NBER WORKING PAPER SERIES

BABIES AND THE MACROECONOMY

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Working Paper 33311
http://www.nber.org/papers/w33311

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 2024

ABSTRACT

Fertility levels have greatly decreased in virtually every nation in the world, but the timing of the decline has differed even among developed countries. In Europe, Asia, and North America, total fertility rates of some nations dipped below the magic replacement figure of 2.1 as early as the 1970s. But in other nations, fertility rates remained substantial until the 1990s but plummeted subsequently. This paper addresses why some countries in Europe and Asia with moderate fertility levels in 1980s, have become the "lowest-low" nations today (total fertility rates of less than 1.3), whereas those that decreased earlier have not. Also addressed is why the crossover point for the two groups of nations was around the 1980s and 1990s. An important factor that distinguishes the two groups is their economic growth in the 1960s and 1970s. Countries with "lowest low" fertility rates today experienced rapid growth in GNP per capita after a long period of stagnation or decline. They were catapulted into modernity, but the beliefs, values, and traditions of their citizens changed more slowly. Thus, swift economic change may lead to both generational and gendered conflicts that result in a rapid decrease in the total fertility rate.

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Babies have been front and center in the news. Governments in much of the world today but especially in North America, Europe, and parts of Asia, have expressed concern about the health of their economies in the face of aging and even declining populations. More recently, anti-immigrant sentiment and populist rhetoric have elevated and altered the importance of increasing the birth rate, especially of the native-born population. In consequence, policymakers have considered and adopted an array of measures to increase fertility.

But the birthrate is also clearly determined by forces that are independent of the whims of governments and that has been the case since the beginning of time. I will add to an extensive literature on fertility by emphasizing forces that have affected the birthrate through the emergence of conflicts between generations and genders. I will consider nations that comprise two groups. One began the period since the 1950s with high birthrates but eventually has had very low birthrates. The other nations began the period with moderate birthrates and have remained at relatively moderate levels. What are the forces that have led couples in some developed countries to have much lower fertility than in others, and why has fertility declined during particular periods?

The analysis will focus on the historical experiences of twelve nations. Six experienced relatively continuous economic growth in the twentieth century, although with considerable volatility in the pre-1950s. They are Denmark, France, Germany, Sweden, the United Kingdom (U.K.), and the United States (U.S.). The other six nations experienced very rapid economic growth in the post-1950s yet more stagnant and even, for some, declining, economic activity before. They are Greece, Italy, Japan, Korea, Portugal, and Spain. These nations also happen to be disproportionately Catholic or Orthodox, and two (Japan and Korea) have non-Western belief systems, with traditions that emphasize family ties and clan identity.

The first group of nations reached a total fertility rate of around two by the 1970s and remained at approximately that figure until around 2010. The second group of nations had fertility rates that remained high through the 1970s, but then plummeted in the 1980s and 1990s becoming, what is termed, "lowest low" with total fertility rates below 1.3.

I will show that countries that have developed rapidly and abruptly have later had very low levels of fertility. Rapid economic growth has given women greater freedoms. But rapid economic change may lead to conflicts of various types when men are more swayed by traditions. What women require of men's time to raise a family and be members of a modern labor market may exceed the time their more tradition-bound spouses, or future spouses, are willing to offer. Household and caring tasks in such societies are largely women's responsibilities.

Note that the driving channel is not just the speed of economic growth. Rather, it is the transformation from a society that is less well-connected, more tradition-bound, relatively isolated and rural, and communal rather than individualistic into a nation that is generally the opposite with more developed markets, thicker communication networks, and denser settlements. It is the speed with which tradition-bound people are catapulted into modernity that gives generations little time to adapt and brings old ways into sudden conflict with the new.[1]

I term this a generational conflict because it derives from men's greater attachment to the past. But it becomes a gendered conflict when the husband's desire for more children exceeds that of the wife's, and when they must find a solution. When nations develop more continuously and across a longer time frame, less generational conflict arises and the fertility desires of men and women are more similar. Household and caring tasks are more evenly divided within couples and fertility levels are, in consequence, higher.

The reduction in fertility in the half century since the 1970s in most of the world, including the twelve nations just mentioned, has been astonishing. I hope to convince you that some part of the fertility decline in the past fifty years has had much to do with the macroeconomy in a long-run sense. Thus, I will address how the macroeconomy has affected fertility given that traditions and beliefs change more slowly than do economies.[2]

1 WORLDWIDE FERTILITY DECLINE

Long-term fertility trends

As an economic historian, I would be remiss if I did not begin with a discussion of long-term fertility trends. By the time the birth rate began to decline worldwide in the 1970s, fertility levels had already greatly decreased across much of Europe, the U.S., and parts of Asia.

In the late nineteenth century, the average woman in the twelve nations I will soon discuss had four or five live births. Figure 1 provides total fertility rate (TFR) data from 1850 to the present for eight of the twelve.[3] Fertility rates, except for Japan, Spain and Italy,

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[1] Oster and Jensen (2009) for India and La Ferrera et al. (2012) for Brazil, demonstrate that isolated groups can be thrust into modernity through television. But simple exposure to new ideas will not enable women to take full advantage of modernity.

[2] The reverse question—the impact of fertility on the macroeconomy—has spawned an extensive literature. See, for example, Jones (2022) on "empty planet" versus "expanding cosmos" equilibria.

[3] The Total Fertility Rate (TFR) is a period or cross-section version of a cohort rate. It creates a birth rate for a synthetic cohort of all living women, generally from ages 15 to 44 years. Most births occur to young women, thus it is generally not very different from the cohort rate.

declined to around three by the twentieth century's interwar period. These rates were then buffeted by the economic and political winds of the immediate pre-World War II era before increasing in many nations at the end of the war, often in a compensatory manner.[4] But by the 1950s, all eight nations in Figure 1 had fertility rates hovering between two and three, except for the U.S., which later joined the rest in the 1960s.

The key point to which I will soon return is that, by the 1960s, some of the twelve nations on which I will focus had much higher fertility rates than the others. But by the 1990s, the same nations had considerably lower rates. Although I will focus on the period from the 1960s to the present, I must first discuss the reasons for the long run decline of fertility beginning in the early twentieth century.

Part of the decrease in the birth rate around the 1910s was because infant and child death rates had begun to decline in much of the industrialized world. Couples who wanted to ensure that they had two or three surviving children would have had more births as insurance against the vagaries of infant and child mortality. But with a greater probability that all children would survive, they had fewer.[5]

Consider the case of the U.S., a relatively rich, farming nation with ample and cheap land. Couples married early and almost universally from around the beginning of the nation. In consequence, the U.S. had an extraordinarily high birth rate even among the free (white) population. In fact, the late eighteenth century marriage and fertility experiences of the North American colonies, later the U.S., are what shaped Malthus's notions that fertility responded to macroeconomic factors (income per capita).[6]

Fertility began to decline in the U.S.—even in rural, farming areas—in the nineteenth century despite the fact that families had higher incomes.[7] Some of the decrease in fertility was because, as just noted, more children survived, and couples could have fewer children with the same target level. Around 1850, for example, the average U.S. (white) woman had 5.4 live births, but just 3.8 would have survived to age five. By 1920, when the average U.S.

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[4] Many combatant nations had a post-WWII baby boom that partly compensated for the baby bust during the war. The U.S. baby boom from 1946 to the mid-1960s was far more than compensatory.
[5] See Goldin and Alsan (2019) on the role of clean water and sewage separation in the decrease in infant and child mortality in the U.S.
[6] In "the English North American colonies, now the powerful people of the United States of America … To the plenty of good land … they added … liberty and equality … The consequences of these favourable circumstances … was a rapidity of increase probably without parallel in history … to double itself in 25 years." (Malthus 1798)
[7] Easterlin (1976) began an important literature on the fertility decline within U.S. farming regions as density of settlement increased and markets in a variety of goods and services expanded.

woman had 3.2 live births, 2.85 would have survived and by 1940 95% survived.[8]

Other reasons for the historical decline in U.S. fertility have focused on the evolution of markets, especially for labor, capital, savings, insurance, and a host of goods. The value to families of children in terms of their household labor, what they could earn, and the future care and income they might ensure for their parents declined over the long run relative to their parent's own current and future income.[9]

As I previously noted, fertility plummeted worldwide starting in the 1970s and the 1980s. Figure 2 gives TFR for the world and several important countries on different continents. All nations, with the exception of those in Sub-Saharan Africa, have experienced greatly declining birth rates. In fact, the world's total fertility rate stands at 2.27, above two only because of high fertility in countries like Nigeria.[10] The big players have been India and China. The rate in India today is less than two, although the north is higher than the south. China's fertility plummeted, as can be seen in Figure 2, long before the famed One Child Policy for reasons that are not entirely clear.

Contraceptive advances, and their dissemination, played an important role. But it also appears that something else was leading couples (or just women) across a wide range of the world's nations to decide to have fewer children or none at all. Among the most astonishing facts in the history of the decline of fertility has been the plummeting of birth rates in tradition-bound countries in Asia, as well as in Catholic and Orthodox Europe.

Why fertility declined

Why fertility decreases as income and standards of living increase has been a much-discussed topic. The answers provided by economists have evolved with the facts and with better modeling of household decisions. This history is summarized in various papers.[11]

Economists began the analysis of fertility decisions in the 1960s, somewhat late in the history of modern economics. The notion that the number of children declined with rising incomes had been so contrary to usual notions of demand theory as to require new theoretical and empirical apparatus. The earliest explanation was a simple one. Fertility control, it was surmised, was poorly understood and inadequately provided to lower-

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[8] 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.
[9] The value of child and youthful labor declined, while their productive value as adults increased with more education and technological change.
[10] Given higher mortality rates in poorer nations, replacement fertility would be higher than 2.1.
[11] Among the recent reviews of the literature is Doepke, et al. (2023). The paper provides an excellent summary. The chronology differs a bit from my reading of Gary Becker's papers.

income households and nations.[12] But 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 effect and a substitution effect. If the latter won out, more income could easily mean fewer time-intensive goods, including children. But that wasn't enough of an explanation. 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 the "quantity" of children, but children were augmented through costly healthcare, teaching, 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 parameters, if goods and services were used to create "quality" children.[13]

In the new theory, known as the Quantity-Quality tradeoff, parents purchase goods and services to enhance the quality of their children. But expenditures on quality for the first born in a family increase the cost of having additional children.[14]

But the new theory also proved insufficient because it did not incorporate the fact that two people must agree on having the 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 richer nations and why, in addition, a positive cross-country (and sometimes within-country) relationship has been apparent between fertility levels and women's employment, at least among wealthier nations.[15]

The income- or female employment-fertility gradient

The mechanism that I will soon expound upon will demonstrate one reason why a

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[12] 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.

[13] 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.

[14] The best description is found in the original formulation, Becker and Lewis (1973).

[15] Doepke, et al. (2022) discuss the changing income-fertility gradient across countries and also within countries with regard to the highest levels of education. Kim and Tertilt (2024) reveal 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. See also van Wijk (2024) on the Netherlands.

positive relationship between female employment and fertility has arisen, and why some nations have lower fertility now even though they had much higher fertility some fifty years ago than did another group of nations.

I will draw on a revealing article that develops an implicit model about why a positive relationship between female employment and fertility might arise among richer nations (Feyrer, Sacerdote, and Stern 2008). That piece explored the notion that there is a U-shape (rather more like a backward J-shape) relationship between female employment, also sometimes income per capita, and fertility by country. Nations with low income levels and low female employment have high fertility. With economic growth, female employment rises and fertility falls. But female employment may not increase as much in some nations and, interestingly, in those countries fertility will decline even more.

I'll provide a simple schematic to explain. Societies could move (over many decades) from point A to C in Figure 3. That is, they would move from a state of high TFR and low female labor force participation to a lower TFR and higher female participation. But what seems to happen is that some countries, especially those that develop rapidly, move instead to point B, lower female labor force participation rate than at C *and* an even lower TFR.

The shift from A to C involves an increase in women's time allocation to the economic marketplace but a decrease, in their childcare and household time. However, in the nations that successfully move to point C, there is also a decrease in the division of labor in the home. Men do more household and childcare, allowing women to accommodate the increase in their employment without having to further cut back on their fertility.

Children take time that isn't easily contracted out or mechanized. Therefore, much of the change in fertility will depend on whether men assume more work in the home as women are drawn into the economic marketplace. If not, women must reduce something.

An important difference between the countries at B and at C is that those at B do not experience as large a shift in the division of labor in the home. Women work both in the home and in the market, but men do not change their time allocation. Therefore, women must cut back at something relative to women at C, whose spouses give more time to household and care work. In consequence, the women at B may have both lower employment and lower fertility than those at C.

I build on this insight to explain why an incomplete transition may occur and why some countries move from A to B and some to C. Economic advances (income, urbanization, educational change) may be so rapid that there is little time for generations to fully adjust to an altered structure of household and market production. One may think of these

countries as having social norms that seem out of touch with economic reality. They are often described as more traditional. In some cases, even patriarchal. Thus, the *rate of growth* of the macroeconomy may have large effects on microeconomic decisions. I will add an explicit model in the spirit of that article.

2 FERTILITY HISTORIES OF TWO GROUPS OF NATIONS

As noted earlier, I will discuss data for two groups of twelve 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.[16] The first group contains Denmark, France, Germany, Sweden, U.K., and U.S. I will call them Group 1. They are currently countries with moderate TFR, although all rates are currently less than two. Group 2 nations include Greece, Italy, Japan, Korea, Portugal, and Spain. These are countries with currently very low fertility. Demographers have termed these countries as the "lowest low."[17]

The past century's total fertility rates for Group 1 nations, from 1920 to the present, are shown in Figure 4. 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. Because of 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. 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.

The fertility experiences of Group 2 nations are different from those of Group 1. Group 2 nations were "late comers" to economic development, and fertility levels began high (especially so for Korea and Japan). Once again, I'll limit the discussion to the post-1940s. Three nations in the group (Korea, Portugal, and Spain) had TFR above or around three by 1970 and three (Greece, Italy, and Japan) were around two. But by the mid-1980s, all six had fertility rates that had dropped below two and all then rapidly converged to about 1.3 by the late-1990s. In the more recent past, the group has become among the "lowest low" with four nations below 1.3 (one is below 1), and two are around 1.4.[18]

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[16] 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 similar to those in Group 1.

[17] On the notion of "lowest low" see Billari and Kohler (2004) and Kohler, Billari, and Ortega (2012), and on its tenacity, see Goldstein, Sobotka, and Jasilioniene (2009).

[18] For a richer description of the post-WWII fertility experiences of these nations, see Zafeiris, et al. (2024) on Greece, Bueno and Brinton (2019) on Spain, and, Kertzer, et al. (2009) on Italy.

Although all twelve 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 and graphed the data for post-1970 in Figure 5, 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.

I will provide one compelling reason for the collapse of fertility in Group 2 nations relative to 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. In contrast, Group 1 nations had more continuous economic growth, and conflict was minimized. There are also other explanations that I will also mention. To make my explanation clearer, I will first construct a simple model of the conflict and then look at the causal elements in the macroeconomy.

3 GENDERED AND GENERATIONAL CONFLICTS

*A model of gendered and generational conflic*t

Assume a series of male (m) and female (f) cohorts identified by their birth year. At birth, all individuals inherit traditions and beliefs that depend on a person's family or clan. These inherited values form a fertility preference carried with individuals over their lifetimes.

But when an individual is 20 years old, the person also forms a fertility preference that depends only on current conditions. The current level of economic development will determine whether the person will want to raise a family, pursue a career, or do a bit of both. 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 to have, given both their inherited traditions and their current desires.

Agents decide how many children each would like to have, given by F_i for the fertility preferences of cohort i. Since each person has two influences on F_i, one that is inherited and one that is formed by current circumstances, these will need to be weighted. A key assumption is that males put more weight, α, on their inherited traditions than do females, who in turn put more weight on economic conditions when they are 20 years old.[19] But it is

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[19] Fernández and Fogli (2009) investigate fertility and labor force behavior in a framework of belief inheritance across generations. They find that the husband's "culture" dominates in determining the wife's employment and is about equal in importance to the wife's for the number of children.

not that males are inherently more traditional. Rather, they benefit more from patriarchal traditions. Women, however, see greater gains from more equal gender relationships.[20]

Why men have greater attachment to the past and to the traditions of their families than do women may be rooted in a variety of factors. Some cultures may reward dutiful sons with an inheritance, the family business, or the farm. Some may endow him with the family name and the spiritual care of the dead. And some may give him an entitlement to demand that his wife do excessive labor in the home. Women, on the other hand, become more unburdened in a host of ways as economic development proceeds. They gain less from an attachment to the past and more from embracing the present.

Therefore, each person's fertility desires at age 20 will be determined by a combination of their inherited traditions and beliefs and the current state of the economy. Mating is random and universal since there is no heterogeneity within men and women.

A more standard assumption of the model is that there is a negative relationship between income and fertility. That could arise because of an increase in the opportunity cost of parental time or because of the standard quantity-quality tradeoff in the Becker-Lewis tradition.[21]

Thus the greater is economic growth, the more the number of births desired by males will diverge from that desired by females. The more males and females differ in the weight they place on the past versus the present, α, the greater will be the divergence. And if there is no economic growth, the two members of the couple will have identical fertility preferences independent of their attachment to the past.

Formally, let $F_{20}^{m,f}$ be desired fertility by m, f in cohort 20 (the cohort of interest is 20 years old):

$$(1) \quad F_{20}^m = \beta_0^{\alpha_m} \beta_{20}^{(1-\alpha_m)}$$

$$(2) \quad F_{20}^f = \beta_0^{\alpha_f} \beta_{20}^{(1-\alpha_f)}$$

where β_0 = the inherited fertility norm; cohort 0 indicates the parents of cohort 20; and $\alpha_{m,f}$ = the weight that males, females place on the inherited fertility norm, such that $\alpha_m > \alpha_f$.[22] To make this simple, I will have the fertility decisions depend only on the level of

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[20] The α parameters are not fixed parameters but are dependent on the traditions and history of each place. The model will assume one place and will not subscript them for simplicity.
[21] The model can be expanded to alter the negative relationship between income and fertility.
[22] In fundamentalist societies, $\alpha_m = \alpha_f = 1$. Fertility is high independent of economic change.

income. Let $\beta_t = y_t^{-\delta}$, where y_t is per capita (real) income (or the education level) for cohort t. The higher is income (or, say, education), the lower is the desired fertility.

Taking the ratio of (1) and (2) and substituting $\beta_t = y_t^{-\delta}$, yields:

$$(3) \quad \frac{F_{20}^m}{F_{20}^f} = (y_{20}/y_0)^{-\delta(\alpha_f - \alpha_m)}$$

Greater economic growth, (y_{20}/y_0), will increase the ratio of male to female desired fertility and create conflict. Similarly, an increase in the difference between male and female attachment to the past, $(\alpha_m - \alpha_f)$, will also increase the fertility conflict of the couple. Both can be thought of as generational conflict. When economic development is rapid and sudden, there is generational conflict, and fertility might be lower than had economic development occurred more slowly over a longer period. But much will depend on how the divergence between the desired fertility of the wife and husband are reconciled.

As long as economic growth occurs from the parental to the children's cohorts (from age 0 to age 20 of the children), and given $\alpha_m > \alpha_f$, females will have a lower value for F than will males. That is, the number of children desired by the husband, F_{20}^m, may theoretically be greater than that desired by the wife, F_{20}^f. But they will eventually have to decide on their family size, even if it is the lower bound.[23]

I assume that the number of children the couple will have, F_{20}, 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.[24] 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.

Whereas α depended on the weight the members of the cohort placed on the past, λ will depend on the content of the past, for example whether the husband's father did any household and caring work or whether that was left entirely up to his wife and whether the society is more patriarchal or more sharing.[25] That is, λ represents gender conflict. In the

[23] Much of the decrease in fertility has come from a later age at marriage or no marriage,
[24] If $H_{m,f}$ = household and caring time of the husband (wife), then $\lambda = H_m/H_f$, assumed to be ≤ 1.
[25] Doepke and Kindermann (2019) analyze the fertility preferences of couples (across 11 countries) and observe if the couple had a birth within three years. Couple disagreement is substantial and agreement is generally needed for a birth. See Doepke and Kindermann (2017) on bargaining models of fertility. A related literature finds that women generally dominate in the fertility decision when there is disagreement (see Testa, Cavalli, and Rosina 2011, 2014).

schematic given by Figure 3, a larger λ would mean going from point A to B and a smaller λ would bring the country to point C.

Implications of the model

When nations that once developed rapidly then advance at slower rates, the conflict across generations should ease. The attachment to the past should matter less as cultural traditions that once greatly favored sons are abandoned. With that, α_m should decline and the difference between the weights $(\alpha_m - \alpha_f)$ will be reduced, eventually to zero. When that occurs, fertility decisions of the couple will be equal and the value of λ will not matter.

But even with agreement between the husband and wife, fertility will be a negative function of income growth.[26] Unless δ becomes positive, fertility will continue to decrease with economic growth. But it is possible that δ will decline and even become positive. To the extent that the negative relationship is due to a tradeoff between the quantity and quality of children, the effect could be reversed if the income elasticity for quality decreases. To the extent that it is negatively related to parental income, the effect may be reversed by greater substitution of the time of professionals for parental time. Another, more complicated, possibility is if the negative effect of income is mitigated by great sharing of household and caring time by husband and wife.

Women, according to the framework, are agents of change. In periods of rapid economic development especially when populations greatly shift from rural areas to cities, men gain more from partly remaining in the past but women gain more from taking a fuller advantage of the present, if they can.

4 ECONOMIC GROWTH, INTERNAL MIGRATION, AND FAMILIES

Economic growth and internal migration over the long run

The model tells 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 the resultant 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 6, part A substantial volatility in the pre-1950s. But despite the messiness of the first half of the

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[26] When the couple is in agreement, the desired level of fertility will be $F_{20} = (y_{20}/y_0)^{-\delta} y_0{}^{\delta}$. It is a negative function of income growth and a positive function of the initial income level.

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 6, part B, did not experience steady economic growth at all. Rather, the first half of the twentieth century saw stasis or slow growth. The economies of these nations were sluggish in the 1920s and 1930s and then many experienced economic collapse due to depression and war, until the 1950s or 1960s. Subsequently, they had extremely rapid catch-up until the late 1990s or early 2000s.[27]

Not only did many of the Group 2 countries have rapid growth after the 1950s and 1960s, but some also experienced huge migrations of their populations 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, with the exception of Portugal.[28]

Migration is important to the story of fertility change because those who move from rural areas enter the urbanized world having with more firmly-held beliefs and more traditional ways. Among the children of the migrants, the daughters gain more from modernity as 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 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.

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[27] This discussion over-simplifies the long-run economic growth trajectories of Group 1 and Group 2 nations. The obvious effect of the Korean War in Figure 6 should be acknowledged.
[28] Fraction "rural" is from the World Bank Development Indicators (WDI). "Rural" is defined by each of the nation's statistical agencies. For example, the U.S. definition, while involved, can be summarized by the fact that "rural" means populations living in incorporated areas of fewer than 2,500 people. But "rural" in Japan means populations living in areas with fewer than 50,000 people. In Italy, the definition of "rural" is based on land density. Information on the definitions can be found at https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS..

Household and care time by gender

Evidence on differences in (unpaid) household and caring hours between men and women supports the notion that the countries that had more sudden and rapid growth, as well as larger migration from rural areas to cities, are also the ones with an excess number of hours worked by women relative to men in (unpaid) household and care labor.

The data for the twelve Group 1 and Group 2 nations are given in Figure 7, part A. The horizonal axis is the difference in household and care hours between males and females (15 to 64 years old) on an average day, by country. It is graphed against the nation's TFR in 2019.

The time-use data were assembled by the Organization for Economic Cooperation and Development (OECD) from each of the country's time-use surveys for all males and females 15 to 64 years old. The dates for each country's latest survey vary from the early 2000's to 2023. l have mainly used results from surveys done from 2009 to 2019.

To ensure that these data agree with those of the individual countries and to explore sensitivity to the conditions imposed by the OECD researchers, I have employed data from the U.S. American Time Use Survey (ATUS). I have found perfect agreement in the time use data for the sample as described above. Using the same age range but limiting to those with children in the household, does not change the results by much, a finding that lends more credibility to using the OECD data.[29]

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 7, part A 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.

One might be concerned that the twelve nations I have chosen as examples for the two groups are not a random selection and that the relationship between time use and total fertility would not hold for a larger group of nations. I have taken the full group assembled by the OECD and limited the sample to those with time use samples that are within the last ten years of the 2019 TFR numbers. That restriction drops Denmark and Portugal from the original group of twelve but adds ten more to produce a sample of 20. The relationship is

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[29] See notes to Figure 7. I have not done the same exercise for the other eleven countries.

about as strong as for the twelve and is given in Figure 7, part B.

Nations that had rapid and sudden economic growth and large movements of population from rural to urban areas experienced sharp drops in fertility. The declines far exceed those for nations that had more continuous growth and did not have substantial internal migration. These facts are consistent with the notions of the model that rapid change leads to disagreements between young men and women in part because of generational clashes for which sons agree more with their parents than do daughters.

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). They find considerable fertility disagreement within couples. For couples with at least one child, women desire fewer births than do their husbands in countries with a larger gap in child care hours done by mothers than fathers. Of the eleven countries for which the data exist, in only three (Belgium, France, and Norway) do wives want the same or more children than do husbands. They also find a negative relationship between fertility disagreement and female employment.[30]

Applying the model

We can now apply the insights from the model by observing several cohorts. In particular, I will use data for the parents (cohort 0 from the model) and their children (cohort 20) in nations that underwent sudden and rapid economic change and in those that underwent more continuous, although still punctuated, economic growth.

Consider first the impact of rapid economic change among Group 2 nations. Descendants of individuals who had spent their lives in rural areas, had low levels of education and income, and who often witnessed economic decline or stasis, had children who would live in cities, be far more educated, and have far higher incomes. The differences were enormously large. All nations in this period had high levels of growth but, for some, there were sharp and sudden breaks with the past. The following example uses the fertility data in Figure 4, part B or Figure 5 and the GDP per capita numbers in Figure 6, part B.

The example of Korea may be the most extreme. A male child born in Korea around

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[30] Doepke and Kindermann (2019) use data from the Generations and Gender Programme (GGP), a longitudinal survey of mainly European nations. The first finding mentioned is from their figure 2. The other eight countries are disproportionately in Eastern Europe and Russia. The second finding is from their figure 3, giving the number of hours worked by women with children less than three year, relative to that worked by other women in the survey, and the disagreement variable. The *fewer relative hours* women with preschoolers work, the *greater* is fertility disagreement.

1980 had about two siblings (TFR = 3). His parents would have been born in the tumultuous late-1950s and would each have had about five siblings (TFR = 6), although all would probably not have reached maturity. His grandparents, as children in the 1930s, would not have had standards of living much different from his parents at the same age.

The boy's parents were raised in the 1960s in a period of rapidly rising income. From their youth to the time of their marriage real incomes increased four times, and a major migration ensued from the farming communities and rural areas of Korea to Seoul. From the time of their birth to that of their marriage 30% of Korea's population had left their rural homes (72% to 43% rural from 1960 to 1980).

The parents would have brought their traditional ways to the city and raised their son with more resources than they had but with a sense that he should marry, as they probably did, into a traditional Korean family, in which the husband would be dominant, the wife would take care of the home and children, and the grandparents would be part of the household.

If they had a daughter, however, she would have been aware that her options had greatly expanded. When she married, around 2005, per capita income would have increased another 4.5 times what it had been at the time of her birth.[31] In the ten years from 1995 to 2005 the fraction of 25-to-34-year-old women in Korea with some tertiary education rose from 24% to 51%. In the same decade, employment of 25-to-29-year-old women increased from 48% to 68%.[32] But the son carried with him many of the traditions of his parents and they clashed with increased female autonomy. Fertility, in consequence, became even lower and fell to just above one around 2005.

A similar story can be told for Spain, but the timing would be around five to ten years earlier than in Korea. The divergence in Spain's fertility with Group 1 is apparent by the 1990s. As in the Korean case, standards of living for the parents as children were not much different than for the grandparents as children. But real incomes then increased by more than three times from when the parents were children to when they married, and standards of living increased by another 2.2 times from when they married to when their son would marry. In addition, 20% of the Spanish population became urban from when the parents were children to when their son would marry.

One may wonder why the parents' generation, experiencing a large change in their

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[31] In the late 1950s (constant $) GDP per capita in Korea was $1,400; $6,000 in 1980, and $27,000 in 2005. See Figure 7.
[32] Education data are from the OECD Education Indicator Data; labor force data are from the ILOSTAT Data Explorer.

standards of living, did not have the generational and gendered conflicts that I am assigning to their children. The reason is that it took time for women to get more education and have the ability to enter the labor market. In terms of the model, α_m and α_f would not differ if women did not have an incentive to break from the past. If these parameters are equal, no generational conflict exists and there is no difference in fertility desires by gender.[33]

What about Group 1 countries? Increases in standards of living were more continuous, as is obvious from observing the slopes of most of the lines in Figure 6, part A. Each generation saw its standard of living rise to some extent. Although there were clearly disruptions due to wars and the Depression, generational changes were not as extreme as in Group 2 nations.

The populations of Group 1 nations had a longer time to be thrust into modernity. Expectations of parents for their children, especially their sons, were less radically different from what the parents had experienced. Generations clashed less, and thus the genders were more in agreement.

Another important feature of Group 2 nations is that they are more Catholic (Italy, Portugal, and Spain), and Orthodox (Greece) than Group 1 nations. They also include two nations (Japan and Korea) for which filial piety, ancestor worship, family lineage, and clan identity are important. These are additional reasons why men might be more attached to the past than are women, why women would gain more from modernity, and thus why, in terms of the model, α_m would be greater than α_f.

Most Group 2 nations were late comers in the dissemination of the birth control pill which is not surprising given their dominant religions.[34] They were also later than most in Group 1 to legalize abortion. But in some cases, the legality of abortion was not a decisive factor. For example, even though abortion remained criminalized in Korea until 2021, the procedure was widely performed in hospitals and other medical facilities. In addition, Japan made the pill available in 1999, the latest of all the nations in the two groups, but abortion was widely available and legally allowable for the health of the mother, broadly interpreted. The somewhat later accessibility of the pill among Group 2 nations might explain their somewhat delayed fertility decline in the 1980s when Group 1 decreased in the 1970s. But

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[33] In the early 1950s, (constant $) GDP per capita in Spain was $4,000; $13,000 in 1975, and $28,000 in 2000. See Figure 7. "Leaving" rural life includes increased density of rural populations.
[34] Pill accessibility is as follows, although the ability of some to obtain the pill does not mean that it was available to women of all ages and marital statuses. For Group 1 nations Denmark (1967), France (1967), Germany (1961), Sweden (1964), U.K. (1961), and U.S. (1960). For Group 2 nations: Greece (1967), Italy (1971), Japan (1999), Korea (1968), Portugal (late 1970s), and Spain (1978), although the pill was widely used in Spain before it became legally available.

the role of abortion is less clear for certain nations.

Other 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 and 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. That, in turn, would have increased the marriage age, decreased the fraction married, and, in consequence, reduced fertility. Interestingly, even though the rise of the gerontocracy has probably served to decrease fertility, research on the gerontocracy has not mentioned the connection. Rather, the reduction in the birth rate has been offered as part of the reason for the aging of the workforce and thus for the rise of the gerontocracy.

Even though the ascendency of the gerontocracy could have been a factor depressing fertility, the evidence presented in the literature 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 differentiates fertility declines among 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 are able to receive substantial subsidies for housing. But these have apparently had little effect, thus far, on the birthrate.

Even for the nations of northern Europe, the evidence for a meaningful impact of family-friendly policies on the number of children is mixed. Whereas Raute (2019) finds

positive effects of subsidizing childcare on fertility, others do not.[35] In the case of northern Italy, a childcare subsidy for a first birth led to the greater employment of women and a lower probability of a second birth (Dimai 2023). There is far more agreement that childcare subsidies and parental leave improve a woman's mental and physical health, as well as the health of her children, than there is on its impact on her fertility.

5 CONCLUSION

Decreased birth rates have been nearly ubiquitous around the world. But they aren't always due to changes in contraceptive practices or legal constraints, and they aren't always due to governmental policies that have tried to help working parents or encourage women to have more children. I have emphasized, instead, that decreased birth rates can be due to macroeconomic changes, especially those that impact differences across generations and thus that cause conflicts between the genders.

Rapid economic change often challenges strongly held beliefs, and beliefs change more slowly than technology does and economies do. Traditional people are often catapulted into modernity with little time for beliefs, traditions, and social mores to adjust. Thus, swift economic change may lead to generational and gendered conflicts and rapid reductions in the birth rate.

The model predicts that in periods of rapid and sudden economic and social change men will want more children than women will want. The differences will be muted when economic change is slower and less sudden, but women will still want fewer children than will men. How can that change?

The reason for the difference, embedded in the simple model, is that women spend more time with their children often by sacrificing their careers or by having lower incomes and thus becoming economically vulnerable. If they are divorced or separated, they and their children may suffer. They know this in advance and, in consequence, will resist having more children.

But if fathers and husbands can credibly commit to providing the time and the resources, the difference in the fertility desires between the genders would disappear.[36] In terms of the simple model, this means that $\alpha_m = \alpha_f$. Commitment would guarantee cooperation, but commitment is difficult to ensure. One method of commitment is to live in

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[35] Cohen et al. (2013) find a positive effect of direct child subsidies rather than subsidized childcare, in the case of Israel. Lalive and Zweimüller (2009) find a positive effect on the second births of Austrian women who had an increase in maternal leave affecting their first birth but a negative effect on their employment.
[36] See Doepke and Kindermann (2019) for a bargaining model of fertility with commitment.

a country or state in which social opprobrium dictates that men provide the finances, time, and mental resources to the family. Perhaps that is part of the reason why most Nordic countries have managed to have reasonably high fertility as well as high female employment. Social insurance is not just that provided by the government. It is also the social capital of the society.

But commitment does not eliminate the negative effects of income on fertility. I noted previously that a positive income gradient by country has emerged. But there are few examples of positive relationships between household income and fertility within countries. One can still have a negative relationship but increase fertility across all income groups. Perhaps that is what happened in the U.S. during the baby boom.

The U.S. baby boom is one of the few examples of a country with TFR less than two that greatly increased. The baby boom was partly accomplished by glorifying marriage, motherhood, the "good wife," and the home. Can a turnaround today be accomplished by glorifying parenthood, especially fatherhood, and changing workplace rules so fathers are not penalized by taking time off and requesting flexible work arrangements? One thing is clear: unless the negative relationship between income and fertility is reversed, the birth rate will probably not increase.

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FIGURE 1: Total fertility rates in eight nations from 1850 to 2018
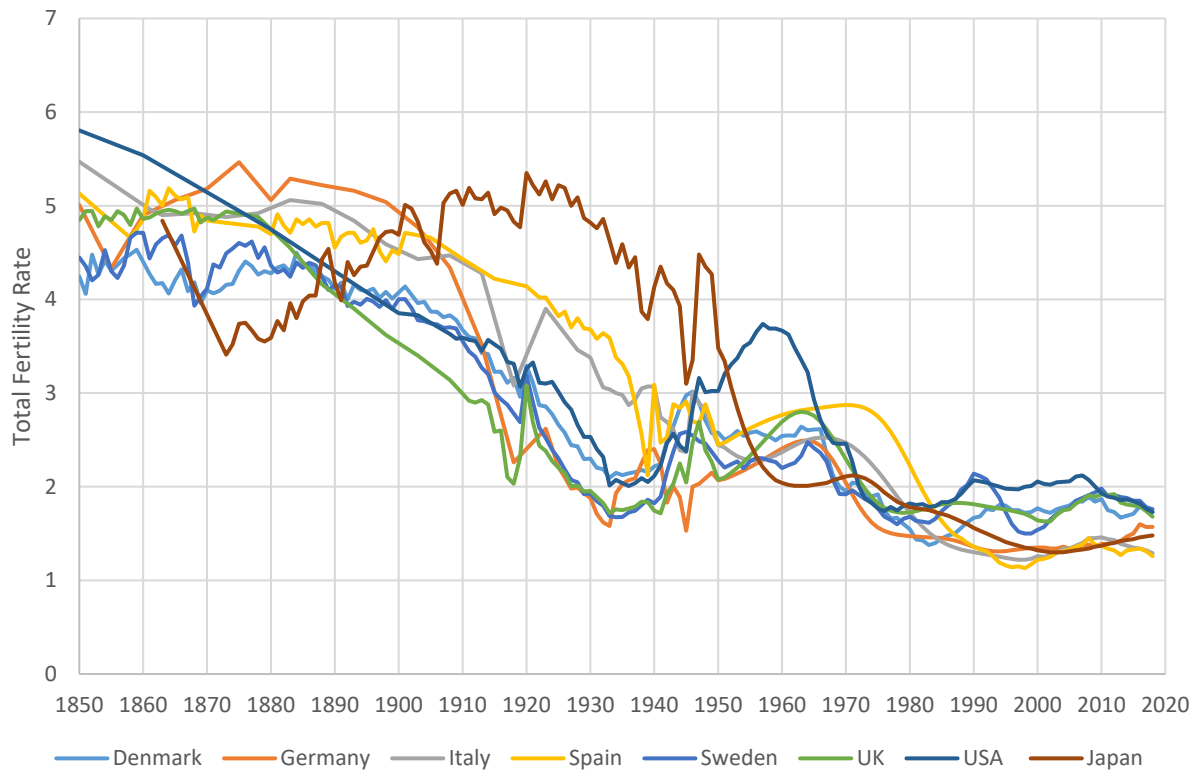
Source: Doepke, Hannusch, Kindermann, and Tertilt (2023), Appendix table A1: Data from figure 1. Data points were provided by the authors and used with emendations. See Notes.

Notes: I have altered two data points for the USA (1850 and 1860) to include the enslaved population. Total fertility rates by race were used from Carter et al., series Ab52-117. TFR by race were aggregated using the fraction of each group among women 15 to 49 years, from series Aa287-364 and Aa 365-456.

FIGURE 2: Total fertility rates across four countries and the world, 1950 to 2022
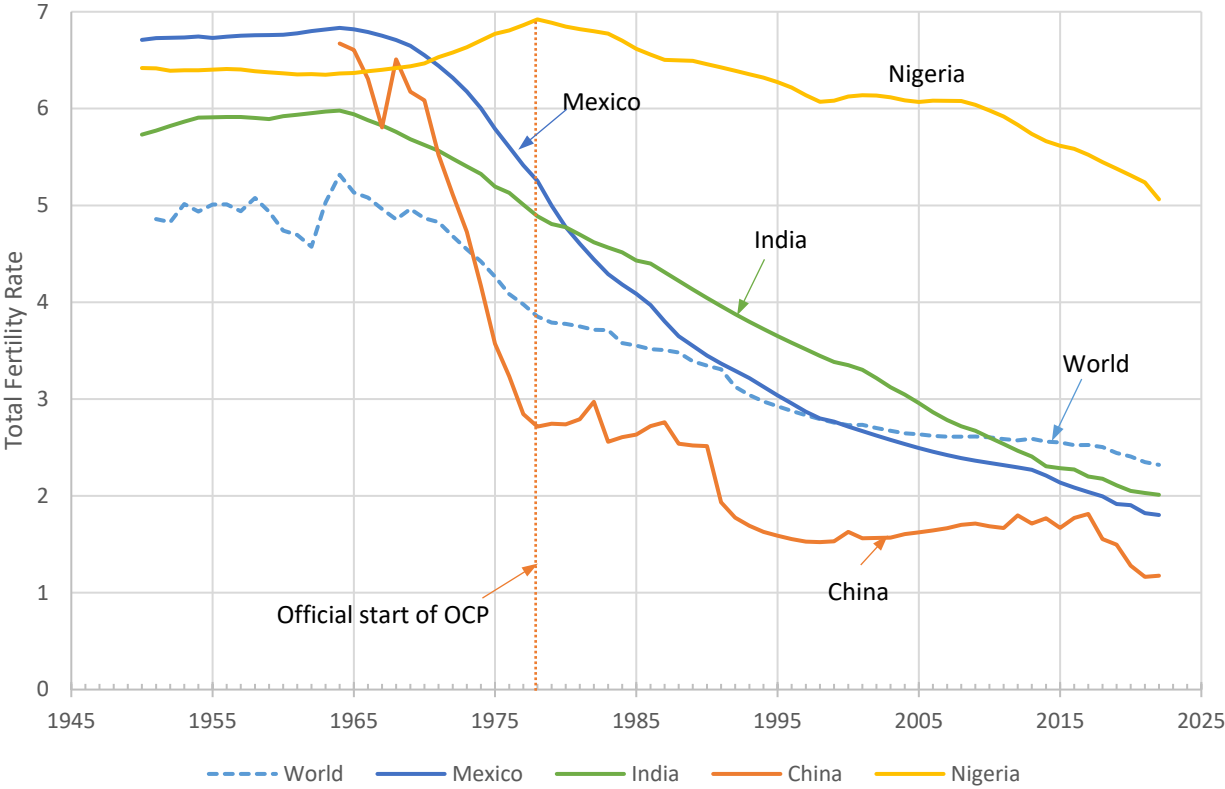
Source: United Nations Population Division, Total Fertility Rate,
http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A54

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

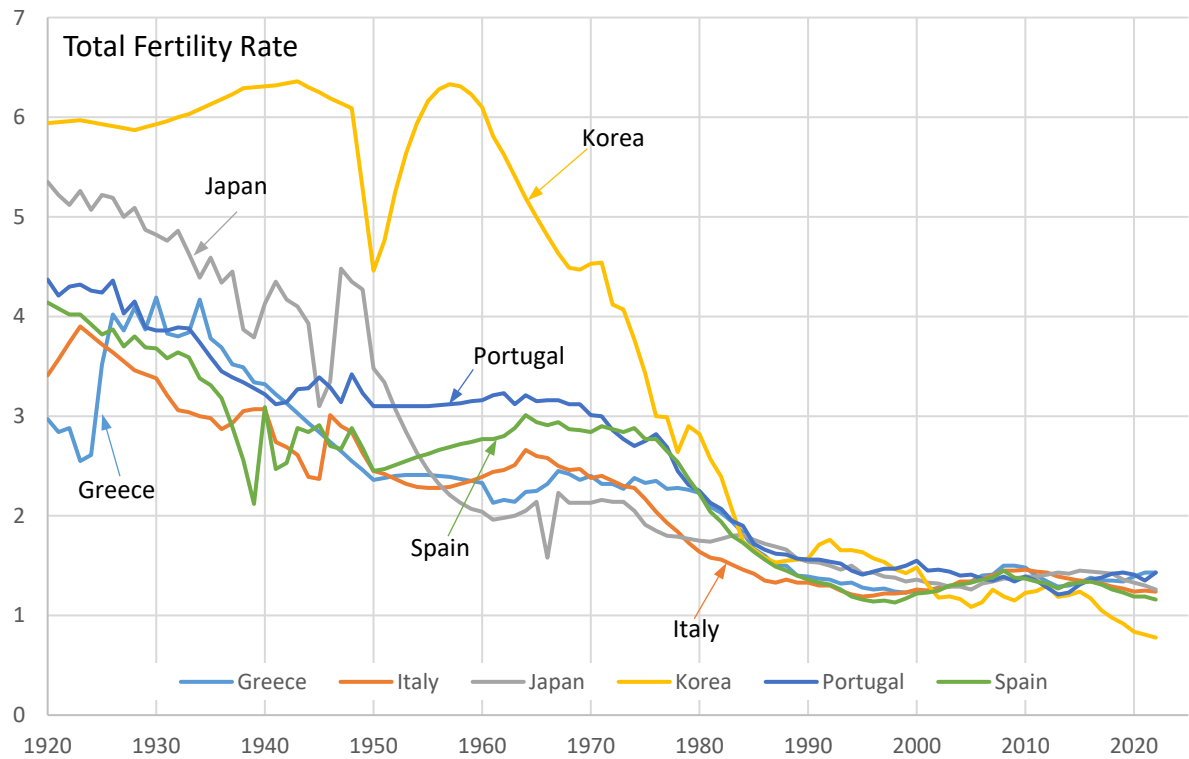FIGURE 3: Schematic relationship between fertility and women's labor force participation
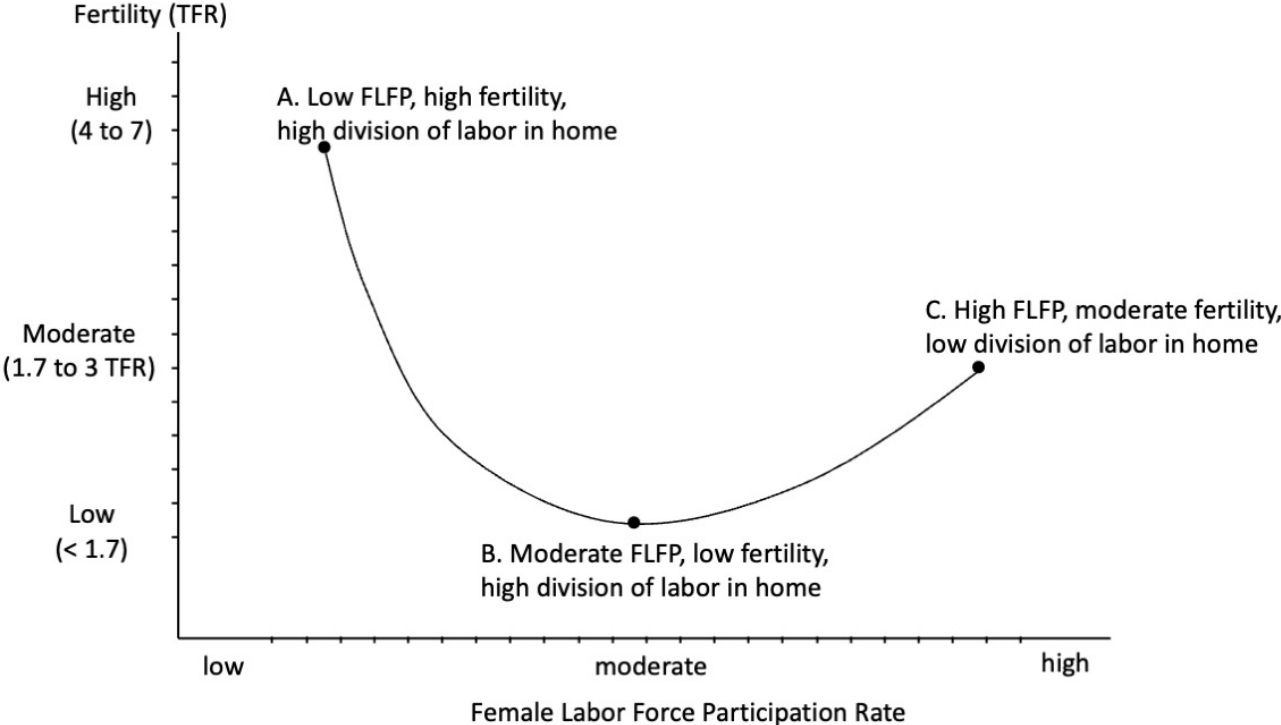
Source: Adapted from Feyrer, Sacerdote, and Stern (2008).

FIGURE 4: Total fertility rates for two groups of nations, 1920 to 2022

Part A: Group 1 nations
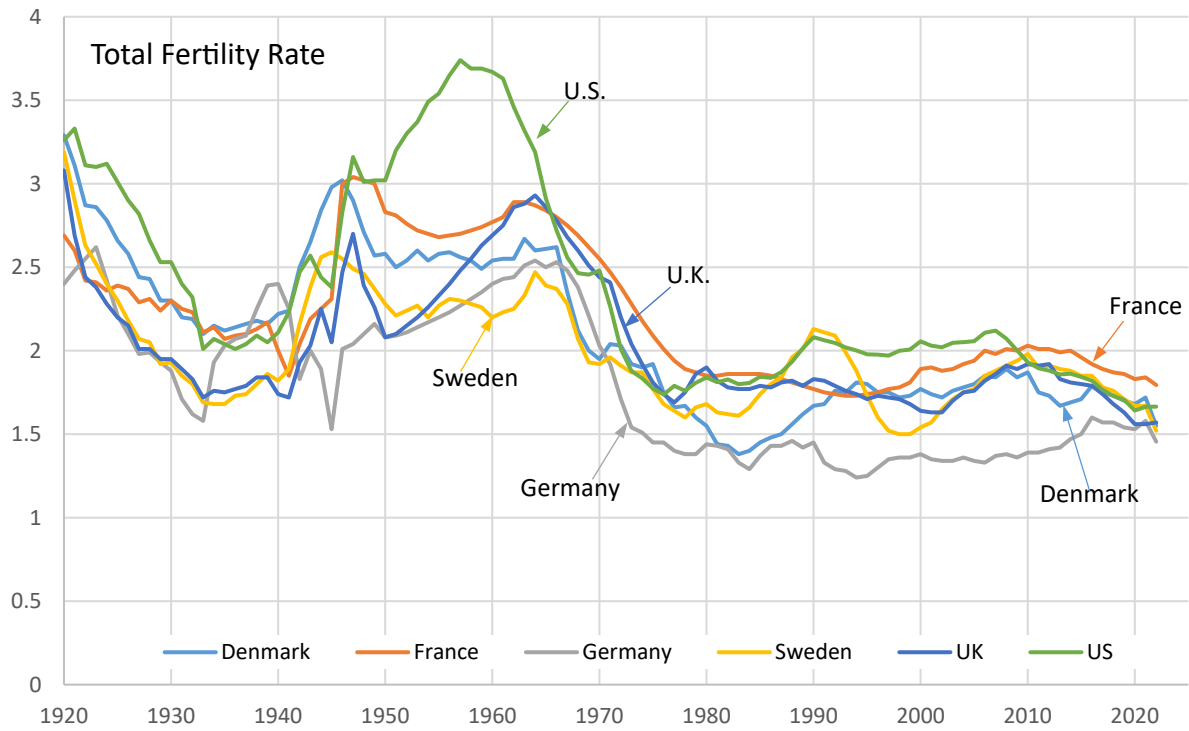
Part B: Group 2 nations

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.

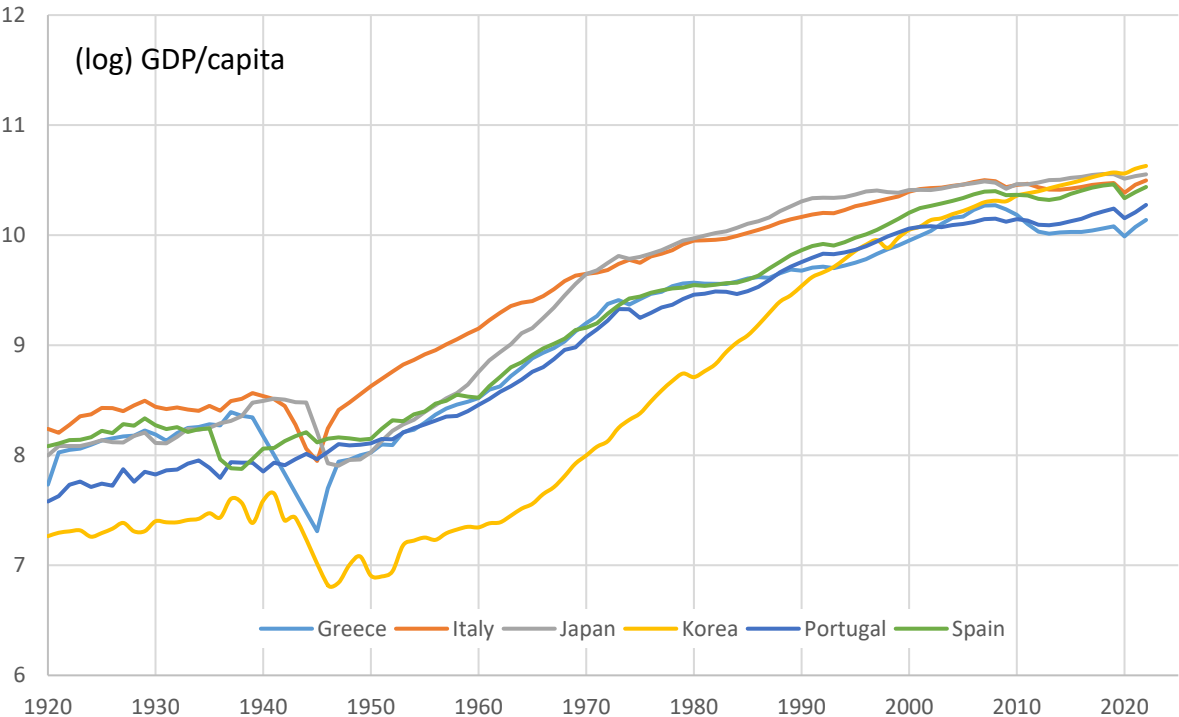FIGURE 5: Total fertility rates for selected Group 1 and Group 2 nations, 1970 to 2022
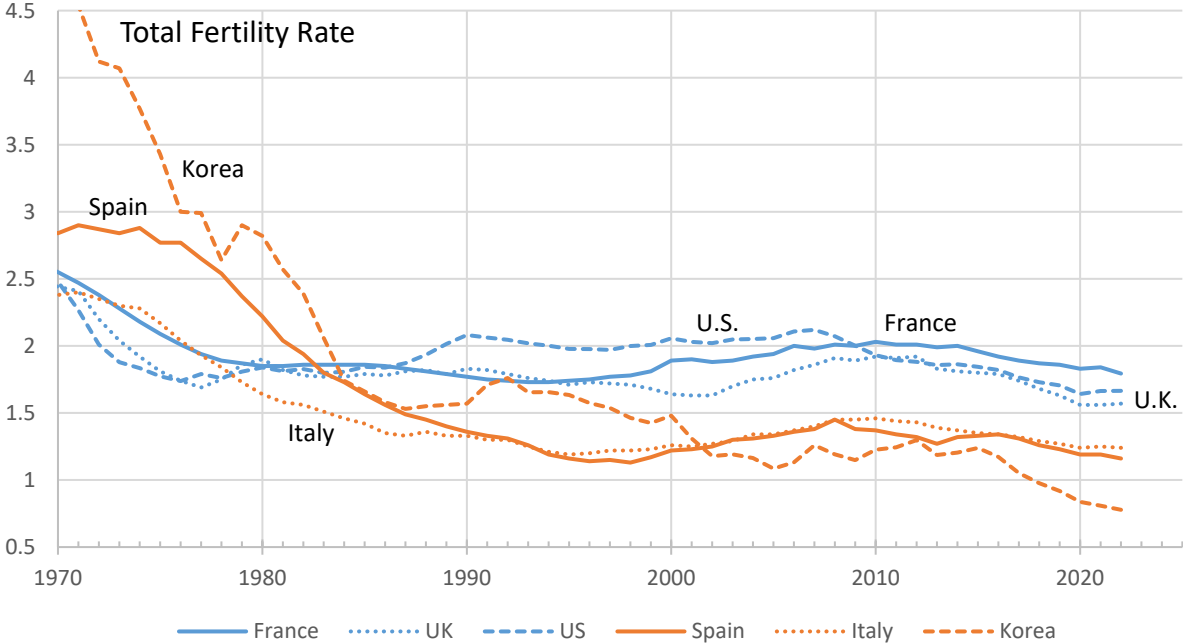
Source: Figure 4.

FIGURE 6: Log gross domestic product per capita for two groups of nations, 1920 to 2022

Part A: Group 1 nations
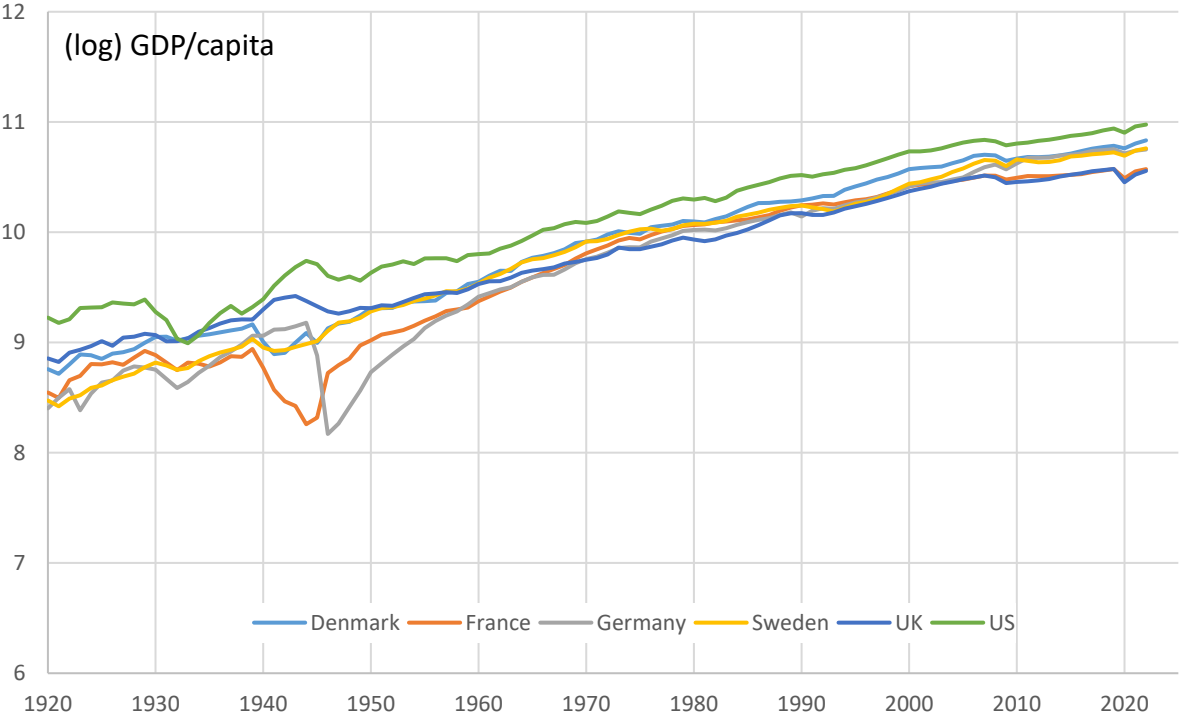
Part B: Group 2 nations

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.
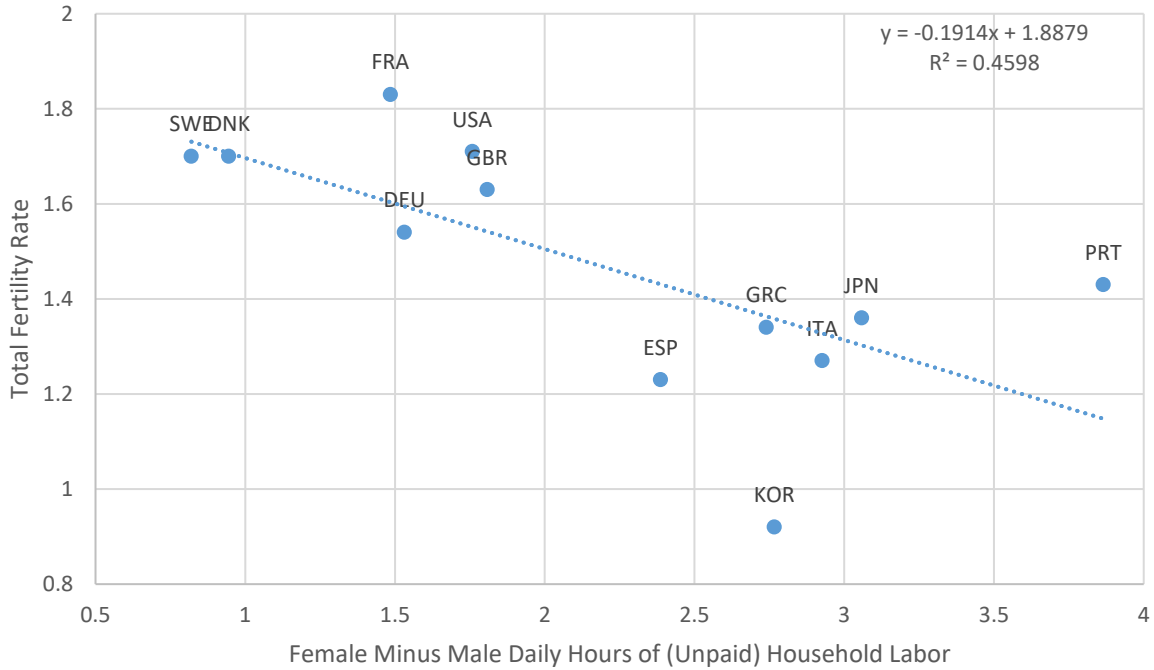https://ourworldindata.org/grapher/gdp-per-capita-maddison
The Maddison Project website is:
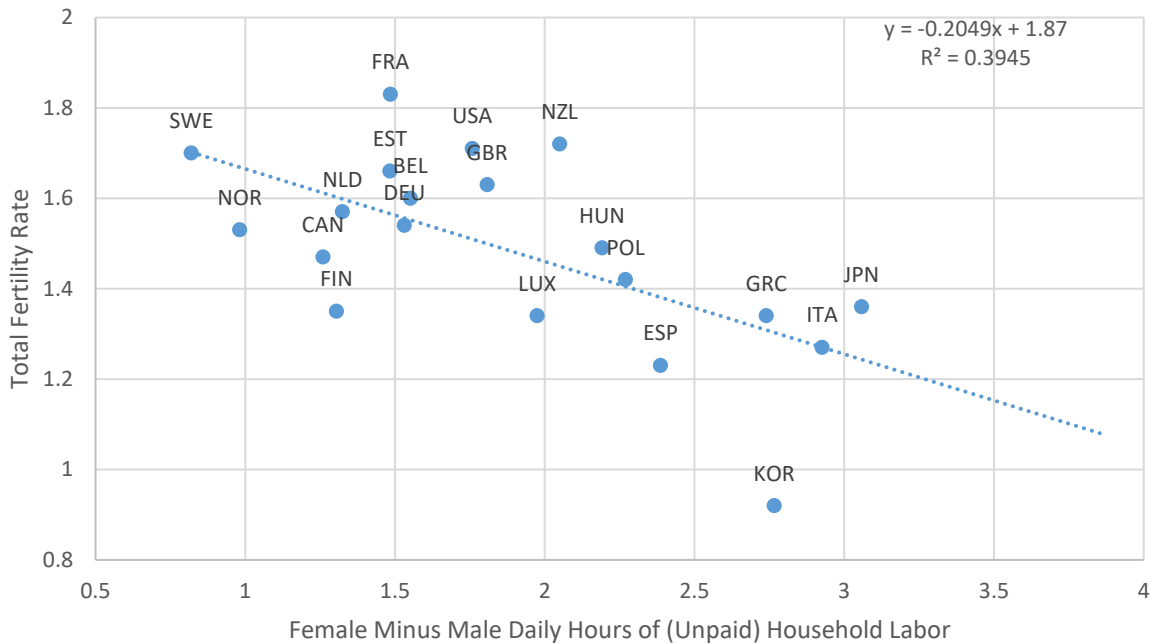https://www.rug.nl/ggdc/historicaldevelopment/maddison/?lang=en. See also Bolt and van Zanden (2014).

FIGURE 7: Gender differences in (unpaid) household and care work and in fertility

Panel A: Time use and fertility among the 12 Group 1 and Group 2 nations

Panel B: Time use and fertility among 20 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.

Notes: The OECD uses the time budget studies of each country. From that group, I have used only those countries that have time budget data for the years 2009 to 2019. I stop at 2019 to avoid pandemic work-from-home issues. Portugal (1999) and Denmark (2001) are dropped from Figure 7, part B because they are too early. Using the most recent data would revise just two observations (U.S. and Japan), add Austria. Including these countries would increase the R^2 to 0.438.

The OECD uses data for all men and women 15 to 64 years old. I have checked the 2019 U.S. data against the ATUS (using 2006 weights). The data line up perfectly for the largest components: routine household time and care for any household member (thus excluding shopping and travel time). I get a difference of 1.43 hours per day between all women and men 15 to 64 years, replicating the OECD for these components, and 1.79 hours for those with children at home. The figure the OECD uses is 1.76, which includes shopping and travel time.

The horizontal axis gives the number of hours per day that women work in unpaid labor at home (e.g., ordinary housework, cooking, cleaning, care for children and others, shopping) more than do men, 15 to 64 years. The fertility variable is for a later year than the time use data since, in my framework, time use "causes" fertility.