Ca' Foscari
University
of Venice

Master's Degree Programme

in

Economics and Finance, Curriculum: Finance

Second Cycle (D.M. 270/2004)

Final Thesis

Demographic Decline: an Overview and Causal Analysis

The Italian Case

Supervisor

Prof. Irene Mammi

Graduand

Christian Zugno

Matriculation Number 861313

Academic Year

2020/2021

Abstract

AFTER reviewing the demographic developments and projections for Italy, I review the literature on demographic theories before running a regression analysis on panel data for the Italian regions to determine possible contributing factors to the country's demographic decline and finally provide an overview on the policies that have been enacted by the Italian Government to counter this phenomenon, commenting them, where possible, based on the empirical results obtained and on further research. I find that the Italian Government has been taking steps in the right direction in the past decade with policies supporting working mothers, but is still biased towards the role of the mother as the parent responsible for childcare and does not provide adequate support to immigration.

Contents

List of Tables

List of Figures

1 Introduction

FERTILIY decline is an issue that is cyclically brought up in the news and in research but is a threat that has been constantly looming over developed countries since the post-baby boom years. Italy has historically been one of the countries majorly affected by declining birthrates and continues to see a progressive decrease and aging of its population, along with increasing life expectancy.

1.1 Demographic Trends

AN overview of the historical data is needed in order to paint a picture of the evolution of the population and of the reproductive trends in Italy. The data presented in this section are all sourced from the Eurostat database (Eurostat 2022a). The total fertility rate, defined as the mean number of children that would be born alive to a woman during her lifetime, reached a peak in 1964 at 2.65 and has been steadily declining ever since, with a slight bounce back in the period going from 1995 to 2010, before newly starting to decrease and attesting itself at 1.27 in 2019. This trend can be observed in Figure 1. Italy has thus fallen much below the "replacement level" fertility rate of 2.1, meaning that, not counting immigration trends, the population will not replace itself but will shrink.

The overall trend in the resident population during the last 60 years has mostly been an increasing one, except for a plateau in the growth from the 1980s to the early 2000s. The number of Italian residents has grown from around 50 million in 1960 to a peak of 60.8 million in 2015. The growth has progressively slowed down during the years, and in 2016 the population witnessed its first decline in the period considered by the dataset. The first

yearly decline was of less than 100 thousand people, but the number has been progressively growing and the decline has reached almost 400 thousand people from the start of 2020 to the start of 2021. This is shown in Figure 2. The median age of the population has also been steadily increasing, with a marked raise in its growth rate starting in 1980, as can be seen in Figure 3. It started at 31.2 years in 1960 and reached 47.2 years in 2020, denoting a marked aging of the population, which got older by 16 years on average.

The yearly number of live births reached its peak in 1964, going slightly above one million newborns. It then started a decreasing trend which slowed down and even reversed its course at times, albeit not significantly, in the decades going from the 1980s to 2009, before newly entering a trajectory of sustained decline reaching the 420 thousand live births recorded in 2019. The number of deaths meanwhile has mostly remained stable, only slightly increasing from a low of around 470 thousand in 1961 to the 634 thousand of 2019 mostly as a result of the increase in the resident population, as can be observed in Figure 2. The trends followed by live births and deaths are shown in Figure 4.

A significative statistic is the old-age dependency ratio. It is defined by Eurostat as the ratio of the number of elderly people at an age when they are generally economically inactive (assumed here to be the share of the population aged 65 or over), over the number of people of working age (assumed here to be the share of the population aged between 15 and 64) (Eurostat 2022b). The ratio started at a value of 14 in 1960, meaning that there were 14 individuals aged 65 and over for 100 people of working age. The first peak was reached in 1981 at 20.4, with a following short decrease that lasted until 1985. It then started steadily increasing, attesting itself at 36.4 today. This trend can be observed in Figure 5.

Another key statistic is the share of the population that is young, working age or elderly, which are defined respectively as the proportion of the population aged from 0 to 14, the proportion aged from 15 to 64 and the proportion that is at least 65 years old. Figure 6 illustrates how the population has been changing in this regard. In 1960 the younger share of the population represented almost 25% of the total, while the older generation represented less than 10% of the total. Nowadays, the number of young people has almost halved, reaching 13% of the total in 2020, while the older share of the population has more than doubled, attesting itself at 23.2%. The difference has compensated itself in the share of the working population, which has been hovering around 65% in the period considered by the dataset.

Figure 7 plots life expectancy, data for which are only available from 1985. During the entire period considered in the dataset, life expectancy in Italy has been consistently rising, even if its growth rate has been progressively slowing down. The average life expectancy in 1985 was 78.8 years and reached 85.7 years in 2019. A few dips can be identified in 2005, 2015 and 2017. The life expectancy of women proves to always be greater than that of men, which is due to a combination of biological and social differences, chief among which is the more physically demanding nature of the jobs in which men generally are majorly employed.

1.2 Demographic Projections

BASELINE projections of these statistics will now be presented. They provide a statistical prediction of how the demographic situation in Italy may evolve in the future, along with insights in the problems that the country will face given the current trends in the evolution of the population.

Starting with the projected Total Fertility Rate, a steady increase can be ex-

pected from 1.33 in 2020 up to 1.63 in 2100, as is shown in Figure 8. The effect of the increasing fertility rate does not come through in the resident population, for which a steady decline is projected which would bring the population down from 60 million to less than 51.5 million, as pictured in Figure 9. This is the result of population aging, resulting in a loss of reproductive potential (D'Addio and d'Ercole 2005), as can be observed in multiple projected statistics. The first is the median population age represented in Figure 10, which is assumed to increase from 47.5 years in 2021 to a peak of 52.2 in 2062, to which follows a steady but slow recuperation which would not, however, lead the country to a rejuvenation. The second is the total number of live births and deaths shown in Figure 11. While the number of yearly births is projected to continue to decrease until stabilising at around 400 thousand in 2054, the number of deaths, due to the aging population, is projected to progressively increase until reaching a peak of 842 thousand in 2059, up from 658 thousand in 2020. After 2059 it enters a declining trend which will bring it to a stagnant level of around 670 thousand yearly deaths. The third is the old-age dependency ratio, which is projected to rapidly increase from 36.7 in 2021 to 61.5 in 2049. A stagnation follows, before a slight increase with a peak of 63.7 in 2082, as pictured in Figure 12.

The results of population aging can be observed in the projected share of young, working age and older population. The share of the older population, as can be evinced from the three statistics presented above, is projected to increase from 23.4% in 2021 to 33.5% in 2047, oscillating around that value in the following years. The share of the young population is instead projected to remain more or less stable, with a median of 11.6%. The increase in the older population is instead due to a decrease in the working age population, which from 63.8% in 2021 is projected to plateau around 54% in 2047. This is the

reason of the increase and following stabilisation of the old-age dependency ratio. These data are shown in Figure 13. The aging problem made evident by these statistics is worsened by the projected steady increase in life expectancy from 81.3 years for males and 85.7 for females in 2020 to 89.6 years for males and 93.3 years for females in 2100, as represented in Figure 14.

The overall situation denotes a worrying demographic decline, with a decrease in the young population, accompanied by an increase in life expectancy. In the long run, this is projected to bring the population of Italy to a state where the elder population is going to place a significant burden on society through healthcare expenses, the social security system and their unproductivity due to both an inability to work, thus not contributing to the welfare system through taxes and a lacking the capability to remain up-to-date in an ever more globalizing and technology-driven economic scenario. That of the increased pressure on social security is an especially relevant one in the Italian case, given that the country adopts an unfunded pay-as-you-go pension system, where it is the active workers that pay the pensions. In such a system with a decrease in the share of the working age population the current minimum pension amount is likely to not be sustainable. Another issue is that of a shortage of specialised workers, such as doctors the number of which has already been reported to not be enough in 2019 (Di Pasqale, Stuppini, and Tronchin 2019).

These problems are caused by the slowing number of yearly births, which is projected to remain stagnant in the future. It is referred to as the “double aging problem” by Hondroyiannis, who writes that it may lead to a fall in average productivity. On the issue of productivity, he also references works by Modigliani, stating that “declining savings ratios, as the aging population might save less, might cause a period of slowdown until a new steady state is

reached, since a decrease in the rate of savings will reduce the stock of capital and the level of output" (Hondroyiannis 2010). In an interview released in a 2021 news article, the director of the Italian National Statistical Institute stated how in the long run the population decrease, which he states may very well be more dramatic than that pictured in Figure 9, could lead the Italian GDP to shrink as much as 18.6%, continuing by pointing out how the projected increase in life expectancy brings a longer future to each of us singularly but a shorter future to people as a collective (Marroni 2021).

1.3 Scope

THIS is an issue that needs more attention given its possible dire consequences for Italy and its inhabitants. In this regard, I am firstly going to provide an historical perspective of fertility decline by French historian Philippe Ariès, followed by a review of the seminal theories and models of fertility and the criticisms associated with each of them in order to review the theorised processes governing fertility and to gain insights on what scholars have identified as determinants of fertility decline. Having identified the most important factors contributing to the decline of the total fertility rate thanks to contributions made by the literature in both theoretical models and empirical analyses, using panel data of the 19 Italian regions and of its 2 autonomous provinces I will run a regression analysis in order to empirically establish the relationship between the identified variables and the total fertility rate in Italy in the period going from 2000 to 2019. Panel data has a number of advantages over time series data, among which is an increase in the sample size which leads to a more accurate inference of the parameters of the estimated model and an enhanced ability of capturing the complexity of human behaviour (Hsiao 2007). The multiple observations available for each region

also allow the inclusion of region-specific fixed or random effects, controlling for time-invariant and region-invariant characteristics which if omitted may bias the estimation (Hondroyiannis 2010). Finally, I will comment on the results and on the current status quo of the pronatalist policies enacted by the Italian Government, providing comments based on the literature and on the empirical analysis.

2 Historical Perspective

SOME first practical insights in the changes undergone by fertility behaviour in Europe are offered by Ariès in his 1980 article (Ariès 1980). In his view, fertility rates can be interpreted as signs which manifest what is hidden in people's subconscious and reveal a society's attitude of how life is lead and should be lead.

The Author identifies two initial developmental stages in different regions. The first took place between the 16th and the 18th century in Northwestern Europe, the area which would experience the 19th industrial revolution. Ariès writes that an increased level of control started to be exerted on the sexuality of young people, a control which materialised in delayed marriages and thus came to structurally lower fertility levels (Ariès 1980). He continues by saying that this was mainly the result of an increased level of self-control, even in lieu of the contrasting pressures exerted by society. During marriage, however, as far as conception was concerned couples were, as Ariès puts it, "resigned to surrender to impulses and destiny" (Ariès 1980). In the second stage, beginning at the turn of the 18th and 19th centuries, Ariès writes that starting from France and then spreading across Western Europe, the upper classes led the way in changing the view on how the family should be structured (Ariès 1980). This change consisted in the introduction of planned parenthood, where the number of children was not just left to fate, but planned by the parents (Ariès 1980). He further notes that how it is the shifting preference towards planned parenthood that increased the need for contraceptives, and it is not because of the availability of contraceptives that fertility began a decreasing trend (Ariès 1980). van de Kaa notes that it is indeed in France where the first ever recorded fertility decline was observed in 1830 (van de Kaa 1996).

Ariès continues by defining Western European society as progressively

shifting to a "child-oriented" society. In such a society, where children started to have an increasingly important role in the family, parents couldn't afford to leave their number to chance (Ariès 1980). As mentioned above, this sentiment started to develop among the upper classes, the objective of which was to maintain and further their social status. Ariès writes: "The parents' chief psychological and material investment consisted of helping the children to get ahead" (Ariès 1980). In order to achieve this goal, he continues, the number of children had to be planned according to the family's financial outlook. Limiting the number of children and focusing the family's resources on them helped the upper classes gain social mobility (Ariès 1980). Ariès cites an early work by Dumont in (Dumont 1890), where the author termed this phenomenon "social capillarity" (Ariès 1980).

Even though the high fertility family model persisted among the lower classes (e.g. factory or agricultural workers), Ariès continues, during the 19th to early 20th century, planned parenthood became more and more widespread, escalating the trend towards lower fertility (Ariès 1980). Contraceptive methods previously shunned became instrumental in the ever more important objective of social mobility; where before influencing nature by altering the reproductive act was unthinkable, the causal determinism philosophy allowed "the human body and sex [to] enter the world of technology" (Ariès 1980).

Ariès finds that the smaller family model beat the high fertility family model in Western Europe during the 1930s, however the established trend of declining fertility stopped temporarily in the 1940s and 1950s postwar period (Ariès 1980). He defines the "baby boom" as the result of another ideological change. Consumerism took the place of planning in an environment where insurance and prospects of endless economic growth "freed individuals of the obligation to worry personally about their well-being. [...] A family model

based on trustful modernity succeeded a model based on prudent modernity" (Ariès 1980). Ariès continues noting that, in this context, scaling the social ladder took a step back in the average family's priorities, which were now focused on the present, rather than on the future, allowing the lower fertility paradigm to change, even if only for a short time period (Ariès 1980). Women's role in the family started to be childbearing and housekeeping, which soon enough generated frictions among younger women (Ariès 1980). Quoting Ariès, "during the late 1950s and the early 1960s [...] People had totally forgotten the more than a century of declining birth rates and of birth control. They remembered solely the fertile days of the baby boom and the happy family. They talked as if the family and fertility had not changed since the beginning of time. Women were being urged to revolt against a fertility that was several millennia old" (Ariès 1980). He concludes that during this time, more reliable and effective contraceptive methods became widely available, such as the pill, which helped fertility trends revert back to those of the pre-baby boom times (Ariès 1980).

Ariès notes how one of the only facts of fertility research is that different epochs have given rise to different motivations to lower fertility: family planning, which started in the 19th century and the protests against the baby boom of the rebellious generation of the 1960s (Ariès 1980). Society has evolved from that time, and further theories attempting to explain the fertility decline can be explored. What I am going to do in the next section is going in depth in the theoretical side of fertility research, understanding the main schools of thought that have developed mainly during the 20th century century.

3 Overview of Fertility Theories

TO present the development of fertility theories that occurred during the 20th century, I'm going to base this section on two literature reviews. A less recent one, by van de Kaa (van de Kaa 1996), and a more recent one by de Bruin, (de Bruijn 2006). Singularly, but especially taken together, these two sources provide a comprehensive account of, and precious insights on, a field as complex, multi-faceted and cross-disciplinary as fertility research. van de Kaa quotes the original authors and provides a more complete narrative, while de Bruijn provides summaries and lays out research paper critiquing the theories and models presented.

3.1 Initial Research

LIKE in the historical perspective, also in illustrating the theories and models developed in the field of demography, and particularly in the branch of fertility, Western Europe is where the first studies started to be published. France, one of the first countries that started to be affected by fertility decline, is where Dumont first introduced the concept of "social capillarity" in (Dumont 1890), as mentioned in the previous section. van de Kaa writes that social capillarity, which intensified social climbing, had the side effect of leading to an excessive rise of "individual tendencies", which could be seen as aiding social development (van de Kaa 1996). Enke writes that a better educated population will contribute to further the economic growth of a country by taking people from the agricultural sector and employing them in other economic segments that have a more significant role in the development of a country, and thus of its people. The resulting lower birthrate, initially, will have also advantaged society at large by raising per-capita income, lowering

unemployment due to the increased demand for labour that would arise from a diminished workforce. He continues stating that it is also true that a family with fewer children gives each family member more potential consumption given the same income, even if it is unlikely that the increase in consumption would be completely realized and the remaining share of the income not used to support additional children would be saved and/or invested (Enke 1969). In the long run, however, even if social capillarity is a necessary condition for progress, also through a lower fertility, a continuous decline in births would lead a country to face different issues (van de Kaa 1996). van de Kaa references Landry, another french author, which in his 1909 paper (Landry 2019) proposed a theory which saw the increasing rationalization of behaviour as the main contributor in the demographic changes that had been happening in France (van de Kaa 1996).

3.2 Demographic Transition Theory

As van de Kaa writes, in the period following the Second World War, scholars with links to Princeton University took an interest in the work by Landry. In his 1909 paper, he described three stages in demographic development, which were picked up again by Thompson in his 1929 article (Thompson 1929) (as cited in van de Kaa 1996). Thompson was the first author to shift the point of view of fertility theory from one where the historical and ideational dimensions were the focus, such as in the earlier work by Dumont, to one where the modernization process and its economic consequences took the center stage (van de Kaa 1996). van de Kaa quotes Kirk: "Rapid population growth and the subsequent slowing of growth arising from control of family size are intrinsic elements in the nexus of cultural traits that are valued as 'progress'" (Kirk 1944) (as cited in van de Kaa 1996). It was, how-

ever, Notestein alongside Davis (Davis 1945; Notestein 1945), which put the "demographic transition theory" on the map (van de Kaa 1996). van de Kaa states that Notestein was the author that most comprehensively laid out the theory, which de Bruijn describes as follows: "The apparent process of demographic transition proceeds in the course of modernization and economic development from a situation characterized by high mortality and high fertility to one where mortality and fertility are low, via a stage with declining death rates and declining birth rates lagging behind" (de Bruijn 2006).

van de Kaa cites Notestein: "Growth came from the decline in mortality" caused by "the whole process of modernization in Europe and Europe overseas [which] brought rising levels of living, new controls over disease, and reduced mortality. [...] Any society having to face the heavy mortality characteristic of the pre-modern era fertility must have high fertility to survive. All such societies are, therefore, ingeniously arranged to obtain the requisite births. Their religious doctrines, moral codes, laws, education, community customs, marriage habits, and family organizations are all focused toward maintaining high fertility" (Notestein 1945). van de Kaa continues to cite Notestein, where he states that the decline in fertility is caused "primarily through rational control largely by means of contraceptive practices. It does not follow that contraception can be viewed as the cause of the declining birth rate in any profound sense" (Notestein 1945). He further states that contraceptive methods were not popularised due to this societal shift, but their usage increased "in response to drastic changes in the social and economic setting that radically altered the motives and aims of people with respect to family size" (Notestein 1945) (as cited in van de Kaa 1996). Summarising, it was not the availability of contraceptives to incite fertility decline, but instead it was an increased demand caused by societal shifts. van de Kaa identifies the changes mentioned by

Notestein in his research efforts as follows: "'growing individualism', 'rising levels of popular aspiration developed in urban industrial living', the function loss of the family, the expense of large families, the freedom from 'older taboos', and 'promoting the health, education, and material welfare of the individual child'" (van de Kaa 1996). Notestein concludes that "the reduction of fertility requires a shift in social goals from those directed toward the survival of the group to those directed toward the welfare and the development of the individual" (Notestein 1945) (as cited in van de Kaa 1996).

de Bruijn puts it in the following terms: "The classic representation of the demographic transition, as for instance sketched by Notestein, claimed that mortality declined in the wake of the industrial revolution, which brought material changes in the sense of agricultural innovation, better communication, higher productivity, and improved health conditions. Fertility was much less responsive to such modernization and its decline depended to a large extent on the collapse — following mortality decline — of ideational and normative systems that supported high fertility" (de Bruijn 2006).

van de Kaa proceeds to cite a 1964 speech by Notestein, then published in 1983 in "Population and Development Review" (Notestein 1983) which serves to complement the transition narrative: "'populations [...] entered the modern era with both the physiological capacity and social institutions required to elicit high rates of reproduction'. 'Marriage customs, family organizations, property systems, the means of attaining status, the systems of community rewards and sanctions, educational processes and religious doctrines are all organized in ways that promote nearly universal and fairly early marriage and high rates of marital reproduction. These institutions, customs, attitudes and beliefs are deeply rooted in long traditions. They represent the moral code, the normative order, which provides the non-rational cement of loyalty that

binds individuals into groups and binds the past to the present'. When controlling factors are no longer mainly institutional, but 'lie mainly in the area of rational choice by the couples involve' fertility will decline. The 'present period of population growth is mainly a by-product of a universal demographic transition arising from the nature of society and the modernizing process'" (van de Kaa 1996).

In the same 1964 speech, van de Kaa observes that Notestein seems convinced of his demographic transition theory being universally applicable (van de Kaa 1996). de Bruijn reports some observations made by Coale: "The power of the demographic transition concept [...] lies in the undeniable fact that with sufficient modernization fertility and mortality change in a predictable manner.", however, its weakness is "the difficulty of defining a precise threshold of modernization that will reliably identify a population in which fertility is ready to fall" (Coale 1973) (as cited in de Bruijn 2006). de Bruijn continues: "Coale and his associates from Princeton University had tried by means of a large-scale survey to identify the crucial variables that had determined the onset and pace of Europe's fertility transition. Their attempt failed in the sense that their study could not find any socioeconomic indicator of modernization that could unequivocally explain the occurrence of fertility decline in Europe" (de Bruijn 2006) referencing Watkins in (Watkins 1986).

de Bruijn points out that these findings were confirmed by a study on fertility transitions in 69 developing countries by Bongaarts and Watkins in (Bongaarts and Watkins 1996) and that there have also been numerous cases, the most notable being France, in which mortality decline has not necessarily preceded fertility decline as suggested by van de Walle in (van de Walle 1978) (de Bruijn 2006). He also writes that the study conducted by van de Walle in the paper (van de Walle 1986) found that "there is no statistical evidence for a gen-

eral trend in the sequence of mortality and fertility decline", further stating that, referencing van de Kaa in (van de Kaa 1996), "the exact causal relation between the decline in mortality and fertility remains difficult to establish" (de Bruijn 2006). Furthermore, he states how, according to Greenhalgh and McNicoll (Greenhalgh 1994; McNicoll 1994): "many descriptions and analyses of fertility within the perspective of transition theory exist in historic vacuums and are not guided by the notion that the specific histories of the social environment can bear much relevance to their fertility patterns" (de Bruijn 2006). de Bruijn also writes: "The suggested homogeneity and immobility of traditional societies — historic or contemporary — is indisputably refuted by the empirical demographic record, which shows a large variety of fertility patterns and levels" (de Bruijn 2006) referencing Blake in (Blake 1985). He finally stresses how transition theory could not "adequately cope with the significant (although temporary) post-transition, postwar reversal of fertility trends in a number of Western countries, which resulted in the 'baby boom' cohorts" (de Bruijn 2006).

Other authors have explained the link between mortality and fertility in ways differing from the transition framework. van de Kaa reports a paper by Ryder (Ryder 1983) in which he argues that "mortality decline disrupts the equilibrium in the traditional family, because it increases the ratio of sons to fathers and leads to a delay in the transfer of assets and rights from the senior to the junior generation" (van de Kaa 1996), noting how this could be a motivating factor for families to limit their offspring.

de Bruijn cites Greenhalgh: "the closer we get to understanding specific fertility declines, the further we move from a general theory of fertility transition" (Greenhalgh 1990) (as cited in de Bruijn 2006). The theory of demographic transition, however, still has a place in the general context of fertility

research. In this respect, de Bruijn reports a quote by Szreter: "The principal virtue and function of the idea of demographic transition has always been in providing a graphic metaphor that summarily describes — and predicts — a long-term overall emergent pattern of change. As such it has enormous justification, motivational, and communicative value for agencies and institutions wishing to effect change. But, [...] a summary description of this metaphorical sort offers no necessary assistance or insight into the causal explanation of how such change occurred or occurs in any particular case" (Szreter 1993) (as cited in de Bruijn 2006). He concludes stating: "What we need to explain and predict population development or design population policies is specific knowledge of particular settings and the mechanisms of social change and structure–agency interaction" (de Bruijn 2006).

3.3 Proximate Determinants of Fertility

WHEN describing the transition from a high fertility society to a lower fertility society, the main explanation put forward has been a newfound post-industrial revolution individualism and the increased availability of contraceptive methods, the means for acting upon the newly established ideals of a child-oriented society. de Bruijn phrases it as follows: "A notion often associated with the transition from high to low fertility is the idea that in the post-transition stage, fertility is under complete control of couples and individuals, whereas in the pretransition stage it is to a large degree left to biologic principles" (de Bruijn 2006). After the demographic transition theory was popularised, research started also to focus on the workings of fertility in pre-transitional populations, although, as de Bruijn notes, the concept had already been mentioned the earlier work of Landry (Landry 2019) (de Bruijn 2006). van de Kaa reports that the concept of "natural fertility", as it was de-

fined by Henry in (Henry 1953), became a topic of major interest in demography (van de Kaa 1996). He goes on to define the concept of natural fertility by referencing the original work of Henry: "[Henry] defined it as legitimate fertility in the absence of contraception and induced abortion. It is now generally understood to mean the pattern and level of fertility that results when couples do not adjust their behaviour depending on the number of children already born" (van de Kaa 1996).

Given the definition of natural fertility, de Bruijn writes that in the context of natural fertility "reproduction is determined by biologic principles, such as age at menarche, fecundability (the monthly probability of conception), time required for gestation, intrauterine mortality, and postpartum amenorrhea. In addition, fertility is determined by a number of social–behavioral factors, which are — at least from the point of view of the couples concerned — not intended to restrict childbearing. These factors might include marriage patterns (in particular as far as related to marital duration), spousal separation, (religious) rules for sexual abstinence in certain periods, and duration and intensity of breast-feeding, with its effects on the period of postpartum amenorrhea" (de Bruijn 2006). Referencing Blake in (Blake 1985), de Bruijn states that these factors are the reason why natural fertility is very different across societies (de Bruijn 2006).

van de Kaa writes that the main contribution of this branch of fertility research have been that "the biometric aspects of human fertility have been clarified (post partum amenorrhoea; period of susceptibility, etc.), standard natural patterns by age and duration of marriage have been described, and procedures developed which make it possible to assess differentials and the impact of deliberate control" (van de Kaa 1996).

A seminal contribution in natural fertility research was made by Davis and

Blake in (Davis and Blake 1956) where they, van de Kaa reports, "presented a limitative list of eleven intermediate fertility variables, all of which play a role in the chain of events that determine the exposure to the risk of conception and the outcome of a pregnancy" (van de Kaa 1996). Davis and Blake describe these factors as the ones "through which, and only through which, any social, economic and environmental variable can influence fertility" (Davis and Blake 1956) (as cited in de Bruijn 2006). This framework was then further developed by Bongaarts in (Bongaarts 1976, 1978), where "he quantified the impact of the most important proximate determinants. After collapsing Davis and Blake's variables into eight factors" (van de Kaa 1996), which de Bruijn reports were later condensed to seven (de Bruijn 2006). de Bruijn goes on to describe the model, which he defines as a "powerful model for analyzing how fertility changes over time or differs from one group to another: Any level of fertility in a population can always be traced to variations in one or more of the following determinants:

1. The proportion of women of reproductive age that is married (as a measure of the proportion exposed to sexual intercourse)

2. The use and effectiveness of contraception

3. Induced abortion

4. Postpartum infecundability (as primarily determined by the duration and intensity of breast-feeding)

5. The frequency of intercourse (including the effect of temporary separation and abstinence practices)

6. The onset of permanent sterility (particularly as related to menopause)

7. Spontaneous intrauterine mortality

" (de Bruijn 2006).

The next step in the development of the model, van de Kaa writes, was when Bongaarts "developed a simple equation which summarized the relationship between the four most significant intermediate fertility variables - identified as the proportion married, the degree of non-contraception, abortion, and lactational infecundability - total fecundity and total fertility" (van de Kaa 1996), allowing the determination of the total fertility rate. van de Kaa continues referencing Reinis in (Reinis 1992), who "concluded that both models performed well under the assumptions of random use of contraception and induced abortion. However, 'under more realistic conditions, the models did not perform well at all'" (van de Kaa 1996). de Bruijn points out another hurdle to face in the application of this model, citing Freedman, which is "the challenge of specifying the determinants of the proximate determinants" (Freedman 1986) (as cited in de Bruijn 2006).

Criticisms notwithstanding, research in natural fertility maintains a strong significance in demography. van de Kaa reports a quote from a 1959 article by Henry, the original proponent of natural fertility, in which he writes that natural fertility "shares in the prestige of the natural sciences, overshadowing that of the social sciences" (Henry 1972) (as cited in van de Kaa 1996). van de Kaa concludes stating that the concept of natural fertility provides a firm base in the discussion of the determinants of fertility levels and change (van de Kaa 1996). de Bruijn instead closes the topic on a warning note, stating how "infecundity and infertility in Western countries [...] have become increasingly evident [problems] with the generally observed rise in age at birth" (de Bruijn 2006), referencing a paper the paper by te Velde (te Velde 1992).

3.4 Economic Theories of Fertility

One of the most important ways in which scholars have tried to model fertility decisions are economic models. Referencing Knodel in (Knodel and van de Walle 1979), van de Kaa writes that the most significant models use a micro-economic approach (van de Kaa 1996), and "view [...] the number of children is the result of individual decision making within an economic context of income and prices", quoting de Bruijn, which also writes that this concept was first put forward by Harvey Leibenstein in (Leibenstein 1957) (de Bruijn 2006).

However, de Bruijn continues, it is the work of Gary Becker in his numerous contributions (Becker 1960, 1965, 1976, 1991) that has evolved the concept into a main avenue of fertility research (de Bruijn 2006). He writes that Becker "developed the consumer choice theory into what became known as the new home economics of the Chicago school. This micro-economic approach not only involves the traditional variables of income and prices, but also the quality of children and budget constraints in terms of allocation of time and opportunity costs" (de Bruijn 2006).

In this context, van de Kaa writes, "children are assumed to provide 'utility'. The utility from children is compared with that from other goods by way of 'a utility function or a set of indifference curves'. The more is voluntarily spent on a child, the higher will be the 'quality' of that child because the parents derive additional utility from the additional expenditure. [...] On the assumption that each family maximizes a utility function of the quantity of children, the expenditure on each child, - called the quality of children - ; and quantities of other commodities at specific cost, he arrives at a budget constraint from which the combination of children and goods that the household will select, given its full income, can be estimated." (van de Kaa 1996),

referencing the works by Becker cited above.

A number of assumptions are made in this model. Firstly, van de Kaa writes that "it is [...] assumed that all children in the family are of the same quality, that that quality is fully produced within the family in its own time using market goods and services, and against a unit cost of quality" (van de Kaa 1996), referencing (Becker 1991). de Bruijn adds that "the quality of children is assumed to be elastic with respect to income, whereas the quantity of children is not. This implies that the desired number of children may fall as income increases because the average cost per child may increase even faster" (de Bruijn 2006).

The main issue underlying the theory are the traditional micro-economic assumptions that have to be made in all models based on these kind of principles. The theory reveals to be, de Bruijn writes, "strongly individualistic, decontextualized, static, relying on a narrow, substantive notion of rationality, and without a sufficient degree of (psychological) realism. [...] With regard to the static nature of the new home economics, it can be observed that by and large economic analysis in demography does not allow for changes in preferences over lifetime as the result of learning and personal experience, and it assumes couples to have defined these preferences at the onset of marriage" (de Bruijn 2006). Most of all, these models assume that individuals are rational to a unrealistic degree, a concept widely refuted by research in behavioral economics, which has empirically found people to be affected by a number of heuristics and biases, which makes individuals at best boundedly rational (Kahneman 2003). de Bruijn continues stating that "the assumption that all children born in a family embody the same quality [...] is refuted by the empirical findings that the value of children may differ by parity", referencing (Bulatao 1981; Bulatao and Fawcett 1981; Namboodiri 1983), "and by sex" (de

Bruijn 2006), referencing (Koenig and Foo 1992; Miller 1981; UNICEF 1990). de Bruijn also points out that the theory also assumes an implausible degree of altruism and harmony between partners, given that the costs and benefits that children vary substantially when considering the male partner and the female partner, referencing (Bulatao and Lee 1983; Caldwell and Caldwell 1987; Fawcett 1983; Simmons 1985) and there is also often an absence of consideration for "the bargaining processes that settle possibly conflicting interests with regard to progeny" (de Bruijn 2006).

Continuing with the evolution of the economic models of fertility, van de Kaa writes that "the failure to anchor the 'consumer choice' demand-theory firmly in empirical data [...] led to various attempts to broaden its sociological and/or biological frame of reference" (van de Kaa 1996). In this respect, he writes that the first attempt was made by Shultz in (Schultz 1976), which "tried to incorporate child mortality into the model and discussed the role of preferences or taste" (van de Kaa 1996). A further issue with the Becker quality of children framework is the lack of supply considerations, given that only the demand side is analysed (van de Kaa 1996). In a seminal contribution by Easterlin, (Easterlin 1978b), he formulated a model, van de Kaa states, that would "combine demand and supply [...] to arrive at a 'synthesis' of the economics and sociology of fertility" (van de Kaa 1996). This became known as the "Easterlin synthesis", which de Bruijn describes as assuming "that all determinants of fertility — public health, education, urbanization, family planning programs, and so forth — work through the categories of the demand for children (depending on household tastes for children and alternative goods, income, and costs and benefits of children), the supply of children (reflecting natural fertility determinants like exposure and frequency of intercourse, postpartum amenorrhea, spontaneous intrauterine mortality, and sterility)

and the costs of fertility regulation (lumping together attitudes toward and access to fertility control methods and supplies, as well as the time and money required to obtain the birth control methods). Motivation to limit fertility only occurs if the supply of children exceeds their demand and the greater the excess of supply over demand, the greater this motivation" (de Bruijn 2006). In this way, the model incorporates individual opportunities and tastes (de Bruijn 2006). van de Kaa also reports that in a later publication, Easterlin published a model, along with Pollak and Wachter in (Easterlin, Pollak, and Wachter 1980) "which emphasized endogenous preferences and natural fertility" (van de Kaa 1996). In the model, he continues, "the determinants of fertility are seen as working through a family's preferences for consumption, children, and fertility regulation, and through four constraints:

1. a budget constraint that reflects the limitations implied by the market prices of goods and services, the wage rates of family members, any non-labour income, and the time at the disposal of household members;

2. the household's technology, which enables it to convert market goods and the time of family members into the basic commodities that are the arguments of its utility function;

3. a "births function" or "fertility production function" that expresses the number of live births as a function of frequency of intercourse, reproductive span of the household, fertility regulation practices, and the commodities, goods, and practices that govern the probability of conception and the non-susceptible period of the wife;

4. an "infant" mortality function that expresses infant and child mortality through adulthood as a function of such variables as health and nutrition.

Subtracting mortality from fertility gives completed family size" (van de Kaa 1996).

Easterlin continued to develop his model, formulating an extension to it, the so-called "Easterlin hypothesis" in (Easterlin 1978a, 1980) (van de Kaa 1996). van de Kaa describes it as a model assuming "that an individual's taste for goods, services and children is formed during socialization in the parental home. If couples and individuals find it difficult to achieve the standard of living they have come to regard as appropriate, they may delay marriage and childbearing and reduce family size. Cyclical demographic patterns may result if large cohorts succeed small ones and, as a consequence, are confronted with adverse labour market conditions and real wages well below their expectations" (van de Kaa 1996). This model may help explain fertility fluctuations, such as the post-Second World War baby boom, where fertility was declining before, then rose in the post-war period just to start declining again. This model has gained significant traction given that it is able to causally link a decrease in birth rate due to increased labour force participation and real income of women and an increased birth rate due to an increase in the real income of the husband (van de Kaa 1996).

Laying out criticisms towards the economic models of fertility, van de Kaa references Cleland and Wilson in (Cleland and Wilson 1987), where the authors found that the validity of demand models of fertility has been put into question by demographic developments (van de Kaa 1996). He also quotes Murphy, which concluded that even though they "may appear to provide firmer empirical validation than alternative apparently simpler methods, [...] these models are based on an incomplete operationalisation of the economic model, they are inappropriately fitted, and they contain internal inconsistencies" (Murphy 1992) (as cited in van de Kaa 1996). de Bruijn cites Pampel and

Peters in (Pampel and Peters 1995), which "conclude that the evidence for the Easterlin effect proves at best mixed and at worst completely wrong and that the degree of support varies across time periods, nations and level of measurement" (de Bruijn 2006). van de Kaa concludes stating that "even though the findings are mostly 'negative' [...] demographic ideas probably benefited more from the shortcomings identified as the formulation of the different models developed, rather than from their empirical results"; also, since "no other narratives of a non-biological nature have been tested as thoroughly and in any future attempt at synthesis, they will have to play an important role" (van de Kaa 1996). Overall, economic models have been beneficial to demographic research, even if not a conclusive solution to the issue of finding the determinants of fertility, they have provided precious insights in the field.

3.5 Diffusion and Innovation

In the research that followed the development of the theory of demographic transition one of the main issues identified was the impossibility of pinpointing a single socio-economic indicator that would trigger a change in the fertility patterns and bring a population from a situation of high to one of low fertility, de Bruijn writes, referencing (Watkins 1986) (de Bruijn 2006). In this scenario, he continues, "the incorporation of some concept of culture — especially perceived as a principle involved in the spread of ideas — seemed to provide a promising alternative" (de Bruijn 2006). This is how the concept of diffusion started to be a topic in the field of demography (Cleland and Wilson 1987; Retherford and Palmore 1983; Watkins 1986, 1987) (as cited in de Bruijn 2006).

de Bruijn continues: "The spread of ideas, behaviors, and techniques has often been found to follow the grooves laid down by sociocultural forces, such

as language, ethnicity, neighborhood, and workplace or channels of communication and exchange" (de Bruijn 2006), mentioning the population along rivers, migration routes or conversational networks. van de Kaa notes that there have been multiple articles that have suggested that the diffusion of the innovation of fertility regulation has had a reinforcing effect on the already present force of social change (van de Kaa 1996). He writes: "The simultaneity of the fertility decline throughout Western Europe and the weakness of its relation to developmental variables such as infant mortality or degree of urbanization, suggest a diffusion process" (van de Kaa 1996) referencing Watkins in (Watkins 1986). He continues by quoting Watkins, which found that in Europe during the transition process both "a reduction in the average number of children born to a couple [and] the adoption of behaviour by which childbearing terminated at an earlier stage in the couple's reproductive years" (Watkins 1986) were factors of change (van de Kaa 1996). She continues: "This innovative behaviour was adopted with great rapidity, compared to the long periods of the past when marital fertility was stable" (van de Kaa 1996) (as cited in van de Kaa 1996). However, when considering Europe, van de Kaa finds in the work of Guinnane, Okun and Trussel (Guinnane, Okun, and Trussell 1994) that "the claim of simultaneity is less convincing when one looks at more disaggregated data or at smaller areas" (van de Kaa 1996). He observes that "fertility decline in contemporary and historical populations frequently appeared to be only very weakly related to developmental factors, and tended to progress much more rapidly - particularly in homogeneous populations - than could be expected on the basis of such developmental factors" (van de Kaa 1996), a fact that, he continues, inspired Cleland and Wilson in (Cleland and Wilson 1987) to argue that innovation and diffusion should take the center stage in the transition process (van de Kaa 1996). van de Kaa also reports the conclusions

of their paper, in which they write that "the fact that family limitation in its modern form of parity-specific control was largely absent from traditional societies means that explanations of the transition must include innovation and the adoption of new ideas and forms of behaviour" (Cleland and Wilson 1987) (as cited in van de Kaa 1996).

Concluding the discourse on diffusion and innovation, van de Kaa writes: "Without careful specification of the nature of the innovation (is fertility regulation used to space births or to limit family size, or is it the application of a method which was latent for a long time, or of a new method, or is the innovation a sudden improvement in access or in method?) - quantification of the effects is likely to remain illusory. And even then, the effects of changes in means and methods will usually be indistinguishable from those which resulted from the ideational changes associated with it" (van de Kaa 1996). Referencing Greenhalgh in (Greenhalgh 1978) de Bruijn warns that "with respect to diffusion, Greenhalgh cautions against a too reductionistic approach focusing almost entirely on communication about birth control, while neglecting the exchange of a broad scale of perceptions on other issues relevant for reproductive behavior" (de Bruijn 2006).

3.6 Social, Ideational and Cultural Approaches

THIS section presents a collection of theories that "are not neatly classifiable as a disciplinary theory" (de Bruijn 2006), such as economic, like the Easterlin synthesis, or biological, like natural fertility. de Bruijn states that such theories came about after the "disappointment at failing to find the crucial determinants of fertility in socioeconomic indicators" (de Bruijn 2006), when studies started to focus on the cultural aspects of society, motivated by a series of papers like those of Anderson, Knodel and van de Walle (Anderson

1986; Knodel and van de Walle 1979) and the conclusions of the study conducted by Watkins and Coale (Watkins 1986) which stress the "importance of cultural factors as the major independent determinants of fertility levels and the onset of fertility decline" but fail to clearly define what is meant by "culture" (de Bruijn 2006). According to de Bruijn, culture is "usually claimed to stand for the shared and intergenerationally transmitted beliefs and evaluations about the world and people's place in it" (de Bruijn 2006), which is a definition that can help to establish a link between the various theories in this section.

Referencing Leroy-Beaulieu in (Leroy-Beaulieu 1896) van de Kaa writes that in 1896 he was the first who "argued that fertility decline was foremost a reflection of the changing moral order" (van de Kaa 1996). The most important contribution to demography emphasising a cultural approach, where culture in this case is "represented by the meaning of kinship and family" (de Bruijn 2006), is Caldwell's wealth flow theory which sees its origins in (Caldwell 1976, 1982) (de Bruijn 2006). Caldwell starts from the demographic transition theory, where Notestein states that fertility would decline after couples gained the ability to rationally control their reproductive behaviour and started implementing planned parenthood through the use of contraceptives. van de Kaa writes that "the proposition put forward by Caldwell is that the limits of economically rational behaviour are set by non-economic factors [...] The central point in his restatement of the demographic transition theory is that fertility decline will not occur before the wealth flow, which in traditional societies goes from children to parents, has been reversed, a condition which he does not expect to occur 'before the family is largely nucleated both emotionally and economically'" (van de Kaa 1996). He continues: "The wealth flow theory predicts that traditional familial production will always be char-

acterized as economically advantageous to high fertility. [...] It is only when a non-familial, commercial or capitalist mode of production becomes more important and the social function of families changes, that the net flow of wealth will be reversed, and the onset of fertility decline is likely to occur", a process strongly associated with modernization (van de Kaa 1996).

Another way to look at Caldwell's theory is that it is the diminishing economic utility of children that causes the reversal in wealth flow, triggering the fertility transition (van de Kaa 1996). van de Kaa writes that "the value of children cannot be measured solely in economic terms" but also needs to be looked at in relation to "social-demographic and psycho-social values" (van de Kaa 1996). A lot of research has been done on the value of children framework, which has been reviewed by Bulatao in (Bulatao 1980) where the four "value and 'disvalue' of children oriented strands [...] he reviewed were: fertility decline is the result of vanishing economic roles for children; as people's aspirations rise, fertility declines; the emergence of the conjugal family and the values and social relations connected with this family type produce fertility decline; and as cultural support for high fertility weakens, fertility declines. The direct evidence, taken from 23 country surveys, Bulatao concludes, supports the first strand most clearly. The second also receives good support, the third is confirmed in one sense but not in another, while the fourth – that weakening of cultural support accounts for the decline in the desire for children – is not supported by the data" (van de Kaa 1996). These results proved that the theory supports most strongly the waning economic role for children and growing aspirations caused by increasing individual tendencies as causes for fertility decline.

de Bruijn identifies a second line of thought in the socio-cultural contribution to demographic research coming from an article by Lesthaeghe and Wil-

son (Lesthaeghe and Wilson 1986). Referencing this article, he writes that "to arrive at reduced levels of fertility, there must be a favorable meaning-giving or ideational environment to direct the preferences and considerations that authorize the legitimacy of individual control over fertility as well as the desirability of smaller family sizes" (de Bruijn 2006). In this context "along with development, intrinsic personal needs will become increasingly important, a universal emancipatory tendency of individualization may be assumed to have its effects on fertility behavior" (de Bruijn 2006). This, in turn "may lead to a decline in fertility, but only if existing institutions that exert a pronatalist influence lose the legitimacy of their grip on individual decision making, and if socioeconomic conditions are such that the balance of subjective cost-benefit considerations is tipped toward smaller families", stressing "the importance of autonomous ideational shifts toward liberal and, especially, secular values" (de Bruijn 2006). van de Kaa quotes the same article by Lesthaeghe and Wilson, where they write that "the moral and ethical acceptability of fertility control is embedded in a much broader ideological development not necessarily concurrent with economic modernization" (Lesthaeghe and Wilson 1986) (as cited in van de Kaa 1996). He also points out how Cleland and Wilson find that, quoting their article, "the influence of new knowledge, ideas and aspirations [...] can spread independently of individual economic circumstances", thus "at least part of the explanations must lie in social or psychological elements, such as aspirations, knowledge, attitudes, or social norms, which are capable of rapid transformation" (Cleland and Wilson 1987) (as cited in van de Kaa 1996) implying that there is more at play than what is described in the initial transition and economic frameworks. Another observation in this regard is put forward by de Bruijn, which writes that "in most European countries fertility dropped below the level of mortality — where transition theory assumed

it to end" (de Bruijn 2006).

These ideas culminated in the concept of the "second demographic transition". van de Kaa, one of its main proponents along with Lesthaeghe in the paper (Lesthaeghe and van de Kaa 1986), describes the concept as being "the quintessential narrative of ideational and cultural change. What distinguishes the second from the first transition is precisely the overwhelming preoccupation with self -fulfillment, personal freedom of choice, personal development and lifestyle, and emancipation, as reflected in family-formation, attitudes towards fertility regulation and the motivation for parenthood. Rising incomes and the economic and political security which democratic welfare states offer their populations, have helped trigger a 'silent revolution'; a shift in a 'Maslowian post-materialist' direction where an individual's sexual preferences are accepted for what they are, and decisions on cohabitation, divorce, abortion, sterilization and voluntary childlessness are largely left to the discretion of the individuals and couples involved" (van de Kaa 1996). This confirms "the shift in motivation for parenthood identified by Ariès, and now part of the Second Demographic Transition. From child-orientedness to self-orientation, or, more popularly, from the King-child to the King-pair" (van de Kaa 1996), referencing (Ariès 1980). It is worth noting that with the second transition there has been a definite shift from a socio-economic to a socio-cultural view of demography, an opposite trend to that initiated by Thompson in his 1929 paper (Thompson 1929).

3.7 Final Remarks

BOTH the authors referenced in this overview of fertility research have put forward some considerations on the direction that this topic may take in the future and some concluding remarks.

Regarding the development of single unifying theory of fertility, van de Kaa writes that "there is every reason to believe that this process [of research] will continue and will lead to a further accumulation of knowledge. That it will, ultimately, lead to a single, consolidated narrative, fully satisfactory for all settings and for all time is, however, highly unlikely" (van de Kaa 1996). He also references Coale in (Coale 1973), where he provides a far-sighted view on the preconditions for marital fertility decline, which he finds to be "

- effective techniques of fertility reduction must be known and available;
- reduced fertility must be perceived to be advantageous;
- fertility must be within the calculus of conscious choice.

" (van de Kaa 1996). These three factors manage to provide a summary of "the biological / technical dimension, the socio-economic-structural dimension, and the cultural / ideational dimension" of fertility theory (van de Kaa 1996).

de Bruijn supports this view with different words: "although demography has yielded adequate descriptive instruments, the emerging vision is still insufficient" and "this may seriously impede development in areas in which demographic expertise is called on, such as the provision of sound population forecasts or the underpinning for efficient and effective population policies" (de Bruijn 2006). Supporting this idea, de Bruijn also quotes McNicoll: "[F]rom a distance, the process of fertility transition that accompanies social and economic development shows many similarities across major world regions [...]. Yet at closer range fertility transitions are idiosyncratic. Their course is influenced by the institutional endowments each society has inherited through its particular historical experience" (McNicoll 1994) (as cited in de Bruijn 2006). He further quotes Greenhalgh: "There is no single de-

mographic transition, caused by forces common to all places and all times. Rather, there are many demographic transitions, each driven by a combination of forces that are, to some unknown extent, institutionally, culturally, and temporally specific" (Greenhalgh 1990) (as cited in de Bruijn 2006). Both these two scholars "view institutions as social constructs that are constantly being made, remade and possibly dismissed in processes of negotiation and individual action" and are pioneers of a new institutional approach, which "seeks situational and path-dependent specificity, and is sensitive to cultural interpretations and the interaction between structure and agency" (de Bruijn 2006). In this context, Barker defines structure as "recurrent organization and patterned arrangements of human relationships", and agency as "the socially determined capability to act and make a difference" (Barker 2003).

4 Identification of Variables

As is clear from the discussion of fertility theories in the previous section, there is no general consensus on an overall theory of fertility incorporating all the characteristics of fertility behaviour detailed in the various research efforts to determine a model of fertility change and the variables at play in such a model. Each theory explored in the previous section has been subjected to significant criticism, highlighting them as an incomplete approach to the study of fertility. de Bruijn judges the state of fertility research as insufficient (de Bruijn 2006), while van de Kaa doubts that a universally applicable consolidated model of fertility will ever be formulated (van de Kaa 1996). Greenhalgh and McNicoll find fertility transitions idiosyncratic and driven by forces that are unique to the places and times they occur in (Greenhalgh 1990; McNicoll 1994).

Based on these conclusions, I deemed appropriate to follow an empirical route, complementing the theoretical findings and drawing from them the explanatory variables needed to set up the most appropriate regression equation in order to determine their effects on the total fertility rate in Italy. In addition to the more general fertility theories reviewed in the previous section, I will also refer to other research papers, also empirical in nature, which went more in-depth and touched upon more recent societal developments in the way of life of the last decades, providing insights that should be taken into consideration. I will now review the variables I identified in the literature, citing the works supporting their role in the determination of fertility behaviour. Since regional panel data for Italy for all the variables considered is only available in the period going from 2000 to 2019, the illustrative graphs provided in this section will only be including data from that time period, with two exceptions made necessary by further considerations that will be explored when

discussing the results of the analysis. All the data collected and presented in this section comes from the Eurostat database (Eurostat 2022a).

4.1 Infant Mortality Rate

A first variable that stands out is infant mortality. The decline in mortality is a cornerstone of the first demographic transition, in which it is linked to it an increase in living standards and set as a prerequisite for high fertility in traditional societies; it is also seen as a possible contributor in triggering the societal shifts that made low fertility a structural phenomenon (van de Kaa 1996). Infant mortality has also been considered a contributor to fertility decline in other scenarios, such as that defined by Ryder which sees it as initially increasing the number of sons, thus diluting intergenerational wealth and incentivising families to limit the number of children in order to counter this phenomenon (Ryder 1983) (as cited in van de Kaa 1996). Hondroyiannis writes that the modern economic theory of population "suggests that when fertility is low, further reductions in it are likely to reduce fertility and survival-enhancing expenditures on children", and cites Sah in (Sah 1991) which finds that "when parents have a target fertility level and are sufficiently risk averse, then better survival opportunities for their children tend to reduce fertility" (Hondroyiannis 2010).

The variable considered in the analysis is the infant mortality rate, defined as the number of deaths of infants (children younger than one year of age at death) per 1000 live births. As can be observed in Figure 19, after a rapid but progressively slowing decline, the infant mortality decreased from 43.9 deaths per 1000 newborns in 1960 to 3.4 in 2004, then mostly stagnating, reaching 2.8 in 2018. A positive impact of infant mortality rate on the total fertility rate is expected since multiple authors have shown that "when the probability

that a child survives to adulthood decreases, the parents may wish to replace them in their fecund period" (Sah 1991; Whittington, Alm, and Peters 1990), which also predict infant mortality to have a positive sign, alongside Cigno in (Cigno 1998) (as cited in Hondroyiannis 2010).

4.2 Level of Education

ANOTHER variable having a role in the literature is the level of education. Mentions of the role of education in shaping fertility trends go back to the first demographic transition theory, which sees it as a part of the transition process. This is because increased modernity is supposed to promote the welfare and development of the child as an individual, through nursing and education in order to further social capillarity (van de Kaa 1996). Education may also play a role in the Easterlin hypothesis in shaping the expected life style of the family, which if better educated could desire a better standard of living not attainable having to share the family resources with additional members (children). It is also part of the wider ideational change that took place in the last century and which is at the center of the second demographic transition, with increasing aspirations of self-fulfillment and knowledge (D'Addio and d'Ercole 2005). A number of studies focus specifically on the education of women. An OECD working paper points out how women's education before the 1990s had a detrimental role to fertility in OECD countries, which however reversed and now shows a positive effect. Supporting this statement, the report empirically finds that fertility decline, even if it is pervasive throughout all educational levels, affects lesser educated women more than it affects other women. It further notes how "better educated women are also more aware of health problems and contraception technologies and thereby more capable of avoiding undesired pregnancies and births" (D'Addio and d'Ercole 2005).

The variable I have decided to include to account for the effect of education is female share of the population who has attained a tertiary level education degree, as defined by ISCED 2011 levels 5 through 8. The evolution of both male and female education is shown in Figure 15. The trend for both is of growth, but the main noteworthy feature of the evolution in this data is that in 2004 the proportion of females in tertiary education overtook that of males, and the gap continued to widen for the following years. The share of females with a tertiary education went from around 10% in 2000 to 22.4% in 2019, more than doubling in less than 20 years. According to the research cited, the sign associated to the educational level of women is expected to be positive.

4.3 Labour Force Participation

POINTED out by the OECD report is also a very significant link between the level of female education and the level of participation of females in the labour force. The report finds that "the male breadwinner model is no longer dominant in several OECD countries", and that there is not a consistent conclusion on the role of female labour force participation in determining fertility rates (D'Addio and d'Ercole 2005). Empirical evidence however shows that women with no children tend to participate more in the job market, which may be explained by the challenges faced by women when combining work and childbearing (D'Addio and d'Ercole 2005). A report on the link between women's employment and fertility in relation to education by Massimiliano Bratti also helps to shed light on the significance of this variable. He compares two theoretical models by Cigno (Cigno 1991) and Murphy and Welch (Murphy and Welch 1992) which, however, reach different conclusions on the outcome of a higher female labour force participation (Bratti 2003). Given these conclusions, he looks at empirical findings by Colombino and Di

Tommaso (Colombino and Di Tommaso 1996) and Di Tommaso (Di Tommaso 1999), which identify an indirect effect of labour force participation on fertility through an increase in wages and a postponement of childbirth, which both have a detrimental effect on childbearing decisions (Bratti 2003). In the empirical analysis Bratti conducts in his paper, he confirms a reinforcing effect of education on labour force participation and also sees a career planning motive having a role, given that if a woman is forced to interrupt his career due to a pregnancy, the consequences would reflect in a lowering of the accumulation of human capital, which is detrimental to fertility intentions (Bratti 2003).

The proportion of females in the labour force, defined as the number of female workers over the total workers, is the variable representing this possible determinant of the total fertility rate. It is pictured in Figure 16, which shows an increasing trend, starting from 36.5% in 2000 and slowly growing to 42.7% in 2019. Hondroyiannis summarises the effect of female labour force participation, writing that "female participation in the labor market and child rearing are competing claims on scarce time. If the woman devotes most of her time to market work, then she will decrease the time devoted to children since the opportunity cost of children increases. Hence, the increase in female participation in the labor market [...] will decrease fertility decisions" (Hondroyiannis 2010), meaning that the sign is expected to be negative.

4.4 Childbearing Postponement

FEATURED strongly in the paper by Bratti is the postponement of fertility decisions, which he finds to be at least partly influenced by the increasing level of education (Bratti 2003). The OECD report observes that postponement is one of the main elements of the second demographic transition

and sees it as one of the main motivations for the fertility decline (D'Addio and d'Ercole 2005). It finds childbearing postponement to be linked with the increased individualism, aspirations and labour force participation of women (D'Addio and d'Ercole 2005). In order to achieve their self-fulfillment goals, women may delay childbearing in order to be able to pursue a career, reach financial independence or maintain a certain lifestyle that could not be attainable in the presence of a child (D'Addio and d'Ercole 2005). It further notes how in every OECD country, in which Italy is included, "recent generations of women have fewer children at early stages of their reproductive cycle and more children at later ages [which] does not fully compensate for the lower number of children that women have when young" (D'Addio and d'Ercole 2005). Also "an increase in fertility rates of older women in one period that exactly matches the decline of younger ones in the previous decade may leave the total fertility rate below the level that prevailed before the onset of postponement" (D'Addio and d'Ercole 2005). The report continues to list the consequences of postponement, which directly affect the total fertility rate. The first consequence pointed out is that "when mothers have their first child in their 30s, the time left to have other children is cut by half relative to those who had their first children in their 20s" (D'Addio and d'Ercole 2005). Supporting this, it includes empirical data showing how in the period considered by the data used in the report, "the share of children of order 4 or above (i.e. children with 3 or more brothers and sisters) has almost halved", with declines of a lower entity also observed in the number of children of order 3, and an increase in children of order 2 and 1 (D'Addio and d'Ercole 2005). This clearly marks a shift in the childbearing behaviour of women. The report remarks on the risks of postponement, chief of which being that it "increases the probability that women remain childless, or that [women] have

fewer children than desired" (D'Addio and d'Ercole 2005), however there are also health risks. "Older mothers are more prone to chronic conditions such as diabetes and chronic hypertension, whose incidence is 7 and 9 times higher for women aged 40-54 than for those aged less than 20", which increases the risk of miscarriage "by 50% among women aged 42 relative to women aged 20. [...] Some health problems of infants, such as Down's syndrome, heart malformation and other chromosomal anomalies, increase with maternal age (e.g. the incidence of the Down's syndrome is 14 time higher for births to women aged 40-54 than to women aged less than 20" (D'Addio and d'Ercole 2005). There is also evidence that complication at the time of birth are more frequent in older women (D'Addio and d'Ercole 2005).

Due to the amount of evidence, both theoretical and empirical, of the detrimental effect of childbearing postponement, in the model I have decided to include the median age of women at childbirth. It is plotted in Figure 18, which shows that it increased from around 31 years in 2000 up to 32.5 in 2010, showing a very slow growth after that point. According to the research, the sign of the variable is expected to be negative.

4.5 Income Level

THE income level, or wage, is a further variable that has been shown to have a significant role in shaping fertility trends in the literature. An increase in wage is associated to an increase in education, which is confirmed by looking at Figure 17. It can be observed how the real compensation per employee has been rising from almost €25,000 in 2000 to close to €33,000 in 2018. The effect of wage was already posited by Becker as a constraint in the utility maximisation carried out by families in the determination of the optimal quantity of children (van de Kaa 1996). The Easterlin hypoth-

esis also sees real income of women as having a negative effect on the birth rate and income is also seen as a trigger of change in the second demographic transition theory (van de Kaa 1996). Bratti finds that for "highly educated women an early withdrawal from the labour market is costly [...] in terms of current opportunity costs (i.e., wages), [and they] might decide to give birth when their current incomes are relatively higher [...], which usually happens at older ages given the steeper wage profile for high skilled jobs" (Bratti 2003), providing a link between education, wage and postponement. Furthermore, he references Colombino and Di Tommaso in (Colombino and Di Tommaso 1996), which also support the view that an increase in wage caused by an increased level of education has a positive effect on labour force participation and a negative effect on fertility intentions (Bratti 2003). The OECD report highlights how "the aggregate relation between income levels and fertility rates is [...] ambiguous, and will also depend on how income is distributed across households" (D'Addio and d'Ercole 2005). Hondroyiannis references Becker in (Becker 1991), writing that "declining fertility rates can be explained by a negative effect of a higher price of having children, due to increasing wages for women, outperforming the positive effect of a higher income on the demand for children", defined respectively as the substitution effect and the income effect (Hondroyiannis 2010). In this context, the income effect is the increased demand for children caused by an increase in household income, while the substitution effect it the increased "quality" that higher-earning parents will expect from children, which would reduce the number of children in favor of allocating more resources to fewer of them (D'Addio and d'Ercole 2005). Hondroyiannis suggests that the income effect can be proxied by the real per capita income variable, GDP per capita, while the substitution effect can be proxied by the real wage variable, the real compensation per employee, de-

fined as the total compensation of employees divided by the total number of workers (Hondroyiannis 2010). In the analysis I have decided to follow this suggestion and include both these variables. GDP per capita is plotted in Figure 17, in which an increasing trend can be observed, save for some oscillations in the years following the 2008 financial crisis. In the period 2000-2019 it has increased from €21,800 to €29,700. According to the theory and to an empirical study by (Yilmazer 2008) (as cited in Hondroyiannis 2010), the sign of the income variable, GDP per capita, is expected to be positive, while the sign for the real wage variable is expected to be negative.

4.6 Part-time Work

RELATED to labour, the OECD report points out the role of part-time work in the determination of childbearing decisions. They find that in 2000 fertility rates were higher where in the OECD countries where higher share of women held part-time jobs (D'Addio and d'Ercole 2005). In her 2008 paper, Melinda Mills also suggests the relevance of more flexible work arrangements in influencing fertility (Mills 2008). Hondroyiannis further supports part-time work as an institutional variable that may affect fertility decisions (Hondroyiannis 2010). The increased time made available to women if they are presented with the choice of part-time work arrangements could tilt the scale towards the choice of having a child. Having to pay less for childcare facilities and having more time to nurture a child in his/her formative years while still being granted the possibility of earning an income and supporting the family is a factor that has a chance to positively impact childbearing decisions.

I have thus decided to include the share of part-time workers, defined as the number of part-time workers over the total number of workers, in the

analysis. This variable proxies the propensity to accept part-time work as an employment option. Its historical evolution is represented in Figure 16, which shows a slow but sustained increase, starting at 8.5% in 2000 and reaching 18.2% in 2019. The effect on the total fertility rate is expected to be positive.

4.7 Unemployment

THE last labour related variable identified as a possible contributor to fertility intentions is unemployment. Hondroyiannis writes how a higher unemployment is a source of uncertainty for a family, given that their livelihood depends on the income generated from labour (Hondroyiannis 2010). He continues: "any type of uncertainty in the labour market [...] will prevent child bearing since economic uncertainties induce doubts about households' future economic position" given that "responsible parents will decide to have children when they are able to support them", also stating that unemployment "creates term-limited contacts and unstable employment situations which are the main forces behind the postponement of childbearing" (Hondroyiannis 2010). The OECD report finds that "when unemployment is high, youths may decide to remain in the parents' home, or to stay longer in schools, both of which contribute to postponing partnership formation and childbearing. However, unemployment may also increase fertility rates, as each woman may expect a lower probability of finding jobs and lower wages, both of which reduce the opportunity costs of childbearing" (Hondroyiannis 2010). It notes how in OECD countries the correlation has been negative, meaning that total fertility is higher in countries with lower unemployment (D'Addio and d'Ercole 2005).

As a proxy for uncertainty, the unemployment rate is included in the analysis. It is plotted in Figure 16, displaying a decline from 8.3% in 2000 to 4.9%

in 2007, then rising after the 2008 financial crisis, reaching a peak of 10.6% in 2014 before starting to decrease and attesting itself at 8.7% in 2019. Unemployment is expected to have a negative effect on the total fertility rate.

4.8 Marriage

A last relevant factor identified in the literature is marriage. As Ariès notes, historically the institution of marriage has been the only one in which childbearing was socially accepted and incentivised, and he views the delay of marriage as one of the reasons of a structural decline in fertility levels before the 19th century (Ariès 1980). The assumption of marriage being the only childbearing institution continued in the research conducted up to the second demographic transition theory, which put ideational changes at the forefront of fertility discussion. In this framework, cohabitation with childbirth started to become a more popular living arrangement between couples due to modern contraceptive methods an abortion laws (van de Kaa 1996). In an article analysing the role of marriage in the Italian society, Rosina and Fraboni reference Lesthaege in (Lesthaeghe 1995), one of the main proponents of the second demographic transition theory, which wrote that in the mid 1990s Mediterranean countries were still at the beginning of the second phase of family change, late compared to other western countries (Rosina and Fraboni 2004). Following Scandinavian countries, Italy would be bound to question marriage through a diffusion of informal unions and extramarital births (Rosina and Fraboni 2004). They also reference Becker in (Becker 1991), according to which education level and work opportunities for women have increased, reducing the convenience of marriage, given that the value they get in investing in themselves is greater than in their roles as wives and mothers (Rosina and Fraboni 2004). They posit that the decrease in marriages

can be seen as a way to manifest one's own freedom against conventions, and the ideational changes characterising the second demographic transition such as "secularism, the emancipation movements, the spread of post-materialist values (such as personal development and self-fulfilment), the scepticism towards institutions, and the increased impatience towards external interference in one's own life (particularly from any form of authority) are all aspects of a transformation in values which have lead the individual to choose according to his[/her] own free will which is the most adequate way to live his[/her] own life" (Rosina and Fraboni 2004). They finally add that the second demographic transition theory suggests that European countries have experienced a common process of transition, rendering the differences between them temporary (Rosina and Fraboni 2004). This is what has been transpiring in the data. While in 1995 the EU average proportion of live births outside marriage was 21.6%, in Italy it was almost one third at 8.1% as shown in Figure 20. From 1999, however, the percentage has seen a rapid growth, reaching 35.4%, on its track to equal the EU average of 42.7% given the high growth rate of out-of-wedlock births in recent years.

To account for the effect of marriage on the total fertility rate, the crude marriage rate has been included. It is defined as the total number of marriages in a year over the total mid-year population multiplied by a thousand, and can be interpreted as the number of marriages occurring in the population during the year per thousand inhabitants. The effect on the total fertility rate is assumed to be positive, given that "[m]arriage agreements are based on anticipated gains from cooperation between individuals [which] are positively related to fertility, since children offer benefits to the household" (Hondroyiannis 2010) and also taking into account historical evidence.

5 Empirical Analysis

5.1 Data Description

THE empirical analysis was carried out using unbalanced panel data for the 19 Italian regions and 2 autonomous provinces (in Italian "province autonome", abbreviated P.A.) sourced from the Eurostat database (Eurostat 2022a) for the period going from 2000 to 2019. The dependent variable is the total fertility rate (TFR) defined as the mean number of children that would be born alive to a woman during her lifetime, while the explanatory variables are:

- the unemployment rate (UNE), defined as the number of people unemployed as a percentage of the labour force. The labour force comprises the economically active population, excluding children, students and pensioners and includes both employed and unemployed persons;
- the share of part-time workers (PTW), defined as the number of part-time workers over the total number of workers;
- the real compensation per employee (RCE), defined as the total compensation of employees divided by the number of workers;
- the GDP per capita (GDP);
- the median age of women at childbirth (MED);
- the proportion of females in the labour force (FLF), defined as the number of female workers over the total number of workers;
- the share of females in tertiary education (FTE), defined as the share of females who has attained a tertiary level education degree, as defined by ISCED 2011 levels 5 through 8.

All the variables are expressed in logarithmic form. The lack of the infant mortality rate and the crude marriage rate will be addressed in the section presenting the results of the analysis.

Summary statistics (mean and standard deviation) are displayed in Tables 7 through 9. Table 7 presents summary statistics for TFR, UNE and PTW. The average TFR is of 1.33, with the highest being in Bolzano and Trento, two of the most well-off areas in Italy, at an average of 1.62 and 1.52 and the lowest in Sardegna and Basilicata at 1.09 and 1.19, both ranking among the less-advantaged regions. The average UNE is 8.17%, but a stark contrast can be noticed between the northern and southern regions of Italy, with the lowest unemployment being again in Bolzano and Trento respectively with an average of 2.52% and 3.81% and the highest being in Calabria, Sicilia and Campania, with an average of 16.04%, 15.42% and 14.89%. As regards PTW, the average is 14.25% and yet again Bolzano and Trento come out on top with an average of 20.43% and 17.39%. The lowest PTW can be observed in Basilicata and Campania, with an average of 11.26% and 11.28%. The north-south divide in this case is not as strong as in other variables.

Table 8 shows summary statistics for RCE, GDP and MED. RCE is the highest in Bolzano and Lazio, which respectively show an average compensation of €35,660 and €34,060, and the lowest in Molise and Sardegna at an average of €23,540 and €23,870. Next is GDP per capita, with an average of €26,230. Again Bolzano tops the rank, followed by Valle d'Aosta at an average of €39,550 and €35,600 respectively, while the lowest can be observed in the less industrialised south, where it is an average of €16,020 in Calabria and of €16,810 in Sicilia. The average MED is of 32.2 years. The regions where women give birth latest are Sardegna, Lazio and Liguria with an average of 33.2, 33.0 and 32.9 years respectively, while childbirth earlier in life is

seen in Sicilia at an average of 30.9 years, Campania with an average of 31.0 years and Calabria with an average of 31.2 years. Among the richest regions an honourable mention goes to Bolzano, which has the lowest median age at childbirth at 31.9 years, even if the difference among regions is not very significant in this case.

Finally, Table 9 displays summary statistics for FLF and FTE. FLF has a regional average of 40.29%, but again shows a significant north-south divide. The most women are employed in Emilia-Romagna and Valle d'Aosta with an average proportion of females in the labour force of 45.10% and 44.56%, while the least women are employed in Campania and Puglia with an average of 32.88% and 33.06%. Average FTE is 15.89%, the highest is observed in Lazio with an average 20.57% and Emilia-Romagna with an average of 20.34%. Meanwhile the lowest share of university-educated females is seen in Puglia, at an average of 12.41%, and in Sicilia, at an average of 12.59%. This is the only statistic where Bolzano does not come out on or almost on top, with an average FTE of 13.30%.

5.2 Methodology

THE equation for fertility to be estimated can be written as follows:

$$TFR = f(UNE, PTW, RCE, GDP, MED, FLF, FTE) \qquad (1)$$

where the total fertility rate (TFR) is a function of demographic and economic variables. As Hondroyiannis writes, Equation 1 "can be considered as demand for children equation. In the microeconomic framework the demand for children is considered as depending on the household's subjective preferences for goods and children externally determined by constraints of prices and income in a way that the household maximizes satisfaction" (Hondroyiannis 2010).

The theoretical framework adopted is thus that of Becker in (Becker 1991), and is integrated with contributions from other authors aiding in the individuation of possible determinants of fertility.

The first test run on the data has been a unit root test in order to assess the order of integration of the variables in the panel data setting. The tests used are the Levin, Lin & Chu t-test (LLC), as defined in (Levin, Lin, and Chu 2002) and the Im, Pesaran and Shin W-test (IPS), as defined in (Im, Pesaran, and Shin 2003). There are a number of issues with these tests given the dataset that is being used. First, these tests assume cross-sectional independence, which cannot be assumed for this dataset, and second, in the dataset $T = 19$ which can be classified as a small period dimension. Quoting Baltagi: "for small T, panel unit root tests have low power and there is the potential risk of concluding that the whole panel is nonstationary even when there is a large proportion of stationary series in the panel" (Baltagi 2021). The tests, however, both refuted the null hypothesis of unit root for all variables. The results are shown in Table 1. The LLC test rejected the null hypothesis at a 0.1% level of significance for all variables, while the IPS test rejected the null hypothesis at 0.1% level of significance for TFR, PTW, MED and FLF, at 5% level of significance for RCE, GDP and FTE and at 10% level of significance for UNE. The purpose of testing for unit root was to support a cointegration analysis of the data, which is not the ideal choice due to the short nature of the panel data employed here where $T = 19$ and $N = 21$, as stated by Breitung and Pesaran in (Breitung and Pesaran 2008). A further problem that makes a cointegration analysis of these dataset not the best option is the difficulty to establish a relationship between the single regional time series in each panel. Quoting Hondroyiannis: "In the empirical analysis, first we verify the order of integration of the variables of the individual country since the long-run

relationship is valid only if the variables have the same order of integration" (Hondroyiannis 2010). This is a problem with such a small time dimension, however, where time series unit root test have a very low power (Kim and Choi 2017). For these reasons, an analysis using the more traditional random and fixed effects models was carried out.

When using a fixed effects model Equation 1 can be written as follows:

$$TFR_{it} = \alpha + \beta x_{it} + \mu_i + \lambda_t + \nu_{it} \tag{2}$$

where X_{it} is the vector containing the explanatory variables used to estimate the regression, ε_{it} is the vector of residuals, α is the intercept term, β is the vector of parameters to be estimated, μ_i is a region-specific constant that encapsulates all the variables affecting X_{it} cross-sectionally and that are time-invariant and λ_t is a time-varying intercept capturing all the variables affecting X_{it} that vary over time but not across regions (Brooks 2008). In this way, the model takes into account unobserved region-specific and time-specific effects that may influence fertility and which are correlated with the explanatory variables.

When using a random effects model Equation 1 can be written as follows:

$$TFR_{it} = \alpha + \beta x_{it} + \omega_{it}, \qquad \omega_{it} = \varepsilon_{i/t} + \nu_{it} \tag{3}$$

In this case the entity-specific intercept is assumed to arise from the common intercept α which is both region and time invariant and from a cross-sectional dependent or time-dependent error term $\varepsilon_{i/t}$ (Brooks 2008). The model specification could contain both these error terms, but such a model could not be estimated with unbalanced data and the software used.

In the random effects model, some assumptions have to be made on the cross-sectional / time-dependent error terms. Specifically that $\varepsilon_{i/t}$ "has zero mean, is independent of the individual observation error term (ν_{it}), has con-

stant variance σ_{ε}^2 and is independent of the explanatory variables (x_{it})" (Brooks 2008). The last assumption is used to determine which model to choose between fixed and random effects through the Hausman test, which has been run on the two model specifications of period random effects and cross-section random effects. The results reported in Table 2, in which it is possible to observe that the null hypothesis of no model misspecification has been strongly reject at a 0.1% level of significance for both model specifications. This means that both the cross-sectional dependent and time-dependent error terms are correlated with the explanatory variables, rendering the random effects estimator inconsistent. A two-way fixed effects model was thus estimated and a redundant fixed effects test was ran in order to determine whether the fixed effects are necessary or not. The results, shown in Table 3 strongly reject the null hypothesis of redundant effects for all model specifications, and especially for the unrestricted two-way specification, supporting its validity. The two-way fixed effects model estimate is displayed in Table 4.

This model has a problem given the variables that are being used, however. Simultaneity is most likely present since all the explanatory variables can be considered to both affect and be affected by the total fertility rate. An example is female labour force participation, which can be considered to affect the total fertility rate through an increase in opportunity costs and to be affected by the total fertility rate given that a having a higher number of children during the lifetime will cause an hindrance to work opportunities due to having to having less time to devote to the job market. This causes the presence of endogeneity in the equation, which makes the explanatory variables correlated with the error term, thus introducing a bias in the ordinary least squares estimation of the two-way fixed effects model and rendering the estimates biased and inconsistent (Bullock, Green, and Ha 2010). Moreover,

endogeneity may be caused by the omitted-variable bias, which this analysis may also be subject to. In order to correct these issues, a model based on the two-stage least squares instrumental variables estimation has been used, using as instruments the first lag of each explanatory variable, given the significant correlation observed between the variables and their first lag.

A first model specification with cross-section random effects was estimated, but the results of the Hausman test in Table 5 rejected the null hypothesis of no model misspecification. A period random effects model was then estimated where the Hausman test, reported in the same table as above, did not reject the null hypothesis. This last model specification is thus the one that will be referred to when commenting the results.

5.3 Results

THE period random effects two-stage least squares model estimation conducted does not include two of the variables discussed in Section 4, namely the infant morality rate and the crude marriage rate. Their exclusion is due to the two variables not being significant in trials of the analysis but it is chiefly due to their lack of theoretical significance in the sample used. As discussed in section 4, the number of births outside marriage has been rapidly increasing since 2000 as can be seen in Figure 20, which is an indication of the decreasing role of marriage as the main childbearing institution in Italy. Regional data for the crude marriage rate in Italy was also only available from 2004, which would have excluded 3 years of observations in the analysis, making it less robust.

As regards the infant mortality rate, it is not referenced as a cause for the decline in the total fertility rate in more recent theoretical literature, and mainly takes a role in the first demographic transition theory, developed observing

the demographic changes of the late 19th to early 20th century. As can be observed in Figure 19, during the period considered in the analysis (2000-2019), the infant mortality rate has been mostly stagnating at around 3, most likely due to the development in medical technology not being able to drive the rate down any more than it already has in the 20th century.

The estimated coefficients for the other variables are all significant at a 0.1% level except for the real compensation per employee, significant a 1% level. The coefficients for the unemployment rate, the median age at childbirth and the share of women in the labour force are all negative, while those for the share of part-time workers, the GDP per capita and the share of females having attained a tertiary level education degree are positive. These results are in line with the assumptions made in Section 4. The only exception is the real wage, which does not seem to be an adequate proxy for the substitution effect theorised by Becker in (Becker 1991), and instead supports the income effect in raising the demand for children, as with an increased level of income the family's ability to sustain the costs of children increases.

6 Policy Considerations

FROM the overall discussion presented in previous sections, it is clear how childbearing has not only *become* less attractive, but has also been *made* less attractive by societal developments that have made the role of women increasingly more important in society, granting them the choice to pursue advanced studies and become an active part of the labour force. These developments have increased the cost of childbearing not only from a monetary standpoint, but also in terms of lost opportunities and unmet aspirations. The OECD working paper previously referenced in Section 4 finds empirically how women have generally less children than they would desire, a reality that is exacerbated in countries where fertility rates are lowest, like Italy. They provide as reason for these constraints faced during everyday life by couples housing problems, unaffordable childcare, labour market insecurity and the failure of social policies to provide the support that new parents need in the presence of a newborn in the family (D'Addio and d'Ercole 2005).

There are two sides to fertility decline, the shift from the King-child to the King-pair posited by Ariès in (Ariès 1980) and incorporated in the second fertility transition theory, an ideational change that policy will struggle to have an impact on, and a more rational economic side driven by the costs of childbearing. These costs, in all the aforementioned forms, can be mitigated by targeted policy measures. Bratti frames it like this: "Can the low fertility be considered the consequence of a change in women's preferences or as a rational response to economic incentives? In the latter case, policy makers can influence fertility behaviour by affecting costs and incentives related to childbearing." (Bratti 2003). In this respect, the OECD report writes that "policies contribute to make childbearing more or less attractive, by either relaxing or strengthening the constraints that parents face in combining work and family

responsibilities This is especially important when female labour force participation becomes more common" (D'Addio and d'Ercole 2005), stressing the importance of the increased role of women in the labour market.

The OECD report divides the costs of children in two groups: "

- *Direct costs* are the additional costs incurred by households when children are present (e.g. food, clothing, childcare, education, housing, etc.).
- *Indirect costs* refer to the loss of income incurred by parents as a consequence of the presence of children, for example when the mother drops out of employment or reduces working hours to care for children, or when her career prospects decline following the birth of a child.

" (D'Addio and d'Ercole 2005). In the following sections I am going to explore the measures implemented by the Italian Government to address both these types of costs, using the results of the empirical analysis as supporting evidence.

6.1 Direct Costs Policy

POLICIES aimed at lowering the direct costs of children are monetary in nature and consist of cash transfers and tax benefits. As of March 1st 2022, the Italian Government has condensed the many policies in place before, such as a lump sum at birth, a labour tax benefit and other recurring cash transfers into a single policy measure which grants every family, irrespective of income, a minimum monthly cash transfer of €50 to families with underage dependent children having an ISEE (indicator of equivalent economic situation of the family) from €40,000 upwards. The maximum amount that can be paid out is of €175 monthly to families with an ISEE that is less than €15,000. The amount halves for all ISEE brackets when the child has an age between 18

and 21 years and is thus considered an adult under Italian law. The base cash amount is valid for the first two children, after which it halves to €85 for the lowest ISEE families and progressively decreases, reaching €15 for each additional child for the highest ISEE tier. For families with 4 children or more, an additional €100 is added monthly. The last additions to the monthly cash transfer, excluding disability situations, are when both parents work, amounting to €30 for the lowest ISEE families and reaching €0 for the highest ISEE families, and when the mother is less than 21 years old, in which case an additional €20 is granted for each child. If a family does not present the ISEE, they will be automatically granted the benefits that would be granted to the highest ISEE tier (INPS 2022a; MEF 2022).

Another measure in place directly addresses the childcare costs incurred to send children up to 3 years old to daycare. The amount of the cash transfer is determined by the minors' ISEE, a form of ISEE taking into account a possible influence on the ISEE of a parent external to the family unit. This may be the case when a child's parents are not married and do not cohabit. Three benefit tiers are present:

- minors' ISEE up to €25,000 $\Rightarrow$ €3,000 a year or €272.72 a month,
- minors' ISEE from €25,001 to €40,000 $\Rightarrow$ €2,500 a year or €227.27 a month, and
- minors' ISEE from €40,001 $\Rightarrow$ €1,500 a year or €136.37 a month

(INPS 2021a). A further tax benefit is provided, granting individuals the possibility to have a 19% tax deduction on the monthly daycare fee not already subsidised through cash transfers for a maximum of €632 per child (Fisco e Tasse 2021). Considering that the average monthly daycare expense for Italian families is of €303 (data from Cittadinanzattiva 2019), the combination of a

cash transfer plus a tax benefit provided to families makes daycare expenses much less heavy on the family budget, especially for the two lower ISEE tiers.

As regards kindergarten, only a tax benefit is provided since total expenses are assumed to be lower given that public kindergartens do not require a monthly subscription fee. Generally the main expenses of a public kindergarten consist in the monthly canteen and transport fees, of which the latter are not tax deductible. The deduction is again of 19%, but for a maximum of €800 per child (D'Andrea 2021).

These measures apply to all people, irrespective of employment status and economic situation. Every family receives monetary support after childbirth. The Italian Government's decision to substitute five policy measures with a single one streamlines the process to obtain the basic cash transfer and is a welcome and necessary change, simplifying the access to public funds dedicated to supporting families with children and making the distribution of the cash transfers more egalitarian (MEF 2022). Most of the national pronatalist policies have been enacted in the past 10 years, for example the cash transfer for daycare expenses was instituted December 11th 2016 with a cap set at €1,000, then increased to the current €3,000 on December 27th 2019 (INPS 2021a). It is safe to assume that the full effect on total fertility of these policies will take a long time to fully materialise, also considering the empirical findings of the OECD report (D'Addio and d'Ercole 2005). What is certain is that the policy measures addressing direct costs enacted by the Italian government are a step in the right direction, and will likely facilitate an increase in the labour force participation of women, which has been having positive effects on fertility in countries that are in a more advanced stage of the second demographic transition (D'Addio and d'Ercole 2005). In northern European countries, for example, an increase in the labour force participation of women has been hav-

ing positive effects on fertility, which is not true in the Italian case, as can be seen from the negative sign of the coefficient associated to the share of women in the labour force in the analysis carried out in Section 5. These policy developments can hopefully contribute to bring Italy in line with other countries in this respect.

A study by Anne Gauthier finds that policies like cash transfers and tax benefits have little effect on total fertility, however, increasing it by less than 0.2 children per woman, but the results in the literature are mixed and studies on the effectiveness of policies lack a comprehensive database (Gauthier 2007). She also finds that policies aimed at lowering the direct costs of children affect the timing of births and promote young motherhood, which would help decrease the median age of women at childbirth that in the analysis conducted in Section 5 has been observed to have a negative effect on the total fertility rate (Gauthier 2007).

6.2 Indirect Costs Policy

THERE are three main policies implemented by the Italian Government that affect the indirect costs of children. The measure that is most common across countries is mandatory maternity leave, which in Italy grants women five months of paid leave starting from two months before the presumed date of birth. The allowance paid by the State is 80% of the average daily pay that the mother receives at her workplace. It is given also to unemployed mothers, where the 80% is calculated on the wage at the last place of employment (INPS 2021b). The companion measure is mandatory paternity, which grants the father ten days of paid leave, to which an additional one may be added if the mother renounces to a day out of her five months, for a total of 11 days. It can be used within the first five months after childbirth and the

allowance is 100% of the father's salary. This policy measure was introduced in 2012 (INPS 2022b).

On top of mandatory leave, the government provides an optional leave that applies to both parents. It consists in 10 months of paid leave that can be used intermittently in the first 12 years of the child's life. Of these 10 months, a maximum of 6 can be used by the mother, and a maximum 6 by the father, which can become 7 if he uses more than 3 months of paid leave, bringing the total up to 11. In the case of a single parent, he/she will be able to take advantage of the whole 10 months. The allowance paid by the State is 30% of the average daily pay in the first 6 years of life of the child, while if the child is between 6 and 8 the 30% allowance is granted only if the wage of the parent requesting paid leave is less than 2.5 times the minimum pension treatment, which in 2021 amounted to €515.58. No allowance is granted if the child is between 8 and 12 years old (INPS 2021c). Since 2015 the optional leave can be substituted with a conversion of the work contract from full-time to part-time, which needs to be granted by the employer within 15 days of it being received. This option can be exercised by both parents only once and according to the same time limits imposed to the optional paid leave. National collective job contracts can however impose their own rules restricting the cases in which an employer is required to grant the contract conversion (Caporale 2019). All these measures are applicable only to employees and not self-employed people.

While the direct costs of childbearing fall upon the family unit as a whole given their primarily monetary nature, the OECD report points out how "indirect costs fall almost exclusively on mothers." In a labour market context, women "may have to withdraw from the labour market, at least temporarily, shortly before and after childbirth; they may not be able to return to work after childbirth, or may have to work part-time or under atypical schedules; or

they may find that, in the longer term, their career prospects have worsened relative to childless women and to men", and these costs rise as women get older (D'Addio and d'Ercole 2005). A bias towards women is clearly present in Italy, where they are afforded much more time of paid leave while fathers are granted less than two weeks, which is most likely not meant to aid the mother in the first period of child rearing but is just a way so the father can take part in significant days of the child's life. Referencing Leigh in (Leigh 1983) the OECD report stresses how "very long periods of maternity leave might lead to detachment from the labour market, dimming the employment and earnings prospects of mothers relative to other women and to men, thereby increasing the indirect costs of childbearing" (D'Addio and d'Ercole 2005). They also cite Kamerman in (Kamerman 2000), who argues that "while maternity leave tends to increase labour market participation of women, it also leads to reductions in their incomes, or to changes in the job situation and in the hours worked relative to their situation before the leave" (D'Addio and d'Ercole 2005).

This bias towards women is also a result of how they have historically "been assigned the status of a short cycle labor force, moving in and out of the labor market, which serve to provide management flexibility to alleviate the rigidity brought about by men's long-term employment security", forcing women to take lower level jobs and inhibiting career advancements (Huen 2007). In this respect, an increased egalitarianism in childcare leave arrangements between mother and father could contribute to bring more equality in the workplace and consequently in the family setting, where women could start to be seen as equally important contributors to household income.

Equality not just in the workplace but mainly in the family context is very frequently cited in the literature as a societal change promoting higher fertility.

Chizuko Ueno writes: "It is statistically clear that a husband's participation in household work is very limited regardless of whether his wife is employed outside the home and that household responsibilities are unilaterally borne by wives. Therefore, a working wife has a 'second shift' of work after returning home (Hochschild 1989) and tends to be overworked" (Ueno 1998). Mills references McDonald in (McDonald 2000), who "suggests that very low fertility is the result of a hiatus that has developed between 'high levels of gender equity in individual-oriented social institutions and sustained gender inequity in family-oriented social institutions'", adding how further studies "demonstrate that the unequal distribution of household labour lowers fertility intentions [...] and slows the transition to second births" (Mills 2008). She also conducts an empirical study and finds that "gender equity matters for fertility intentions" and "domestic unpaid labour has an impact on fertility intentions. Women who engage in considerably more household labour and find their housework stressful appear to have lower fertility intentions" (Mills 2008).

Bernhardt writes how gender equity in individual-oriented institutions as theorised by McDonald has been achieved through an increased participation of women in tertiary education, in the labour market and in politics. She views this as the first phase of the gender revolution, which could be seen as coinciding with the second demographic transition (Bernhardt 2004). She continues by stating that in order to lead a country in the second phase of the gender revolution, bringing gender-equality in family-oriented institutions, "the attitudes (and the behaviour) of young men towards partnership, childbearing and parenting [...] need to be revised, so that sharing of domestic as well as economic responsibilities becomes the natural foundation of male-female relationships in the future" (Bernhardt 2004). This could be seen as a second phase of the second demographic transition, bringing the possibility of increasing

fertility levels, as has already happened in Scandinavian countries (Bernhardt 2004).

In this respect, the Italian Government could act through policies influencing directly or indirectly the gender equality issue, mainly by promoting an increased tertiary education among women, specifically in the STEM field where they have been historically underrepresented. STEM careers like engineering and IT are higher paying than those in the humanities, traditionally preferred by women (Di Cagno 2021). This could aid fertility by increasing the level of women's tertiary education, the real wage and the GDP per capita, which could help society shift towards a greater equality in family-oriented institutions through a greater emancipation of women. This could be coupled with an increased support for the participation of women in the labour force, as discussed in the previous section. An increase in educational level, GDP per capita and real wage have been also found to have a positive effect in the empirical analysis conducted in Section 5.

Another policy recommendation would be an increased flexibility in working hours for parents. Yashiro finds that self-employed households have significantly more children than others and links this to the greater opportunity that self-employed parents have to adjust their working hours (Yashiro 1998). The empirical analysis conducted in Section 5 also finds that an increase in the share of part-time workers has a positive effect on the total fertility rate. The Italian Government has made a first step in providing more flexible working hours to parents in 2015, but they have to be mandatorily granted only for a relatively short period of time and can be subject to limitations (Caporale 2019).

6.3 Immigration Policy

A final consideration has to be given to the question of immigration. It is not a given that policies will manage to bring the total fertility rate back to replacement level (D'Addio and d'Ercole 2005), also in light of the ideational changes brought about by the second demographic transition which have changed women's preferences and priorities towards childbearing (van de Kaa 1987).

In Italy, Ambrosini writes, "the reception of the newcomers and the defence of their rights has been [historically] provided mainly by non-public actors: trade unions, voluntary associations, social movements, catholic institutions. In the last decade, Italian immigration policies have hardened, above all in the period 2008-2011, with the advent of a securitarian discourse" (Ambrosini 2013). Things have not been improving in recent years, instead they have arguably been worsening with a populist political discourse aimed at isolating migrants and legitimising anti-immigration policies (Cervi, Tejedor, and Alencar Dornelles 2020).

If the Italian Government was to take a different approach towards immigration by providing public support to migrants and by not antagonizing them, immigration could be one one of the main contributing factors to quelling the demographic decline.

7 Conclusions

An increasing level of aging in the Italian population poses a significant threat to the economy. This is a trend that can be observed in multiple indicators, such as a decreasing total fertility rate, resident population and number of live births and an increasing median age, old-age dependency ratio and life expectancy. The level of fertility has been decreasing since at least the 18th century in Western Europe, but the post-baby boom decline has different causes that can be linked to ideational and social changes. The theories and models of fertility that have been developed adopt different approaches to explaining the phenomenon of decreasing fertility, providing precious insights but not reaching a unified and universally applicable conclusion. An empirical approach has thus been adopted using inputs from both theoretical and empirical research, with which a causal relationship between variables potentially affecting the total fertility rate present in the literature was established. The empirical results are coherent with the literature, seeing the unemployment rate, the median age at childbirth and the share of women in the labour force as affecting negatively the total fertility rate and the share of part time workers, the real compensation per employee, the GDP per capita and the share of females in tertiary education as affecting it positively. Policy changes enacted in the last decade by the Italian Government are a step in the right direction, making it easier for working mothers to conciliate work and childbearing, but still show a bias towards the role of the mother as the parent responsible for childcare. Another possible factor that could contribute to the growth of the Italian population is immigration, where the Government has however not shown signs of support. In conclusion, the prospects are positive for an increase in the total fertility rate, but the Italian Government needs to work on equalising gender roles in the family and instate better immigration policies.

Tables

Table 1: Panel Unit Root Tests

	Levin, Lin & Chu t-test		**Im, Pesaran and Shin W-test**	
Variable	Statistic	Probability	Statistic	Probability
TFR	-4.35135***	0.0000	-3.56079***	0.0002
UNE	-3.18470***	0.0007	-1.46816†	0.0710
PTW	-17.6698***	0.0000	-6.76405***	0.0000
RCE	-5.86141***	0.0000	-1.66646*	0.0478
GDP	-5.14468***	0.0000	-2.06788*	0.0193
MED	-15.0935***	0.0000	-11.5351***	0.0000
FLF	-8.03547***	0.0000	-3.20985***	0.0007
FTE	-7.90521***	0.0000	-1.89311*	0.0292

Notes: ***, **, *, † respectively indicate rejection of the null hypothesis of unit root at 0.1%, 1%, 5% and 10% level of significance.

Table 2: Hausman Test (Least Squares)

Hausman Test (Least Squares)

Summary	χ^2 Statistic	χ^2 d.f.	Probability
Cross-section Random	45.214745***	8	0.0000
Period Random	246.751117***	8	0.0000

Notes: ***, **, *, † indicate rejection of the null hypothesis of no model misspecification at 0.1%, 1%, 5% and 10% level of significance.

Table 3: Redundant Fixed Effects Test

Redundant Fixed Effects Test

Effects Test	Statistic	d.f.	Probability
Cross-section F	7.983424***	(20, 333)	0.0000
Cross-section χ^2	148.452028***	20	0.0000
Period F	34.645868***	(18, 333)	0.0000
Period χ^2	399.947190***	18	0.0000
Cross-section / Period F	29.371779***	(38, 333)	0.0000
Cross-section / Period χ^2	557.347737***	38	0.0000

Notes: ***, **, *, † respectively indicate rejection of the null hypothesis of the effect being redundant at 0.1%, 1%, 5% and 10% level of significance.

Table 4: Two-way Fixed Effects Model Estimation

Two-way Fixed Effects Model Estimation

Variable	Coefficient	Std. Error	t-Statistic	Probability
UNE	0.063453***	0.014567	4.355876	0.0000
PTW	0.035018†	0.020893	1.676046	0.0947
RCE	-0.190642**	0.070925	-2.687928	0.0076
GDP	0.303575***	0.080734	3.760191	0.0002
MED	-2.988926***	0.325827	-9.173347	0.0000
FLF	-0.315439***	0.083049	-3.798204	0.0002
FTE	-0.025836	0.027736	-0.931527	0.3523
C	4.024596***	0.674366	5.967968	0.0000

Model estimated with both cross-section (regional) and period fixed effects.

Notes: ***, **, *, † indicate significance at 0.1%, 1%, 5% and 10% level respectively.

Table 5: Hausman Test (Two-Stage Least Squares)

Hausman Test (Two-Stage Least Squares)

Summary	χ^2 Statistic	χ^2 d.f.	Probability
Cross-section Random	25.698299***	7	0.0006
Period Random	0.000000	7	1.0000

Notes: ***, **, *, † indicate rejection of the null hypothesis of no model misspecification at 0.1%, 1%, 5% and 10% level of significance.

Table 6: Two-Stage Least Squares Model Estimation

Two-Stage Least Squares Model Estimation

Variable	Coefficient	Std. Error	t-Statistic	Probability
UNE	-0.069487***	0.011183	-6.213695	0.0000
PTW	0.152230***	0.015868	9.593352	0.0000
RCE	0.141250**	0.048184	2.931483	0.0036
GDP	0.223811***	0.042287	5.292682	0.0000
MED	-3.244412***	0.151536	-21.41017	0.0000
FLF	-0.515262***	0.081868	-6.293841	0.0000
FTE	0.146287***	0.017412	8.401407	0.0000
C	3.217023***	0.270550	11.89067	0.0000

Model estimated with period random effects.

Instrument specification: UNE(-1) PTW(-1) RCE(-1) GDP(-1) MED(-1) FLF(-1) FTE(-1) C

Notes: ***, **, *, † indicate significance at 0.1%, 1%, 5% and 10% level respectively. (-1) indicates the one-period lag of a variable.

Table 7: Summary Statistics by Region

	Variable		
Region	TFR	UNE	PTW
Piemonte	1.33 (0.10)	5.90 (1.91)	13.47 (3.50)
Valle d'Aosta	1.42 (0.13)	5.89 (1.48)	13.26 (3.02)
Liguria	1.25 (0.11)	6.31 (1.81)	15.96 (4.05)
Lombardia	1.41 (0.11)	4.40 (1.42)	14.29 (3.23)
P.A. Bolzano	1.62 (0.09)	2.52 (0.58)	20.43 (3.33)
P.A. Trento	1.52 (0.08)	3.81 (1.18)	17.39 (4.13)
Veneto	1.38 (0.09)	4.36 (1.22)	14.93 (2.71)
Friuli-V.G.	1.29 (0.10)	4.67 (1.40)	15.40 (2.82)
Emilia-Romagna	1.39 (0.10)	4.79 (1.54)	15.04 (2.30)
Toscana	1.29 (0.10)	5.60 (1.58)	14.91 (3.41)
Umbria	1.31 (0.09)	6.16 (2.02)	15.04 (4.16)
Marche	1.31 (0.09)	6.69 (2.21)	15.80 (2.37)
Lazio	1.33 (0.11)	7.99 (1.70)	14.86 (4.48)
Abruzzo	1.25 (0.07)	7.51 (2.36)	12.30 (3.89)
Molise	1.16 (0.03)	9.91 (2.06)	11.79 (3.75)
Campania	1.42 (0.07)	14.89 (3.33)	11.28 (3.86)
Puglia	1.30 (0.05)	12.76 (2.86)	11.51 (4.15)
Basilicata	1.19 (0.04)	11.04 (1.83)	11.26 (3.31)
Calabria	1.28 (0.02)	16.04 (4.96)	13.39 (3.81)
Sicilia	1.40 (0.04)	15.42 (3.26)	14.46 (3.83)
Sardegna	1.09 (0.05)	12.94 (2.55)	15.51 (4.61)
Average	1.33 (0.07)	8.17 (1.74)	14.25 (3.59)

Notes: the values are the average with standard deviation in parentheses. UNE and PTW are percentages.

Table 8: Summary Statistics by Region

	Variable		
Region	RCE	GDP	MED
Piemonte	28.21 (2.48)	28.16 (2.07)	32.3 (0.5)
Valle d'Aosta	30.39 (1.89)	35.60 (2.74)	32.2 (0.5)
Liguria	28.13 (3.00)	28.66 (2.45)	32.9 (0.4)
Lombardia	33.29 (3.22)	34.99 (2.78)	32.6 (0.5)
P.A. Bolzano	35.66 (4.12)	39.55 (5.02)	31.9 (0.4)
P.A. Trento	31.39 (2.57)	34.69 (2.52)	32.2 (0.4)
Veneto	27.99 (3.04)	29.51 (2.36)	32.5 (0.4)
Friuli-V.G.	30.25 (2.97)	28.23 (2.22)	32.6 (0.4)
Emilia-Romagna	31.19 (2.05)	31.99 (2.68)	32.5 (0.5)
Toscana	26.66 (2.36)	28.10 (2.30)	32.7 (0.6)
Umbria	24.75 (1.81)	24.55 (1.32)	32.2 (0.6)
Marche	25.79 (1.57)	25.17 (1.87)	32.4 (0.6)
Lazio	34.06 (2.55)	32.48 (2.08)	33.0 (0.6)
Abruzzo	24.93 (2.40)	22.82 (1.85)	32.4 (0.7)
Molise	23.54 (1.94)	20.03 (1.43)	32.3 (0.8)
Campania	25.92 (2.54)	17.40 (1.13)	31.0 (0.8)
Puglia	24.82 (2.57)	17.06 (1.26)	31.6 (0.9)
Basilicata	25.30 (1.32)	19.77 (1.94)	32.2 (0.9)
Calabria	24.11 (1.95)	16.02 (1.24)	31.2 (0.8)
Sicilia	25.89 (2.49)	16.81 (1.13)	30.9 (0.7)
Sardegna	23.87 (1.72)	19.20 (1.69)	33.2 (0.7)
Average	27.80 (2.37)	26.23 (2.01)	32.2 (0.6)

Notes: the values are the average with standard deviation in parentheses. RCE and GDP are in thousand of Euros, MED is in years.

Table 9: Summary Statistics by Region

	Variable	
Region	FLF	FTE
Piemonte	43.76 (1.70)	14.96 (4.34)
Valle d'Aosta	44.56 (2.02)	14.68 (5.07)
Liguria	43.23 (1.76)	18.62 (4.83)
Lombardia	42.41 (1.65)	16.76 (4.74)
P.A. Bolzano	43.86 (1.81)	13.30 (4.88)
P.A. Trento	42.94 (2.29)	16.47 (5.19)
Veneto	41.28 (1.67)	14.75 (4.62)
Friuli-V.G.	42.87 (1.40)	15.88 (4.78)
Emilia-Romagna	45.10 (0.63)	20.34 (3.64)
Toscana	43.64 (1.86)	17.32 (4.74)
Umbria	43.39 (1.69)	19.10 (4.63)
Marche	43.80 (0.88)	19.72 (3.34)
Lazio	41.96 (2.32)	20.57 (5.45)
Abruzzo	39.20 (1.93)	17.44 (4.32)
Molise	38.31 (1.87)	17.05 (4.32)
Campania	32.88 (2.49)	13.35 (3.20)
Puglia	33.06 (2.53)	12.41 (2.93)
Basilicata	35.90 (2.46)	14.05 (4.11)
Calabria	35.20 (2.60)	14.79 (2.85)
Sicilia	33.64 (2.54)	12.59 (2.45)
Sardegna	38.73 (3.69)	14.62 (3.72)
Average	40.29 (2.14)	15.89 (4.31)

Notes: the values are the average with standard deviation in parentheses. FLF and FTE are percentages.

Figures

Figure 1: Italian Total Fertility Rate 1960-2019

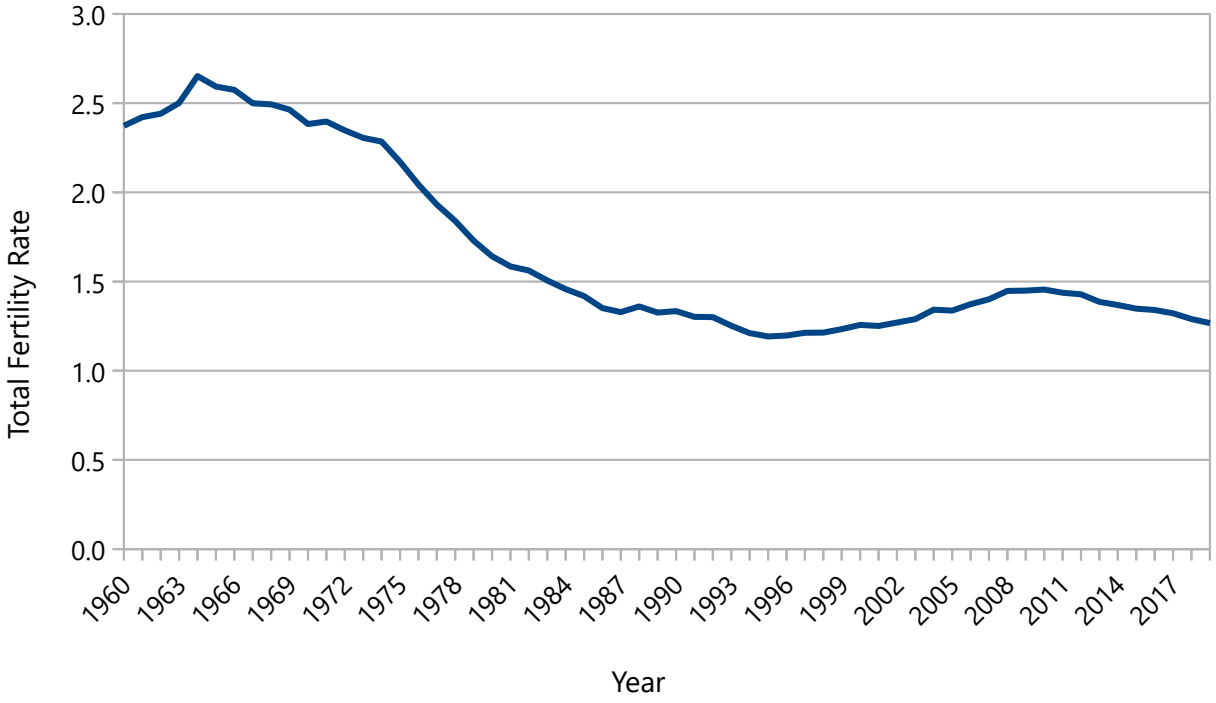


Figure 2: Resident Population in Italy 1960-2021

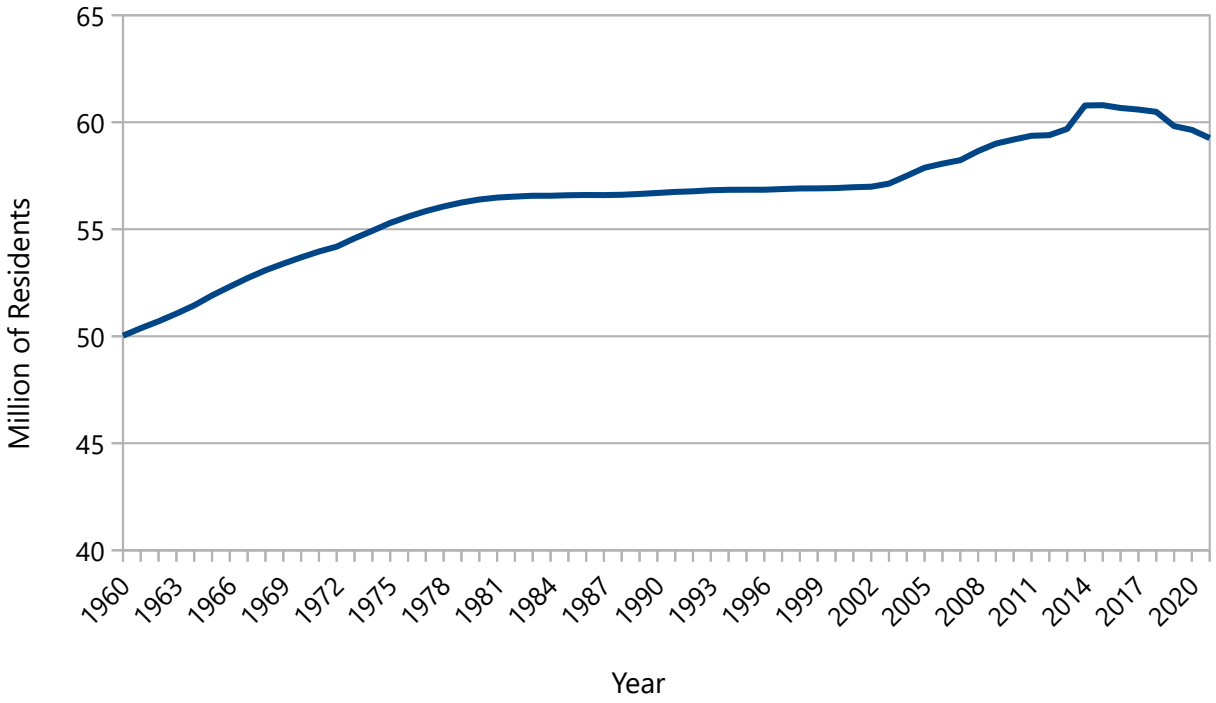


Figure 3: Median Age of the Population in Italy 1960-2020

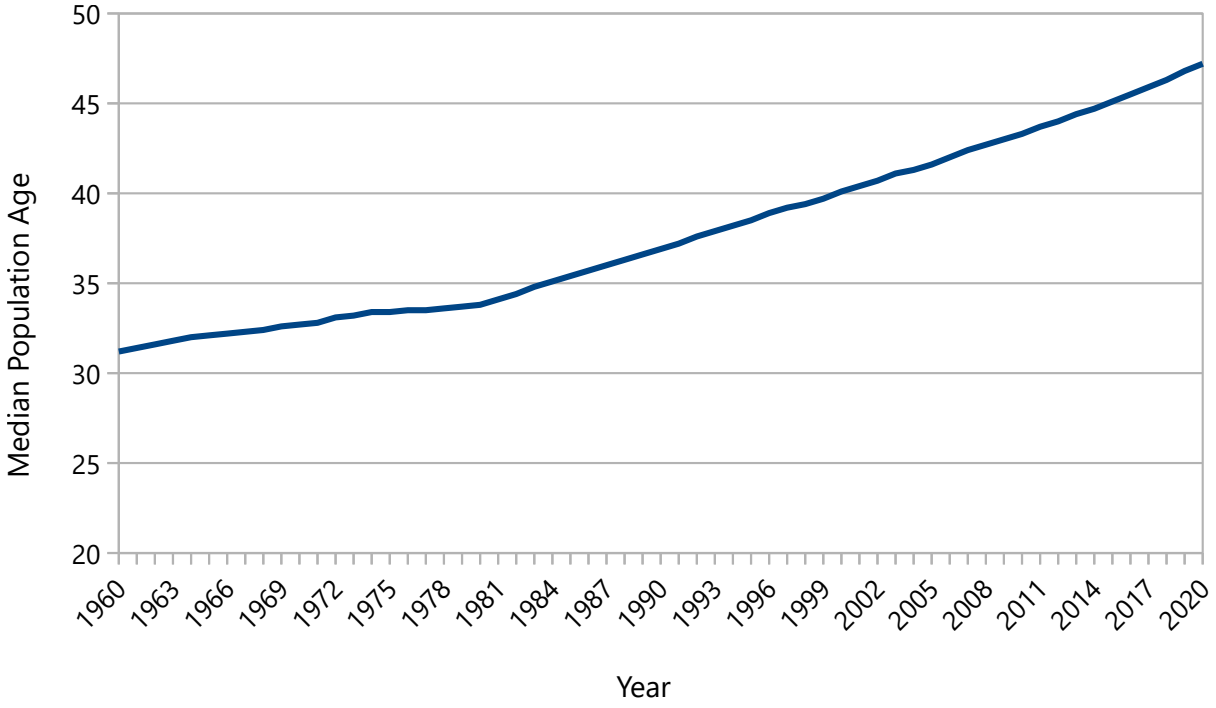


Figure 4: Total Number of Live Births and Deaths in Italy 1960-2019

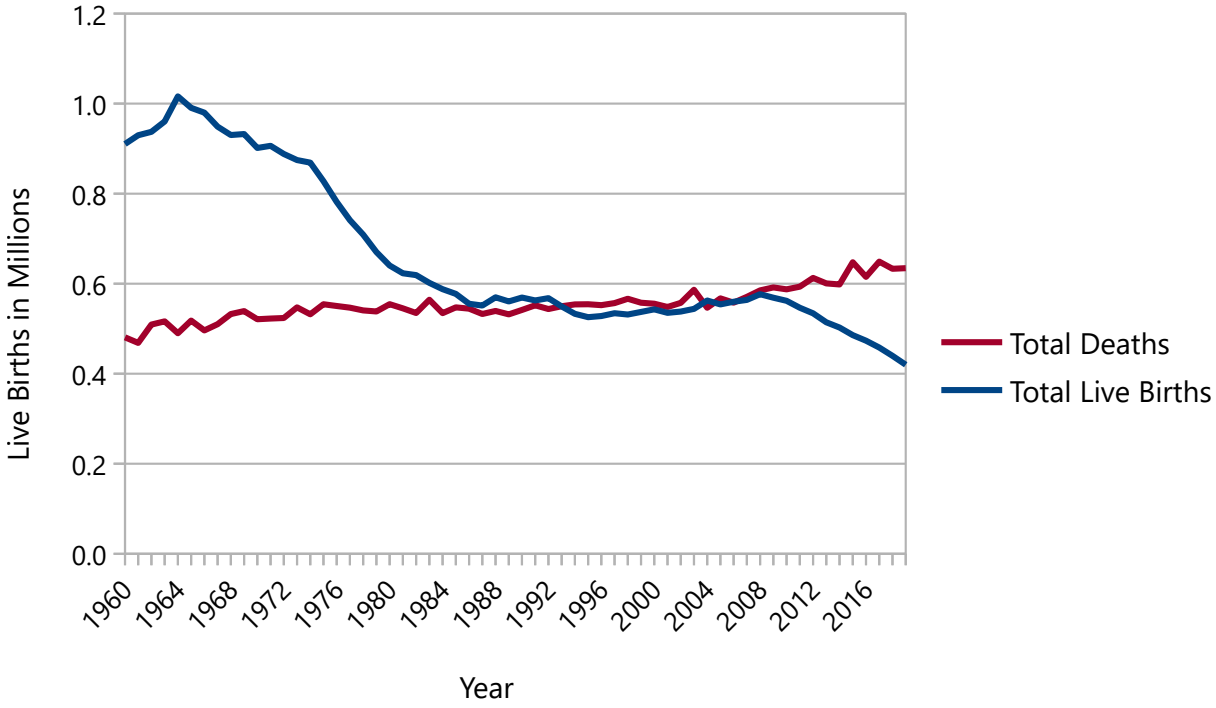


Figure 5: Old-age Dependency Ratio in Italy 1960-2020

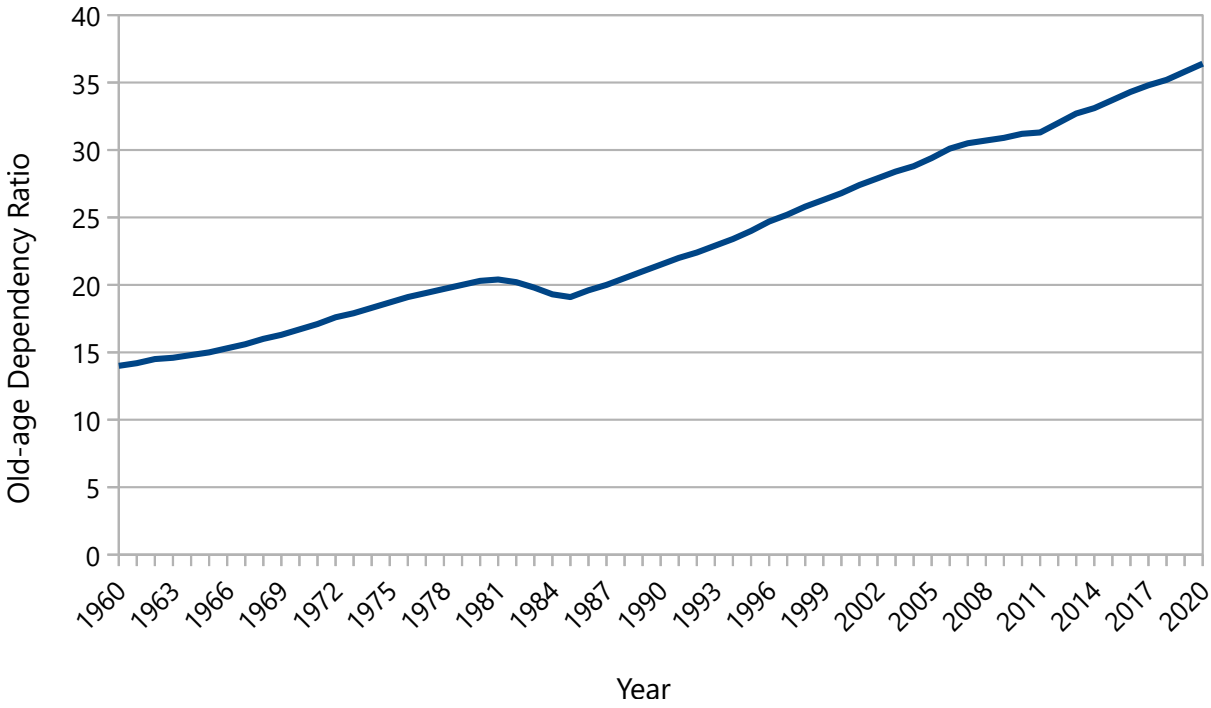


Figure 6: Age Distribution in the Italian Population 1960-2020

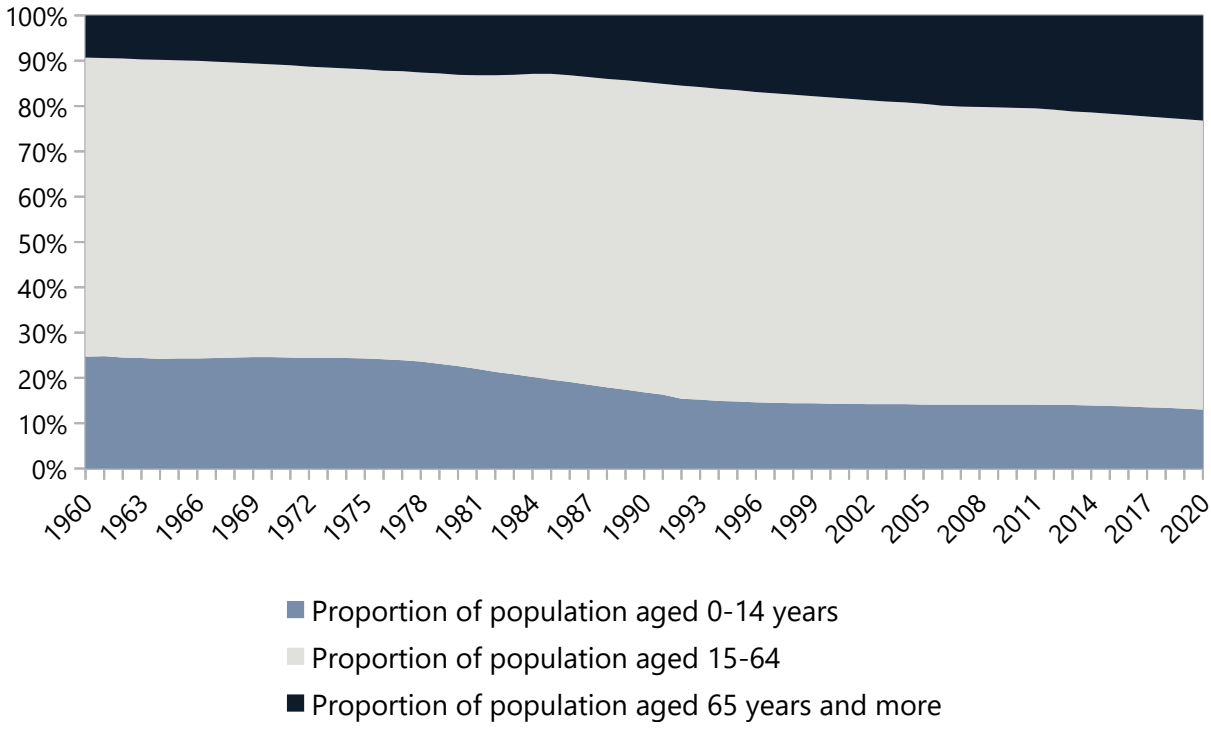


Figure 7: Life Expectancy in Italy 1985-2019

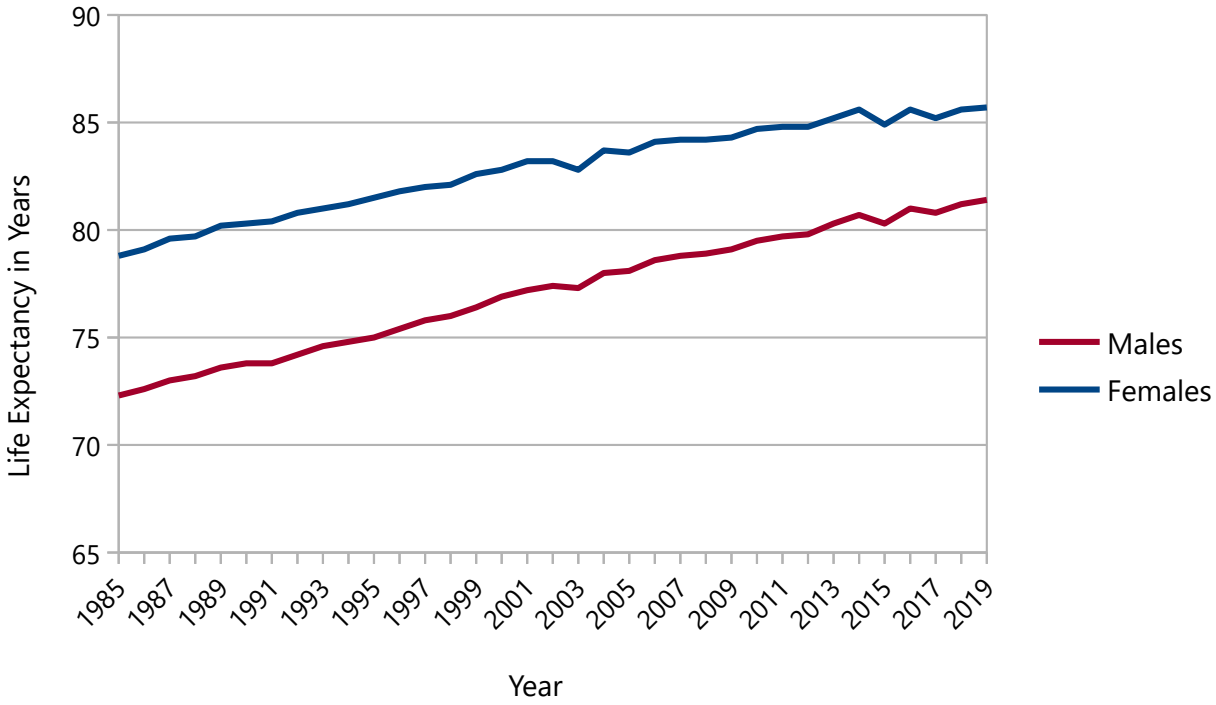


Figure 8: Projected Total Fertility Rate in Italy 2020-2100

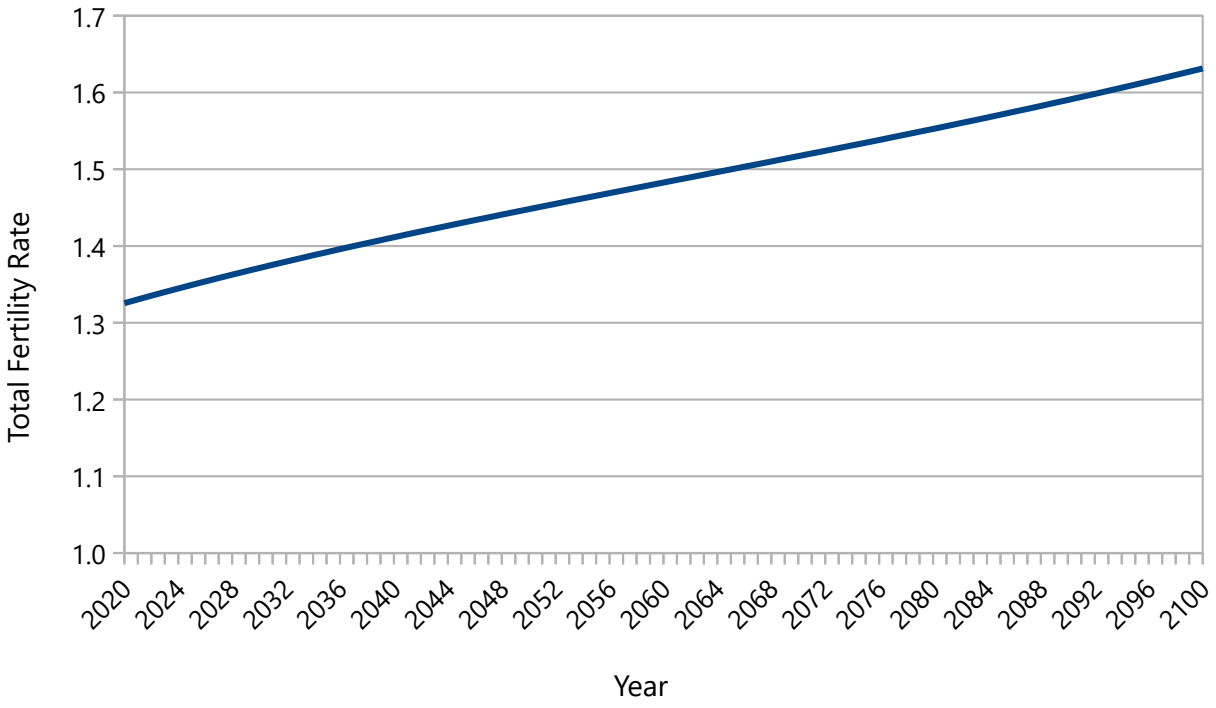


Figure 9: Projected Resident Population in Italy 2022-2100

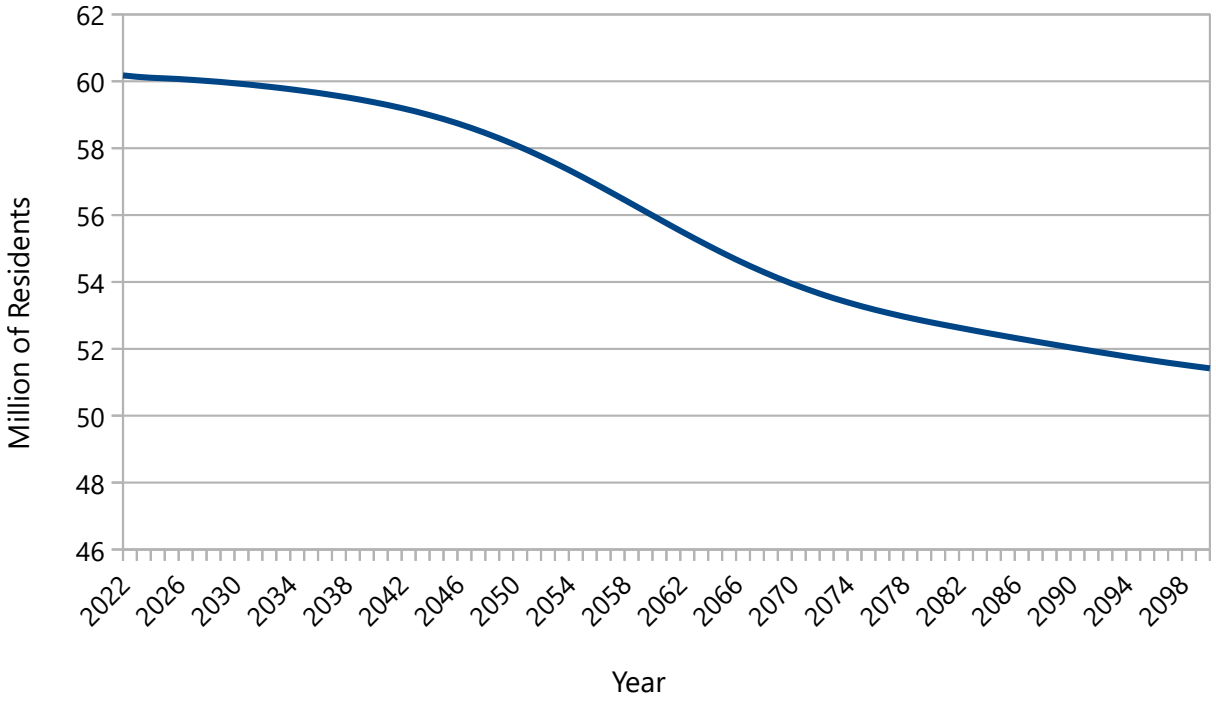


Figure 10: Projected Median Age of the Population in Italy 2021-2100

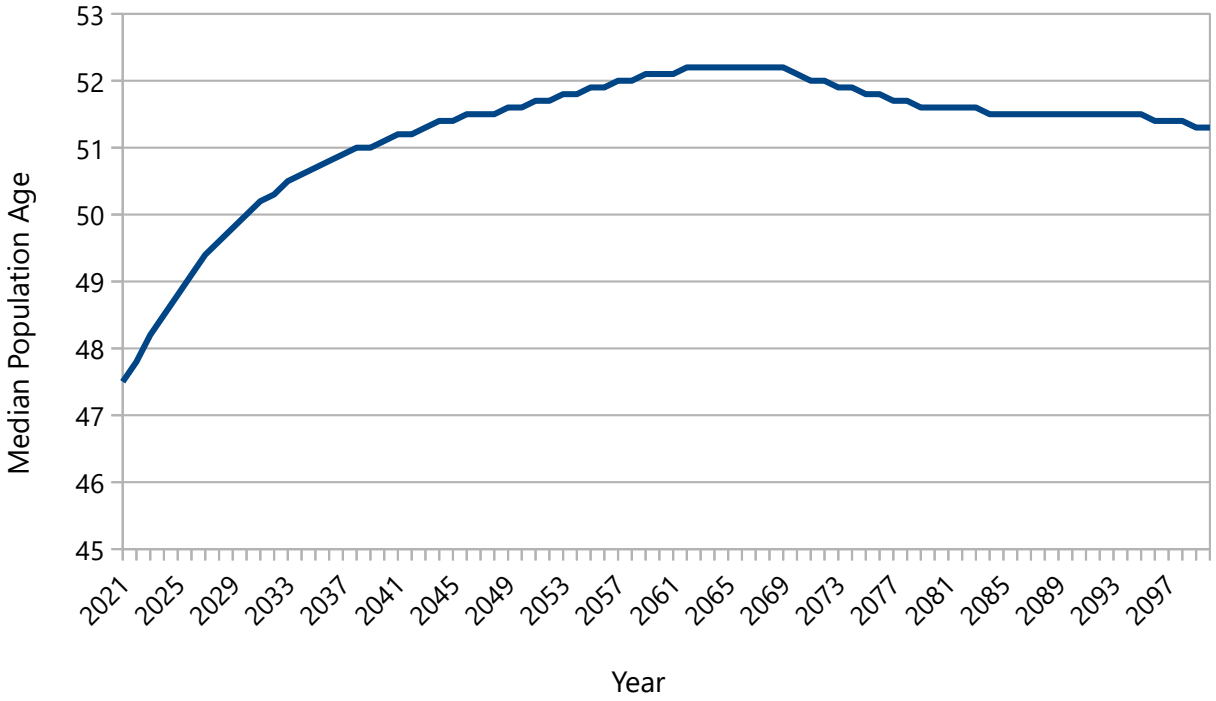


Figure 11: Projected Total Number of Live Births and Deaths in Italy 2020-2100

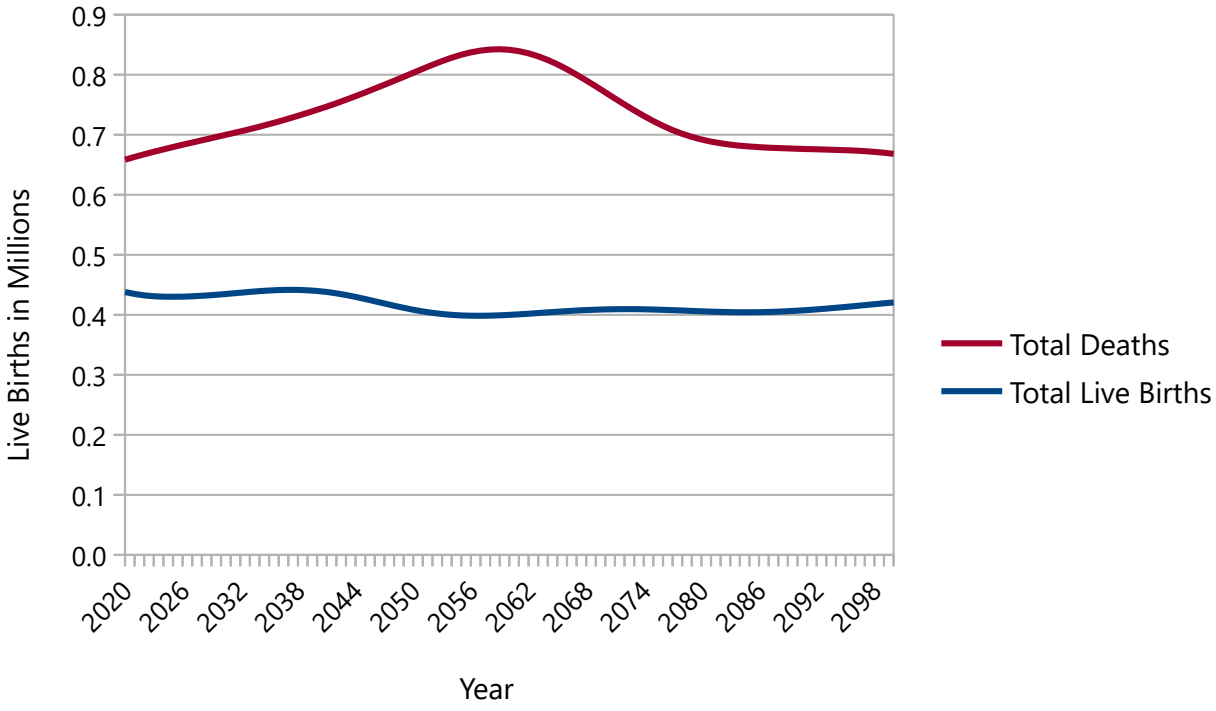


Figure 12: Projected Old-age Dependency Ratio in Italy 2021-2100

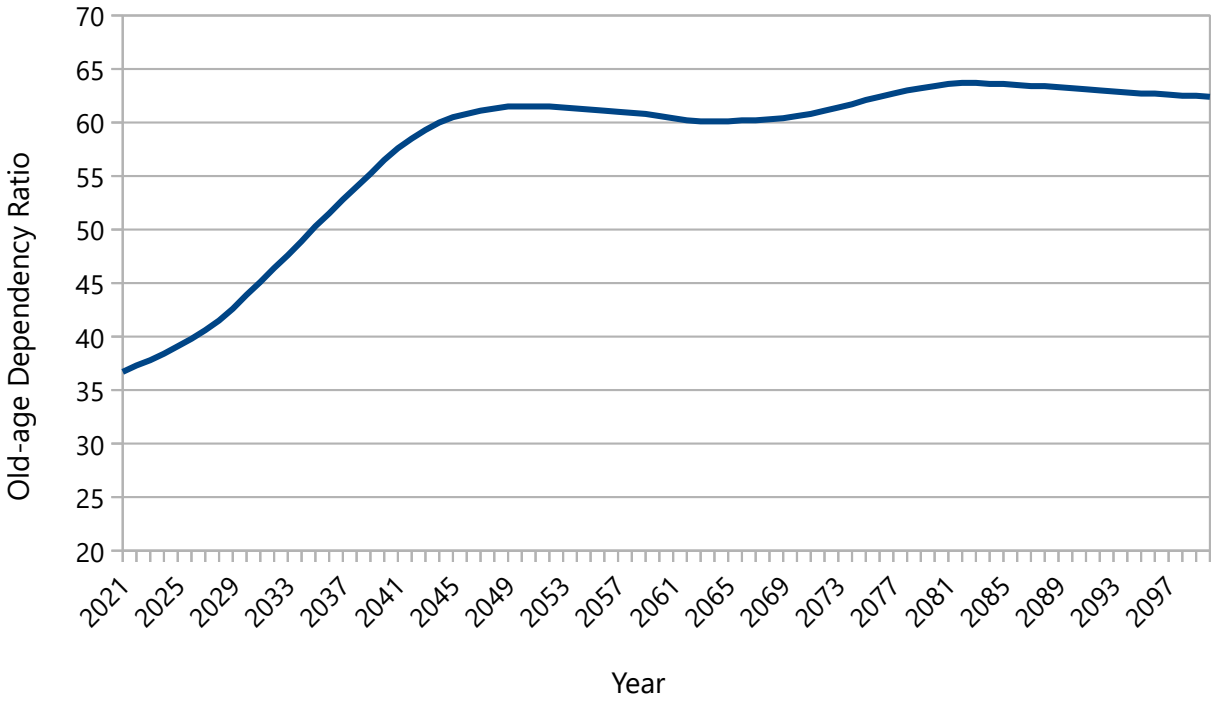


Figure 13: Projected Age Distribution in the Italian Population 2021-2100

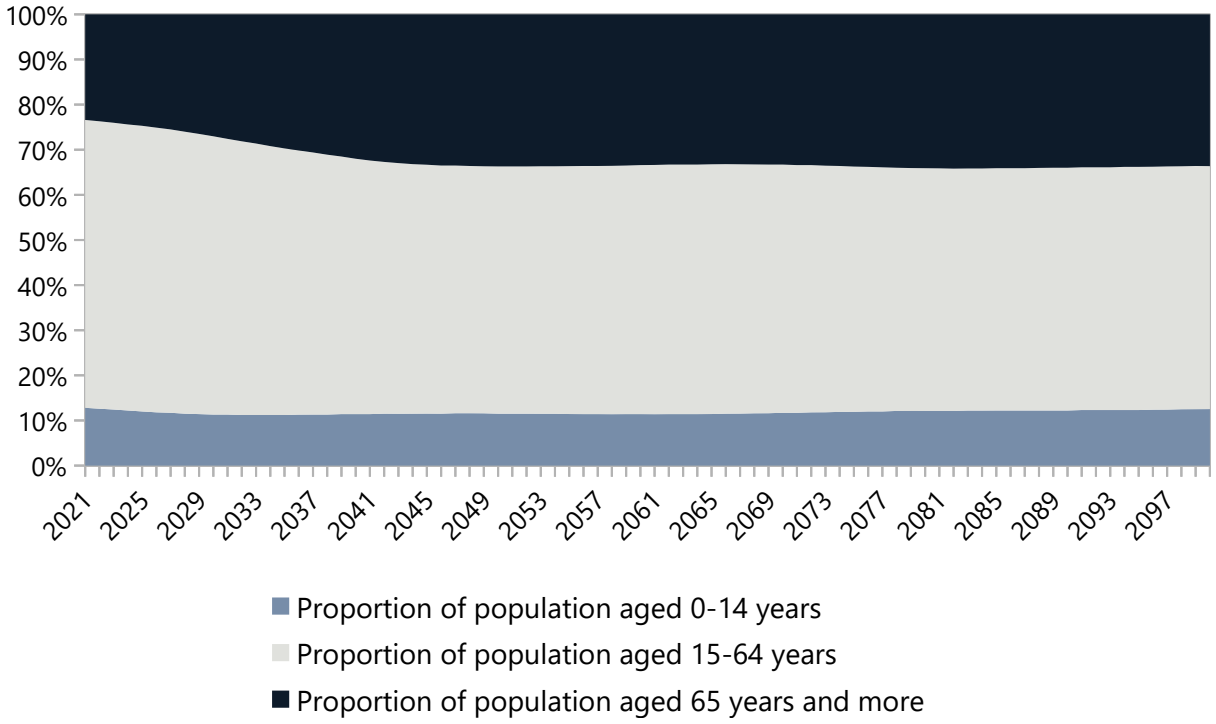


Figure 14: Projected Life Expectancy in Italy 2020-2100

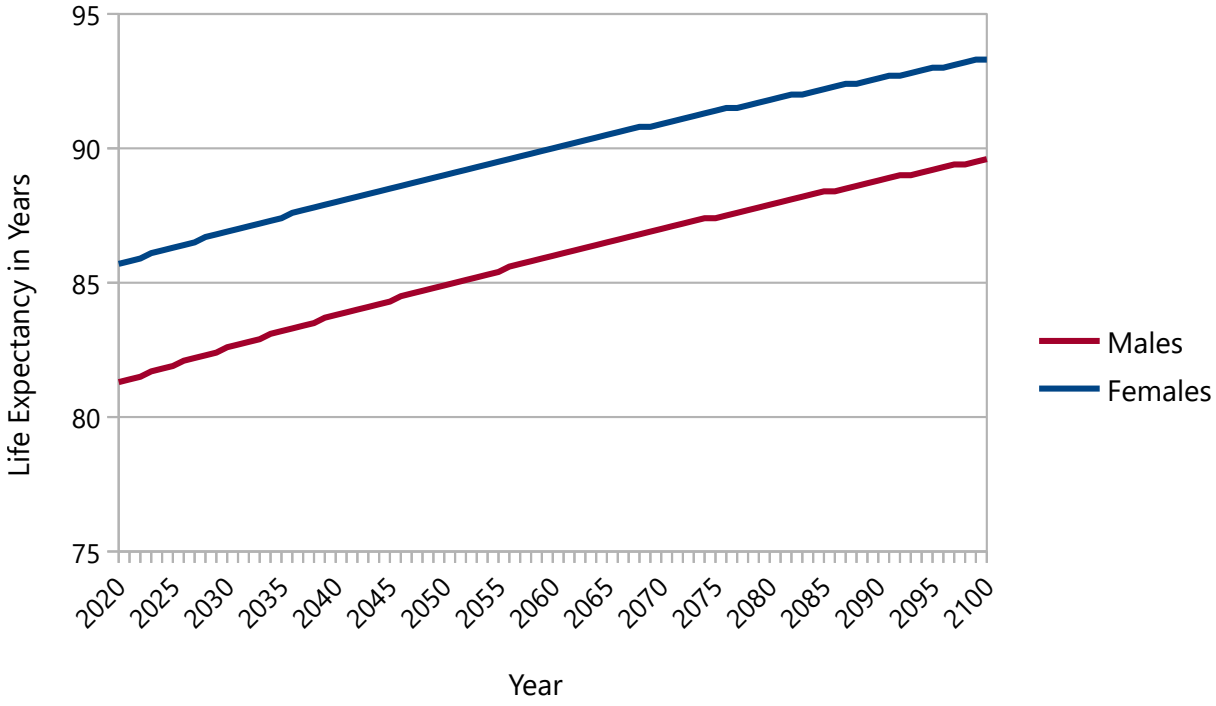


Figure 15: Share of Italian Males and Females in Tertiary Education 2000-2019

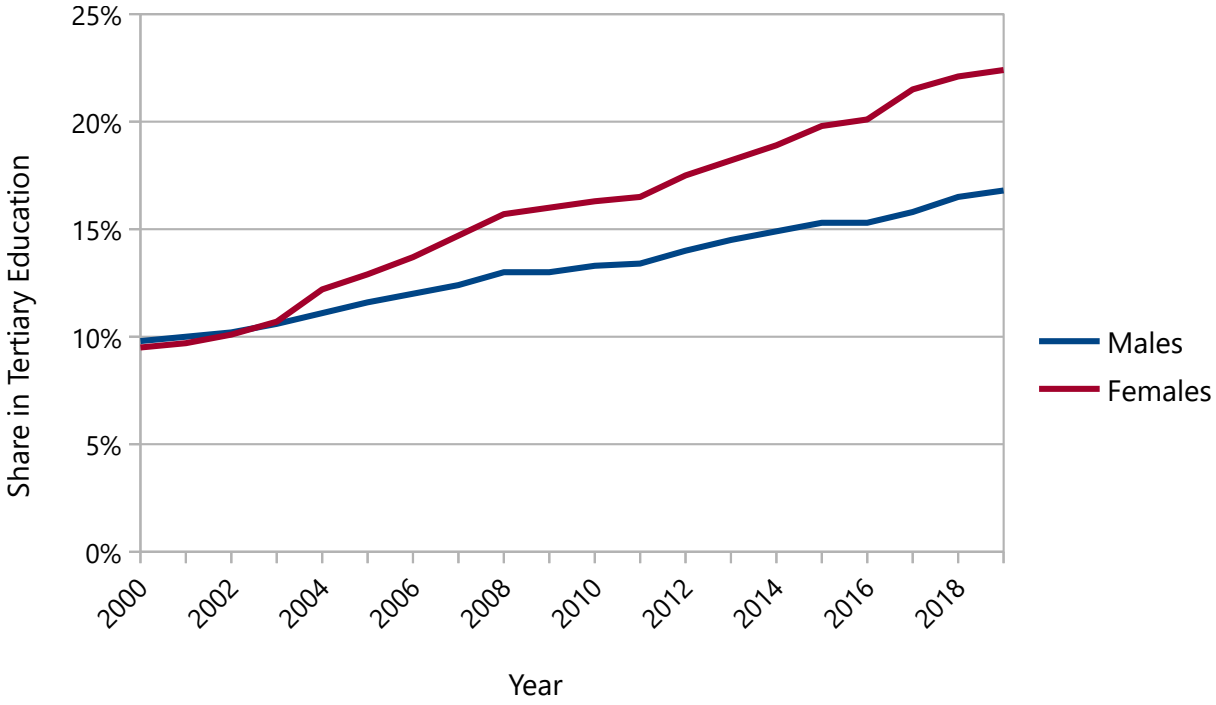


Figure 16: Employment Statistics in Italy 2000-2019

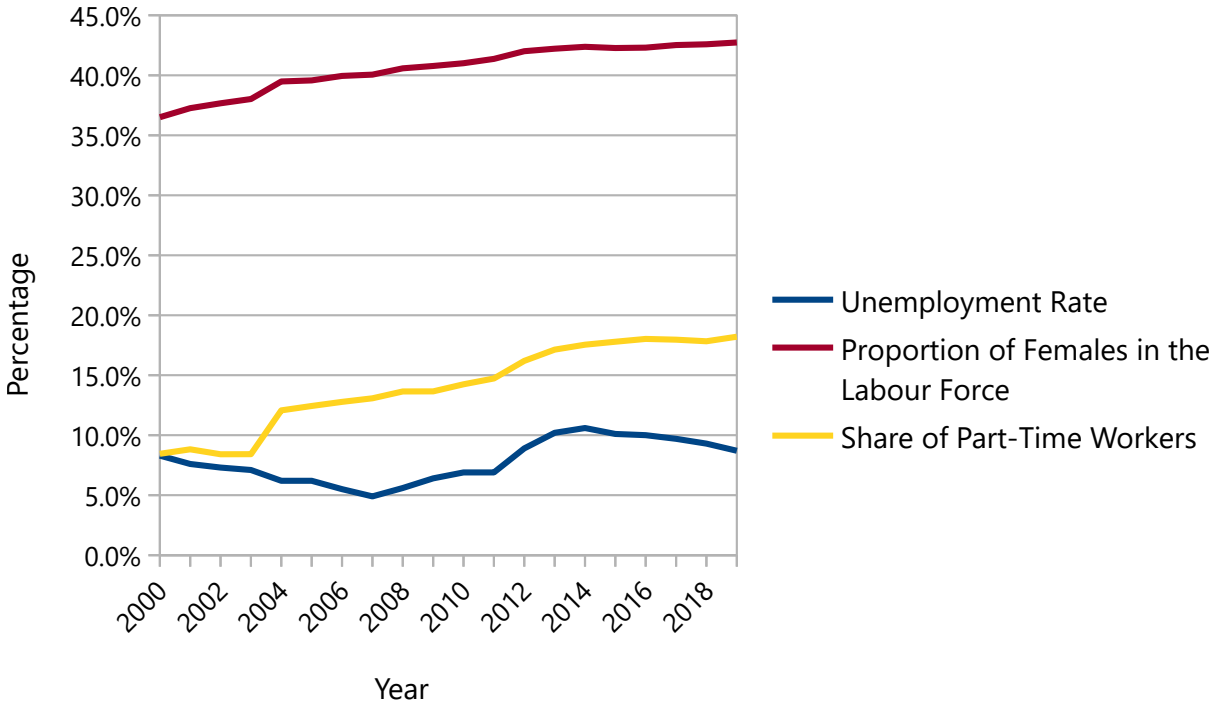


Figure 17: Real Compensation per Employee and GDP in Italy 2000-2019

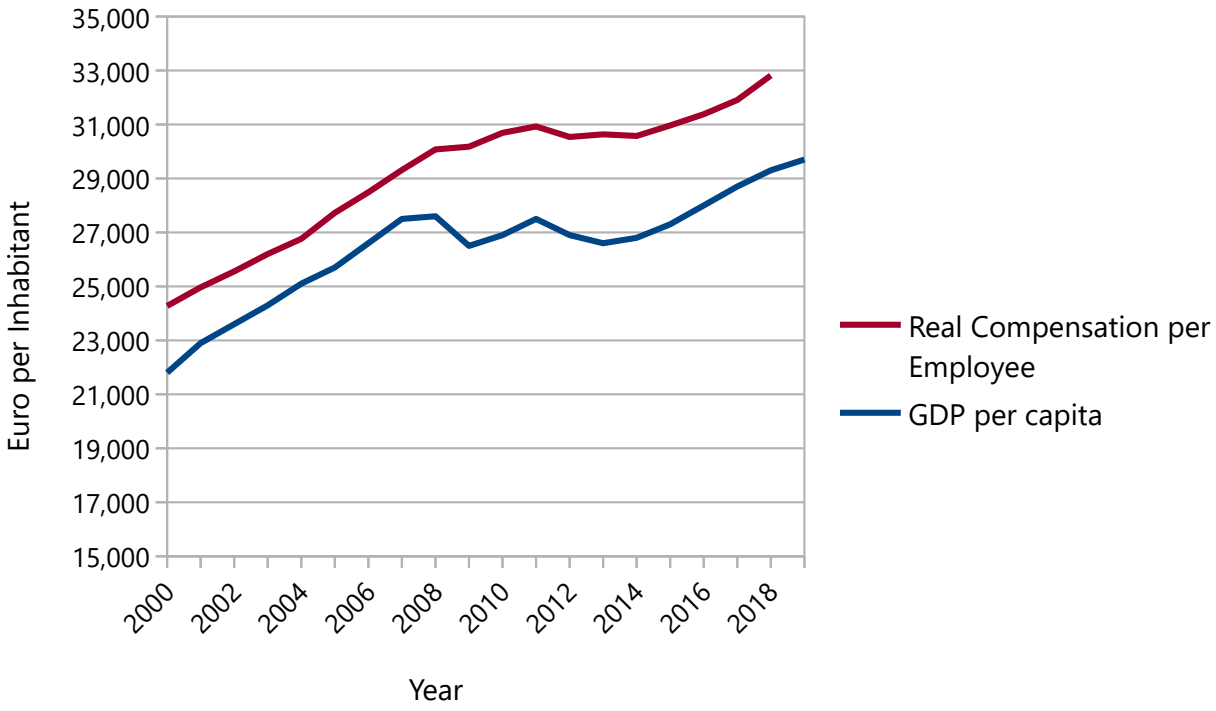


Figure 18: Median Age of Italian Women at Childbirth 2000-2019

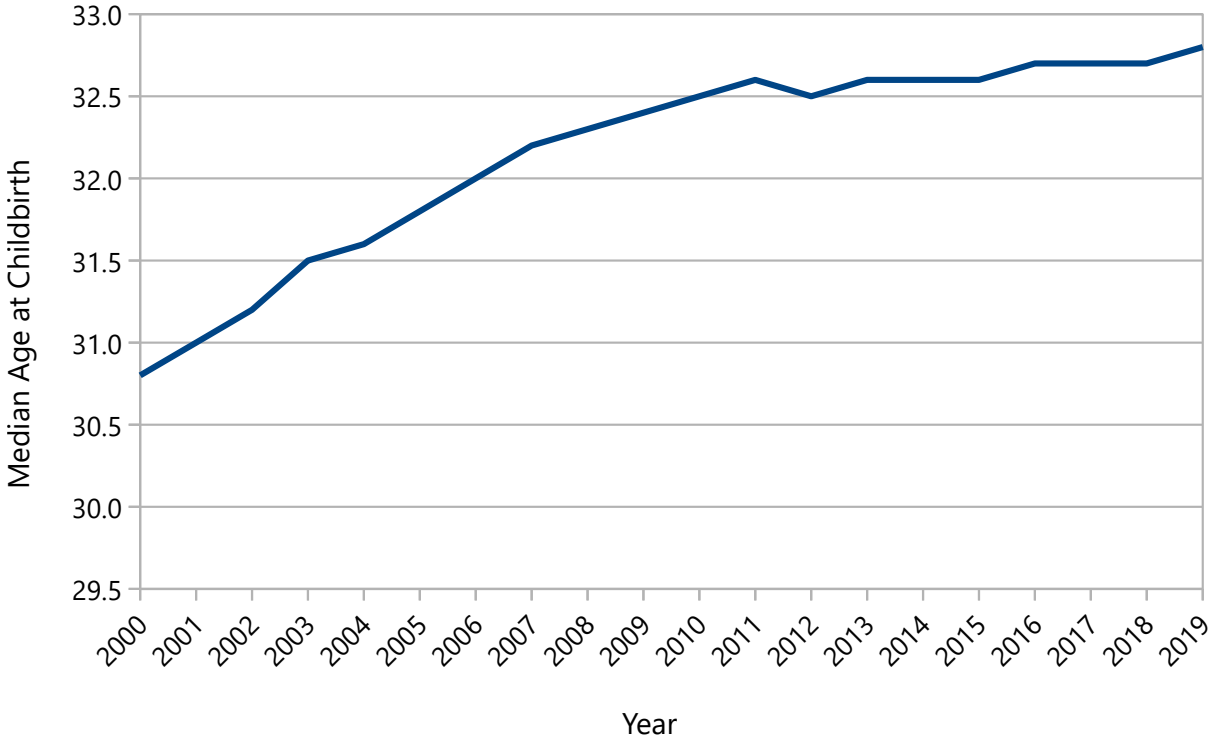


Figure 19: Italian Infant Mortality Rate 1960-2019

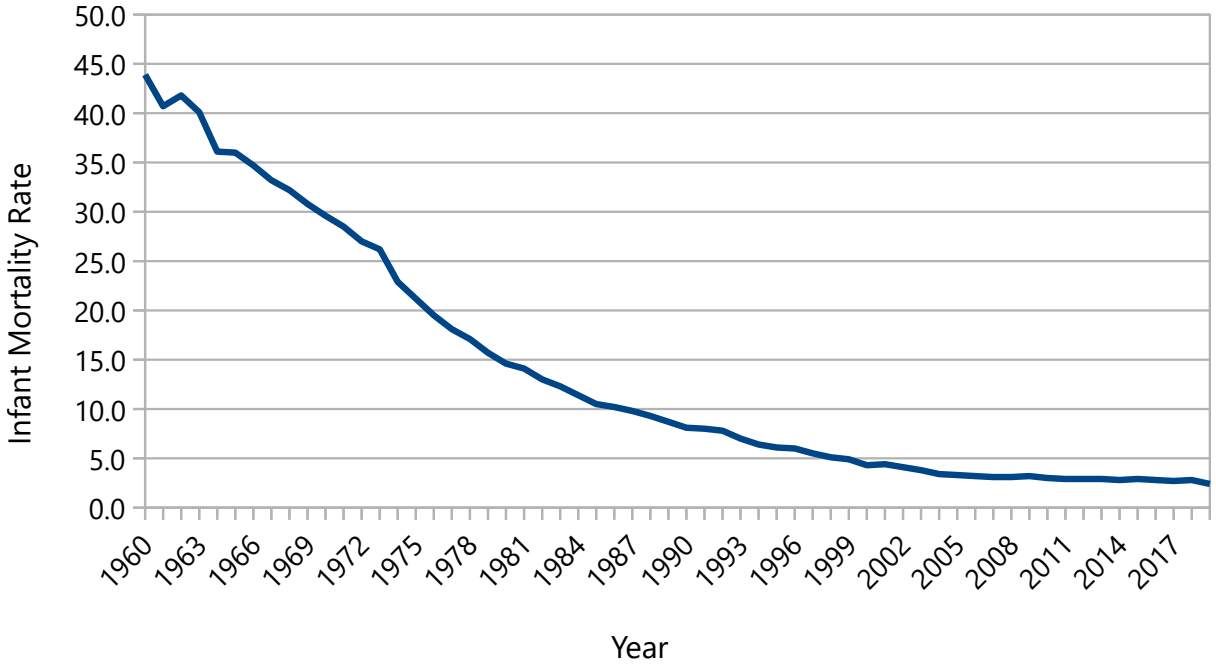
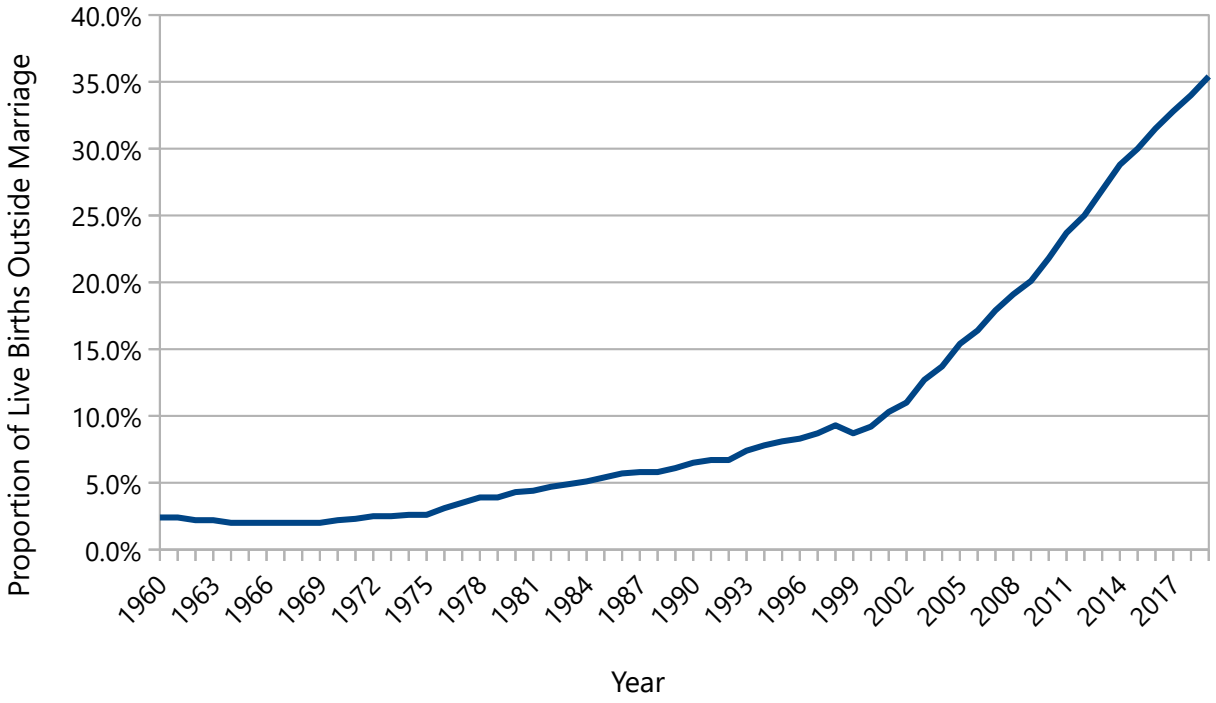


Figure 20: Proportion of Live Births Outside Marriage in Italy 1960-2019



References

Primary Sources

Ariès, Philippe (1980). "Two successive motivations for the declining birth rate in the West". In: *Population and Development Review*, pp. 645–650.

Baltagi, Badi Hani (2021). *Econometric Analysis of Panel Data*. Springer.

Barker, Chris (2003). *Cultural Studies: Theory and Practice*. SAGE Publications.

Bernhardt, Eva (2004). "Is the Second Demographic Transition a useful concept for demography?" In: *Vienna Yearbook of Population Research* 2, pp. 25–28.

Bratti, Massimiliano (2003). "Labour force participation and marital fertility of Italian women: The role of education". In: *Journal of Population Economics* 16.3, pp. 525–554.

Breitung, Jörg and Pesaran, M. Hashem (2008). "Unit roots and cointegration in panels". In: *The Econometrics of Panel Data*. Springer, pp. 279–322.

Brooks, Chris (2008). *Introductory Econometrics for Finance*. Cambridge University Press.

Bullock, John G., Green, Donald P., and Ha, Shang E. (2010). "Yes, but what's the mechanism? (don't expect an easy answer)." In: *Journal of Personality and Social Psychology* 98.4, pp. 550–558.

Caporale, Angela (2019). "Come funziona il part time post maternità?" In: *InSalute*. URL: https://blogunisalute.it/part-time-post-maternita-come-funziona/ (visited on Feb. 10, 2022).

Cittadinanzattiva (2019). *Asili nido: i dati del nostro Osservatorio Prezzi e Tariffe*. URL: https://www.cittadinanzattiva.it/comunicati/12699-asili-nido-i-dati-del-nostro-osservatorio-prezzi-e-tariffe.html (visited on Feb. 4, 2022).

D'Addio, Anna and d'Ercole, Marco Mira (2005). *Trends and Determinants of Fertility Rates: The Role of Policies*. Tech. rep. OECD Publishing.

D'Andrea, Anna Maria (2021). "Detrazione spese d'istruzione, scolastiche e universitarie: come compilare il modello 730/2021". In: *Informazione Fiscale*. URL: https://www.informazionefiscale.it/detrazione-spese-istruzione-scolastiche-universitarie-730-2021-istruzioni (visited on Feb. 4, 2022).

de Bruijn, Bart J. (2006). "Fertility: Theories, Frameworks, Models, Concepts". In: *Demography: analysis and synthesis. A treatise in population studies*, pp. 549–569.

Di Pasqale, Enrico, Stuppini, Andrea, and Tronchin, Chiara (Oct. 30, 2019). "Contro il calo demografico serve programmazione". In: *lavoce.info*. URL: https://www.lavoce.info/archives/61882/contro-il-calo-demografico-serve-programmazione/ (visited on Feb. 5, 2022).

Enke, Stephen (1969). "Birth Control for Economic Development: Reducing human fertility can raise per capita income in less-developed countries." In: *Science* 164.3881, pp. 798–802.

Eurostat (2022a). *Eurostat Database*. URL: https://ec.europa.eu/eurostat/web/main/data/database (visited on Jan. 21, 2022).

— (2022b). *Eurostat Glossary*. URL: https://ec.europa.eu/eurostat/statistics-explained/index.php (visited on Jan. 21, 2022).

Fisco e Tasse (2021). *La detraibilità delle spese scolastiche nel 2021*. URL: https://www.fiscoetasse.com/approfondimenti/12515-la-detraibilita-delle-spese-scolastiche-nel-2021.html (visited on Feb. 4, 2022).

Gauthier, Anne H. (2007). "The impact of family policies on fertility in industrialized countries: a review of the literature". In: *Population Research and Policy Review* 26.3, pp. 323–346.

Hondroyiannis, George (2010). "Fertility determinants and economic uncertainty: An assessment using European panel data". In: *Journal of Family and Economic Issues* 31.1, pp. 33–50.

Hsiao, Cheng (2007). "Panel data analysis — advantages and challenges". In: *Test* 16.1, pp. 1–22.

Huen, Yuki W.P. (2007). "Policy response to declining birth rate in Japan: Formation of a 'gender-equal' society". In: *East Asia* 24.4, pp. 365–379.

INPS (2021a). *Bonus asilo nido e forme di supporto presso la propria abitazione*. URL: https://www.inps.it/prestazioni-servizi/bonus-asilo-nido-e-forme-di-supporto-presso-la-propria-abitazione (visited on Feb. 4, 2022).

— (2021b). *Indennità per congedo di maternità/paternità per lavoratrici e lavoratori dipendenti e per iscritti alla Gestione Separata*. URL: https://www.inps.it/prestazioni-servizi/indennita-per-congedo-di-maternitapaternita-per-lavoratrici-e-lavoratori-dipendenti-e-per-iscritti-alla-gestione-separata (visited on Feb. 4, 2022).

— (2021c). *Indennità per congedo parentale per lavoratrici e lavoratori dipendenti*. URL: https://www.inps.it/prestazioni-servizi/indennita-per-congedo-parentale-per-lavoratrici-e-lavoratori-dipendenti (visited on Feb. 4, 2022).

— (2022a). *Assegno unico e universale per i figli a carico*. URL: https://www.inps.it/prestazioni-servizi/assegno-unico-e-universale-per-i-figli-a-carico (visited on Feb. 4, 2022).

— (2022b). *Congedo papà (nascita, adozione o affidamento bambino)*. URL: https://www.inps.it/prestazioni-servizi/congedo-papa-nascita-adozione-o-affidamento-bambino (visited on Feb. 4, 2022).

Kahneman, Daniel (2003). "Maps of bounded rationality: Psychology for behavioral economics". In: *American Economic Review* 93.5, pp. 1449–1475.

Kim, Jae H. and Choi, In (2017). "Unit roots in economic and financial time series: a re-evaluation at the decision-based significance levels". In: *Econometrics* 5.3, p. 41.

Marroni, Carlo (Oct. 3, 2021). "Istat: 'Con 400mila nascite all'anno siamo un paese da 30 milioni di abitanti'". In: *Il Sole 24 Ore*. URL: https://www.ilsole24ore.com/art/istat-con-400mila-nascite-all-anno-siamo-paese-30-milioni-abitanti-AEfClTl (visited on Feb. 5, 2022).

MEF (2022). *L'Assegno unico e universale per i figli*. URL: https://www.mef.gov.it/focus/LAssegno-unico-e-universale-per-i-figli/ (visited on Feb. 4, 2022).

Mills, Melinda (2008). "Gender Equality, the Labour Market and Fertility: A European Comparison". In: *35th CEIES Seminar*. Eurostat. Warsaw.

Rosina, Alessandro and Fraboni, Romina (2004). "Is marriage losing its centrality in Italy?" In: *Demographic Research* 11, pp. 149–172.

Ueno, Chizuko (1998). "The Declining Birthrate: Whose Problem?" In: *Review of Population and Social Policy* 7, pp. 103–128.

van de Kaa, Dirk Jan (1996). "Anchored narratives: The story and findings of half a century of research into the determinants of fertility". In: *Population studies* 50.3, pp. 389–432.

Yashiro, Naohiro (1998). "The economic factors for the declining birthrate". In: *Review of Population and Social Policy* 7, pp. 129–144.

Secondary Sources

Ambrosini, Maurizio (2013). "Fighting discrimination and exclusion: Civil society and immigration policies in Italy". In: *Migration Letters* 10.3, pp. 313–323.

Anderson, Barbara A. (1986). "Regional and cultural factors in the decline of marital fertility in Western Europe". In: *The Decline of Fertility in Europe*. Ed. by Ansley Johnson Coale and Susan Cotts Watkins. Princeton University Press, pp. 293–313.

Becker, Gary S. (1960). "An economic analysis of fertility". In: *Demographic and economic change in developed countries*. Ed. by Gary S. Becker. Princeton University Press, pp. 209–240.

— (1965). "A Theory of the Allocation of Time". In: *The Economic Journal* 75.299, pp. 493–517.

— (1976). *The economic approach to human behavior*. Vol. 803. University of Chicago Press.

— (1991). *A Treatise on the Family*. Harvard University Press.

Blake, Judith (1985). "The fertility of transition: continuity or discontinuity with the past?" In: *International Population Conference*. Ed. by IUSSP. Vol. 4. Florence: IUSSP, pp. 393–405.

Bongaarts, John (1976). "Intermediate fertility variables and marital fertility rates". In: *Population Studies* 30.2, pp. 227–241.

— (1978). "A framework for analyzing the proximate determinants of fertility". In: *Population and Development Review*, pp. 105–132.

Bongaarts, John and Watkins, Susan Cotts (1996). "Social interactions and contemporary fertility transitions". In: *Population and Development Review* 22.4, pp. 639–682.

Bulatao, Rodolfo A. (1980). "The transition in the value of children and the fertility transition". In: *Population and Economic Change in Developing Countries*. Ed. by C. Höhn and R. Mackensen. Ordina Editions, pp. 95–123.

— (1981). "Values and disvalues of children in successive childbearing decisions". In: *Demography* 18.1, pp. 1–25.

Bulatao, Rodolfo A. and Fawcett, James T. (1981). "Dynamic perspectives in the study of fertility decision-making: successive decisions within a fertility career". In: *International Population Conference*. Ed. by IUSSP. Vol. 1. Liège: UIESP, pp. 433–449.

Bulatao, Rodolfo A. and Lee, Ronald D., eds. (1983). *Determinants of fertility in developing countries: a summary of knowledge*. Washington D.C.: National Academy Press.

Caldwell, John C. (1976). "Toward a restatement of demographic transition theory". In: *Population and development review*, pp. 321–366.

— (1982). *Theory of fertility decline*. Academic Press.

Caldwell, John C. and Caldwell, Pat (1987). "The cultural context of high fertility in sub-Saharan Africa". In: *Population and Development Review*, pp. 409–437.

Cervi, Laura, Tejedor, Santiago, and Alencar Dornelles, Mariana (2020). "When Populists Govern the Country: Strategies of Legitimization of Anti-Immigration Policies in Salvini's Italy". In: *Sustainability* 12.23, p. 12.

Cigno, Alessandro (1991). *Economics of the Family*. Oxford: Clarendon Press.

— (1998). "Fertility decisions when infant survival is endogenous". In: *Journal of Population Economics* 11.1, pp. 21–28.

Cleland, John and Wilson, Christopher (1987). "Demand theories of the fertility transition: An iconoclastic view". In: *Population studies* 41.1, pp. 5–30.

Coale, Ansley (1973). "The demographic transition reconsidered". In: *International Population Conference*. Ed. by IUSSP. Vol. 1. Liège: Derouaux, pp. 53–74.

Colombino, Ugo and Di Tommaso, Maria Laura (1996). "Is the preference for children so low, or is the price of time so high? A simultaneous model of fertility and participation in Italy with cohort effects". In: *Labour* 10.3, pp. 475–495.

Davis, Kingsley (1945). "The world demographic transition". In: *The Annals of the American Academy of Political and Social Science* 237.1, pp. 1–11.

Davis, Kingsley and Blake, Judith (1956). "Social structure and fertility: An analytic framework". In: *Economic Development and Cultural Change* 4.3, pp. 211–235.

Di Cagno, Marina (2021). "Gender gap in STEM programs in Italian universities". In: *Tra i Leoni*. URL: `https://traileoni.it/2021/10/gender-gap-in-the-italian-university-system-a-reversed-leaky-pipeline/` (visited on Feb. 4, 2022).

Di Tommaso, Maria Laura (1999). "A trivariate model of participation, fertility and wages: the Italian case". In: *Cambridge Journal of Economics* 23.5, pp. 623–640.

Dumont, Arsène (1890). *Dépopulation et civilisation: étude démographique*. Translation: *Depopulation and civilization: a demographic study*. Lecrosnier et Babé.

Easterlin, Richard A. (1978a). "New directions for the economics of fertility". In: *Major social issues. A multidisciplinary view*. Ed. by J. Milton Yinger and Stephen J. Cutler. The Free Press, pp. 310–317.

— (1978b). "The economics and sociology of fertility: a synthesis". In: *Historical studies of changing fertility*. Ed. by Charles Tilly. Princeton University Press.

— (1980). *Birth and fortune. The impact of numbers on personal welfare*. Basic Books.

Easterlin, Richard A., Pollak, Robert A., and Wachter, Michael L. (1980). "Toward a More General Economic Model of Fertility Determination: Endogenous Preferences and Natural Fertility". In: *Population and Economic Change in Developing Countries*. Ed. by Richard A. Easterlin. University of Chicago Press, pp. 81–151.

Fawcett, James T. (1983). "Perceptions of the value of children: satisfactions and costs". In: *Determinants of fertility in developing countries*. Ed. by Rodolfo A. Bulatao and Ronald D. Lee. Vol. 1. New York: Academic Press, pp. 429–458.

Freedman, Ronald (1986). "Theories of fertility decline". In: *Fertility and mortality: theory, methodology and empirical issues*. Ed. by Mahadevan Kuttan. New Delhi: Sage Publications, pp. 30–36.

Greenhalgh, Susan (1978). "Anthropology theorizes reproduction: integrating practice, political economic, and feminist perspectives". In: *Situating fertility: anthropology and demographic inquiry*. Ed. by Susan Greenhalgh. Princeton University Press, pp. 3–28.

— (1990). "Toward a political economy of fertility: Anthropological contributions". In: *Population and Development Review*, pp. 85–106.

— (1994). *Anthropological contributions to fertility theory*. Tech. rep. The Population Council.

Guinnane, Timothy W., Okun, Barbara S., and Trussell, James (1994). "What do we know about the timing of fertility transitions in Europe?" In: *Demography* 31.1, pp. 1–20.

Henry, Louis (1953). "Fondements théoriques des mesures de la fécondité naturelle". In: *Revue de l'Institut international de statistique*. Translation: *Theoretical foundations of the measures of natural fertility*, pp. 135–151.

— (1972). In: *On the Measurement of Human Fertility: Selected Writings*. Ed. by Mindel C. Sheps and Evelyne Lapierre-Adamcyk. Amsterdam: Elsevier's Publishing Company.

Hochschild, Arlie Russell (1989). *The Second Shift: Working Families and the Revolution at Home*. New York: Penguin.

Im, Kyung So, Pesaran, M. Hashem, and Shin, Yongcheol (2003). "Testing for unit roots in heterogeneous panels". In: *Journal of Econometrics* 115.1, pp. 53–74.

Kamerman, Sheila B. (2000). "Early childhood education and care: an overview of developments in the OECD countries". In: *International Journal of Educational Research* 33.1, pp. 7–29.

Kirk, Dudley (1944). "Population changes and the postwar world". In: *American Sociological Review* 9.1, pp. 28–35.

Knodel, John and van de Walle, Ètienne (1979). "Lessons from the Past: Policy Implications of Historical Fertility Studies". In: *Population and Development Review* 5.2, pp. 217–246.

Koenig, Michael A. and Foo, Gillian H.C. (1992). "Patriarchy, women's status, and reproductive behaviour in rural north India". In: *Demography India* 21.2, pp. 145–166.

Landry, Adolphe (2019). *La Révolution Démographique: Études et Essais sur les Problèmes de la Population*. Original paper from 1909 publshed in *Scientia*, then included in the book published in 1934, and in the 2019 edition introduced by Fabrice Cahen and presented by Alain Girard. Ined Éditions.

Leibenstein, Harvey A. (1957). *Economic backwardness and economic growth: studies in the theory of economic development*. New York: John Wiley.

Leigh, J. Paul (1983). "Sex differences in absenteeism". In: *Industrial Relations: A Journal of Economy and Society* 22.3, pp. 349–361.

Leroy-Beaulieu, Paul (1896). *Traité Théorique et Pratique d'Économie Politique*. Paris: Librairie Guillaumin et Cie.

Lesthaeghe, Ron (1995). "The second demographic transition in Western Countries: an interpretation". In: *Gender and Family Change in Industrialized Countries*. Ed. by Karen Oppenheim Mason and An-Magritt Jensen. Oxford: Clarendon Press.

Lesthaeghe, Ron and Wilson, Chris (1986). "Modes of production, secularization and the pace of the fertility decline in Western Europe, 1870-1930". In: *The Decline of Fertility in Europe*. Ed. by Ansley Johnson Coale and Susan Cotts Watkins. Princeton University Press, pp. 261–292.

Lesthaeghe, Ron J. and van de Kaa, Dirk Jan (1986). "Conclusions". In: *Bevolking: Groei en Krimp*. Ed. by Ron J. Lesthaeghe and Dirk Jan van de Kaa. Deventer: Van Loghum Slaterus, pp. 9–24.

Levin, Andrew, Lin, Chien-Fu, and Chu, Chia-Shang James (2002). "Unit root tests in panel data: asymptotic and finite-sample properties". In: *Journal of Econometrics* 108.1, pp. 1–24.

McDonald, Peter (2000). "Gender equity in theories of fertility transition". In: *Population and Development Review* 26.3, pp. 427–439.

McNicoll, Geoffrey (1994). *Institutional analysis of fertility*. 62. The Population Council.

Miller, Barbara D. (1981). *The endangered sex: neglect of female children in rural north India*. Cornell University Press.

Murphy, Kevin M. and Welch, Finis (1992). "The Structure of Wages". In: *The Quarterly Journal of Economics* 107.1, pp. 285–326.

Murphy, Mike (1992). "Economic models of fertility in post-war Britain – A conceptual and statistical re-interpretation". In: *Population Studies* 46.2, pp. 235–258.

Namboodiri, Narayanam Krishnam (1983). "Sequential fertility decision making and the life course". In: *Determinants of fertility in developing countries*. Ed. by Rodolfo A. Bulatao and Ronald D. Lee. Academic Press, pp. 444–472.

Notestein, Frank W. (1945). "Population - The long view." In: *Food for the World*, pp. 36–57.

— (1983). "Frank Notestein on population growth and economic development". In: *Population and Development Review* 9.2, pp. 345–360.

Pampel, Fred C. and Peters, H. Elizabeth (1995). "The Easterlin effect". In: *Annual Review of Sociology* 21.1, pp. 163–194.

Reinis, Kia I. (1992). "The impact of the proximate determinants of fertility: evaluating Bongaarts's and Hobcraft and Little's methods of estimation". In: *Population Studies* 46.2, pp. 309–326.

Retherford, Robert D. and Palmore, James A. (1983). "Diffusion processes affecting fertility regulation". In: *Determinants of fertility in developing countries*. Ed. by Rodolfo A. Bulatao and Ronald D. Lee. Vol. 2. Academic Press, pp. 295–339.

Ryder, Norman B. (1983). "Fertility and family structure". In: *Population Bulletin of the United Nations* 15, pp. 15–34.

Sah, Raaj K. (1991). "The effects of child mortality changes on fertility choice and parental welfare". In: *Journal of Political Economy* 99.3, pp. 582–606.

Schultz, T. Paul (1976). "Determinants of fertility: a micro-economic model of choice". In: *Economic Factors in Population Growth*. Ed. by Ansley Johnson Coale. New York: Halsted Press, pp. 89–124.

Simmons, George B. (1985). "Theories of fertility". In: *Fertility in developing countries. An economic perspective on research and policy issues*. Ed. by Ghazi M. Farooq and George B. Simmons. New York: St. Martin's Press, pp. 20–66.

Szreter, Simon (1993). "The idea of demographic transition and the study of fertility change: a critical intellectual history". In: *Population and Development Review*, pp. 659–701.

te Velde, E. (1992). "De invloed van de leeftijd op de vruchtbaarheid van de vrouw". In: *Een slimme meid regelt haar zwangerschap op tijd*. Ed. by Gijs Beets and Pauline Verloove-Vanhorick. Translation: *Effects of age on women's fertility*. Amsterdam: Swets & Zeitlinger, pp. 21–27.

Thompson, Warren S. (1929). "Population". In: *American Journal of Sociology* 34.6, pp. 959–975.

UNICEF (1990). *Children and women in India. A situation analysis*. Tech. rep. UNICEF.

van de Kaa, Dirk Jan (1987). "Europe's Second Demographic Transition". In: *Population Bulletin* 42.1, pp. 1–59.

van de Walle, Ètienne (1978). "Alone in Europe: The French fertility decline until 1850". In: *Historical studies of changing fertility*. Ed. by Charles Tilly. Princeton University Press, pp. 257–288.

van de Walle, Francine (1986). "Infant mortality and demographic transition". In: *The Decline of Fertility in Europe*. Ed. by Ansley Johnson Coale and Susan Cotts Watkins. Princeton University Press, pp. 201–234.

Watkins, Susan Cotts (1986). "Conclusions". In: *The Decline of Fertility in Europe*. Ed. by Ansley Johnson Coale and Susan Cotts Watkins. Princeton University Press, pp. 420–449.

— (1987). "The fertility transition: Europe and the Third World compared". In: *Sociological Forum*. Vol. 2. 4. Springer, pp. 645–673.

Whittington, Leslie A., Alm, James, and Peters, H. Elizabeth (1990). "Fertility and the personal exemption: implicit pronatalist policy in the United States". In: *The American Economic Review* 80.3, pp. 545–556.

Yilmazer, Tansel (2008). "Saving for children's college education: An empirical analysis of the trade-off between the quality and quantity of children". In: *Journal of Family and Economic Issues* 29.2, pp. 307–324.