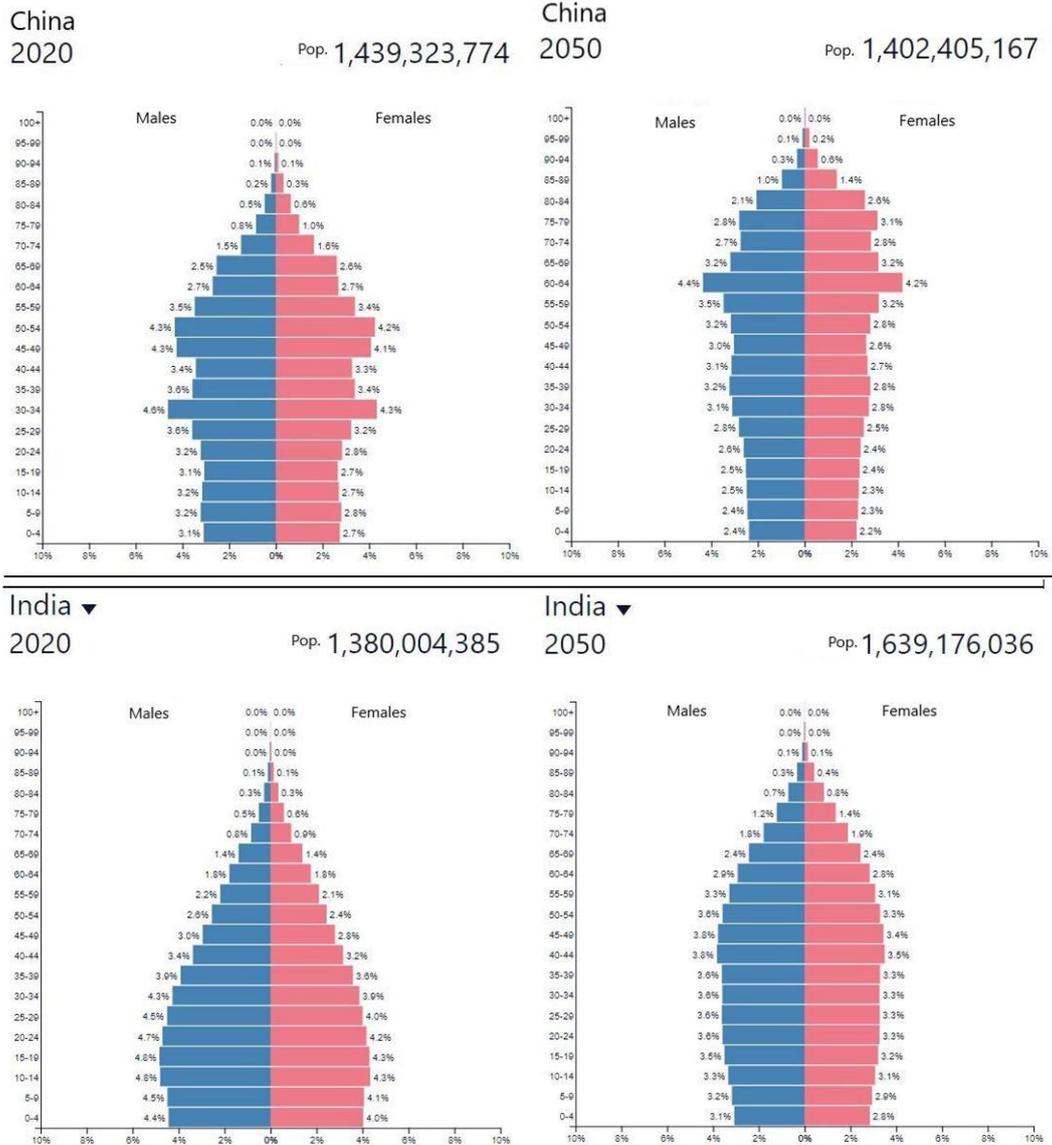
without an adaptation period (as it happened for European countries) to have to face a series of problems related to the aging of the population.

Thus, the population of China and India go in opposite directions, although the countries have converging population sizes today, by 2050, India will add roughly 270 million more citizens, and China's total will decrease by 30 million people, based on leverages data from the United Nations.

As we have seen, a reduction in births is something that happens naturally in a demographic transition. When an economy becomes more developed, it's common for fertility rates to decrease but for China, it has happened prematurely through policy. As a result, the country's age distribution doesn't fit a typical profile.

Figure 13 shows the population structure of China and India in 2020 and the forecasts for 2050 and permit both a comparison between the two countries and overtime.

Figure 13 - population structure of China and India in 2020 and 2050



Source: Populationpyramid.net

The pyramids of 2020 are consistent with what has been exposed so far on the two countries. Regarding forecasts, by the year 2050, it's estimated that India's working age population will be comparable in size to that of China's today

(almost 811.04 million people). China's population will eventually decline over the remainder of the 21st century. There are good prospects to grow economically, but the weight of an aging population will create additional social and economic pressures. By 2050, it's estimated that over one-third of Chinese population will be 60 years or older. On the other hand, India is following a more traditional demographic path because it was not interrupted by such drastic policy decisions as China.

India will likely top out at 1.6-1.7 billion people, before it begins to experience the last stage of demographic transition already experienced by more developed economies in North America, Europe, and Japan.

For the United States, the country's population in 2019 was 329 million; it is the third most populous country in the world, representing more than 5% of world population.

The population of the United States nearly quadrupled during the 20th century, with a growth rate of about 1.3% per year, from about 76 million in 1900 to 281 million in 2000. From 1946 to 1964 USA experienced the baby-boom, more than 76.4 million children were born. Factors that contributed to the baby-boom consisted of young couples who started families after putting off marriage during the War, government encouragement of growth of families through the aid of GI²³

²³ Servicemen's Readjustment Act of 1944, commonly known as G.I. Bill, was a law that provided a number of benefits for the return of WWII veterans (commonly referred to as G.I.s).

benefits, and popular culture that celebrated pregnancy, parenthood, and large families. Once the baby boom began, the average age for marriage in woman started decreased to 20 from 22. Couples were eager to have babies post-war due to the increased notion of safety in the world. After the baby-boom event, USA is estimated to have reached the threshold of 200 million in 1967 and that 300 million was touched in 2006. But today, even the total fertility rate of the United States has suffered a decline below the replacement level, the value estimated for 2019 is 1.78 children per woman. The global financial crisis a decade ago and the resulting recession left long-lasting scars on future growth, the crisis has had a negative impact on births on several economies but especially the United States where it originated, the rate fell from a peak of 2.12 in 2007 to 1.8 in 2016.

The United States is expected to grow by nearly 79 million people in the next 4 decades, from about 328 million to 404 million between 2019 and 2060. The rate of population growth is slowing, beginning in 2030, the population is projected to grow more from international migration than natural increase in coming decades because of population aging. As baby boomers age into older adulthood, the number of deaths is projected to rise faster than the number of births, thus, even the United States will face the problem of increasing of the old- age dependency rate. As a result, the population will naturally grow very slowly, leaving international migration to overtake natural increase as the leading cause of population growth, but projected levels of migration remain relatively flat.

The *Table 6* allows us a quick comparison between the Asian, American and European regions, summarizing the main demographic indicators according to the World Population Prospects, the 2019 revision of United Nations

Table 6 - Some demographic indicators for China, EU-27, India and United States

a) 2015-2020		b) 2019	
Country	Net Reproduction Rate	Country	Total population
China	0.78	China	1.433.783.686
EU-27 (mean)	0.75	EU-27 (mean)	447.512.041
India	1.002	India	1.366.417.754
United States	0.843	United States	329.064.917

Country	2019	2015-2020
	Life expectancy at birth (both sexes combined)	Total Fertility Rate
China	76.62	1.69
EU-27 (mean)	80.05	1.55
India	69.27	2.24
United States	78.81	1.78

Source: Elaboration of United Nations Population Division dataset

The data of the *Table 6(c)* confirm that for China, Eu-27 and United States the Total fertility rate is below the replacement level and suggest that for all the three regions life expectancy is high (over 75 years), especially in the European Union where the average is the highest with 80 years. The only country showing a TFR higher than 2.1 and a relatively low life expectancy at birth of less than 70 years is India.

These data could be sufficient to make us understand the path of the population of these countries (or group of countries in the case of EU-27). But further confirmation is provided by *Table 6(a)* through the Net reproduction rate (NRR) that is a value adjusted for mortality (in the sense that take mortality of women into account) and measures the size of the next female generation relative to the size of the present one. If this rate exceeds 1, the next female generation, other things be constant, will be bigger than the present one and thus population will grow, while if the rate is less than 1, the next female generation will be smaller than the present one and population will decrease, finally if it is equal to one, next female generation will have exactly the same size as the present one and population size will be constant. From the values displayed in *Table 6(a)*, population growth is expected exclusively for India, the only one to have a Net reproduction rate above 1, while the others will suffer a reduction since they all have values below 1. Especially for EU, which presents the lowest NRR with 0.75, is expected the most important reduction of the next female generation, followed by China with 0.78 and by USA with 0.843. Putting all this data together it would seem to exist all the conditions to confirm that Indian population will soon be in first place in terms of size, surpassing the decreasing Chinese population of 1.433 billion people.

4.3 THE NUMBERS OF THE FUTURE IN THE EUROPEAN UNION

In an atmosphere of uncertainty like the one created by the SARS-CoV-2 pandemic, it becomes really difficult to make reliable predictions as in normal periods, but on the base of latest population projections released by Eurostat at the end of April 2020, we can have some indications. Eurostat's population projections result from the application of a set of assumptions on future developments for fertility, mortality and net migration. The projections should not be considered as forecasts, as they show what would happen to the resulting population structure if the set of assumptions are held constant over the entire time horizon under consideration; in other words, these forecasts do not take into account the consequences that the pandemic could have on the behaviors of the population. Moreover, these projections are made over a relatively long-time horizon, statements about the likely future developments for the EU's population should be taken with caution, and interpreted as only one of a range of possible demographic developments. Covering the period 2019 to 2100, EU-27's population is projected to grow modestly within the first decade followed by a steady decline by the end of the century: is expected to increase from 446.8 million in 2019 and peak to 449.3 million in 2026 (+0.6 %), then gradually decrease to 441.2 million in 2050 and to 416.1 million in 2100, thus with an overall decrease of 30.8 million (-6.9 %) from 2019 to 2100.

The pattern of population ageing that we have seen in the previous chapter within the EU-27 is likely to continue through 2100, with both the size and the proportion of older people in the total population increasing.

The pattern of population ageing that we have seen in the previous chapter within the EU-27 is likely to continue through 2100, with both the size and the proportion of older persons in the total population increasing.

Over the next eight decades, the median age of the EU-27 total population is likely to increase by 5.1 years, from 43.7 years in 2019 to 48.8 years in 2100. The median age, which divides the population into a younger and an older half, is projected to increase for genders, with the gap narrowed by 0.6 years between genders (from 3.0 years in 2019 to 2.4 years in 2100). Median ages are projected to increase by +5.5 years for men (from 41.8 years in 2019 to 47.3 years in 2100) and by +4.9 years for women (from 44.8 years in 2019 to 49.7 years in 2100).

The proportion of children is projected to decrease in both relative and absolute terms, from a share of 15.2 % (67.8 million) at the beginning of 2019 to 13.9 % (58.0 million) by 2100, with the share falling to a low of 13.6 % during the years 2035-2045.

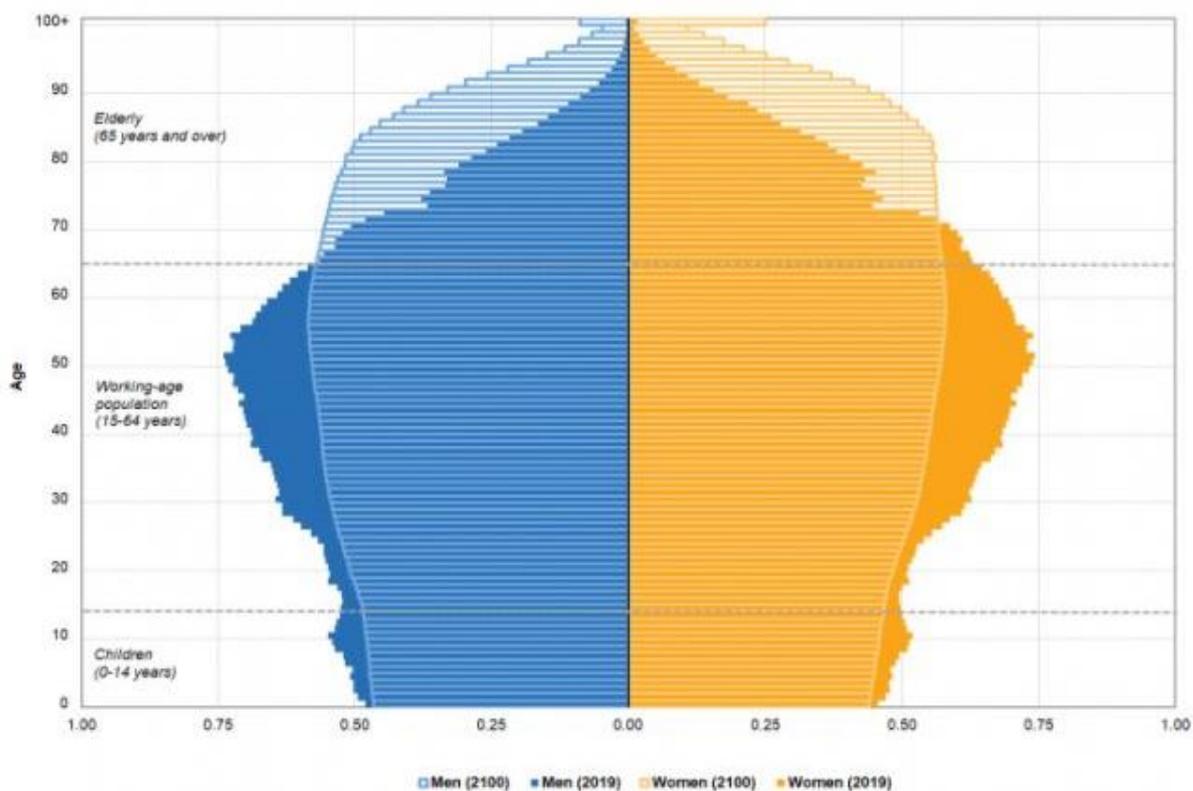
The share of working-age population (15-64 years old) in the EU-27's total population is projected to decrease from 64.6 % at the start of 2019 to 54.8 % by 2100, representing an overall reduction of 60.6 million persons, equal to the entire

Italian population. This share of persons in the working age is projected to fall below 60 % by 2037 and then remain below this level through to 2100.

The proportion of elderly (65 years and over) in the EU-27 total population is projected to increase from 20.3 % at the start of 2019 to 31.3 % by 2100. Thus, is projected to rise by 11.0 %, corresponding to an additional 39.7 million persons by 2100; within the overall EU population declining by 2100. Within this is the only main demographic age group that is projected to grow, both in relative and absolute term, indicating the continuation of population ageing.

The number of people aged 80 years and over is projected to more than double both in absolute and relative terms: from 26.0 million in 2019 (5.8 %) to 60.8 million (14.6 %) in 2100. A graphical presentation of changes in the EU-27 population structure by sex and age between 2019 and 2100 is provided by *Figure 14* superimposing two population pyramids

Figure 14 – Population pyramid, EU – 27, 2019 – and 2100 (% of total population)



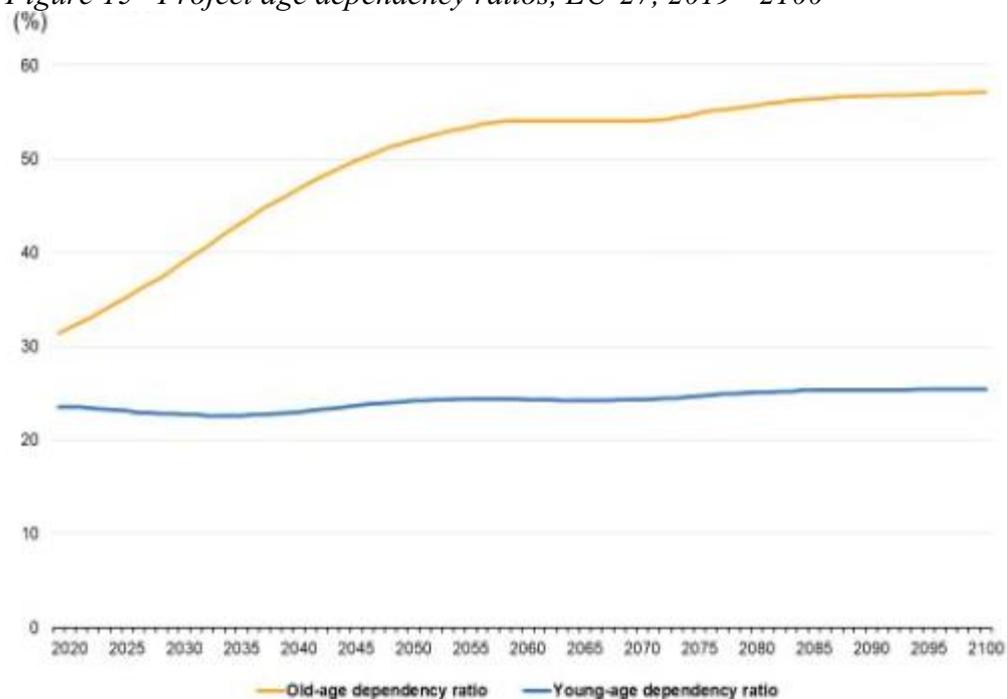
Source: Eurostat

The young age population is projected to decrease moderately due to a lower number of births; this narrowing process is known as ‘ageing at the bottom’

The working-age population will shrink considerably between 2019 and 2100, thus further increasing the burden on those of working-age to sustain the dependent population, the elderly population is projected to grow much larger and this implies the broadening at the top of the pyramid. The 2019 population pyramid may be described as a rhomboid (what is known as “Overturned Pyramid”), due to the relatively high number of men and women aged 45-55, that

correspond to people that were born in the second half of the 1960s and early 1970s. These people will, in the coming years, gradually move into retirement, while there are fewer persons of working-age in the generations that follow and this implies a moderately increase of old-age dependency ratio. The young-age dependency ratio is projected to increase moderately, rising by 1.9 points from 23.5 % in 2019 to 25.4 % by 2100. Instead, the old-age dependency ratio is projected to increase at a rapid pace through to 2045 reflecting the on-going process of retirement among the baby-boomers and subsequent aging population. Indeed, the old-age dependency ratio is projected to increase by 25.7 points from 31.4 % in 2019 to 57.1 % by 2100. While there were almost three persons of working-age for every elderly person in 2019, by 2100 this ratio is projected to be less than 2:1. The projection of the trend of the two dependency ratios are reported in *Figure 15*

Figure 15– Project age dependency ratios, EU-27, 2019 - 2100



Source: Eurostat

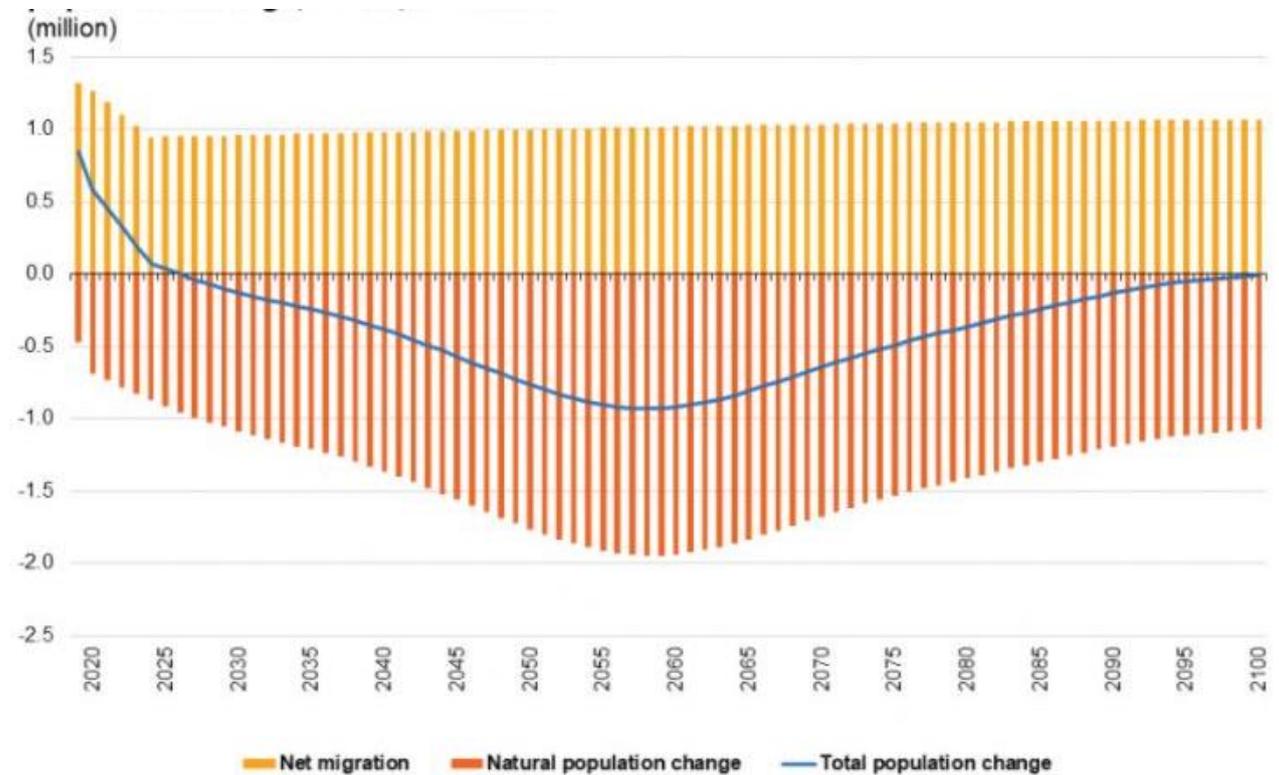
At EU level, over the entire period between 2019 and 2100, a higher number of deaths than live births are projected, resulting in a continuous negative natural change with different patterns of evolving.

In those EU Member States which are characterized by positive net migration, it is possible that the process of population ageing may be slowed down, as migrant populations are often characterized to have a high share of working-age persons. On the other hand, where there is negative net migration, the ageing process may be accelerated because those leaving the country may also tend to be relatively

young, thereby reducing the number of working-age persons in the population, while also reducing the fertility rate as well.

Figure 16 shows the contributions of natural population change and net migration to overall population change in the EU-27 during the period 2019 to 2100,

Figure 16 – Projected natural population change, net migration and total population change, EU-27, 2019 - 2100



Source: Eurostat

The net migration is expected to be positive over the entire period and to be the only component favorable to the population growth, but it is projected to be lower than in 2019 (1.3 million) all through the projections period. The natural change will

be negative over the entire period, and thus unfavorable contribution to the population growth. Over the period 2019 to 2100, Eurostat's projections suggest there will be 312.5 million births and 427.5 million deaths in the EU-27, equivalent to a net reduction of 115.0 million inhabitants as a result of natural changes in the population. The cumulated net migration is projected to contribute with an increase of 84.3 million persons, resulting in an overall decrease of 30.8 million inhabitants in the total population.

4.4 POSSIBLE SOLUTIONS TO THE EUROPEAN POPULATION DECREASE

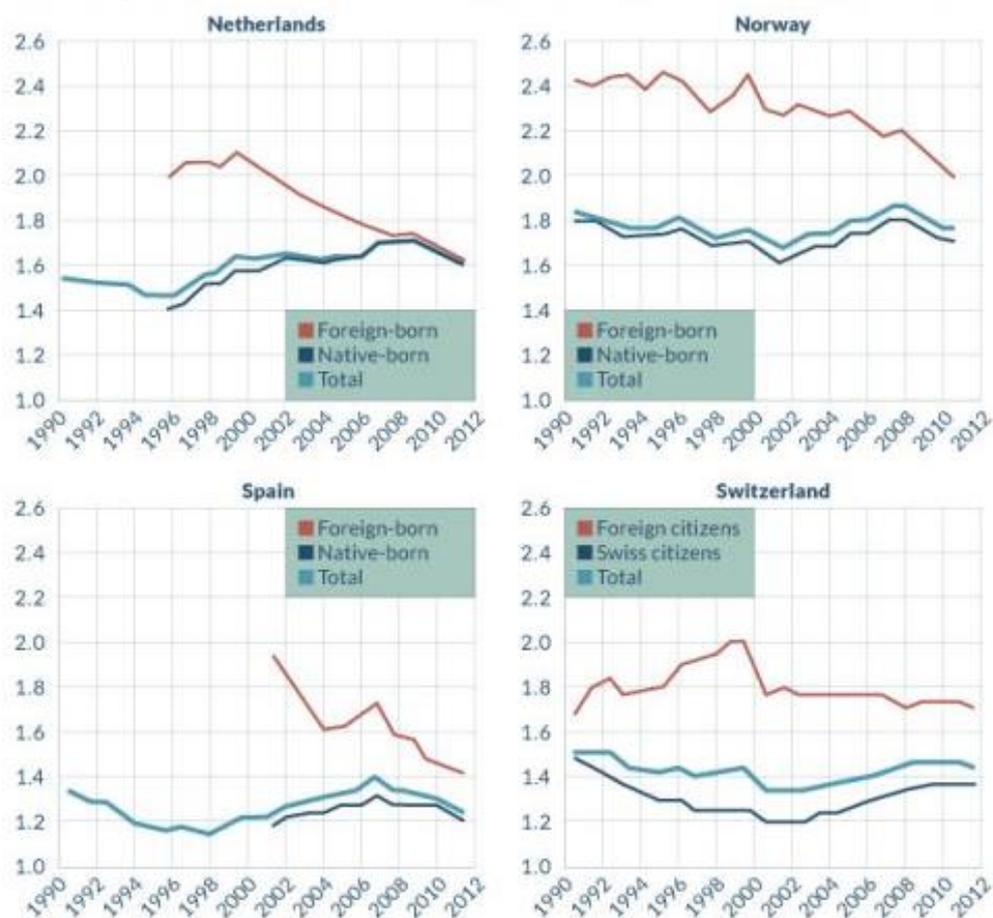
A much-debated issue when analyzing European demographic behaviors is precisely whether young immigrants arriving from countries outside the Union can replace lost births, that is, whether migration can act as a replacement. To cope with the dramatic demographic regression of the European population, several people are positive towards migration as a solution and mathematically speaking, migratory flows could actually compensate for lost in birth: the results of some simulations²⁴ carried out by combining the levels of both fertility and net immigration with reference to the European Union, show that the same elderly dependency rate would be reached with a total fertility rate equal to one and a

²⁴ Lutz 2003

migratory jump equal to 1,2 million entries a year or with a total fertility rate equal to 2,2 and a zero migratory balance. But not all are convinced that the optimal response to tackle the problems deriving from the fall in fertility and the aging of the population is migration, because some demographers think that this type of solution could lead to the exacerbation of some problems such as territorial segregation, unemployment and public disorder. Moreover, the flows of migrants necessary to close the serious gap in the countries of the Union are disproportionate to be concretely feasible. As we have seen in the previous paragraph, the expected migration for EU will not avoid the decrease of the population. According to Eurostat data as of 2018, only 2.4 million third-country nationals immigrated to the EU-27, of the 446.8 million residents in the EU-27 in 2019, foreign citizens were just 21.8 million (4.9%).

Furthermore, even if this enormous flow was feasible, the countries concerned would probably not be able to absorb such enormous flows. Moreover, it is true that immigrants immediately low the average age and to raise the TFR but in the long run the migrants stabilized within a state, tend to integrate and assume the same demographic behaviors of the host country; Figure 17 shows the convergence of immigrant and native- born women TFR in some European countries.

Figure 17 – TFR of immigrant and native-born women for the Netherlands, Norway, Spain, Switzerland, (1990-2012)



Source: European fertility Datasheet 2015

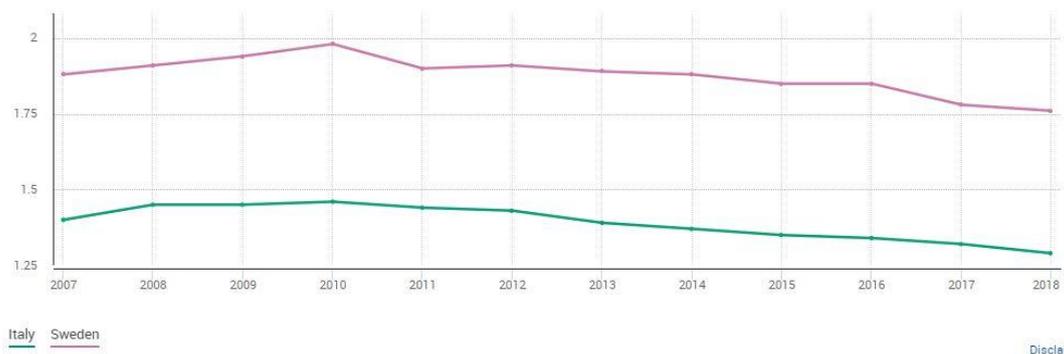
Thus, this type of solution would seem to be effective in the short term, but the problem would only be postponed. It might have been the optimal solution in case the decline was not of such great proportions, thus, rather than on migration it would seem more appropriate to focus on the reasons for such low Total fertility rate.

Even if increased gender equity is associated with lower fertility rates in developing countries, in the Western Europe and elsewhere gender equity is generally associated with higher fertility²⁵. In the industrialized world, the countries where incompatibility between work and childcare is reduced through more equitable parental leave and support policies, have higher fertility compared to the countries where there is less flexibility in work and slightly government support for childbearing.

The Western Europe can be distinguished in two different kinds of societies that are different in attitudes and public policies, the “nations of families” and “the nation of individuals”.

We can take as example of them Italy and Sweden of which we report the Total fertility rate in *Figure 18*

Figure 18 – TFR for Italy and Sweden



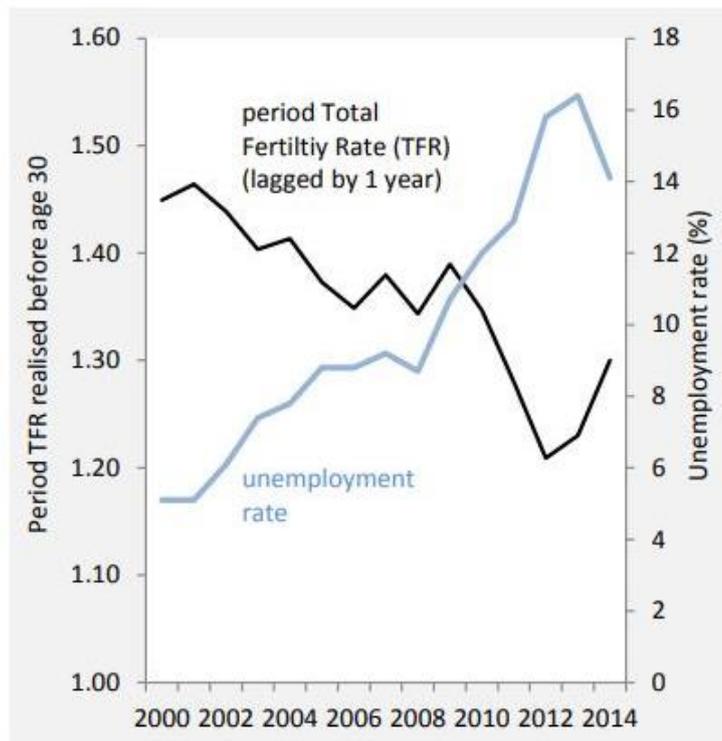
Source: Eurostat

²⁵ Chesnais, 1996

From the graph is clear that there is an important distance between the level of fertility of Italy and that of Sweden, almost 0.5 children per woman.

Italian exceptionally low level of fertility is mainly due to low adaption in equality of genders and the lack of social protection for children, but even to inadequate housing, high unemployment rates, rigidity of labour market (especially for women) and precarious job opportunities. *Figure 19* shows the close correlation of fertility trends with unemployment, especially in southern Europe, providing the example of Portugal.

Figure 19 – TFR and unemployment rate in Portugal, 2000-2014



Source: Sobotka T, 2018

Italian women have obtained an important improvement in education during recent decades and this led for them to higher expectations wishing to have other roles outside family domain, but the inadequacy of public support for families with children makes the standard of living of most of them markedly reduced with the arrival of each additional child. The reaction of young couples is the postponement of childbearing and the choice to have only 1 or eventually 2 children.

Instead, in the case of Sweden, we find a country that in contrast with Italy, never felt under a TFR of 1,6²⁶ so, the indicator is not as depressed as it is in the southern societies. The reasons are attributable to several mechanisms that have sustained fertility. Not by chance, Sweden presents the highest and long lasting female participation rates that is sustained and encouraged by public authorities, a large proportion of jobs held by women is part-time and this has limited the conflict between economic activity and fertility. Thus, in Sweden we find a pro-natalist and family-oriented government. Both parents became entitled by law to share parental allowances upon the birth of a child and the effect was the reduction of the opportunity cost of the child. Hence, direct support led Sweden to be a country where child upbringing is more equally shared between parents and between family and community, than in most other societies in Western Europe.

²⁶ As well as France and in UK

Swedish women (and other Scandinavian countries) enjoy the same status as men in all spheres of professional and domestic life and the consequence is that women are less reluctant on having more children.

It would therefore seem that a possible solution to the very low fertility rates, could be to achieve a higher status of women through policies. We talk about feminist paradox that in essence is that feminist and pro-natalism work together.

The role of the state is essential to elevate the status of women and alleviate the cost of childbearing.

CONCLUSION

The action of the factor of constraint on the demographic processes of the ancient regime has marked a precise path of the population in the centuries preceding the industrial revolution; the latter, together with the scientific progress have led the population to be less and less dependent on the forces of constraint; freer from constraints, world population increased by more than 10 times respect to the estimated size prior to the industrial revolution. The Demographic transition of the last two centuries has led to the strengthening of the population's capability to choose, thus, the main factor determining the size of the population is choice, so the contemporary regime begins. In more recent times, world's population growth has declined a lot mainly due to the protracted behaviors of developed countries with respect to natality, but also because of anti-natalist policies implemented in some developing countries.

For EU, the further decline of the already very low fertility would be a big problem, the lengthening of life risks increasing more than proportionally the years lived in poor health and lack of autonomy, moreover the EU-27 behaviors in demographics have had a negative impact on the economy since today the reaching of retirement age of these generations will increase the burden on the most recent and scarce generations, the alteration of the age structure determines a

strong deterioration of the relationship between productive and unproductive with a continuously increase of old-age dependency ratio.

For China are expected even more serious consequences than the UE, due to the drastic policies applied to reduce the high birth rate and the lack of time to adapt to important changes in the population structure. India, on the other hand, is developing in demographic conditions that allow it to sustain economic development. In US, the situation does not differ much from that of European Union and China, as since after the Great Recession of 2008, the fertility indicators have continued to go down, and because of the past pronounced baby-boom, the old-dependency rate continues to grow even for this world region.

What characterizes the last few decades of EU is therefore a demographic slowdown, the aging of the population is accelerating, and the union is closing in on immigration.

But as we have seen, the quantities of migrants needed to solve the problem are inapplicable because the EU does not have all these flows. Although migration seems to solve the problem in the short term, the behavior of immigrants in the long run tends to converge with that of the host country, this type of solution therefore seems to be only a temporary "patch". It would seem more appropriate that institutions of the member nations of the UE try to raise the number of births through direct financial support or other measures that allow to lower the opportunity cost of having children. The number of children that couples decide to

have is in part influenced by the present and expected economic conditions of the country where they live.

Therefore, the best solution would be the combination of these two options; but in an atmosphere of uncertainty such as the one created by Covid-19 pandemic, it becomes difficult to remain positive on the prospects of European demography, as in general, fertility increases if the foreseen resources or opportunities also increases, as well as decreases if negative forecasts for the future occurs.

With the pandemic, the constraint forces are making themselves felt again and have make the whole European demography even more vulnerable.

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