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The Downside of Fertility

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ABSTRACT: The fertility decline is everywhere in the world today. Moreover, the decline goes decades back in the histories of rich countries. Birthrates have been below replacement in the U.S. and Europe since the mid-1970s, although further declines occurred after the Great Recession. The reasons for the declines from the 1970s to the early 2000s involve greater female autonomy and a mismatch between the desires of men and women. Men benefit more from maintaining traditions; women benefit more from eschewing them. When the probability is low that men will abandon traditions, some career women will not have children and others will delay, often too long. The fertility histories of the U.S. and those of many European and Asian countries speak to the impact of the mismatch on birth rates. The experience of middle income and even poorer nations may also be due to related factors. Various constraints that I group under "matching" problems have caused fertility to be lower than otherwise and imply that fertility has a "downside."

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Low and declining fertility have been much-discussed subjects of late in the U.S. as well as in several European and Asian countries.[1] But the fertility decline in many of these nations occurred decades ago. Levels far below the magic replacement figure of 2.1 have existed for some time. There have, however, been further declines in some nations since around 2010.[2]

My primary goal is to understand why fertility has declined across a wide range of countries and to comprehend whether there are structural impediments.[3] I will also address why concern is currently being voiced about low fertility despite its far longer duration.[4] Policies intended to increase fertility have been proposed and implemented in many countries. But the policies do not address the structural impediments I will identify, although such policies can have beneficial effects on children and their parents without increasing the number of children.

1. The Ups and the Downs of Fertility

An increase in the birth rate is almost always caused by a decrease in economic constraints. But a decrease in the birth rate is also often caused by a decrease in a different set of constraints.

The few sustained increases in the birthrate that have existed in recent history occurred after major economic downturns, as in the case of the U.S. in 1939. They have also occurred at the conclusion of major wars, as in 1945 for almost all combatant nations. Several well-known policies increased constraints and caused spikes in the birth rate, as when Nicolae Ceauşescu in 1967 suddenly abolished abortion in Romania. But these instances did not produce sustained increases.

[1] The term "fertility" means several different things. I will use it to refer to three related measures: the general fertility rate (also called the birth rate), the total fertility rate (TFR), and the cohort fertility rate. The reader is advised to consult the Appendix on the relationship among these various measures that are each often termed the "fertility" of a population.
[2] Among the 12 nations that I will later discuss four (Japan, Korea, GBR, and the U.S.) have experienced a recent TFR level lower than any that has existed in the past 40 years. In the other eight countries, TFR has declined but lower levels had once existed.
[3] See the informed discussion in Weil (2024) about why replacement fertility is not the answer. Jones (2022) explored some of the implications of lower birth rates.
[4] The current interest in the subject, therefore, must be for some other reason. In the U.S, for example, births are seen as substitute for immigration. Many would like to curb the latter, therefore there is a need to increase the former. In addition, some see great harm in the deviation from traditional family values, and they have espoused pro-family and anti-abortion policies.

Fertility declines have often been preceded by improvements in women's employment, education, and reproductive rights that have enabled them to exercise increased agency regarding marriage and childbearing. Many other factors have also been shown to have reduced fertility.

For example, the increase in relative housing costs has been a factor in Asia. The decrease in young men's job opportunities and the rise of the gerontocracy have been emphasized in Europe and the U.S. (Bianchi and Paradisi 2024). The perceived and real increase in the cost of raising children, including the possibility of a rat-race equilibrium regarding college education, has been shown to be a factor in Asia and elsewhere (Kim and Tertilt 2024). But these factors have not been as pervasive across nations and through time as those that have given women greater self-determination.

Even though women's enhanced agency is an important factor in determining fertility in most developed nations today, its role has also depended on the ability of women to be assured they can reap the financial and personal rewards from their education while raising their children. The more men can credibly signal that they will be dependable "dads" and not disappointing "duds," the higher will be the birthrate in the face of greater female agency.

Therefore, even though the major factor in the decline of fertility is increased women's agency, the real downside or obstacle is the need for husbands and fathers to reliably demonstrate their commitment. I will provide two related models that make the point that the real problem is a mismatch between what women need to enjoy the fruits of their autonomy and what credible commitments men can make.

I begin by demonstrating that the fertility decline in the past half century has been nearly ubiquitous. Furthermore, in many currently developed nations, low levels of fertility go back to the mid-1970s. I then use the U.S. as a case study to show how greater female agency increased the age at first marriage, boosted education, and enabled women's career employment. The birth rate decreased through several interrelated routes. These include later marriage, less marriage, an enhanced desire by women for careers, and the need for men to credibly assure commitment. The increase in "greedy" jobs for both husband and wife has made couple equity even more expensive.[5]

[5] See Goldin (2021) on greedy jobs. Couple equity becomes more expensive when jobs pay more per unit time for overtime, weekends, vacations, evenings, and other family time.

I then turn to a comparison between two groups of nations in the post-World War II period to show the importance of the macroeconomy. When economic growth is substantial and sudden and when women are allowed to have more education and be employed in higher-paying occupations and careers, they make the transition to the modern world more easily than do their male counterparts. Young men, on the other hand, gain more from retaining the traditions of their parents and grandparents regarding the division of labor in the home, and they do little in their households to ease the increased burden on women. Without a reduction in their household labor, women cut back on having children to enable their increased employment. As in the case of the U.S., the prime driver of low fertility in the nations that developed rapidly is the increased agency of women. It is reinforced by the lack of change among men.

Even though the developing world is not the focus of my examples, countries such as India, Brazil, and Mexico, have had similar fertility trajectories to those in the more developed ones. I will suggest that they, too, have experienced more female autonomy.

The central point of my argument is that fertility declines have often been preceded by improvements in women's employment, education, and reproductive rights that have enabled them to exercise greater agency regarding marriage and childbearing. When men do not have similar priorities to those of women, a matching problem arises that may lead to large reductions in fertility.

2. Fertility Decline is Everywhere

More than half of the 193 nation states in the United Nations have a total fertility rate that is currently (c. 2022) less than the agreed-upon replacement rate of 2.1. These countries, moreover, contain two-thirds of the world's population and include the two most populous nations. The TFR of the world is currently 2.27. Most of the currently high fertility nations have majority Muslim populations and are in sub-Saharan Africa. But even their birth rates are in decline.[6]

The birth rate has declined significantly at some point in the recent past of virtually every nation in the world. *The fertility decline is everywhere*. Furthermore, in most developed nations, the decrease to a level below 2.1 occurred decades ago and levels today

[6] Fertility has declined in Nigeria, the region's most populous nation, since around 1980, but at around five births per woman, it is still very high. There are some notable exceptions. Israel's birth rate has hovered around three for the past 30 years in large part due to the high fertility of the Jewish ultra-Orthodox community.

are very low in many of these nations. Take the 38 member nations in the OECD. All but Israel had a TFR in 2023 that was less than 2.1 and in 23 (61%) TFR was less than 1.5.

Furthermore, many OECD nations with low fertility today have experienced low fertility for decades. Fully 25 (66%) have been below the 2.1 replacement figure since 1980. Figure 1 demonstrates that for the U.S., France, and the U.K., fertility levels were below 2.1 ever since 1980. Spain, Italy, and Korea each achieved a level of 2.1 a bit later than the other three. And although each had starting levels that were higher than the other three, each decreased further to become among the "lowest low."[7] I will later comment on two groups of countries from which those in Figure 1 are a subset and explain the somewhat different fertility paths each of the two groups has taken.

Even though many of the richer nations underwent fertility declines to less than replacement many decades ago, other nations have only recently joined the low fertility club. Among the rich nations of in the Middle East, the fertility decline began sometime in the 1980s from levels around 6 or 7. TFR in Qatar and the UAE dipped below 2.1 in the early 2000s, and although the level in Saudi has been a bit higher, the timing of the decline is similar to that of others in the region. Likewise in India and in many nations of southeast Asia, the decrease began from around six in the 1960s and 1970s to less than two today.

Figure 2 provides the TFR for the world, and some of the countries just mentioned or alluded to (India, China, Mexico, and Nigeria) from 1950 to the present. The time series demonstrates the ubiquitous decline among some of the most populous nations that are still developing economically.

Although coercive fertility control policies have existed in many nations, most of the birth rate decrease has not been due to national programs of population restriction (de Silva and Tenreyro 2017). Although many nations had policies in the 1970s and 1980s to reduce the birth rate, only China managed to get its TFR to low levels using state sanctions. In addition, China managed to effect large change even before its famed one-child policy (OCP) was formally announced in 1978, as is obvious from Figure 2.

Providing the means for fertility reduction, including effective contraception and legal abortion, is never sufficient and not always necessary to achieve a decrease in the birth rate. The birth rate in the nineteenth century U.S. was greatly reduced in the absence

[7] By "lowest low" is meant a TFR of 1.3 or lower. On the concept of the "lowest low," see Billari and Kohler (2004).

of modern contraceptive methods and abortion was, apparently, unimportant.

For a sustained and substantial reduction in the birth rate one also needs that couples want to have fewer children. And to increase the birth rate, couples must want to have more children, and women must be assured that their children will be cared for if there is marital or couple dissolution.

Decreased fertility, I should add, does not necessarily mean fewer surviving children, and thus a decline or a smaller increase in the working or adult-age population. The reason is that fertility control often occurs when infant and child mortality rates decline.

As can be seen in Figure 3, the TFR for white women in the U.S. around 1870 was 4.55. But only 3.41 of those babies, or 3 out of 4, would have survived to the time they were five years old. By 1920 when TFR had declined to 3.17, the number that lived to age five was 2.88. That is, around 10 out of 11 would have survived. By 1935 when TFR had declined to 2.12, 23 out of 24 would have survived. A reasonable fraction of the fertility decline, from 4.55 in 1870 to 2.88 in 1920, was due to the increased survival of infants and children. Fertility decreases to 1935 were due to several other factors I shall soon discuss.

When child survival is low and families want several surviving children, they often engage in "child hoarding" and have more as insurance. As infant and child mortality rates fell historically, often through the provision of clean water and the separation of sewage from drinking water, families rapidly decreased their fertility.[8] In the more modern era, infant and child mortality rates fell even further with antibiotics and methods to rehydrate sick babies. But as mortality rates decline families need to be assured that these rates will remain low before they change their long-held traditions. Thus, fertility declines often lag decreases in infant and child mortality and this is especially true in poorer nations.

Despite levels of infant mortality in the developing world today that are high by modern standards, decreased fertility in most developing nations has meant fewer children. This fact is true even in places like India where infant and child mortality rates are still declining. Decreased fertility has been far larger than the decrease in infant deaths and has not been as compensatory as it was historically in other nations that are currently

[8] See Alsan and Goldin (2019) on the role of clean water and sewage separation in the decrease in infant and child mortality in the U.S. Note that the desire to have surviving children was often to secure the wellbeing of the parents in their older years. Thus, another reason for declining fertility has been the growth of well-functioning capital markets and the provision of social insurance.

developed.

Now that I have established the central fact that the fertility decline is everywhere and is generally not offset by a decrease in infant and child mortality, the question is what the cause has been. The fact that the fertility decline is ubiquitous means that a common factor is likely. But given the vast differences across many of these nations, the common factor will likely have many auxiliary and ancillary factors. The common factor in Europe and North America might have operated differently than the same factor in Asia or Latin America or the Middle East.

Why fertility in the more modern period generally declines with rising income and standards of living, has been a much discussed and researched topic among economists ever since the 1960s. The answers provided have evolved with the facts and with better modeling of household decisions and have been admirably summarized in various papers.[9]

The earliest explanation by economists was a simple one. Fertility control was poorly understood and inadequately provided to lower-income households and nations.[10] That explanation proved wrong as modern contraceptive practices spread. Something else was driving higher-income households and nations to have fewer children than their lower-income counterparts.

One possibility was that the higher-income households placed a greater value on parental time, particularly that of the mother. An increase in labor earnings has both an income and a substitution effect. If the latter won out, more income could easily mean fewer time-intensive goods, including children. But that was not enough of an explanation since it held even when the mother was not employed for pay. Something else was needed in the economist's toolkit to understand why higher income led to fewer children.

That need was met by the notion that births produced a "quantity" of children, and that children were then "augmented" through costly healthcare, education, training, and so forth. The "quality" dimension of children was of critical importance in understanding the role of income. The "full" relative price of children could rise with income, given certain

[9] Among the recent reviews of the literature is the informative summary by Doepke, et al. (2023).
[10] See Becker (1960, p. 231): "Crude cross-sectional data show a negative relationship with income, but the crude data do not hold contraceptive knowledge constant. When it is held constant, a positive relationship appears." The explanation is not found in his subsequent papers.

parameters, if goods and services were used to create "quality" children.[11] In the new theory, known as the Quantity-Quality tradeoff, parents purchase goods and services and use their time to enhance the quality of their children.[12]

But the new theory also proved insufficient because it did not incorporate the fact that both members of the couple must agree on having children in an environment in which commitment is difficult to secure. In addition, it cannot explain why a positive fertility-income gradient has appeared across a subset of the world's richest nations (for example, why Sweden and the U.S. have higher fertility levels than Greece and Korea).[13]

The unifying factor to many of these explanations and the one that I will emphasize is the increased agency of women. Although the reason for their improved self-determination will differ across places, the greater ability of women of all ages to control their fertility will be the common factor. Fertility control, however, will impact related decisions that women make before it will greatly impact the birth rate. We will see in the case of the U.S., that fertility control altered the age at first marriage, women's continuation in higher education, and their demand for careers. The indirect effects of reproductive control were greater than its direct effect on the birth rate.

3. A Model of the Birth Rate

I present a simple model of the demand for children that will focus attention on the tradeoffs women make between their jobs and children, their demand for higher and professional education, and the importance of commitment from the child's father.[14] The latter will enable women to reap the rewards from their education while they raise their children. The model will highlight that a necessary input to having a child among women who can obtain more education is a commitment from the father of the child.

Assume that women live for two periods. In the first, they can either work or get

[11] The conditions are that quantity and quality cannot be very close substitutes for an equilibrium to exist, and the income elasticity for quality must be greater than that for quantity for an increase in income to lead to a lower demand for child quantity.
[12] The best description is found in the original formulation, Becker and Lewis (1973).
[13] Doepke, et al. (2023) discuss the changing income-fertility gradient across countries over time and provide evidence on within country education-fertility gradients. Kim and Tertilt (2024) find a positive gradient within Korea mainly due to the high cost of educating children and the perceived necessity of getting a child into a good college. Their paper points to an increase in the perceived cost of having a child due to stigma. See also van Wijk (2024) on the Netherlands.
[14] Briselli and González (2025) construct a related model.

educated, say in college. In the second period they can have children (I will assume one child per woman) and work, either at a job that does not require higher education or at a job that does. The job that does not require higher education pays w and the job that does pays $\overline{w}$, where $\overline{w} > w$. Only a fraction of women, $0 > \lambda \geq 1$, can gain from further education.[15]

Men, in this model, serve a critical function (beyond the biological). They provide care for their children but vary in their dependability at that task. Some are dependable and are high types ($D = 1$) and some are not and are low types ($D = 0$). Whether a man is a high or low type is known to others only after the fact (meaning after the birth). The fraction of men with $D = 1$ is $0 \geq p \geq 1$, and p is public knowledge.[16]

Dependability of the father is important only for women who obtain more education. If the father of an educated woman's child is a low type, the mother's wage becomes w, because she cannot both care for the child and work effectively in the high-wage sector. The "child penalty" is $(w - \overline{w})$.[17] If women who do not continue with their education have a child with a low-type father, they continue to work, and earn w. If they have a child with a high-type father, they do not earn more.

Women make two related decisions. The first is whether they should become more educated by investing during the first period. That investment can be done only by the fraction, λ, of women above some cutoff of ability. The second decision is whether they should have a child in the second period given their education.

I assume that all women receive K units of value or utility from having a child. Therefore, the $(1 - \lambda)$ fraction of women who will not go to college will have lifetime value (utility) of $(2w + K)$. The λ fraction who are academically able to go to college can expect to have $(\overline{w} + p \cdot K)$ in lifetime value. Note that K is multiplied by p since the woman who is considering college will know the distribution of male types but will not know in advance whether her mate will be a high type.

[15] The fraction of women who can go to college, λ, can be endogenized by assuming that an effort cost of college varies by woman. As the premium to college rises, more go to college. In addition, the model presumes effective birth control. In its absence, women make a stark choice in period 1. Those who get education will remain relatively celibate, and the others will have a child. Historically, these are Group 1 women, who had career or family (see Goldin 2021).
[16] The assumption can be altered to reflect differences by women together with positive assortative mating.
[17] For child penalty measures, see Kleven, Landais, and Leite-Mariante (2025).

The woman who invests in college and has a child but then discovers that the baby's father is a low type, will receive ($w + K$), but she will have invested w. If she invests in college and has a child with a man who turns out to be a high type, she will get ($\overline{w} + K$). If she invests in college and has no children, she will get $\overline{w}$, and had she never invested in college she would get ($2w + K$). Those are the four possibilities for the λ-fraction women who could invest in college. Since there is no heterogeneity among the women who can gain from college, all will attend college or none will.

All non-college women will have a child (as long as $K > 0$). When $p = 0$, and thus no men are of the high type, λ-fraction of women will go to college if $\overline{w} > 2w + K$, none will have a child, and the birthrate will be $(1 - \lambda)$. At the other extreme when $p = 1$, all college-eligible women will go to college if $\overline{w} > 2w$ and all will have a child. The birthrate will be 1. For values of $p > 1 - [K/(\overline{w} - w)]$, all women who invest in college will have a child, and for values below, none will.[18]

Therefore, the λ-fraction of women who can invest in college will do so if

$$\overline{w} > 2w + K(1 - p) \qquad (1)$$

When, in addition, $p > 1 - [K/(\overline{w} - w)]$, the college woman will have a child. If, instead, $p < 1 - [K/(\overline{w} - w)]$, the college woman will not have a child, and the λ-fraction women will invest in college only if $\overline{w} > 2w + K$.

The model underscores the importance to the birth rate of both societal and individual mismatch. Characterize the $D = 0$ men as "traditional" and the $D = 1$ men as "modern." Women are considered modern if they attend college and traditional if they do not. When both men and women are traditional, the birth rate will be high. As more women become modern because, for example, of an increase in the college premium the birth rate will decline. The birth rate will continue to decrease unless there is an increase in p, the fraction of men who are modern.

Another type of mismatch can occur within couples. An implication of the model is that a modern man may be married to a modern woman, but the aggregate level of p may be too low. If $p < 1 - [K/(\overline{w} - w)]$, the modern woman will not take a chance and have a child. The man may want a child and may be willing to allow a college woman to earn $\overline{w}$. But he has no credible commitment mechanism. Under these circumstances, the birth rate

[18] The college woman will not have a child if $\overline{w} > p(\overline{w} + K) + (1 - p)(w + K)$, because the expected value of having a child is less than the certain value of not having one.

will be lower than if there were such a contractual device.

As the proportion of high-type or modern men in society increases, more college-educated women will have a child even if some are, ex post, not able to earn $\overline{w}$ because they were matched to a low-type or traditional man. It is also likely that as society provides more benefits that substitute for the childcare services of high-type men (e.g., subsidized childcare, paid maternity leave), modern women will have children even if p is too low. And as there is greater marketization of childcare services of all types, more college-educated women will be able to have a baby and earn $\overline{w}$, independent of the ex-ante p and the ex-post realization.

4. Downside I: Rising Female Autonomy and the Falling U.S. Birthrate

The first application of the framework is to the case of the U.S. from the 1950s to the present, commencing with the first few years of the U.S. Baby Boom. But before I examine the 1950s to the present and traverse an increase and then a decrease in the birthrate, I must digress a moment and discuss America's longer demographic history. Because the U.S. had an exceptionally high fertility rate from its inception as a nation—among the highest on record—much of its history contains fertility decline. That is obvious from Figure 3, showing that the TFR for the white population decreased from seven live births in 1810 to four by 1880 and then to two by 1933.

4.1 The Ups and (Mainly) Downs of U.S. Fertility History

Most of the decrease in fertility that preceded the Baby Boom occurred as the U.S. underwent large sectoral changes, from a rural society to an urban one and from an agricultural economy to an industrial one. Some part of the fertility decline, especially from the 1880s to the 1920s, was because infant and child mortality decreased (as noted previously). The rest was due to a combination of factors, including a reduction in the employment of youthful labor particularly on farms, the expansion of elementary schooling, and a greater ability for parents to save in financial assets rather than in their children.

Even though the long period of secular fertility decline was not largely due to women's increased self-determination, many women expressed a desire to have better means to limit their births. The high demand for contraceptive devices is evident from the history of early (and often illegal) birth control clinics in the early twentieth century (Bauernschuster, Grumm, and Hajo 2023). We also know that as the birth rate fell, the age of the mother at last birth decreased likely demonstrating deliberate control (Haines,

Hacker, and Jaremski 2020).

One factor that buoyed fertility in the pre-1920s U.S. was the high level of immigration from Europe. Immigrants had higher fertility rates than the existing U.S. population, and when immigration was sharply curtailed in the 1920s, TFR fell. A short while later when the Great Depression struck, family formation was reduced, and the birthrate declined further. These changes are apparent in Figure 4, which has both the TFR and the birth rate (also known as the General Fertility Rate). Both fertility measures decreased beginning around 1908 and then plummeted after the immigration restriction acts around 1924. Using the TFR measure, the decrease was from 3.5 in 1915 to 2 in 1933.

But starting in 1940 as the economy began to improve, fueled in part by WWII defense contracts, marriages and births began to increase. The marriage rate increased yet more when draft deferments were issued for married men, and births increased when fathers were exempt. And then, about nine months after the troops came home, the birth rate spiked as it did in just about every combatant nation. The U.S. Baby Boom officially began in 1946.

Baby booms in many nations were compensatory, making up for the lost time that the war entailed. But that in the U.S. was something else entirely. Both the TFR and the birth rate increased every year after the end of the war. Both peaked a decade later when their levels were as high as they had been at the turn of the century (the TFR in 1957 was 3.74).

In 1957, the median age at first marriage for all U.S. women was just 20.3 and that for college graduate women was less than 23 (see Figure 5, part A). Americans, in fact, were marrying younger in the late 1950s than they had in the first half of the twentieth century.[19] They had always married at younger ages than their European counterparts. But by the 1950s America was no longer a rural and agricultural nation. The Baby Boom was an astonishing turnaround from the low birthrates of the 1920s and the Great Depression.

4.2 Power of the Pill

But around 1957 the demographic tide began to turn once again, as is clear from Figure 4, and it has not cycled back in 68 years. Enovid, later known as “the Pill,” one of the most revolutionary science and technology advances of the twentieth century, was

[19] For the median ages at first marriage for years before those given in Figure 5, see source to that figure. Ever since the eighteenth century, Americans had married young, in fact considerably younger than their European counterparts in large part due to the greater availability of land.

approved by the FDA for medical use in 1957.[20] Three years later, in 1960, the Pill was officially approved by the FDA for contraceptive use (although it had been used by many for that purpose since 1957). The Pill's impact occurred in several stages, spread out across many cohorts and traversing two decades or more. The world of marriage and fertility, and eventually women's self-efficacy, would never be the same again.

From 1950 to 1972, women tripled their fraction graduating from college and greatly narrowed the gap with men.[21] But their earnings and career opportunities did not advance by much. The reasons were largely that college women at that time often married just after they received their BAs, and they had their first child soon after that. The median age at first marriage for college graduate women in 1955 was just 23 years and it remained around 23 until 1972. The mean age at which they had a first birth, conditional on having one, was just less than 25 years old. Furthermore, the majority of college graduate women's jobs at the time were compatible with child rearing. They were disproportionately teachers, nurses, clerks, and part-time retail sales workers.

Even though the Pill could be prescribed in 1960 for contraceptive purposes, the availability of any type of contraceptive device or medication was restricted in various ways by state law, even to adult married couples. The laws regarding married women soon changed, especially after the 1965 *Griswold v. Connecticut* U.S. Supreme Court decision affirming privacy as a constitutional right. A careful study using reversals of state laws banning sales of contraception to married individuals demonstrates the importance of the increased use of the Pill in the initial fertility decline (Bailey 2010; table 1 has state laws).

The Pill enabled couples to space births and prevent pregnancy with greater confidence (and without irreversible surgery). It diffused rapidly to married women and even to Catholics.[22] But the Pill's long-term impact on women and the birthrate would be far greater if it could reach those not yet married. In the early 1960s, the Pill, could not have done much to change the lives of young and unmarried women, because it was still not generally available to them. Its dissemination to young single women was strictly governed by a host of state laws that were even more restrictive than those pertaining to married couples. In the late 1960s and early 1970s, state laws began to change, and judicial decisions enabled young unmarried women to obtain the Pill and other contraceptive

[20] *The Economist*, in its December 1999 millennial issue, chose "The Pill" as the greatest science and technology advance of the twentieth century.
[21] By college graduation is meant a bachelor's or four-year degree.
[22] The Papal Encyclical on birth control (Humanae Vitae) was delivered in 1968, almost a decade after the Pill became available.

devices. Change was further advanced, somewhat fortuitously, by the passage and ratification in 1971 of the 26th Amendment lowering the voting age to 18 and thereby reducing the age at majority in many states (see Goldin and Katz 2002, and Bailey 2006 for the timing of the changes).

When single women could obtain the Pill, its availability could and did increase the age at first marriage. When only married women could more easily obtain contraception, the age at first marriage would obviously not be affected. By allowing single women to delay marriage and still have active social lives, they were granted the ability to become more financially independent before marriage. Single women were enabled to complete their BAs, obtain graduate and professional degrees, and have substantial careers.

The age at first marriage, given in Figure 5, part A, greatly increased beginning around 1972 for college graduate women and a few years later for all women. The increase in the marriage age from the 1948 to the 1961 birth cohorts of college graduate women extended the number of years before marriage by almost three. The increase gave college graduate women time to complete an MBA or a JD or begin a graduate or professional degree program. Many did just that. The fraction female among professional school graduates in all major fields (e.g., law, medical, dental, business) soared after the early 1970s (Goldin 2021, figure 6.3). From 1972 to 1982, the fraction female among law and medical students tripled and the increase was even greater for business programs.

Therefore, the initial impact of the Pill extended the marriage age and enabled women to invest more in their education and to be taken more seriously by their mentors and employers. By increasing their income-earning ability, it also gave women the ability to step away from or delay marriage and have greater bargaining ability with the father of their children. The Pill did far more than aid in controlling fertility. It gave women the possibility of an independent and more secure life (Goldin and Katz 2002).[23]

The existence of the Pill, in an extension to the simple model previously discussed, would enable women to choose, in period 1, between investing in their education or having a child. By giving women the option of putting off marriage and family, the Pill enabled more women to invest in education and careers. Given that ability, the higher $\overline{w}$ is the fewer children women will have. But the impact of a greater level of education on fertility is mediated by p, the fraction of men who are modern, and the lower is p, the lower fertility

[23] See also Bailey (2006) who shows that changes in legal access to the pill before age 21 reduced births to women younger than age 22 and increased female employment at both the extensive and intensive margins.

will be among the more educated.

For all the reasons just given, the birth rate fell. As seen in Figure 6, part A, the birth rate fell for women across all educational groups. The decrease for college graduate women took the birth rate to very low levels quite rapidly. By the 1948 birth cohort, the number of births per college graduate woman had fallen to 1.64. In fact, the 1950 birth cohort had fewer children per woman than implied by the 2023 total fertility rate of 1.62.[24] But the 1950 birth cohort was already 35 years old in 1985. The point is that the post-Baby Boom fertility decline in the U.S. among college graduate women began a long time ago.

Interestingly, the large decrease in births among cohorts of college graduate women in the early 1970s may have been a miscalculation. The cohorts of young women who could have been impacted by the Pill start around 1945. The fraction of college graduate women with no births across their entire reproductive lives reached the exceptionally high peak of 28% with the cohort born in 1955 (see Figure 6, part B). That fraction eventually decreased to 17.5% with the cohort born in 1974. It is possible that the early cohorts of women who entered predominantly male professions, including those in business, law, medicine and a host of academic fields, put off having children for longer than was biologically feasible and that later cohorts made adjustments.[25]

Similar changes occurred for women who eventually had no college education. They, too, had an increased fraction with zero births beginning with cohorts who could have been affected by the Pill. Their zero-birth rate peaked with the 1964 birth cohort at 17%, later and lower than the peak for the college women. Rather than putting off having children to obtain more education, these women often delayed having children to work.

A greater fraction eventually had no children, and a growing fraction who eventually had children would never marry. The fraction of mothers who were ever married up to age 35 (and beyond) began to deviate from almost 100% around the birth cohorts impacted by the Pill. As can be seen in Figure 5, part B, the impact is discernable for college graduate women but is considerably smaller than for those who never graduated college.

By the cohort born in 1965, 10% of the non-college graduate mothers had never

[24] The reason is that the TFR averages the birthrates of a cross section of women.
[25] These are members of Groups 4 and 5 from Goldin (2021). Group 4, college graduate women born 1944 to 1957, was the first to set their sights on a career and then a family. Group 5, born 1958 to 1978, saw that having career first could be detrimental to family and reduced their fraction with zero births. There is considerable evidence that these cohorts of women were unaware how much natural fertility falls with age.

married and by the cohort born in 1975, 15% had never married. For college graduate mothers, the figure for the 1975 cohort is just 5%. Although the influence of the Pill is evident, the somewhat later impact of abortion legalization may also have been an important factor especially for those who were not college graduates.[26]

4.3 Recent Fertility Decline, Intensive Parenting, and Rat-Races

I have emphasized that the decrease in fertility among rich nations goes far back in time to around 1975. But I also noted that fertility levels, as measured by the TFR or the birth rate (GFR), dipped again starting with the Great Recession. In the U.S. that slump in births began around 2007. In much of northern Europe the decrease began 2010. What caused the dip in the birthrate and why has it lasted long after the Great Recession ended?

First off, the dip in the U.S. birthrate around 2007 is substantial (see Figure 4). There were 66 births per woman 15 to 44 years in 2007, but 55 in 2023.[27] A large part of the decrease was due to the substantial decline in births among Hispanic women and among young women. The decline among the 15- to 19-year-old group alone accounts for 36.7% of the total decrease from 2007 to 2019.[28] Even though the decline after the Great Recession is clear, the level of TFR just before the Great Recession was abnormally high compared with the average during the years since 1975.

The decrease in births was also substantial for immigrant groups and they apparently began to converge on the rates of native-born women. But the decrease was also substantial among college graduates. Among those 20- to 44-years old, the decrease in the GFR was from around 70 in 1992 to 60 in 2019 (see Figure 7, part A). Further detail for college women by age is found in Figure 7, part B for 2011 to 2023. Those data reveal that the decline in births among college graduate women was mainly for the 25- to 34-year-old group. There were gains or stability in the older groups (35 years plus) but these could not make up for the losses in the GFR.[29]

The decrease among college graduate women occurred largely because they are

[26] According to the work of Akerlof, Yellen, and Katz (1996), shot-gun marriages were more common before abortion became legal. But after women could legally and more safely end their pregnancies, the father felt less compelled to take full responsibility and marry the woman.
[27] The birth rate (GFR) was 69.3 in 2007 and 54.5 in 2023. But the 2007 figure was far higher than any from 1992 to 2006 and seems to have been due to a brief blip from 2004 to 2007.
[28] See Kearney, Levine, and Pardue (2022, table 1) who do the analysis for the years to 2019.
[29] I emphasize that the GFR and the TFR are both cross-section measures and that the GFR incorporates the age distribution whereas the TFR does not.

continuing to delay having children. Even in the past decade, the fraction of all births to college graduate women older than 34 years increased from 25% to 30%. As noted previously and shown in Figure 6, part B, college graduate women had a high rate of childlessness for cohorts born in the late 1950s. These women then made a remarkable turnaround, not by having children earlier in life. Rather, they were managing to have more children later in life due largely to advances in reproductive technology.

The trend in cohort fertility has continued, but the increase for those in their late thirties and even early forties might not make up for the decrease in childbearing among those in their twenties and early thirties. Even though cohort fertility for college graduate women in completed cohorts has not yet turned down (see Figure 6, part A), the birth rate data of Figure 7 provide leading indicators that it probably will. In addition, there was a large increase in childlessness among women in recent cohorts that have turned 40 years (see Figure 6, part B), even for the non-college group. But note that the fraction with zero children was equally high for the 1955 to 1964 birth cohorts.

That college women are delaying even more is testament to the mismatch factors I have emphasized. They have invested in their education and want to ensure their careers before they have their children. For some, it will mean that they will delay sufficiently that they will not have children. With greater assurances and commitment, they might have had the children and had them earlier.

Various researchers have noted that in the past decades some of the richest nations in Europe and North America have had the highest birth rates.[30] I will address one possible reason for that fact in the next section. Of importance here is the claim that a positive slope to fertility with respect to income exists *within* countries and that there is a new era of fertility change.

Children, according to many, have become more of a luxury good in some societies. In various countries, social prestige has apparently increased for parents whose children get into the right college or who attain some other coveted goal that requires substantial time and financial inputs. At the extreme, the need to guarantee one's child a choice college education or another positional good has meant that those who cannot make the investment, do not have children (Kim and Tertilt 2024).

The large expenditures on test prep academies and tutors in Korea and possibly

[30] The finding is in Feyrer, Sacerdote, and Stern (2008). See also Doepke, et al. (2023).

China seem like compelling evidence. But that for other countries, including the U.S., is less clear. Although some authors have cited evidence that the birth rate is higher among women with more than a BA education, the June CPS Fertility Supplement, for example, does not reveal that to be the case when using actual cohort fertility for those born in the 1980s (see Figure 6, part A).[31]

Furthermore, if a rat-race is operating, as has been claimed, more highly educated women may be the first to forego children because children will require more of their time.[32] It may not be just a rat-race issue. It may be a combination of a rat race and greater female autonomy that have together produced lower birth rates. The social norm of intensive parenting has meant that women with advanced education and a desire for a career are forward-looking and will not risk of having children without sufficient assurances from the father that he will share in the time needed to raise a child.

In summary, the birth rate plummeted some time ago in the U.S. It occurred with the greater ability of women to marry later, get more education, and obtain more job experience before marriage. Because women had more autonomy, they had more options, and because the relative earnings of college-educated workers greatly increased, their options became more valuable. In terms of the model, not only did $\overline{w}$ increase relative to w, but λ, the fraction of women who can go to college, did as well. However the fraction of men with $D = 1$, as given by p, may not have increased. The opportunity cost of children to more-educated women rose. Women needed greater assurances that the care of their children would be shared with the father. That is the downside of fertility.

5. Downside II: The Macroeconomy's Impact on Gendered and Generational Conflict

The second example extends the insights of the model to a large group of currently developed nations that have had divergent fertility paths but also differing macroeconomic histories. The application will emphasize the relationship between an increase in women's economic, social, and reproductive autonomy, on the one hand and declining fertility, on the other. A key part of the application is the evolution of a mismatch between men's and women's desires in some of the countries but less so in others. The case will summarize the

[31] Doepke et al. (2023) uses a hybrid fertility measure to demonstrate that fertility is higher for those with more than a BA.
[32] Ramey and Ramey (2010) were among the first to point to a potential rat-race equilibrium and demonstrated the enormous increase in the childcare time of the most highly educated mothers (and fathers, to lesser extent). Although the authors use the phrase "rat race," their evidence and the model they employ do not imply true rat races.

findings in “Babies and the Macroeconomy” (Goldin 2025).[33]

5.1 Fertility Experiences of Group 1 and Group 2 Nations

What happens when women suddenly gain agency in periods of rapidly rising income and urbanization? I address in this section the relationship between the speed of economic growth and conflict between generations and genders. Rapid economic growth provides little time for traditions to catch up with economic reality. Men are more attached to the traditions of their parents and grandparents than are women who have considerably more to gain from breaking with them. Countries that had economic stagnation and then bursts of economic growth in the 1950s, 1960s, and 1970s have had larger decreases in fertility than have countries with more steady post-World War II economic growth.

I will discuss data for two groups of 12 countries in total that include nine in Europe, one in North America, and two in Asia. I have limited each group to six nations for convenience.[34] The first group contains Denmark, France, Germany, Sweden, U.K., and U.S. I will call them Group 1. These countries were chosen because they have had moderate TFR, although all rates are currently below replacement. Group 2 nations include Greece, Italy, Japan, Korea, Portugal, and Spain. These countries were chosen because they currently have very low fertility. Demographers have termed these countries as the lowest low.

The past century’s total fertility rates for Group 1 nations, from 1920 to the present, are shown in Figure 8. Fertility rates are about three at the start of the period. But because war and economic depression lead to delays in marriage and family formation, rates decreased during the interwar period and the Great Depression and remained low until the end of World War II. Due to these historical realities, I will limit the discussion to the years after the late 1940s. It is also clear from the figure that there were compensatory “baby boomlets” in most countries but that the U.S., as noted in the last section, experienced an extended one, known as the “Baby Boom.” I should also note that by about 1980 fertility in all Group 1 nations had already reached levels below two. Because I have made the scale of the graph for Group 1 identical to that of Group 2, the changes look somewhat small.

Although all 12 nations experienced declining fertility, clear differences are apparent when the data are displayed together. I have taken three countries in each of the two groups

[33] Hwang (2016) is an earlier statement of the effect of rapid growth.
[34] Another group are those in Eastern Europe that were once part of the USSR (e.g., Estonia, Latvia, Lithuania) or were Soviet satellites (e.g., Romania and Hungary). Before their independence they had higher TFR than the rest of Europe, but they have now become like those in Group 1.

and graphed the data for post-1970 in Figure 1, with Group 1 in blue and Group 2 in orange. Something interesting is apparent: Group 2 (in orange) has the higher total fertility rate in the 1970s, but the *lower* rate beginning in the mid-1980s. Group 1, however, began with a lower fertility rate, but is now *higher* than Group 2.

An important facet of fertility decline is childlessness, that is whether changes in cohort fertility are at the intensive (number of children per woman) or extensive (zero or positive) margins and to what extent the declines are experienced uniformly or for certain groups. If the countries that had rapid advances in economic development maintained various marriage and conjugal traditions (such as prohibitions of sex before marriage), the fraction of childless women would increase with fertility declines. The rationale is that if the age at marriage increases with economic development as women seek more education and employment opportunities, but if it is difficult or impossible to have a child outside marriage, then childlessness will increase. If such prohibitions do not exist, then babies will be born outside marriage and the fertility decline would be more at the intensive margin.

Most of the Group 2 nations experienced far more childlessness than did Group 1 nations for the same birth cohorts.[35] The fraction of Japanese women with no children by age 44 increased to 28% for those born in the mid-1970s.[36] The Korean data show that the increase in childlessness was accompanied by an increase in the fraction never married by age 40. The fraction without children for similar birth cohorts in the U.S. was only 10% and was 13% in Sweden.[37] Countries with strong social norms against having children out of marriage have greater childlessness and an increased fraction never marrying, in response to increased levels of women's education and mismatch.

5.2 Rapid Economic Growth and Fertility Collapse

I will provide a compelling reason for the collapse of fertility among Group 2 nations relative to those in Group 1. The reason I will emphasize concerns the sudden and rapid economic growth among Group 2 nations that produced, what I term, gendered and generational conflicts.

[35] The evidence on childlessness is in Goldin (2025, table 1). Cohort measures are used.
[36] The figure is coincidentally the same as the high point for the 1955 birth cohort of U.S. college graduate women.
[37] The U.S. had a large increase in childlessness among college graduate women but no related decrease in marriage. In addition, less-educated women in the U.S. had a decrease in marriage but no increase in childlessness. See Goldin (2021).

Countries, like those in Group 1 that underwent rapid economic change did not have sufficient time to adjust societally. In contrast, Group 1 nations that had more continuous economic growth, has generations that were not as different from each other and have had far less societal conflict. To make my explanation clearer, I first present a simple model of the conflict and then look at the causal elements in the macroeconomy.

Assume a series of male (m) and female (f) cohorts identified by their birth year. At birth, all individuals inherit traditions and beliefs that form a fertility preference carried with individuals over their lifetimes. When an individual is 20 years old, the person also forms a fertility preference that depends solely on current conditions. The two fertility preferences—the one that is inherited and the one that is formed as an adult—then get aggregated. At age 20, all people form opposite sex couples, marry, and decide on the number of births they want, given their inherited traditions and their current desires.

Agents decide how many children each would like, given by F_i for the fertility preferences of cohort i. A key assumption is that males put more weight, $0 \leq \alpha \leq 1$, on their inherited traditions than do females, who in turn put more weight on economic conditions when they are 20 years old.

Men are not inherently more traditional than women. Rather, they benefit more from patriarchal traditions. Women, however, experience greater gains from more equal gender roles. Women, according to the framework, are agents of change. In periods of rapid development especially when populations experience migration from rural to urban areas, men gain more from partially remaining in the past. Women gain more from taking fuller advantage of the present, when they can increase their education and employment.

Formally, let $F_{20}^{m,f}$ be the desired fertility of males (m) and females (f) in a cohort that is 20 years old, such that $F_{20}^{f,m} = \beta_0^{\alpha_{f,m}} \beta_{20}^{(1-\alpha_{f,m})}$. β_0 is the inherited fertility norm; cohort 0 indicates the parents of cohort 20; and $\alpha_{m,f}$ is the weight that males and females each place on the inherited fertility norm, such that $\alpha_m > \alpha_f$.

Fertility decisions will depend on the level of income, such that $\beta_t = {y_t}^{-\delta}$, where y_t is per capita (real) income for cohort t. The higher is income per capita, the lower is desired fertility. Taking the ratio of male to female desired fertility and substituting for β_t, yields:

$$\frac{F_{20}^m}{F_{20}^f} = (y_{20}/y_0)^{-\delta(\alpha_f - \alpha_m)} \qquad (2)$$

The more rapid economic growth is per capita (y_{20}/y_0), the more divergent will be the level of births desired by men relative to those desired by women (F_{20}^m/F_{20}^f). But the couple will eventually have to decide on their family size, even if it is the lower bound.

I assume that the couple's decision regarding family size is determined by the value of a parameter λ, such that $F_{20} = \lambda F_{20}^m + (1-\lambda)F_{20}^f$. The parameter λ represents the sharing of household and caring time.[38] The greater is the sharing, the closer λ will be to 1, and the more women will accede to their husbands' fertility desires. But when men eschew household and childcare work and the burdens (and joys) fall more on women, λ will be closer to 0, and women's fertility desires will dominate.

Note the similarity between the model of this section and that from the previous one. Both demonstrate that a mismatch between men and women will reduce fertility. They also both emphasize greater female autonomy and the need for men to enable women's employment by undertaking more household responsibilities and childcare.

The model reminds us that to make sense of the fertility decline, we must also pay attention to the speed with which countries advance economically. Thus, the framework shifts attention to the macroeconomy—the rate of growth in GDP per capita (measured in constant price PPP for comparability) and also the related migration from low-productivity rural areas to high-productivity urban areas.

Looking first at GDP per capita among Group 1 nations, one can see (in Figure 9, part A) substantial volatility in the pre-1950s. But despite the messiness of the first half of the twentieth century, these nations had fairly steady increases in economic growth across the long period from 1920 to 2022.

However, Group 2 nations, as seen in Figure 9, part B, did not experience steady economic growth. Rather, the first half of the twentieth century saw stasis, slow growth, and even some decline. The economies of these nations were sluggish in the 1920s and 1930s and then many experienced economic collapse until the 1950s or 1960s, due to depression and war. Subsequently, they had extremely rapid catch-up growth until the late 1990s or early 2000s.[39]

[38] If $H_{m,f}$ = household and caring time of the husband (wife), then $\lambda = H_m/H_f$, assumed to be ≤ 1.
[39] This discussion over-simplifies the long-run economic growth trajectories of Group 1 and Group 2 nations. The obvious effect of the Korean War on GDP/capita should be acknowledged.

Not only did many of the Group 2 countries have rapid growth after the 1950s and 1960s, but some also experienced huge migrations from more traditional rural areas to cities. Of course, the migrations were both caused by economic growth and were one of the reasons for further economic growth.

Group 1 nations, however, had much smaller migrations in the post 1960s in part because Group 2 nations were more rural to start with than those in Group 1. In fact, the Group 2 nation with the lowest percent rural in 1960 was Japan at 37%. But Japan's percent rural was still 7 percentage points higher in 1960 than one of the most rural among Group 1 nations, the U.S. The average percentage rural in 1960 among Group 1 nations was 29% but was 50% among those in Group 2. But by 2023 the percent rural for Group 1 was 16% and was 21% for Group 2. Most of the decrease for Group 2 nations had taken place by the early 2000s, except for Portugal.

Migration is also an important part of the fertility story because those who move from rural areas enter the urbanized world with more firmly held beliefs and traditional ways. The daughters of migrants gain more from modernity since they are offered considerably more options than they once had. The sons, however, gain from maintaining parts of the past. How much they gain is evident from the division of labor in the home. Men in currently developed countries that modernized very rapidly do considerably less housework and care for others in their homes, relative to women, than do men in countries that had more continuous growth experiences.

The relationship between the time differences and TFR for the two groups of countries is clear. All six Group 1 nations are in the upper left of Figure 10, with higher fertility and lower time differences between the genders. All six Group 2 nations are in the lower right, with lower fertility and higher time differences between the genders. The time difference for Japan, for example, is 3.1 hours and is 3 hours for Italy. Their TFRs (in 2019) were 1.36 and 1.27 respectively. But for Sweden, the time difference was 0.8 hours and Denmark's was 0.9. Their TFRs (in 2019) were both 1.7. The correlation between the country's TFR and the gender difference in household and caring hours is strong.[40]

[40] The model is also consistent with data on the fertility preferences of couples and their disagreement. Survey data for each member of a couple, as well as their actual births within three years, are provided in a revealing article by Doepke and Kindermann (2019). For couples with at least one child, they find women desire fewer births than do their husbands in countries with a larger gap in childcare hours done by mothers relative to fathers.

5.3 Alternative Explanations

The story I have told about why a group of nations has had lowest low fertility, though that group once had much higher fertility than other nations, has relied on an interaction between the macroeconomy and social traditions. There are other explanations that might substitute or be reinforcing.

One explanation that also involves the macroeconomy concerns the rise of the gerontocracy caused by a twist in the wage structure in favor of "older men" (Bianchi and Paradisi 2024). In consequence, young entrants to the labor market have had fewer opportunities. The factors were probably important in the increased age at which sons moved out of their parents' homes, which in turn, would have increased the marriage age, decreased the fraction married, and reduced fertility. Interestingly, even though the rise of the gerontocracy probably served to decrease fertility, the research on the gerontocracy never mentions the connection. Rather, the reduction in the birth rate is offered as part of the reason for the aging of the workforce and thus for the rise of the gerontocracy.[41]

Even though the ascendency of the gerontocracy could have been a factor depressing fertility, the evidence presented in that work has extended to both Group 1 (Greece, Italy, and Spain) and Group 2 nations (Denmark, Germany, U.K., and U.S.). Therefore, it may have been a reinforcing factor, rather than one that can differentiate fertility declines between the groups of countries.

Many Group 1 nations (especially Denmark, France, Germany, and Sweden) have instituted extensive social programs including highly subsidized childcare and generous paid parental leave, that may serve to increase the birth rate by making children less of a personal responsibility and more of a community one.

But some of the very low fertility nations have also instituted extensive programs with unmistakably pronatalist purposes. Japan's National Health Insurance, in March 2022, began to allow for the reimbursement of infertility treatments. The Japanese government instituted a guarantee of more than 30 weeks of paid *paternity* leave, the largest by far in the OECD, and Japanese newlyweds can receive substantial subsidies for housing. But these have apparently had little effect, thus far, on the birthrate.

[41] See, also, Guner, Kaya, and Sánchez-Marcos (2024) on the role of temporary contracts in decreasing fertility because men have less job security and women have fewer part-time jobs.

6. Downside III: Notes on Fertility Change in the Rest of the World

I have made a case for the increase in female autonomy together with a mismatch between more traditional men and more modern women in the decline in the birth rate in the U.S. and in much of the rich world. But what about poorer and middle-income nations in the developing world? We have seen that fertility decreased throughout the world and is now low even in countries such as Mexico, Brazil, and India. Can the same forces be at work?

In each of these three nations, an initial decrease occurred in the 1960s or 1970s and subsequent declines have continued to the present. Contraceptive programs appear to have been important in the initial decrease. The ability to control births was reinforced by an increase in the age at first marriage, greater schooling for girls and, in some cases, greater female employment. But these changes have not been uniform. Female employment, for example, has not increased in India and may have decreased.[42]

Even though higher education is too small a fraction of the population to be of importance to the fertility decline, in each of these countries more education for girls is correlated with lower fertility.

Smaller family size in many poorer nations with substantial rural populations began to be broadly considered indicative of greater wealth and sophistication. The view was propagated as television spread to rural and far-flung areas, as demonstrated in the case of Brazil with the spread of the "telenovelas" and in India more generally.[43]

Although many of the same forces have been at work in middle income and poorer nations as they have in the richer parts of the world, it is not clear how much of the decline in these three countries is due to the mismatch I pointed to in the other examples.

7. Conclusion: Why Has Concern Mounted?

The fertility decline is everywhere and has existed in much of the rich world for

[42] Across Indian states in 2015-16, lower fertility was largely due to an increased age at first marriage and, at older ages, to contraception and abortion. See Singh, et al. (2022).
[43] See La Ferrara, Chong, and Duryea (2012) on the impact of television, particularly the spread of Globo, the primary "novela" producer in Brazil. Jensen and Oster (2009) explore the expansion of cable and satellite coverage in India and observe progressive attitudinal change regarding female autonomy, son preference, fertility, and educational norms regarding girls. Kearney and Levine (2015) demonstrate the impact of MTV's *16 and Pregnant* in lowering teen births in the U.S.

many decades. In the U.S., the TFR has been below the rate of replacement since 1972, with the exception of a few years (see Figure 4). I have emphasized the possibility that fertility is lower than desired by couples and by women because of both societal and individual mismatches. These may be due to commitment problems within couples and an absence of credible assurances by governments in terms of childcare benefits and transfers.

The decline of fertility across vastly different nations and societies suggests that a common factor is at work. The declines have closely followed the greater ability of women to marry whom they want and when they want, to be able to invest in their education and in their future, and to have secure and dependable reproductive freedom. I have emphasized the possibility that frictions, mismatches in society and in individual relationships, the problem of commitment, and the inability to write binding contracts have each contributed to birth rates that are lower than optimal.

Why concern over the birthrate has mounted recently is likely due to several factors.[44] Decreased immigration has been the stated policy of the current U.S. administration and internal population growth has been viewed as a (long-run) substitute. The family has always been a vital foundation to social stability and is being called upon now to play a key role as a replacement for the economic supports once provided by the federal government.

Finally, there is the sense, expressed by some governmental and private-sector leaders as well as in surveys, that social norms have moved too far in the direction of gender egalitarianism.[45] But reversing progressive change could increase the degree of mismatch and lower the birthrate even further, as demonstrated in the case I discussed regarding gendered and generational conflicts. The downside of fertility is that greater female autonomy in the absence of sufficient change to guarantee support will produce lower birthrates.

[44] VP Vance has often spoken about the importance of the family and the need for a higher birth rate. At the January 2025 March for Life he said: "I want more babies in the United States of America."
[45] Mark Zuckerberg remarked on a January 2025 Joe Rogan podcast that: "a lot of the corporate world is really culturally neutered … The masculine energy is good." Many surveys have shown a growing gender divide among the young.

Appendix: Definition and Measurement of "Fertility"

The term "fertility" embraces several closely related demographic constructs. I will use it to refer to any one of three measures: the birth rate (GFR), the total fertility rate (TFR), and the cohort fertility rate. Although one might prefer to use a cohort rate, that is not always available if a cohort is not old enough.

The birth rate, also termed the general fertility rate or GFR_t, is the number of live births in a population in year *t* divided by the number of women capable of giving birth, taken to be the number of women aged 15 to 44 or 15 to 49. The birth rate is a period or cross-section measure.

The total fertility rate is also a cross-section measure, and it is the cross-section analogue of the cohort rate. Although one can measure the cohort rate at any age, it is most useful for birth cohorts older than 40 years since deficits before that age can often be offset.

The total fertility rate is the most widely used fertility measure. It is a period rate, referring to a particular year and effectively aggregates the contemporaneous birth rate for each age of women. That is, it aggregates the cross-sectional age-specific birth rate as if each of the ages were part of a cohort. Therefore, it gives a sense of being current and relevant, but it averages cohort rates and is somewhat "backward" looking.

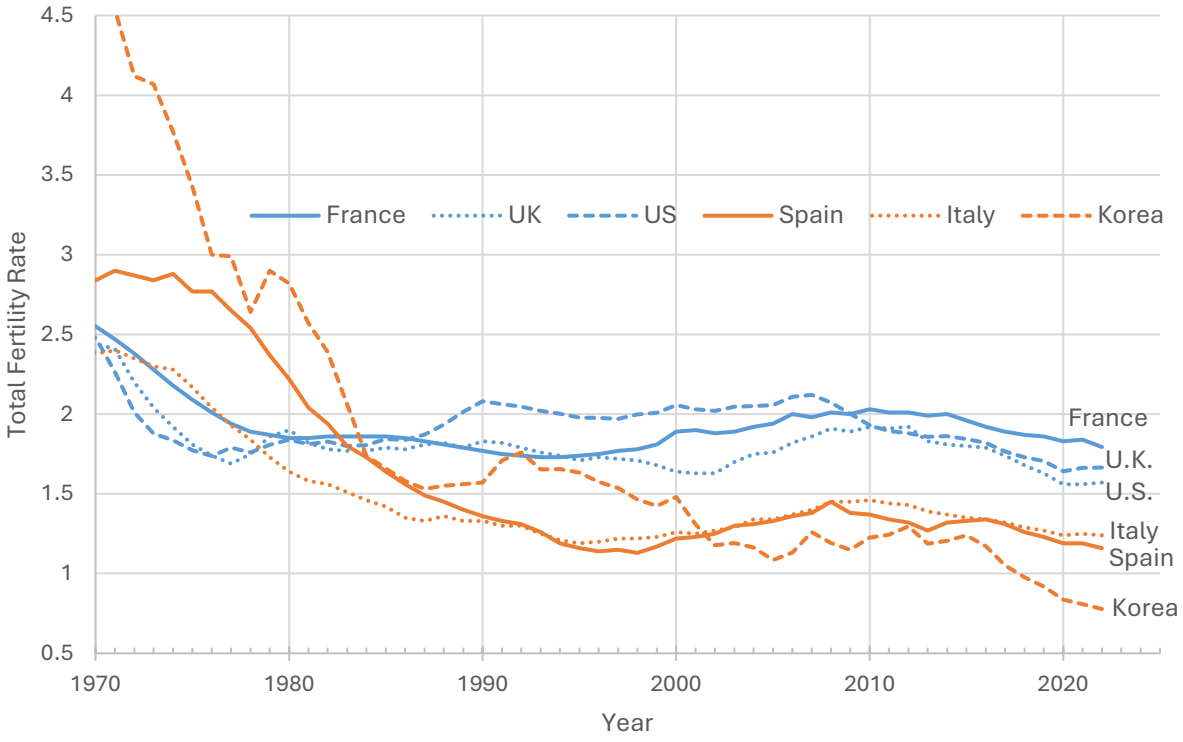
Using the actual cohort rate would be better but completed cohorts would be less current. For example, the latest birth cohort for which we currently have completed fertility would have been born around 1985. Since most births were once to women in the twenties, the TFR measure did not seem to be missing much. But as women have been having their children later, it has become less relevant but can be complemented with cohort rates by age. I should note that an underlying assumption of the calculation of the TFR is that all women survive from the beginning, say age 15, to the end, say 50.

Note that the total fertility rate and the general fertility rate are both period rates and differ only by the number of women at each age. The TFR treats each age as a separate observation and aggregates, as if the cross section were one period. The GFR implicitly weights each age by the actual number of women.

Fertility data come from two general sources. The first are population census data, which ask women how many live births they ever had. Census data also often ask whether a woman had a birth during that year. Another source is vital statistics or natality information.

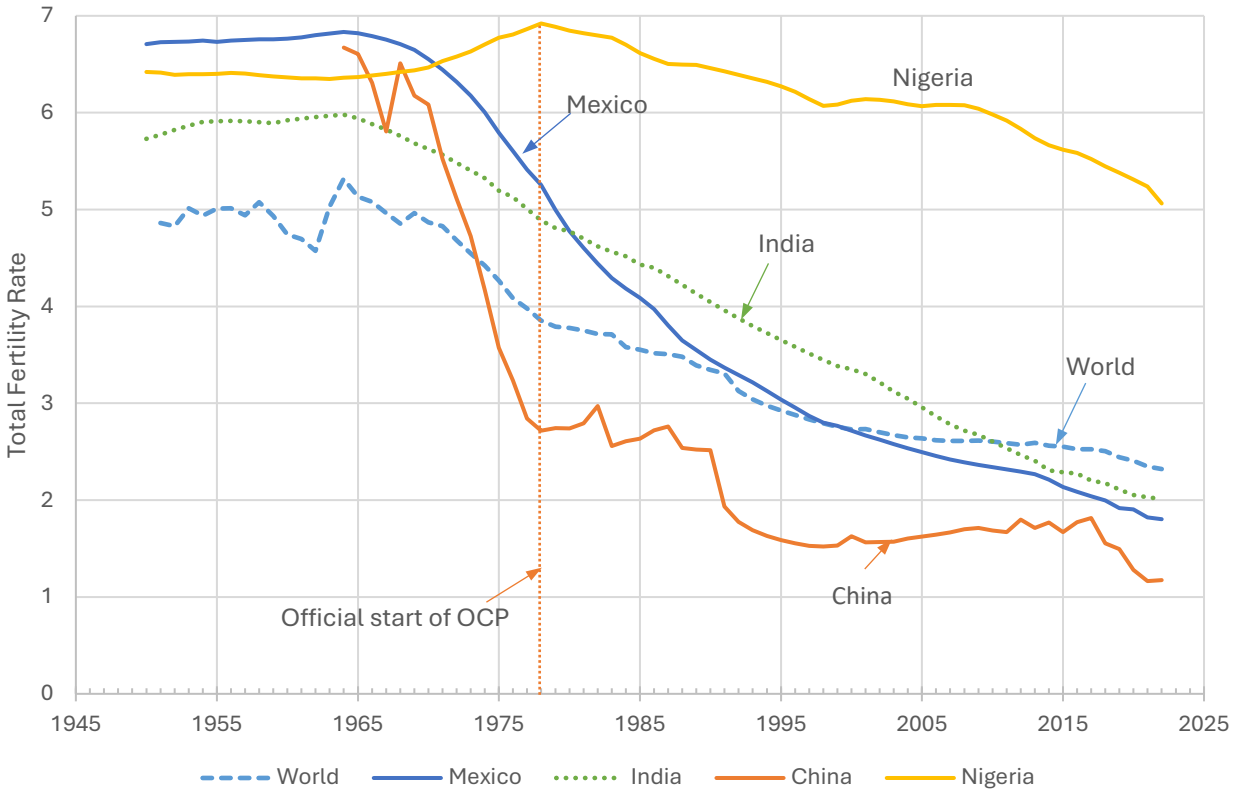
Many countries, particularly ones with large rural populations, have incomplete coverage of births. The U.S., for example, did not have complete reporting by state of birth until the early 1930s and fertility data before that time were projected from states that had complete coverage. For further information see Carter et al. (2006), Chapter Ab "Vital Statistics," Michael R. Haines editor.

Figure 1: Total fertility rates for selected OECD nations, 1970 to 2022



Source: 1961 to 2022: World Bank Group: World Development Indicators. Last Updated: 06/28/2024; accessed 09/08/24. https://databank.worldbank.org/reports.aspx?source=2&series=SP.DYN.TFRT.IN&country=&_gl=1*1y8yzg4*_gcl_au*NjQyNjk5Mi4xNzIzMTI1ODEx

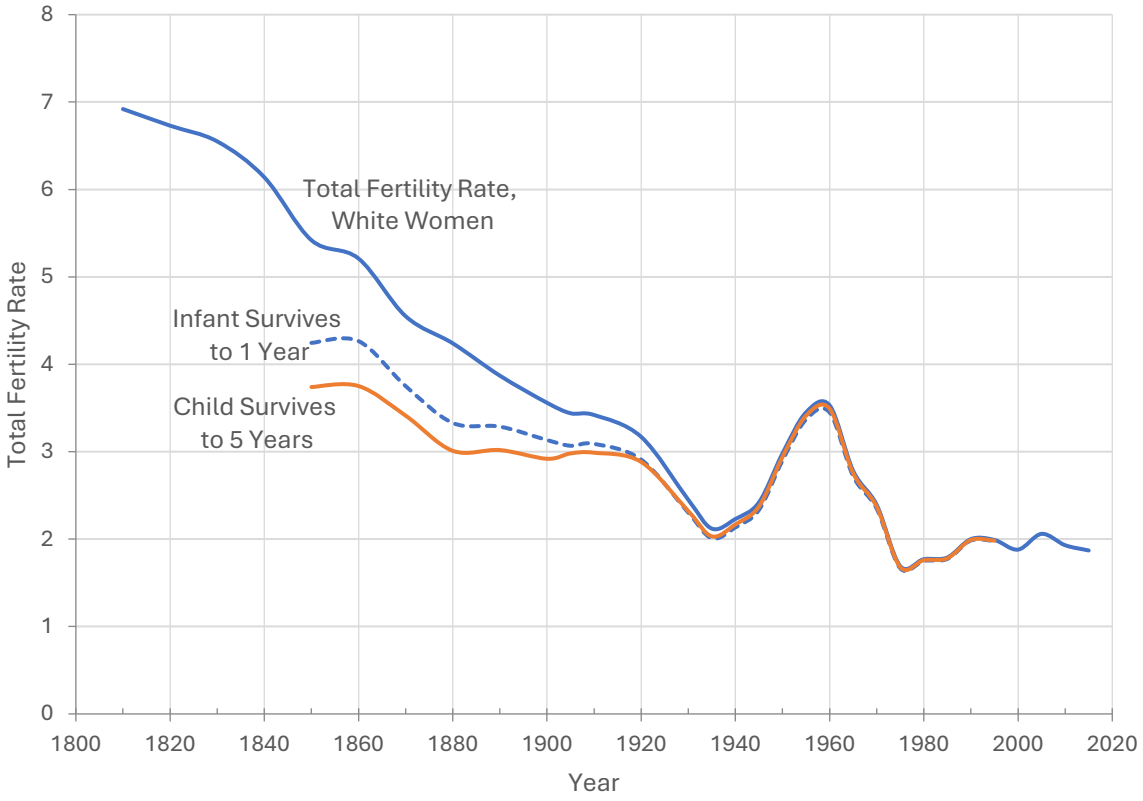
Figure 2: Total fertility rates for four countries and the world, 1950 to 2022



Source: United Nations Population Division, Total Fertility Rate, http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A54

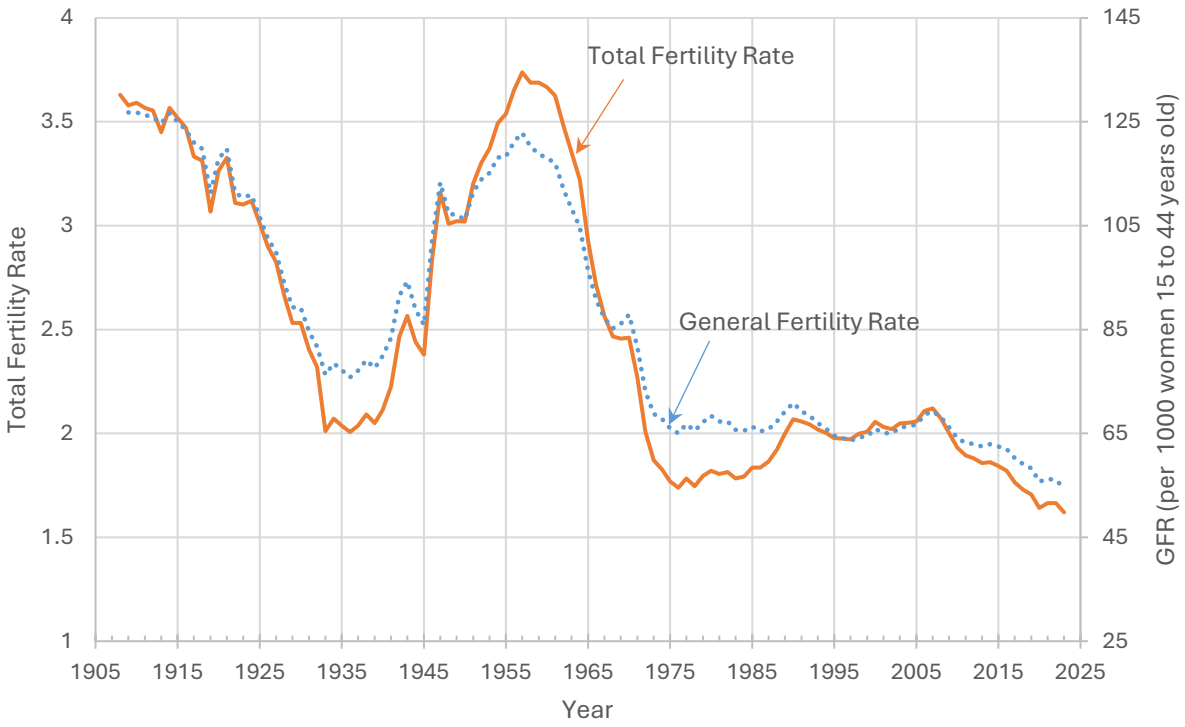
Note: OCP = China's One Child Policy, officially started in 1978

Figure 3: U.S. Total Fertility Rate and Net of Infant and Child Mortality (for Whites): 1800 to 2015



Sources and Notes: White fertility rates are from Carter, et al. (2006) series Ab63. Survival to five years old is from Ab763 for white males and Ab789 for white females. Total survival to five years averages the two.

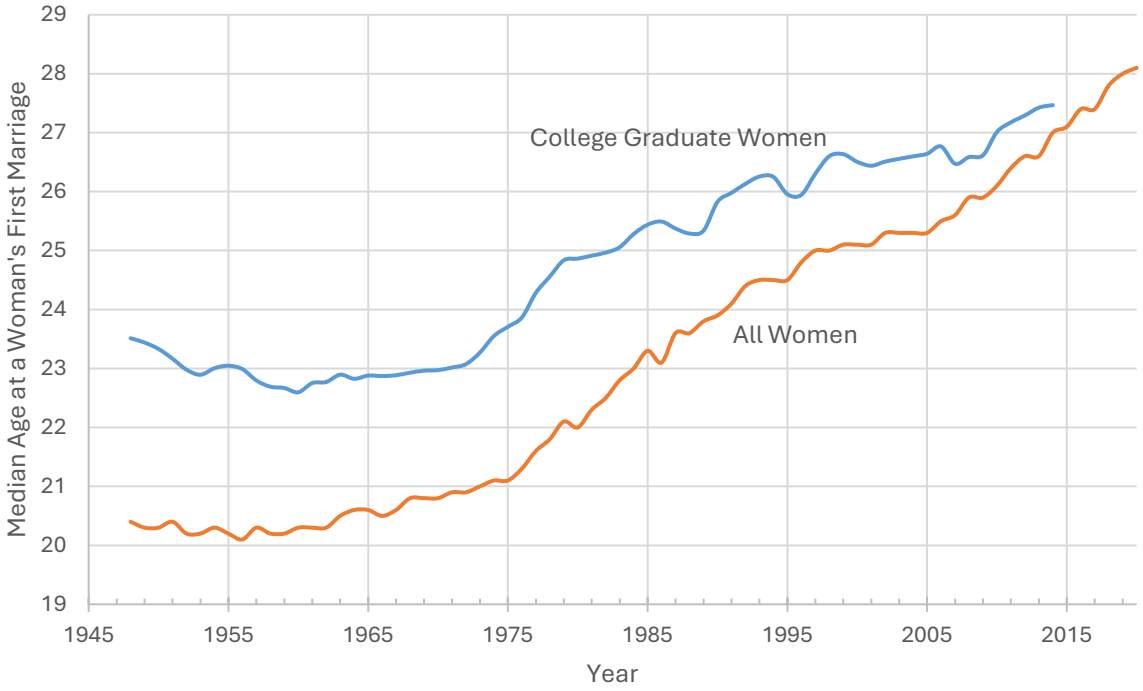
Figure 4: The Total Fertility Rate (TFR) and the General Fertility Rate (GFR) in the U.S.: 1908 to 2023



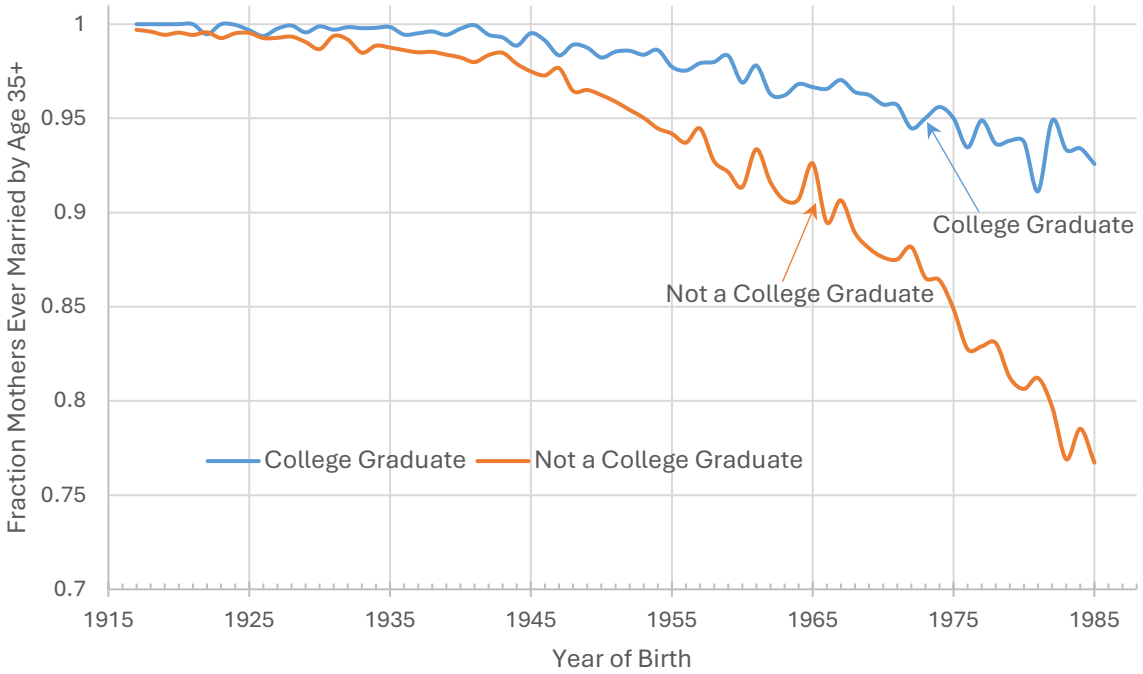
Sources: Total Fertility Rate (TFR) series: 1961 to 2023 World Bank Group. World Development Indicators https://databank.worldbank.org/reports.aspx?source=2&series=SP.DYN.TFRT.IN&aGeneral 1908 to 1960: Gapminder Historic estimate compiled and documented by Mattias Lindgren. https://www.gapminder.org/data/documentation/gd008/
General Fertility Rate (GFR) series: https://usafacts.org/articles/how-have-us-fertility-and-birth-rates-changed-over-time/.
Notes: The $(\text{General Fertility Rate})_t$ is the number of (live births/women 15 to 44 years) × 1000 in year *t*. See Appendix.

Figure 5: Median Age at First Marriage and Fraction of Mothers Ever Married

Part A: Median Age at First Marriage: All Women and College Graduate Women, 1948-2020



Part B: Fraction Ever-Married Mothers: College Graduates and Not College Graduates

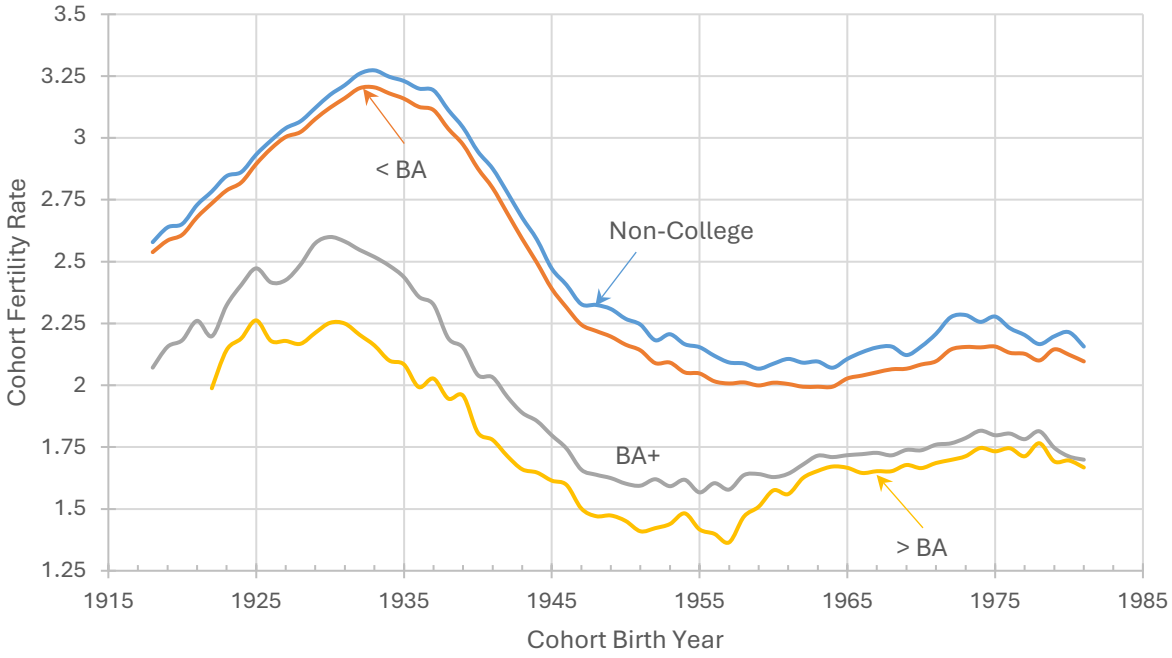


Sources: Part A: All women, Carter et al. (2006), series Ae482 to 1995. The entire series is: U.S. Census Bureau (2021). Current Population Survey, March and Annual Social and Economic Supplements, published table MS-2 Estimate Median Age at First Marriage, by Sex: 1890 to the Present. https://www.census.gov/data/tables/time-series/demo/families/marital.html College graduate women, Goldin (2021), figure 6.1. Part B: CPS June Fertility Surveys, for all women > 34 year at the time of the survey who had at least one child.

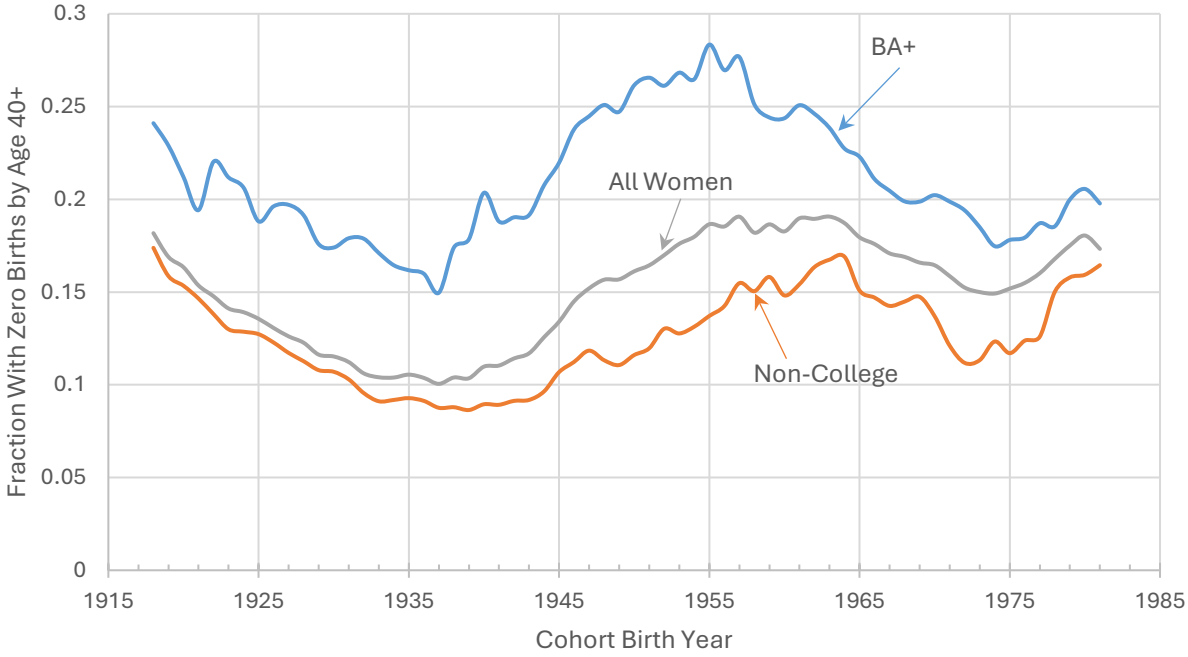
Notes: Part A: Both series are derived from census data on birth cohorts. The year given is the year in which the median woman was married.

Figure 6: Cohort Fertility and Childlessness by Education: Cohorts Born 1917 to 1982

Part A: Cohort Fertility



Part B: Cohort Childlessness

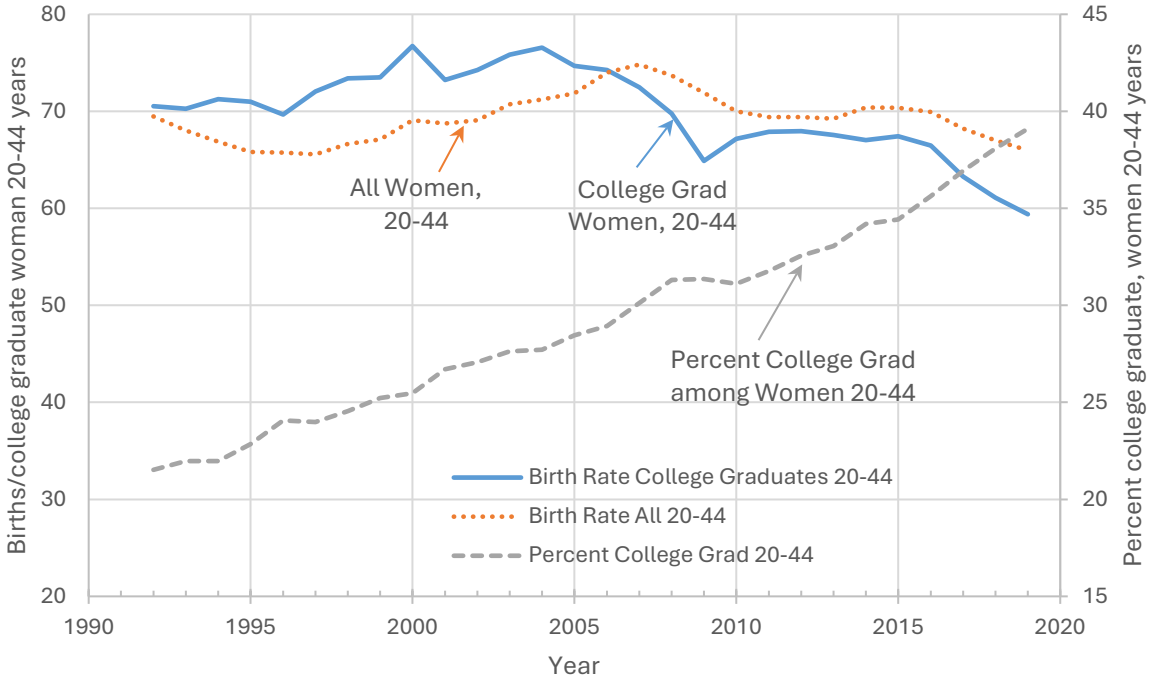


Source: June CPS, Fertility Supplements, 1973 to 2022

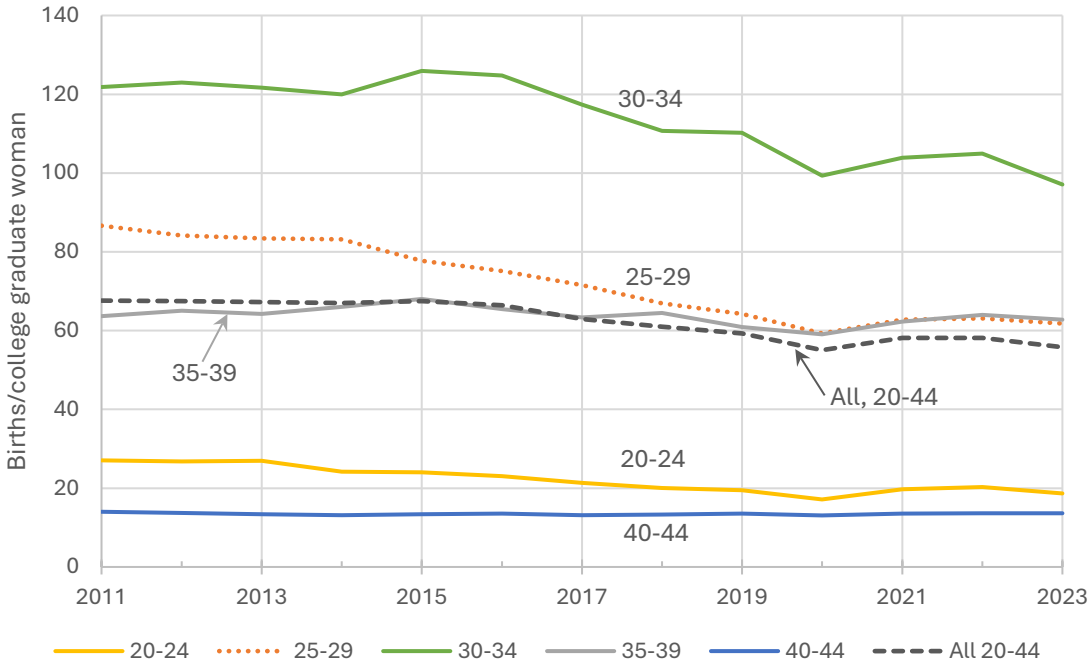
Notes: BA means either a bachelor's degree or at least four years of college, depending on the June CPS measure. BA+ means all women with a BA and also those with a post-graduate degree or more than four years of college, depending on the June CPS measure. >BA are those with more than a BA. Non-college means no years of college at all. <BA means no BA or not four years of college or no college. <BA and BA+ would be exhaustive. Cohort fertility is calculated for each cohort from information on the number of live births for women at least 40 years old, to get a nearly accurate record of cohort fertility. Information on actual degrees is used when available, from 1992 to 2022. Five or more years of college is the definition before 1992 when actual degree completion is not available. Three-year centered moving averages are shown. CPS weights are used.

Figure 7: Birth Rate for College Graduate Women: 20 to 44 Years

Part A: Birth Rate and Percent Graduating College: 1992 to 2019



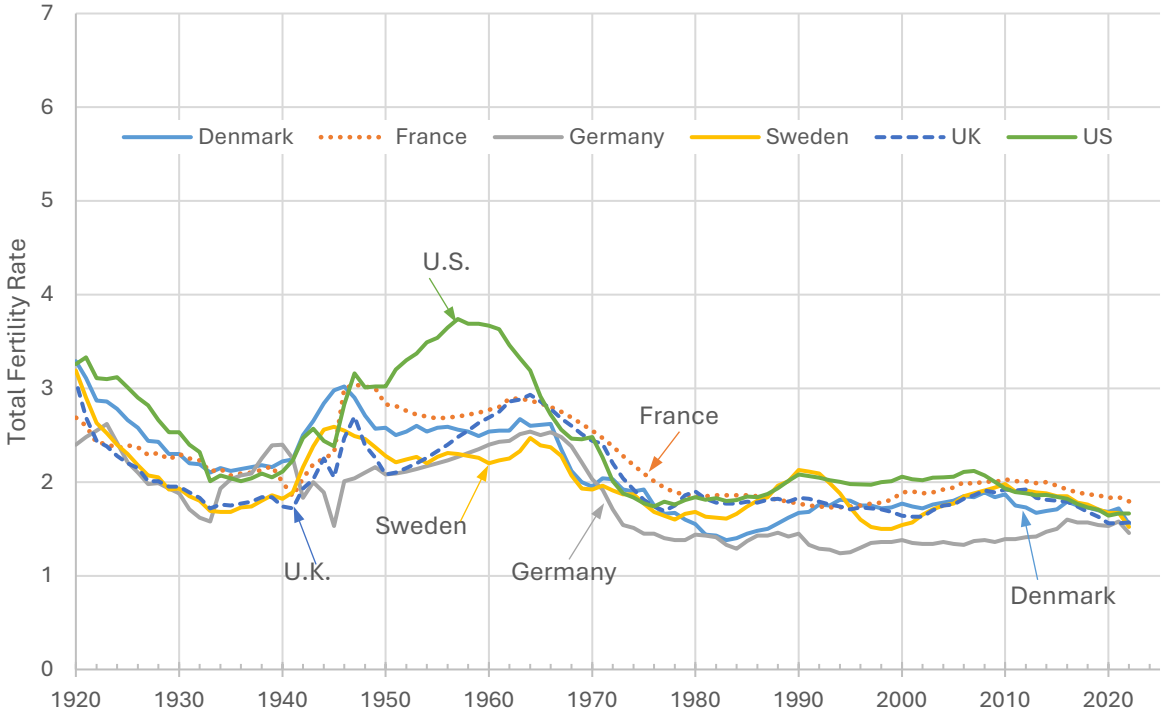
Part B: Birth Rate by Age Group: 2011 to 2023



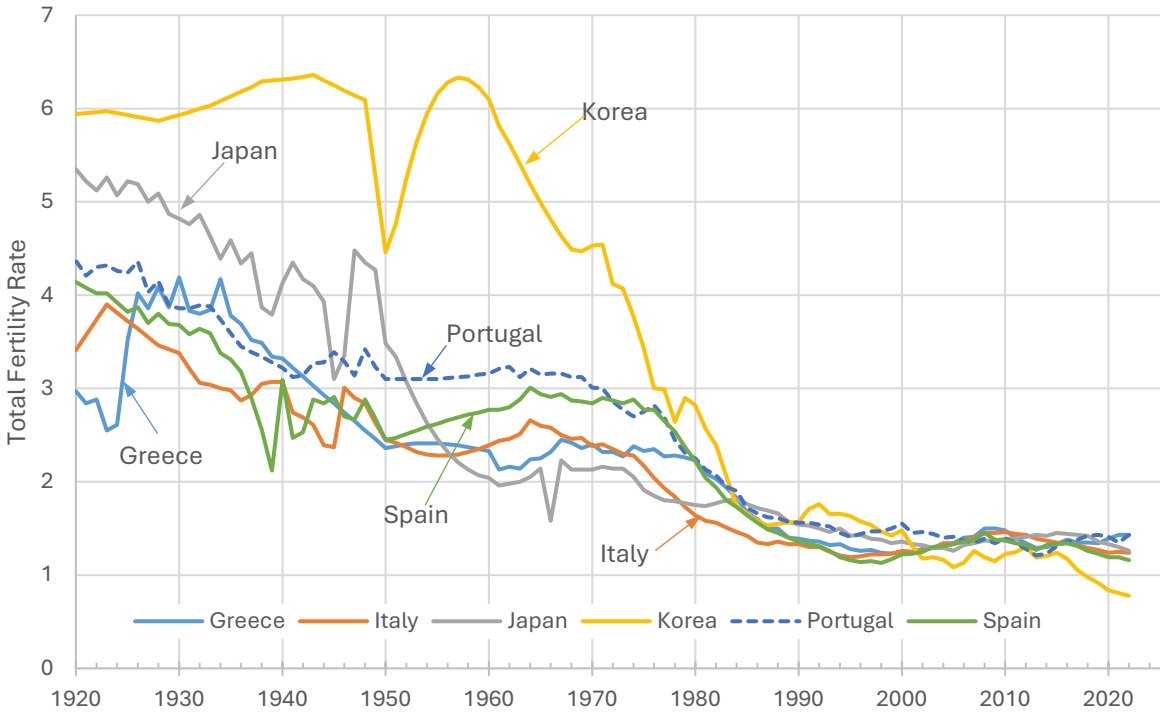
Sources: Part A: Kearney and Levine (2022), replication package and SEER data https://seer.cancer.gov/popdata/download.html. Part B: Birth data by age: age https://data.nber.org/nvss/natality/dta/ Number of college graduate women by age from Current Population Surveys.

Figure 8: Total fertility rates for two groups of nations, 1920 to 2022

Part A: Group 1 nations



Part B: Group 2 nations

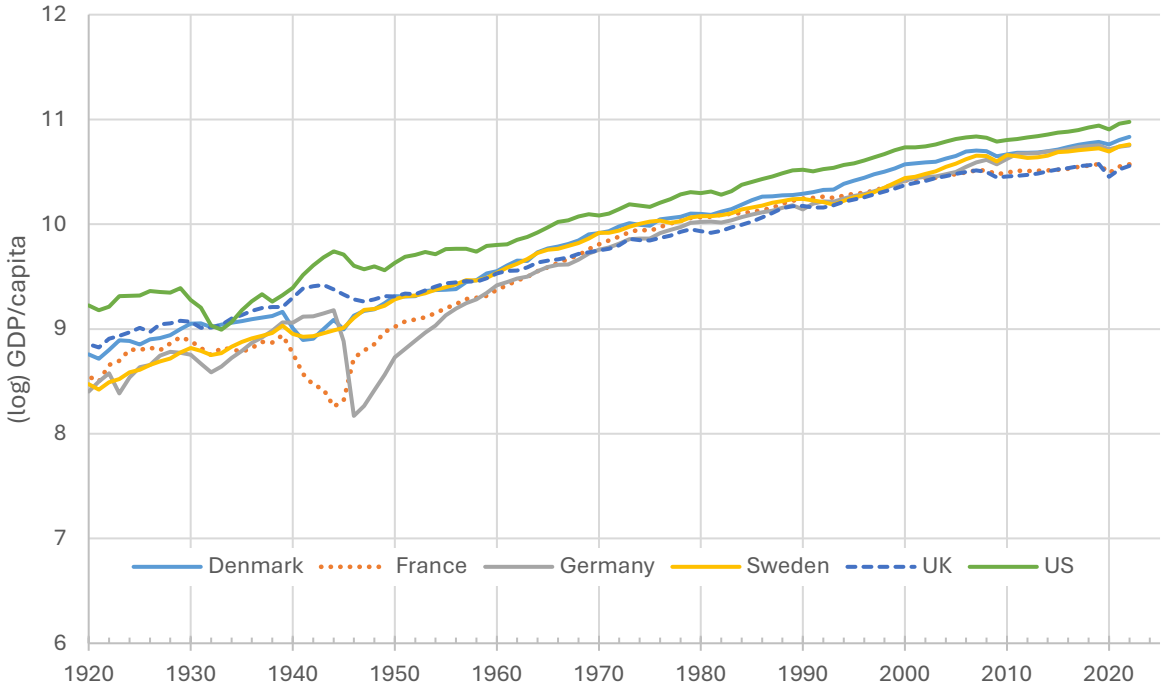


Sources: 1920 to 1949: Gapminder Historic estimate compiled and documented by Mattias Lindgren. https://www.gapminder.org/data/documentation/gd008/
1950 to 1960: UN World Population Prospects from Gapminder
1961 to 2022: World Bank Group: World Development Indicators. Last Updated: 06/28/2024; accessed 09/08/24.
https://databank.worldbank.org/reports.aspx?source=2&series=SP.DYN.TFRT.IN&country=&_gl=1*1y8yzg4*_gcl_au*NjQyNjk5Mi4xNzIzMTI1ODEx

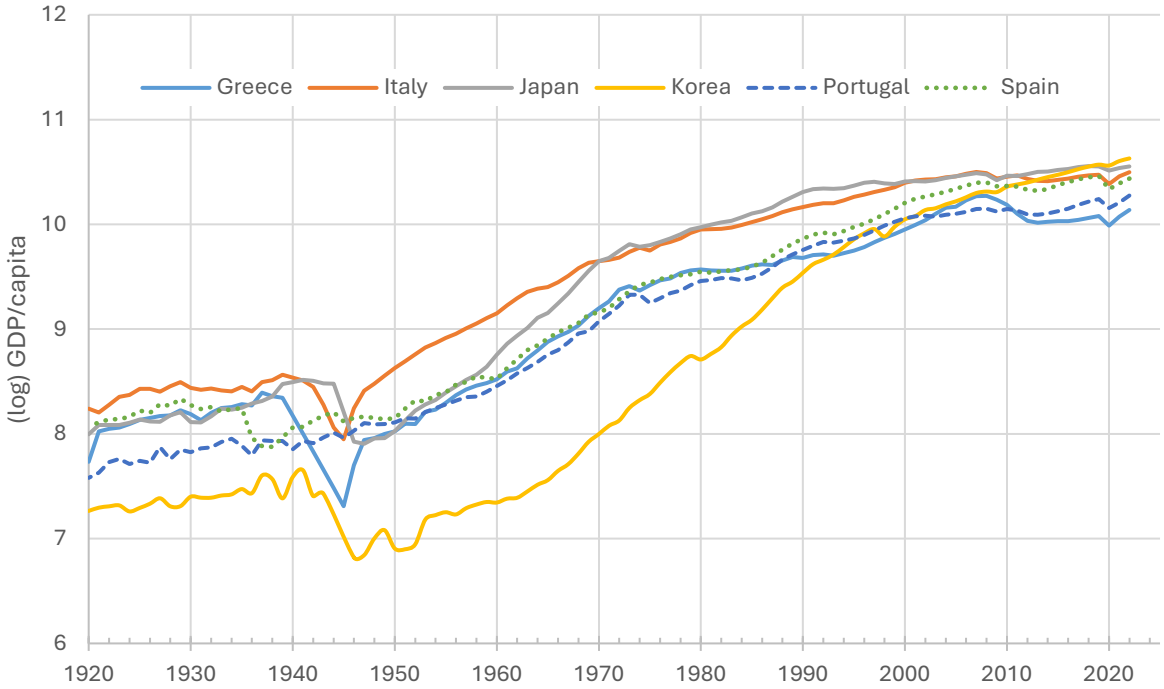
Notes: The two most recent series were spliced at 1961.

Figure 9: Log gross domestic product per capita for two groups of nations, 1920 to 2022

Part A: Group 1 nations

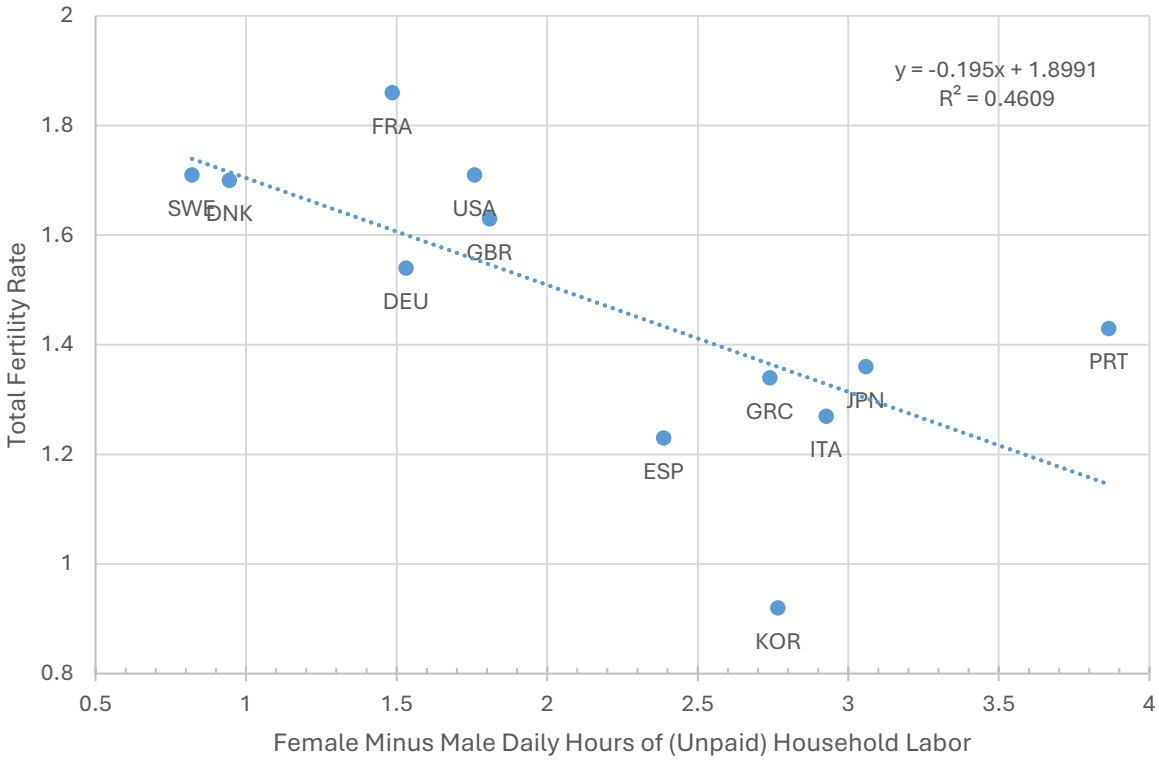


Part B: Group 2 nations



Source: Maddison Project Database 2023 (with minor processing by Our World in Data), in 2011 prices using a combination of 2011 and 1990 PPPs for historical data.
https://ourworldindata.org/grapher/gdp-per-capita-maddison
The Maddison Project website is:
https://www.rug.nl/ggdc/historicaldevelopment/maddison/?lang=en. See also Bolt and van Zanden (2014).

Figure 10: Relationship between the difference in (unpaid) household and care work by sex and fertility among 12 nations



Source: OECD Time Use Database extracted from OECD Data Explorer. http://stats.oecd.org/index.asox?datasetcode=TimeUse and the OECD Gender Data Portal www.oecd.org/gender, since the OECD frequently changes its website.

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