

24

DEMOGRAPHIC DECISION-MAKING UNDER UNCERTAINTY

Timothy W. Guinnane and Jochen Streb

In the run-up to the 1957 federal elections in West Germany, Chancellor Konrad Adenauer's governing coalition passed a major pension reform that is believed to have contributed significantly to his successful reelection. Existing old-age pensions were increased by an average of 60 percent and in the future were to be linked to the development of the wages of the actively employed, who were required to finance pensions from taxation on their earned income (Hockerts 1990; Schmähl 2007). Critics of this pay-as-you-earn (PAYE) system argued that Adenauer's exorbitant increase to the old-age pension would lead to a significant decline in fertility, because children were now no longer needed as a form of security for old age. As German society aged, there would be ever more pension recipients and ever fewer contributors. The PAYE system would inevitably fail in the long run in a predictable feedback effect, according to critics from the private sector (Hockerts 1990, 100). Adenauer is said to have brusquely dismissed these concerns with the response, "People always have children."¹

Unlike Adenauer, economists have believed since Malthus (1798) that the (lifetime) income of potential parents decisively influences their fertility choices. While Malthus (1798) thought that there was a positive relationship between income and fertility rates, in that higher wages led people to marry earlier and have more children, economists since Becker and Lewis (1973) have assumed that fertility tends to decline as income rises. There are two important causal channels. The first recognizes that children require a great deal of parental time, and as wages increase, the opportunity cost of child-rearing makes them more and more expensive. The second stresses the increasing importance of human capital since the Second Industrial Revolution (Galor and Weil 2000; Cinnirella and Streb 2017).² To establish children in life, parents need to invest in an excellent education for each child; the resulting financial budget constraints mean parents are likely to have fewer children.

Becker (1960) emphasized that having a child is an irreversible decision with long-term economic consequences for parents.³ Potential parents, in his view, would therefore do well to consider whether their joint income will be sufficient in the future to provide their children with the desired standard of living and a good education. In addition, they need to consider the implications of parenthood for their own lifetime income. For example, the mother's lifetime income may drop significantly if she interrupts her employment for an

extended period of time to care for her young children at home. She may also be unable to resume her previous career thereafter. However, the lifetime income of both parents may increase if they are financially supported by their children in old age, which is of no little importance, especially in societies with underdeveloped social security systems.

While we focus on economic considerations in the decision to have children, the theories we discuss do not exclude other influences. Economic models typically presume a set of preferences that lie outside the scope of the theory. According to the model, and given these exogenous preferences, variations in prices and incomes make it harder or easier to have the desired number of children, just as prices and incomes account for decisions to buy a car or a house. This reasoning lies at the heart of Becker (1960). Many accounts rightly stress the role of religion in fertility decisions, and with this, the role of secularization in the European fertility transition. The famous “Princeton project” elaborated one version of this argument (Coale and Watkins 1986). Religion enters into fertility decisions in several ways, one being for example the admonition to abstain from contraceptives or abortion. Another way reflects the role of women in society. Women’s lost labor market earnings are a large part of the cost of a child, and religious teachings that discourage roles for women outside the home encourage large families because they deprive women of the opportunity to choose earned income over children. While a full discussion of this issue lies beyond the scope of our paper, it is important to note that empirically, religion matters in cross-sectional comparisons (that is, when comparing two different religious groups at a given point in time) and over much longer horizons than we consider. For example, the introduction of social insurance in the 1880s represented a sharp break to people at the time while secularization occurs over a longer timescale.

Economic theories of the relationship between lifetime income and fertility typically assume that couples willing to reproduce are able to form correct expectations about economic variables far into the future. In reality, however, many couples make demographic decisions in situations of great uncertainty, and neglect longer-term consequences. Significant and sudden changes in divorce rates, for example, reflect both uncertainty and unexpected changes in economic and social reality. An illustration might be the brief, sharp spike in divorce rates in the United States in the late 1940s and early 1950s, as couples who married in haste during the Second World War came to regret their decision. A more sustained and dramatic increase in divorce rates occurred in the 1970s. In 1980, the US divorce rate reached 22.6 per 1,000 women, compared to 8 in 1920 and 4.1 in 1900 (Schweizer 2020). Economists and others continue to debate this dramatic change in the US (which has parallels elsewhere) but most agree that an important cause was the changing role of women in work and family life. Marriages sealed in 1960 reflected a set of expectations about the future that turned out to be false.⁴ The influence of uncertainty on demographic decisions, among which we include fertility, marriage, and divorce, will be explored in this essay in three different case studies.

First, we will use the example of German reunification to examine what happens when a fundamental transformation of an economic and social system abruptly devalues people’s previous life experiences. We will discuss whether the East German people fell into a state of irrational demographic shock in the early 1990s or whether, in a more rational process of adjustment, they used the option to postpone demographic decisions into the future. In our second case study, we will turn to the question of whether the post-Second World War (US-American) baby boom can be explained by the reduced uncertainty that characterized the Golden Age of economic growth compared to previous decades (Vonyó 2008). We will

see in this context that, during periods of prolonged uncertainty, short-term responses to economic fluctuations can also lead to long-term changes. Finally, going back further in time, we will discuss whether the introduction of social insurance systems in Germany in the late nineteenth century contributed to the fertility transition that took place at the same time. Doubts about this hypothesis are justified insofar as it places high demands on the rationality and long-term orientation of working families affected by social reform. Our study of German social reform under Bismarck suggests that, in the short term, the introduction of social insurance, affected, if anything, marriage behavior rather than fertility.

Our discussion of fertility stresses decision-making by married couples. For most of European history, the majority of all births were to married women. There were always some births to unmarried women, but illegitimate children were subject to social and legal discrimination. In a few regions (such as much of southern Germany), such children could account for up to 40 percent of all births, but these were exceptions. In most European states in recent decades, the law has abandoned the category of “legitimate.” Single women who bear children today do not find themselves subject to the same social disapproval, and in many societies, the proportion of children born to unmarried mothers has skyrocketed (Klüsner 2015). For the kind of economic reasoning we stress here, the decision to have a child differs little between a married couple and a single woman.

German Reunification: Demographic Shock or “Rational Freezing”?

The fall of the Berlin Wall on November 9, 1989, foreseen by few, initiated the process of German reunification, which via the intermediate goal of monetary union achieved in July 1990 led to the accession of the former GDR to the political system of the Federal Republic of Germany on October 3, 1990. Even though this process was wanted and driven forward by the citizens of the GDR, after reunification the people of the former East Germany fell into demographic paralysis (Figures 24.1–24.3). The average number of children per woman of childbearing age fell by 47 percent between 1989 and 1994, with marriages per 1,000 inhabitants falling by 57 percent between 1989 and 1992, and divorces per 10,000 existing marriages by as much as 74 percent between 1989 and 1991, while West German citizens were largely unimpressed by reunification as measured by their demographic reactions. According to Eberstadt (1994), no comparable collapse in marriage and birth rates can be found in this or any other period of modern economic history, even though similar developments did take place in the other transition countries in the former Soviet sphere of power. Thus, Eberstadt (1994) argues that East German society was facing an existential crisis in the early 1990s, when uncertainty and fear of the future seemed to cause people to cling to the demographic status quo. Under the given circumstances, they seemed to find it better to continue a bad marriage than to face fundamental social and economic change alone. Based on data from the German Socioeconomic Panel, Witte and Wagner (1995) observed that those East German women who stated that they were “very worried” about their personal future refrained from having their first or further children in the post-reunification years.

Conrad et al. (1996), however, interpret the dramatic decline in demographic changes in the former GDR not as an expression of irrational panic but as the result of rational behavior. Looking again at Figures 24.1 and 24.2, it is clear that marriage and birth rates in the GDR had been significantly higher than those in West Germany since the early 1970s. This divergence was due to the GDR’s pronatalist policies. Marrying early and having

Demographic Decision-Making under Uncertainty

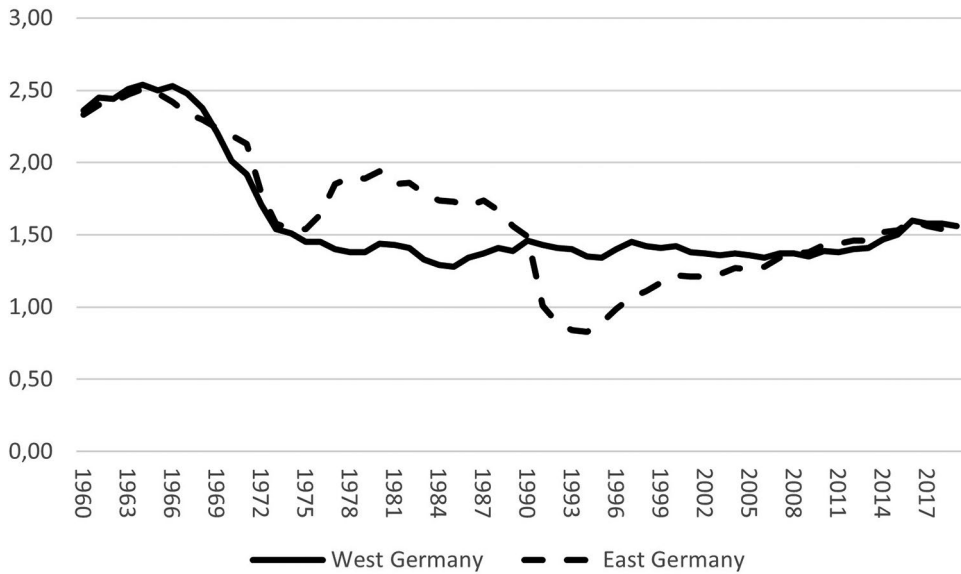


Figure 24.1 Crude birth rate, West and East Germany, 1960–2019.

Source: <https://www.bib.bund.de/DE/Fakten/Fakt/F09-Zusammengefasste-Geburtenziffer-West-Ost-ab-1945.html?nn=9991998>, accessed at January 17, 2022.

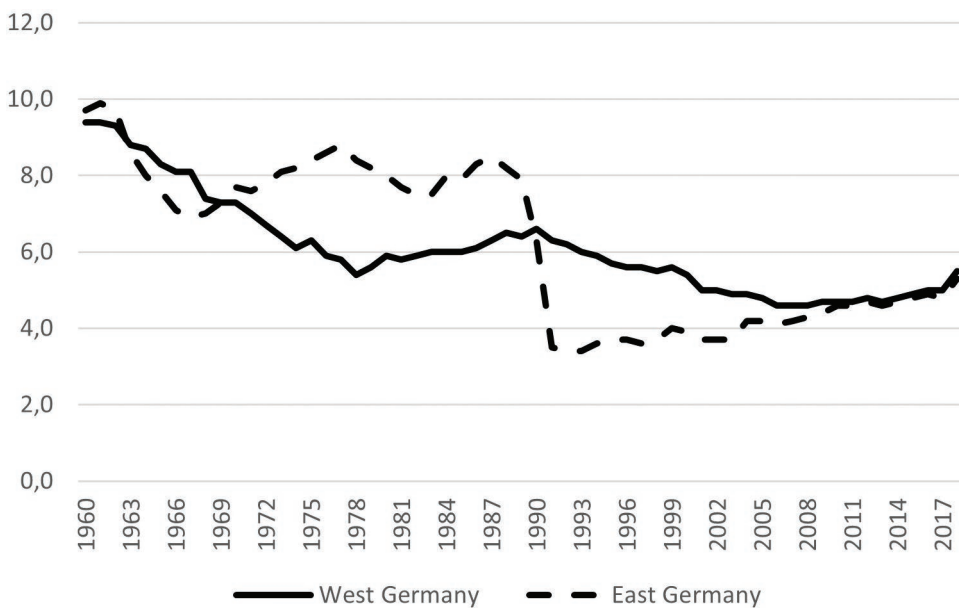


Figure 24.2 Marriages per 1,000 inhabitants, West and East Germany, 1960–2018.

Source: <https://www.bib.bund.de/DE/Fakten/Fakt/L102-Eheschliessungen-West-Ost-ab-1950.html?nn=9994330>, accessed at January 17, 2022.

children enabled young East German couples to get access to housing and, compared to West Germany, carried lower income risks, as the mother received a fully paid “baby year” (*Babyjahr*) and free childcare facilities were available once she returned to work (Cornelius 1990).

In particular, predictable income trends provided young East German couples with a high degree of planning security and therefore with the opportunity to make long-term commitments, such as marriage or having children, early in their life-cycle. The elimination of these benefits alone would have made it likely that East German marriage and birth rates would quickly approach the lower West German level after reunification. The overshooting decline is what Conrad et al. (1996) refer to as “rational freezing.” In view of the fundamental change in their life circumstances after the fall of the Wall, it may have been the most rational option for East German couples to postpone having children and to first gather additional information and experience that would enable them to evaluate their new situation and to form reliable expectations again.⁵

To explain the demographic changes in the Eastern European transition countries, Ranjan (1999) developed a “two period” model in which each couple exists in two consecutive time periods. A couple can fulfill its desire to have a child in either the first or second period but will only want to raise a child in the second period if it will then be in a good economic state rather than a bad state. When there is little uncertainty about its future income (that is, about the state of the second period), it may be reasonable for a couple to have its child already in the first period. However, when this uncertainty increases, as it did after the collapse of the Soviet Union and its satellite states, it is rational to postpone having a child until a couple can observe that a good state has returned in the second period.

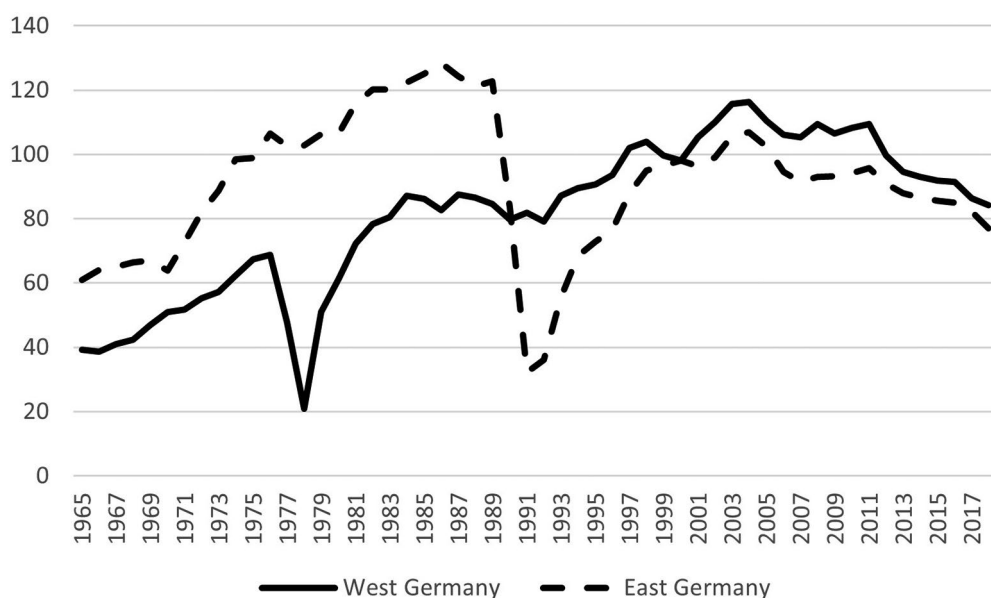


Figure 24.3 Divorces per 10,000 existing marriages, 1965–2018.

Source: <https://www.bib.bund.de/DE/Fakten/Fakt/L129-Scheidungsnummer-Deutschland-West-Ost-ab-1960.html>, accessed at January 17, 2022.

In view of the dramatically increased unemployment risk and other uncertainties that came with reunification, it was reasonable for the citizens of the former GDR to opt to wait, postponing major demographic changes into the future. Continuing with plans made before the 1989 changes would have implied either that the agents were irrational or that they did not much care about the future when planning their lives. Figures 24.1–24.3 show that the demographic behavior of East Germans eventually converged with that of West Germans, even if this adjustment took more than a decade.

Iyer and Velu (2006) also assume that in making economic decisions, the option value of waiting increases with uncertainty.⁶ However, crisis situations and people's reactions to them may differ radically: qualitative studies of German war-time letters and diaries from the 1930s to 1940s, among both non-persecuted and persecuted Germans (Piro 2018, 2022), found that existential crisis, fear of permanent separation, and imminent death may lead people, while considering postponement, to have children instead as a sort of “coping mechanism” in extremely difficult situations, while at the same time being aware of acting irrationally.

Baby Bust and Baby Boom

Since deciding to have children means making a long-term economic commitment, it is reasonable to assume that short-term economic fluctuations, unlike changes in growth trends, do not affect fertility. According to Becker (1960, 227), the long “production time” of children alone rules out an overly close connection between the business cycle and births:

It takes about ten months on average to produce a pregnancy and this period combined with a nine-month pregnancy period gives a total average construction period of nineteen months. This period is sufficiently long to reduce the impact on the demand for children of temporary movements in income.

Contrary to these preliminary considerations, most empirical studies do indeed find a procyclical relationship between macroeconomic aggregates and fertility. Regardless of whether the unemployment rate or GDP is used as an indicator for the business cycle, birth rates increase during economic booms and decrease during recessions (Sobotka et al. 2011; Bellido/Marcén 2019; Schaller et al. 2020). In the view of Buckles et al. (2021), the decline in birth rates can even be interpreted as a reliable early indicator of an economic downturn. The authors thus see clear parallels between family planning and consumption decisions. Just as the decline in consumer confidence at the beginning of a recession leads to a reduction in demand for durable consumer goods, the demand for children also declines.

The observed procyclical effect is rather small in most studies. This may be due to the marital division of labor. In his seminal paper on the economic theory of marriage, Becker (1973) postulated that marriage maximizes the joint (lifetime) utility of the two spouses if one of them focuses on earning market income and the other on producing household goods, which includes cleaning and cooking as well as caring for and raising children. The spouse with the lower wage income should focus on household production; this is/was usually assumed to be the wife. Under these assumptions, there are countervailing demographic effects of business cycle fluctuations. If the male breadwinner's income rises in an economic upswing (or his unemployment becomes less likely), both the incentives to marry and the incentives to have children increase. As long as many couples see marriage as an

important prerequisite for realizing their desire to have children, the increase in the man's wage thus has not only direct but also indirect positive effects on fertility via marriage. By contrast, a cyclical increase in women's wages raises the opportunity costs of housework and child rearing and therefore triggers opposite effects; women with the prospect of rising wages will more often choose not to marry (Schaller 2013) or have children (Butz and Ward 1979).⁷ Following this argument further, in an economic downturn, falling male wages weigh against marriage and children, while falling female wages weigh in favor. The opposing effects of male and female wages in both the upswing and the downswing could explain why the business cycle as a whole has only a small effect on fertility.

All these explanations do not change the argument made at the beginning of this section that short-term fluctuations in the business cycle should not in fact affect the long-term decision whether or not to have children. Gozgor et al. (2021) argue that the decline in fertility observable during a recession should not be attributed to actual changes in income at all, but to increases in uncertainty. While in times of economic upswing workers can expect to keep their jobs for the foreseeable future, so that they can look to the future with optimism and stable expectations, in periods of economic decline they must fear layoffs or wage cuts, so that the gap between possible bad and good states inevitably widens, which is equivalent to an increase in uncertainty (Bloom 2014). Ranjan's (1999) model discussed in the previous section therefore seems applicable not only to periods of major change and crisis. During "ordinary" recessions too, it may be worthwhile for potential parents to rely on the option of waiting and to postpone having children into the future. Especially for young couples at the beginning of their professional careers, during difficult economic times it may seem sensible to focus first on employment and increasing their precautionary savings. Gozgor et al. (2021), using a 126-country sample for the period 1996 to 2015, show that fertility is negatively correlated with uncertainty, the country- and year-specific level of which was measured using an uncertainty index constructed with the help of text mining.

A short-term postponement of childbearing should not have a permanent effect on a woman's completed fertility because a couple can still realize the desired number of children by making up for births postponed during crisis in better economic times. However, Sommer (2016) points out that because both women's and men's biological fertility levels decline with age, voluntarily postponing having children can sometimes lead to an involuntary reduction in a family's total number of children. This risk is magnified if above-average uncertainty persists for several years or occurs with particular frequency in a particular period, or women are having their children so late in life that a modest additional postponement makes it impossible to have children later. These considerations allow a new explanation for the (US-American) baby boom of the Golden Age from the mid-1940s to the mid-1960s.

Most scholars look for the causes of this baby boom in the special conditions of the postwar decades. In the tradition of Becker's work, Butz and Ward (1979) see rising wages for male workers as a strong incentive to marry and have children.⁸ Doepke et al. (2015) argue that in the postwar years, jobs suitable for young women were blocked by older women who had become gainfully employed in large numbers during the Second World War. Younger women who were kept out of the labor market therefore focused on the option of motherhood. Albanesi and Olivetti (2014) state that decreased maternal mortality was another important motive for the increase in fertility rates in the postwar period.

Easterlin (1966) explains the baby boom of the Golden Age by the above-average divergence between expected and realized consumption levels. The starting point of his

argument is the assumption that young people base their expectations on their childhood experiences; that is, they aspire to a standard of living they know from their own parental home. That is why, during the Golden Age, the rapid rise in average incomes positively surprised the younger generation. Young couples found that after satisfying their experience-based consumption demand, they still had some income left over, which, in Easterlin's view, prompted them to expand their number of children beyond their original plan.

Chabé-Ferret and Gobbi (2018) criticize the implicit assumption underlying all these explanations that the special demographic development took place primarily in the decades after the Second World War. A long-term look at the completed fertility of birth cohorts of American women reveals a particularly low number of children for the 1900 to 1925 birth cohorts, which requires at least as much explanation as the higher number of children of the subsequent birth cohorts of the years 1926 to 1935. The former cohorts experienced their fertile years in the first half of the twentieth century; during this time, two wars and the Great Depression (see O'Sullivan, Chapter 27 in this volume) generated long periods of increased uncertainty, so that potential parents might have repeatedly postponed births. This voluntary restriction of fertility then led to a partially unintended reduction in completed fertility through two distinct mechanisms. First, as explained by Sommer (2016), for reasons of biological aging, the fertility of both sexes decreased during the period of prolonged uncertainty, so that, in later life, it was no longer feasible for couples to have all the children they had originally planned. Second, many women had pursued successful professional careers during the waiting period, so that the opportunity costs of childbearing had increased significantly, leading couples to revise downward the total number of children they had intended to have.

Chabé-Ferret and Gobbi's (2018) conclusions apply to the entire industrialized Western world: the baby boom of the Golden Age appears extraordinary mainly because it was preceded by the baby bust of the interwar period. Looking at both periods together, the baby boom can also be interpreted as a return to demographic normality, as the steady economic growth of the Golden Age ended the period of frequent and great economic uncertainty, and married couples were again able to realize the number of children they had envisioned when they married.⁹

Fertility and Social Security

In the last quarter of the nineteenth century, Germany underwent a demographic transition from a society with high birth and mortality rates to one with low birth and mortality rates, with the fertility decline occurring with a time lag (see Figure 24.4). Around the same time, Imperial Chancellor Otto von Bismarck introduced compulsory social insurance for broad segments of the population in the form of health (1883), accident (1884), and disability and old-age insurance (1889). This social reform meant that for the first time in a Western industrialized country, people were comprehensively insured against the existential risks of illness, disability, old age, and death. As economists have been of the opinion since Leibenstein (1957) that people used to have children primarily in the hope of being supported by them in old age, it seems obvious to causally link these two historical events. Fenge and Scheubel (2017) estimate that between 1895 and 1907, about 15 percent of the decline in fertility in the German Empire can be explained by the introduction of Bismarck's disability and old-age insurance.

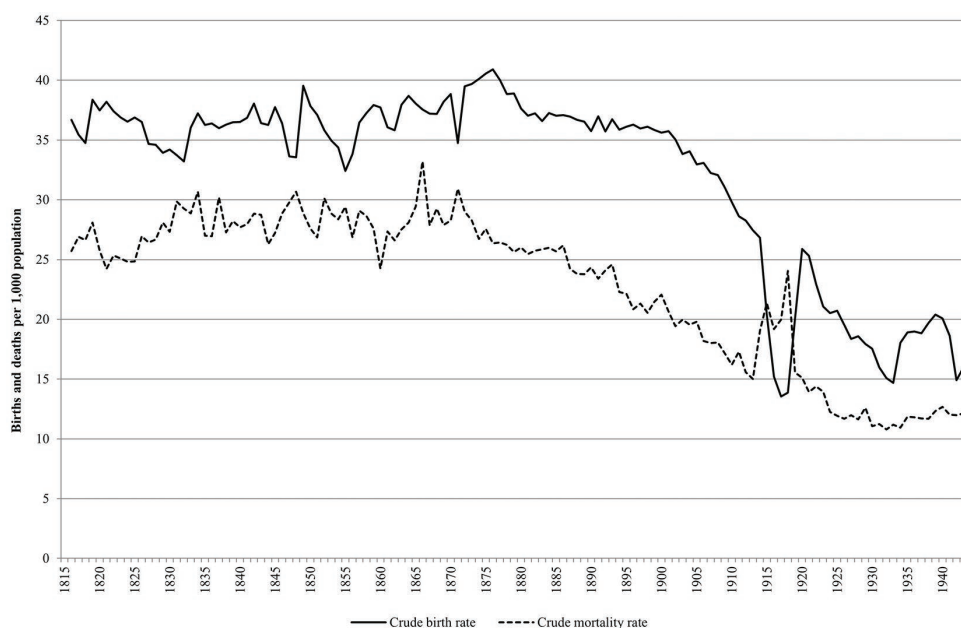


Figure 24.4 The demographic transition in Germany, 1815–1940 (within the borders of 1871).

Source: Jopp and Streb (2023), 224.

Five arguments, however, speak against the hypothesis that Bismarck's social reform contributed significantly to the German fertility transition. First, several European countries like France experienced an earlier decline in birth rates than Germany, although they did not have any mature social security system (Guinnane 2011). Second, Boldrin et al. (2015) argue that the old-age insurance systems of the leading industrialized countries began to significantly change the birth patterns of the insured only after 1945, because it was only at that time that pension payments reached a level that allowed pensioners to maintain their accustomed standard of living in retirement. Indeed, old-age pensions in the German Empire amounted to only about 20 percent of average wages, and it is doubtful that such a low wage replacement was already sufficient to convince lower-class working couples that their children were no longer needed for old-age security. If the generosity of old-age insurance has to exceed a certain financial threshold in order to have a noticeable effect on fertility, the starting signal for the decline in births in Germany might have come no earlier than Adenauer's pension reform in 1957, mentioned at the beginning of this article, which pre-dated the decline after the baby boom by less than a decade.

Third, Galasso et al. (2009) observe that the negative correlation between the generosity of old-age insurance and fertility is weaker in those economies where a mature financial system allows people to make independent financial provision for old age through private savings. An increase in old-age pensions then tends to reduce private savings rather than the planned number of children. Around 1889, Germany already had a nationwide system of savings banks set up specifically for workers. Lehmann-Hasemeyer and Streb (2018) show that there was indeed a crowding-out of private savings after the introduction of Bismarck's

social insurance—which likely dampened the demographic effect of old-age insurance (see Hesse, Knake, and Lehmann-Hasemeyer, Chapter 23 in this volume).

Fourth, people tend to overlook the fact that Bismarck's social insurance system also included health (1883) and accident (1884) insurance, which were much more generous than the old-age insurance (Jopp and Streb 2023) and exerted an independent influence on people's demographic behavior. Because the vast majority of children were born within marriage in the nineteenth and well into the twentieth century (and celibacy was thus one of the most effective methods of contraception), it is particularly important to ask how Bismarck's social insurance system influenced marriage rates. Both health insurance and accident insurance stabilized incomes through wage replacement benefits, free medical care, and accident pensions, respectively. This provided an effective incentive to marry, which contemporaries had already suspected in the context of older miners' social insurance (Guinnane and Streb 2021). A male worker who could reliably provide for his family even if he was (temporarily) unable to work was a more attractive husband. All other things being equal, marrying more often or earlier was associated with a higher birth rate.

The effects of accident insurance on fertility are ambiguous. Wives knew that even after the work-related death of their partner, financial resources in the form of a widow's pension were available to care for them and their children, reducing the costs of bringing up the latter. On the other hand, a generous invalidity pension also reduced the importance of children as old-age insurance, and this possibly induced a reduction in the planned number of children. The net effect of these two opposing influences cannot be determined *a priori*.

In contrast to accident insurance, Bismarck's old-age insurance (before being reformed in 1911) did not provide pension rights for the survivors of the actual policyholder. Therefore, the introduction of old-age insurance may have encouraged women to build up their own pension entitlements through gainful employment. In the German Empire, most insured workers were initially male, but the proportion of insured women increased over time. Increasing female labor force participation increased the opportunity costs of childcare, which may have actually reinforced the commonly assumed negative effect of old-age insurance on birth rates.

Fifth, it is important to keep in mind that we do not know how long it took German working-class couples to change their expectations and adapt their marriage and fertility patterns to the changing institutional environment. Scholars such as Fenge and Scheubel (2017) who claim that this adjustment took place within a few years, assume that workers understood immediately how the various pillars of social insurance worked and, moreover, trusted from the beginning in their practical implementation. Most nineteenth-century Germans had not yet had any experience with the payment reliability of a state-organized insurance system. Given the resulting uncertainty, we think it makes sense to assume that they initially maintained their traditional demographic behavior until, after a prolonged period of observation, they had convinced themselves that the social insurance organizations actually delivered on their promises. But even with sufficient confidence in the social security system, a young married couple would have accomplished no small feat by adjusting their contraceptive efforts to reflect an old-age pension promised in about 50 years' time. Given the notorious problem of individuals underestimating future needs, economists should not assume a higher degree of financial literacy, foresight, and discipline in contraceptive matters among young working-class couples in the German Empire than they give people credit for today.

It is possible that over the course of a century, Germans have learned to rely on old-age insurance to meet their needs in old age. It may even be true that this is why they have so few children today—which further implies that old-age provision is the dominant motive for family planning. None of this means, however, that it was the introduction of Bismarck's social insurance that accelerated the decline in fertility during the late nineteenth century.

The question of the demographic effects of social security can only be answered by empirical studies. Guinnane and Streb (2021) find that the introduction of Bismarck's social insurance system promoted marriage to a small extent but had no direct effect on marital fertility in Prussian counties between 1880 and 1910. In particular, health and accident insurance created incentives to marry, thereby at least partially offsetting the birth-reducing effect of old-age insurance.¹⁰

Conclusion

Economists are often accused of reducing people, even in matters of marriage and children, to pure utility maximizers guided by income and relative prices but not by love and affection. We think the problem lies elsewhere. Getting married and having children are decisions that create long-term economic consequences. Standard economic models of marriage and fertility implicitly assume that people can form correct expectations about the long-term effects of their demographic choices. In reality, this is not the case (see Eusepi and Preston, Chapter 3 in this volume). Demographic decisions are made in situations of considerable uncertainty, which can increase well beyond normal levels in times of crisis. Our historical examples suggest that people often respond to this increased uncertainty by postponing demographic decisions. Using the option of waiting is, in our view, not an irrational shock reaction, but a rational behavior that the social scientist must acknowledge if she aims to understand demographic behavior in interesting (historical) situations.

Notes

- 1 <https://www.bundestag.de/dokumente/textarchiv/2017/kw03-kalenderblatt-rentenreform-488538>. Accessed January 20, 2022.
- 2 Mühlhoff (2022) argues that high rates of uncontrollable child mortality create selective advantages for families with many offspring, while low exogenous child mortality favors families in which parents invest carefully in the well-being of fewer children.
- 3 Becker's model abstracts from the uncertainty surrounding pregnancy and contraception. Improvements in contraceptive technology mean that it is easier for women to become pregnant only when they want to. The introduction of the contraceptive pill in the 1960s is often referred to in this context. However, we have clear evidence that shows the widespread use and efficacy of earlier methods such as condoms. See Guinnane (2011). In this chapter we stress uncertainty that would inform the decision to have a child; improvements in contraceptive methods would make it easier to convert such decisions into reality.
- 4 Even Becker et al. (1977) admit that high divorce rates must be explained by the fact that, at the time of marriage, spouses are not able to correctly forecast the future development of their joint utility.
- 5 Rindfuss et al. (1978) show a related phenomenon in the United States. Twelve months after the Supreme Court's ruling on May 17, 1954, declaring the segregation of public schools unconstitutional, the birth rate of the white population in the former Confederate states declined. According to the authors, this decline in births may have been caused by the increased uncertainty that resulted from the unexpected end of an "established way of life."

- 6 Bloom (2014) discusses how rising uncertainty during recessions affects the option value of waiting for businesses and households.
- 7 Shore (2010) argues that marriage can be used as insurance against income risk. Joint income can be stabilized by having the spouses work in different industries and offsetting a cyclical loss of income for one with extra work by the other.
- 8 Consistently, Butz and Ward (1979) explain the subsequent baby bust of the 1960s with the sharply rising wages of women. On the role played by the introduction of the contraceptive pill, see Bailey (2006).
- 9 See also Becker and Barro (1988), 15.
- 10 Unlike Fenge and Scheubel (2017), Guinnane and Streb (2021) consider the endogeneity of the two explanatory variables of marriage behavior and child mortality.

References

- Albanesi, Stefania, and Claudia Olivetti. 2014. "Maternal Health and the Baby Boom." *Quantitative Economics* 5, no. 2: 225–269. DOI: 10.3982/QE315.
- Bailey, Martha J. 2006. "More Power to the Pill: The Impact of Contraceptive Freedom on Women's Life Cycle Labor Supply." *Quarterly Journal of Economics* 121, no. 1: 289–320. DOI: 10.1093/qje/121.1.289.
- Becker, Gary S. 1960. "An Economic Analysis of Fertility." In *Demographic and Economic Change in Developed Countries*, edited by the National Bureau of Economic Research, 209–231. New York: Columbia University Press.
- Becker, Gary S. 1973. "A Theory of Marriage: Part 1." *Journal of Political Economy* 81, no. 4: 813–846. DOI: 10.1086/260084.
- Becker, Gary S., and Robert J. Barro. 1988. "A Reformulation of the Economic Theory of Fertility." *Quarterly Journal of Economics* 103, no. 1: 1–25. DOI: 10.2307/1882640.
- Becker, Gary S., Elisabeth M. Landes, and Robert T. Michael. 1977. "An Economic Analysis of Marital Instability." *Journal of Political Economy* 85, no. 6: 1141–1187. DOI: 10.1086/260631.
- Becker, Gary S., and H. Gregg Lewis. 1973. "On the Interaction between the Quantity and the Quality of Children." *Journal of Political Economy* 81, no. 2: S279–S288. DOI: 10.1086/260166.
- Bellido, Héctor, and Miriam Marcén. 2019. "Fertility and the Business Cycle: The European Case." *Review of Economics of the Household* 17: 1289–1319. DOI: 10.1007/s11150-019-09449-y.
- Bloom, Nicholas. 2014. "Fluctuating in Uncertainty." *Journal of Economic Perspectives* 28, no. 2: 153–175. DOI: 10.1257/jep.28.2.153.
- Boldrin, Michele, Mariacristina de Nardi, and Larry E. Jones. 2015. "Fertility and Social Security." *Journal of Demographic Economics* 81, no. 3: 261–299. DOI: 10.1017/dem.2014.14.
- Buckles, Kasey, Daniel Hungerman, and Steven Lugauer. 2021. "Is Fertility a Leading Economic Indicator?" *Economic Journal* 131, no. 634: 541–565. DOI: 10.1093/ej/ueaa068.
- Butz, William P., and Michael P. Ward. 1979. "The Emergence of Countercyclical U.S. Fertility." *American Economic Review* 69, no. 3: 318–328.
- Chabé-Ferret, Bastien, and Paula E. Gobbi. 2018. "Economic Uncertainty and Fertility Cycles: The Case of the Post-WW2 Baby Boom." CEPR Discussion Paper 13374. URL: <https://cepr.org/publications/dp13374>.
- Cinnirella, Francesco, and Jochen Streb. 2017. "The Role of Human Capital and Innovation in Economic Development: Evidence from Prussia." *Journal of Economic Growth* 22, no. 2: 193–227. DOI: 10.1007/s10887-017-9141-3.
- Coale, Ansley Johnson, and Susan Watkins, eds. 1986. *The Decline of Fertility in Europe*. Princeton, NJ: Princeton University Press.
- Conrad, Christoph, Michael Lechner, and Welf Werner. 1996. "East German Fertility after Unification: Crisis or Adaptation?" *Population and Development Review* 22, no. 2: 331–358. DOI: 10.2307/2137438.
- Cornelius, Ivar. 1990. "Familien- und Bevölkerungspolitik in der DDR. Ein Beitrag zur Bestand-saufnahme und Analyse." *Arbeit und Sozialpolitik* 44, no. 8/9: 308–316.
- Doepke, Matthias, Moshe Hazan, and Yishay D. Maoz. 2015. "The Baby Boom and World War II. A Macroeconomic Analysis." *Review of Economic Studies* 82, no. 3: 1031–1073. DOI: 10.1093/restud/rdv010.

- Easterlin, Richard A. 1966. "On the Relation of Economic Factors to Recent and Projected Fertility Changes." *Demography* 3, no. 1: 131–153. DOI: 10.2307/2060068.
- Eberstadt, Nicholas. 1994. "Demographic Shocks after Communism: Eastern Germany, 1989–1993." *Population and Development Review* 20, no. 1: 137–152.
- Fenge, Robert, and Beatrice Scheubel. 2017. "Pensions and Fertility: Back to the Roots." *Journal of Population Economics* 30, no. 1: 93–139. DOI: 10.1007/s00148-016-0608-x.
- Galasso, Vincenzo, Roberta Gatti, and Paola Profeta. 2009. "Investing for the Old Age: Pensions, Children and Savings." *International Tax and Public Finance* 16, no. 4: 538–559. DOI: 10.1007/s10797-009-9104-5.
- Galor, Oded, and David N. Weil. 2000. "Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond." *American Economic Review* 90, no. 4: 806–828. DOI: 10.1257/aer.90.4.806.
- Gozgor, Giray, Mehmet Huseyin Bilgin, and Peter Rangazas. 2021. "Economic Uncertainty and Fertility." CESifo Working Paper No. 9025. URL: <https://www.cesifo.org/en/publications/2021/working-paper/economic-uncertainty-and-fertility>.
- Guinnane, Timothy W. 2011. "The Historical Fertility Transition: A Guide for Economists." *Journal of Economic Literature* 49, no. 3: 589–614. DOI: 10.1257/jel.49.3.589.
- Guinnane, Timothy W., and Jochen Streb. 2021. "The Introduction of Bismarck's Social Security System and its Effects on Marriage and Fertility in Prussia." *Population and Development Review* 47, no. 3: 749–780. DOI: 10.1111/padr.12426.
- Hockerts, Hans Günter. 1990. "Die Rentenreform 1957." In *Handbuch der gesetzlichen Rentenversicherung*, edited by Franz Ruland, 93–104. Neuwied: Luchterhand.
- Iyer, Sriya, and Chander Velu. 2006. "Real Options and Demographic Decisions." *Journal of Development Economics* 80: 39–58. DOI: 10.1016/j.jdeveco.2005.02.005.
- Jopp, Tobias A., and Jochen Streb. 2023. "Social Insurance and its Consequences for Workers' Living Conditions." In *An Economic History of the First German Unification: State Formation and Economic Development in a European Perspective*, edited by Ulrich Pfister, and Nikolaus Wolf, 217–235. London: Routledge.
- Klüsener, Sebastian. 2015. "Spatial Variation in Non-marital Fertility across Europe in the Twentieth and Twenty-First Centuries: Recent Trends, Persistence of the Past, and Potential Future Pathways." *The History of the Family* 20, no. 4: 593–628. DOI: 10.1080/1081602X.2015.1099112.
- Lehmann-Hasemeyer, Sibylle, and Jochen Streb. 2018. "Does Social Security Crowd Out Private Savings? The Case of Bismarck's System of Social Insurance." *European Review of Economic History* 22, no. 3: 298–321. DOI: 10.1093/ereh/hex022.
- Leibenstein, Harvey. 1957. *Economic Backwardness and Economic Growth*. New York: John Wiley.
- Malthus, Thomas Robert. 1798. *An Essay on the Principle of Population*. London: J. Johnson.
- Mühlhoff, Katharina. 2022. "Darwin Beats Malthus: Evolutionary Anthropology, Human Capital and the Demographic Transition." *Cliometrica* 16, no. 3: 575–614. DOI: 10.1007/s11698-021-00234-5.
- Piro, Katerina. 2018. "Kinderwunsch im Krieg: Kriegserfahrung und Fertilität in Deutschland im Zweiten Weltkrieg." *Jahrbuch für Wirtschaftsgeschichte* 59, no. 2: 471–506. DOI: 10.1515/jbwg-2018-0016.
- Piro, Katerina. 2022. "Familie als Krisenbewältigung. Eine Mikrogeschichte aus den 1930er und 1940er Jahren." In *Kindheiten in gesellschaftlichen Umbrüchen*, edited by Claudia Dreke, and Beatrice Hungerland, 121–136. Weinheim: Beltz.
- Ranjan, Priya. 1999. "Fertility Behaviour under Income Uncertainty." *European Journal of Population* 15, no. 1: 25–43.
- Rindfuss, Ronald R., John S. Reed, and Craig St. John. 1978. "A Fertility Reaction to a Historical Event: Southern White Birthrates and the 1954 Desegregation Ruling." *Science* 201, no. 4351: 178–180. DOI: 10.1126/science.351806.
- Schaller, Jessamyn. 2013. "For Richer, If Not for Poorer? Marriage and Divorce over the Business Cycle." *Journal of Population Economics* 26, no. 3: 1007–1033. DOI: 10.1007/s00148-012-0413-0.
- Schaller, Jessamyn, Price Fishback, and Kelli Marquardt. 2020. "Local Economic Conditions and Fertility from the Great Depression through the Great Recession." *AEA Papers and Proceedings* 110: 236–240. DOI: 10.1257/pandp.20201109.

- Schmähl, Winfried. 2007. "Die Einführung der 'dynamischen Rente' 1957: Gründe, Ziele und Maßnahmen; Versuch einer Bilanz." ZeS-Arbeitspapier 3/2007. Bremen: Universität Bremen, Zentrum für Sozialpolitik. URL: <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-109145>.
- Schweizer, Valerie J. 2020. "Divorce: More than a Century of Change, 1900–2018." FP-20–22, *Family Profiles* 22. DOI: 10.25035/ncfmr/fp-20–22.
- Shore, Stephen H. 2010. "For Better, for Worse: Intrahousehold Risk-Sharing over the Business Cycle." *Review of Economics and Statistics* 92, no. 3: 536–548. DOI: 10.1162/REST_a_00009.
- Sobotka, Tomáš, Vegard Skirbekk, and Dimiter Philipov. 2011. "Economic Recession and Fertility in the Developed World." *Population and Development Review* 37, no. 2: 267–306. DOI: 10.1111/j.1728–4457.2011.00411.x.
- Sommer, Kamila. 2016. "Fertility Choice in a Life Cycle Model with Idiosyncratic Uninsurable Earnings Risk." *Journal of Monetary Economics* 83, no. C: 27–38. DOI: 10.1016/j.jmoneco.2016.08.002.
- Vonyó, Tamás. 2008. "Post-war Reconstruction and the Golden Age of Economic Growth." *European Review of Economic History* 12, no. 2: 221–241. DOI: 10.1017/S1361491608002244.
- Witte, James C., and Gert G. Wagner. 1995. "Declining Fertility in East Germany after Unification: A Demographic Response to Socioeconomic Change." *Population and Development Review* 21, no. 2: 387–397. DOI: 10.2307/2137500.