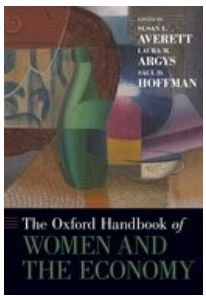


**The Oxford Handbook of Women and the Economy**

Susan L. Averett (ed.) et al.

https://doi.org/10.1093/oxfordhb/9780190628963.001.0001

**Published:** 2017 **Online ISBN:** 9780190628987 **Print ISBN:** 9780190628963



CHAPTER

# 7 Fertility Issues in Developed Countries

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https://doi.org/10.1093/oxfordhb/9780190628963.013.7 Pages 149–172

**Published:** 06 September 2017

## Abstract

This chapter documents current trends in childbearing behavior in developed countries—such as large drops in fertility rates and delayed fertility—and reviews some of the mechanisms that can explain them. Ultimately, these trends are linked to the shift in couples' demand for children following the increase in women's education and labor market attachment and access to family planning. The chapter also discusses the recent emergence of a positive gap between desired and actual fertility in connection with adverse economic conditions and high housing costs, as well as barriers for women regarding the ability to combine family and work. The chapter closes with a discussion of patterns of fertility among immigrants and of recent fertility policy experiences in developed countries.

**Keywords:** fertility rates, desired and actual fertility, quantity-quality tradeoff, maternity wage penalty, second demographic transition, procyclical fertility, immigrant fertility

**Subject:** Health, Education, and Welfare, Economics

**Series:** Oxford Handbooks

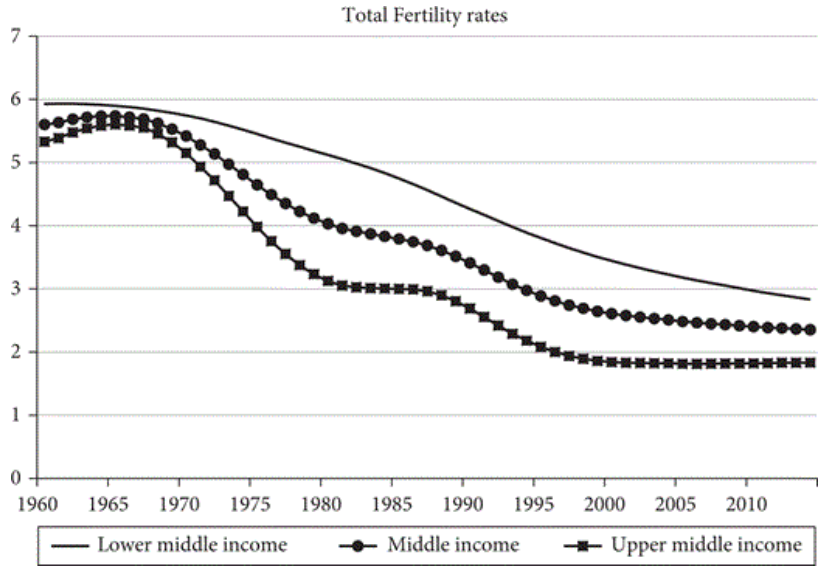
**Collection:** Oxford Handbooks Online

CHILDBEARING patterns have changed substantially across the developed world.[1] Total fertility rates have been falling in most developed countries since the late 1960s, with a faster drop in higher-income countries, where total fertility is currently below replacement level—approximately 2.1 births per woman (see Figure 7.1 and Table 7.1). In some parts of Europe, total fertility rates fell below 1.3—what some demographers call "low-lowest fertility" (Kohler et al. 2002)—for the first time in the late 1980s. Declines in fertility rates have been accompanied by increases in age of motherhood. The mean age at birth in Organisation for Economic Cooperation and Development (OECD) countries is currently 30 or above, varying from around 28 or less in Mexico to 31.8 in Spain and Switzerland. This trend is driven by the reduction in adolescent fertility and, most importantly, the postponement of first birth in most countries. The average age at first birth for OECD countries was 30 in 2014, up by three years since 1995 (see Table 7.1).

Whereas in 1970 women aged 20 to 24 had the highest fertility rates, in 2014 the highest fertility rates were more often observed for women in their early 30s (OECD 2017). Later ages at childbearing are generally associated with lower completed fertility due to decreases in fecundity and in the number of fertile years left (Sobotka 2004).

Rising education levels have been invoked as a force driving fertility levels down, since higher education tends to increase the opportunity cost of children for women. As technologies and capital investments over the twentieth century became increasingly complementary with women's skills (i.e., less dependent on physical strength), increases in capital per worker were accompanied by a growth in the relative wages of women, a rise in female labor force participation, and a drop in fertility (Galor and Weil 1996). While it is true that women who are more educated have fewer children than less educated women, it is less obvious
p. 150 how fertility has changed by education group over time. ↳ Fertility diminished for all education groups in some countries between the 1980s and 2000s (Mexico, Canada), while it remained constant in others (Netherlands) or even increased (Finland), with yet other countries showing differences in fertility trends across education groups (such as large drops among highly educated Italian women) (d'Addio and D'Ercole 2005).[2]

**Figure 7.1**




Total fertility rates by country's development level, 1960–2014.
*Notes:* Authors' calculations based on World Bank Data (http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators).

Childlessness is often associated with fertility postponements, although the causality is not clear since it is difficult to disentangle what constitutes involuntary childlessness and what does not. In OECD countries, childlessness at the end of the reproductive period is high (around 20 percent)—and seems to have followed an upward trajectory during the last years—in Germany, Austria, England, the Netherlands, and Italy. Other OECD countries have lower rates and flatter trends, with Bulgaria and Portugal showing the lowest percentages of childless women (around 5 percent) (OECD 2017). Despite these trends, survey data show that the number of children women desire still hovers above two for women in most developed countries, even though it is particularly low in German-speaking ones (Goldstein, Lutz, and Testa 2003).

In this chapter, we review some of the mechanisms behind these new trends in childbearing behavior. The next section describes the basic insights of the Becker-Willis economic model of fertility to explain the sustained drop in fertility in post-transition countries, as well as some of the empirical literature that tests

its predictions for the relationship between family size and investment per child. Following that, we present recent evidence on fertility preferences with a particular focus on the theories of the Second Demographic
p. 151 Transition that highlight value changes. We also review some of the ↳

p. 152 ↳
difficulties of measuring fertility intentions and document the emerging gap between preferences and the relatively lower actual fertility in many countries across all educational levels. The next two sections review other causes that likely account for low fertility, such as increases in education, access to family planning, adverse economic conditions, and high housing costs, as well as barriers for women to combine family and work and changes in partnership formation. We close the chapter with a discussion of the potential implications of increased migration to low-fertility countries and a discussion of recent fertility policy experiences and their ability to raise fertility rates in developed countries.

**Table 7.1** Total Fertility Rates, Age at First Birth, and Childlessness, 1970–2014, OECD Countries

| | Children per Woman | | | Mean Age of Women at First Birth | | Proportion (%) of Women Aged 40–44 Who Have Not Had a Live Birth | |
|---|---|---|---|---|---|---|---|
| | 1970 | 1995 | 2013 | 1995 | 2014 | 1990–1998 (a) | 2002–2011 (b) |
| Australia | 2.9 | 1.8 | 1.8 | — | — | 12.8 | 16 |
| Austria | 2.3 | 1.4 | 1.5 | — | 28.8 | 7.6 | 21.54 |
| Belgium | 2.3 | 1.5 | 1.7 | 27.3 | 28.6 | — | — |
| Bulgaria | 2.2 | 1.2 | 1.5 | 22.4 | 25.8 | 8.2 | 11.7 |
| Canada | 2.3 | 1.6 | 1.6 | 26.3 | 28.5 | 15.9 | 18.94 |
| Czech Republic | 1.9 | 1.3 | 1.5 | 23.3 | 28.1 | 4.9 | 7.1 |
| Denmark | 2 | 1.8 | 1.7 | 27.4 | — | — | — |
| EU average | — | 1.5 | 1.5 | — | 28.5 | — | — |
| Finland | 1.8 | 1.8 | 1.7 | 27.2 | 28.6 | 14.6 | 19.89 |
| France | 2.5 | 1.7 | 2 | — | 28.3 | 7.7 | — |
| Germany | 2 | 1.2 | 1.5 | 25.7 | 28.9 | — | — |
| Greece | 2.4 | 1.3 | 1.3 | 26.7 | 30 | — | — |
| Hungary | 2 | 1.6 | 1.4 | 23.8 | 27.7 | 8.5 | 12 |
| Iceland | 2.8 | 2.1 | 1.9 | 24.9 | 27.5 | — | — |
| Ireland | 3.9 | 1.9 | 2 | 27.3 | 29.6 | -- | 19 |
| Italy | 2.4 | 1.2 | 1.4 | 28.1 | 30.7 | 10.5 | — |
| Korea | 4.5 | 1.6 | 1.2 | 26.5 | 31 | 3.6 | 6.78 |
| Netherlands | 2.6 | 1.5 | 1.7 | 28.4 | 29.5 | 15 | |
| New Zealand | 3.2 | 2 | 1.9 | — | — | 11.9 | 15 |
| Norway | 2.5 | 1.9 | 1.8 | 26.4 | 29 | — | — |
| OECD average | 2.8 | 1.7 | 1.7 | 26.2 | 28.9 | — | — |
| Poland | 2.2 | 1.5 | 1.3 | 23.7 | 26.9 | 6.1 | — |
| Portugal | 2.8 | 1.4 | 1.2 | 25.7 | 29.2 | 8.1 | — |
| Slovenia | 2.2 | 1.3 | 1.6 | 24.9 | 28.6 | 9.4 | 7 |
| Spain | 2.9 | 1.2 | 1.3 | 28.4 | 30.6 | — | 21.6 |
| Sweden | 1.9 | 1.7 | 1.9 | — | 29.2 | — | 13.4 |
| United Kingdom | 2.4 | 1.7 | 1.8 | 26.6 | 28.6 | 14 | 20 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| United States | 2.5 | 2 | 1.9 | 24.5 | 26.3 | 17.5 | 18.8 | |

*Notes:* OECD Family Database: (a) 1990 for Korea, Hungary, and Finland; 1991 for Poland, Slovenia, and Canada; 1993 for the Netherlands; 1996 for Italy, Austria, Australia, and New Zealand; 1997 for Portugal and Czech Republic; and 1998 for Bulgaria. (b) 2002 for Slovenia; 2005 for Korea; 2006 for New Zealand; 2007 for Canada; 2010 for Austria, Finland, United Kingdom, United States, and Sweden; 2011 for Ireland, Australia, Bulgaria, Czech Republic, Spain, and Hungary.

## The Microeconomic Model of Fertility

Before undergoing the first demographic transition, countries lived in what generally is known as a Malthusian equilibrium. In times of prosperity, household incomes moved above subsistence level and grew enough to sustain more and earlier marriages and, as a result, larger families, since the completed fertility of a woman depended greatly on her age at marriage. These population increases led, in turn, to a reduction of wages via population pressures that ultimately brought incomes back to subsistence levels. In that context, the relation between income and fertility was clearly procyclical and the total fertility levels were relatively high despite their cyclicality.

The demographic transition began in the early nineteenth century in some European countries and was completed by the early twentieth century in most developed countries. Coale (1973) noted that three preconditions are necessary for fertility to drop in a sustained way: (1) that couples viewed fertility as a choice (more likely among the most educated); (2) that there were gains from smaller families, such as parents being able to improve their children's chances by investing more in their education; and (3) that there was some reliable contraceptive technology.

### A Model of Demand-for-Children

In an excellent article, Guinnane (2011) provides an overview of the different economic forces responsible for the transition around the end of the nineteenth century and that still today emerge as key to explaining current low fertility. Those include the introduction of the first "modern contraceptives," fast declines in infant mortality, and, most important, changes in the relative price of children brought about by increased housing costs, urbanization, more opportunities for women in the labor force, larger welfare states, and access to compulsory education that reduced the gains from child labor. These price changes are relevant if fertility is understood in a model of demand-for-children.

In 1960, Becker suggested that fertility could be understood as the result of parental demand for children
p. 153
and hence analyzed using standard consumer theory. Consistent ↳ with Coale's first condition for fertility decrease, in this model women make fertility choices under a set of constraints (e.g., economic, educational, and/or institutional) and within a given set of social norms toward family size, contraceptive use, gender preferences, and nonmarital childbearing.[3] Raising children involves direct costs (diapers, food, and education) and indirect costs (time required for child care, generally provided by women). If children are normal goods, increases in male wages or in nonlabor household income should lead to an increase in the demand for children (via an income effect). However, an increase in female wages will have an ambiguous effect on fertility, since the income effect and the substitution effect (from the higher opportunity costs of women's time) will work in opposite directions.

Hotz, Klerman, and Willis (1997) note the difficulty involved in empirically testing the impact of changes in income in this model. Empirical labor studies have long struggled to understand the causal relationship between female labor market participation, education and fertility choices. This relationship is complicated

because unobserved characteristics may jointly affect all three choices. For example, low preferences for fertility may be driving the choice of higher education and higher supply of labor. Hence, using observed female wage variation to infer the opportunity cost of fertility will tend to overestimate the opportunity cost of fertility, since women with higher wages might have chosen lower fertility even if their wages were not high. This is also the case for educational outcomes, since educational choices are likely to be affected by the same unobserved factors that influence labor and fertility choices. Proper estimation of these models is further complicated by the fact that prices are often not observed for all subjects in a given sample. For instance, wages or child care prices are only reported for those who work or purchase child care, which introduces a selection bias in estimates of the effect of these prices on fertility. Despite the difficulties, some empirical strategies have been developed to shed light on these issues, which we summarize in a later section.

## Quantity–Quality Tradeoff

A second important insight of Becker's model is that the cost of children is also partly endogenous, because utility can be derived from both the quantity of children and their quality (i.e., investments in their human capital, such as health or education) and because households have different demand elasticities for each of them. Willis (1974) presents a model of fertility that integrates Becker's quality–quantity tradeoff with a model of household production and human capital investment and predicts a negative relationship between income and fertility due to assumptions about the value of women's time and the quantity–quality interaction. Thus, the quantity–quality model helps to reconcile the fact that increases in household income (particularly in the value of women's time) may be accompanied with more investment per child ("higher quality" children) without an increase in fertility.

Testing the quality–quantity model is problematic due to omitted variable bias concerns when estimating
p. 154 effects of family sizes on children outcomes, since both the ↳ number of children and parental investments are endogenous. Several papers in the economic history literature employ exogenous changes in the price of child quality to examine subsequent effects on fertility. Becker, Cinnirella, and Wössman (2010) study the impact of stricter compulsory schooling laws in Prussia in the mid-nineteenth century, finding that counties with higher enrollment rates had steeper declines in fertility. Bleakley and Lange (2009) examine the effects of a deworming program in the US South in the early twentieth century, which led to the eradication of hookworm disease among children. This in turn increased the return to investments in child quality and resulted in a significant decline in fertility.

A different way to measure the quality–quantity tradeoff is through exogenous variation in the quantity of children induced by multiple births or by employing the sex composition of the first child as an instrument for fertility, under the assumption that parents aim for a balanced-gender composition. Rosenzweig and Wolpin (1980), for instance tested whether twin births reduced educational investments in the children relative to single births and found support for the quantity–quality tradeoff in Indian data. Some researchers, however, argue that these results are more likely to hold in developing countries where public provision of education and health is more limited. Indeed, recent research using a similar approach in Norway (Black, Devereux, and Salvanes 2005) and Israel (Angrist, Lavy, and Schlosser 2010) finds almost no effect of twin births or sex composition on the education of children and other outcomes of child quality such as earnings. Rosenzweig and Zhang (2009) show that, controlling for birth weight, an extra child at parity one and two in China significantly reduces educational outcomes and assessed health of all children in the family. They argue that the previous analyses are biased away from finding a negative effect of family size because they are confounded by interchild allocation effects due to parental endowment/reinforcing behavior and close spacing of twins. However, Black, Devereux, and Salvanes (2010) argue that it is surprising that estimates employing either the exogenous shock of twins or the planned expansion of the family to attain gender diversity as instruments produce similar effects. Using data on more recent

Norwegian male cohorts, they find that only unexpected increases in family size from twins have a negative impact on IQ scores, whereas estimates using sex composition are not significant.

## Fertility Preferences

In the mid-1980s, the term "Second Demographic Transition" (SDT) was coined to describe demographic and social changes that had been occurring in Western Europe since the late 1950s. Those changes included a sustained drop in fertility to below replacement levels, the rise in both new forms of living arrangements beyond traditional marriage and childlessness among women ever in a union, and a separation between partnership and childbearing. Behind these new demographic patterns are significant value changes, with a
p. 155 shift from a focus on basic material needs (such as income, housing, or health) to ↳ "higher order" needs (such as individual autonomy, self-actualization, grassroots democracy, or tolerance as a prime value) (Lesthaeghe and Surkyn 1988).

Many theories of fertility posit that changes in preferences about the number of children are a possible mechanism to explain the observed low fertility levels across developed countries. On occasion, surveys gather information about ideals at the society level by asking individuals about the ideal number of children for a family without making an explicit reference to the respondent's personal choices or circumstances. However, most research employs personal ideal family size, desired number of children, intended fertility (sometimes in the near future, such as within the next two years) or ultimate intended family size as different ways to approximate individual fertility preferences. This literature recognizes the shortcomings of these measures, such as the complexity of distinguishing social norms from each individual's desires, as well as the blurred boundaries between the different measures. Personal ideal fertility and desired fertility are regularly used interchangeably, while intended fertility is often considered a more direct measure of the number of births a woman expects to have. Further, individual fertility intentions often vary over time and the answers to different questions/measures may be sensitive to the order in which they are included in surveys. Despite the difficulty of measuring preferences, they are given a causal role in the SDT, as well as in other models of fertility change, such as the theory of planned behavior (Ajzen and Kloblas 2013).

Other theories point to a reverse causal direction from low fertility to intentions via socialization and peer effects. Using data from the Eurobarometer of 2001, Goldstein et al. (2003) found decreases in the mean ideal family size among younger cohorts across European countries consistent with the SDT developments. They note that despite fertility rates being already below replacement in many of those countries, the average ideal number of children was hovering just over two children, except for German-speaking areas of Europe, where it had fallen to 1.7. However, they hypothesized that ideals and intentions would also follow a downward trend in countries with "low-lowest" fertility, such as those in Southern Europe, after newer cohorts had been exposed to new social norms.

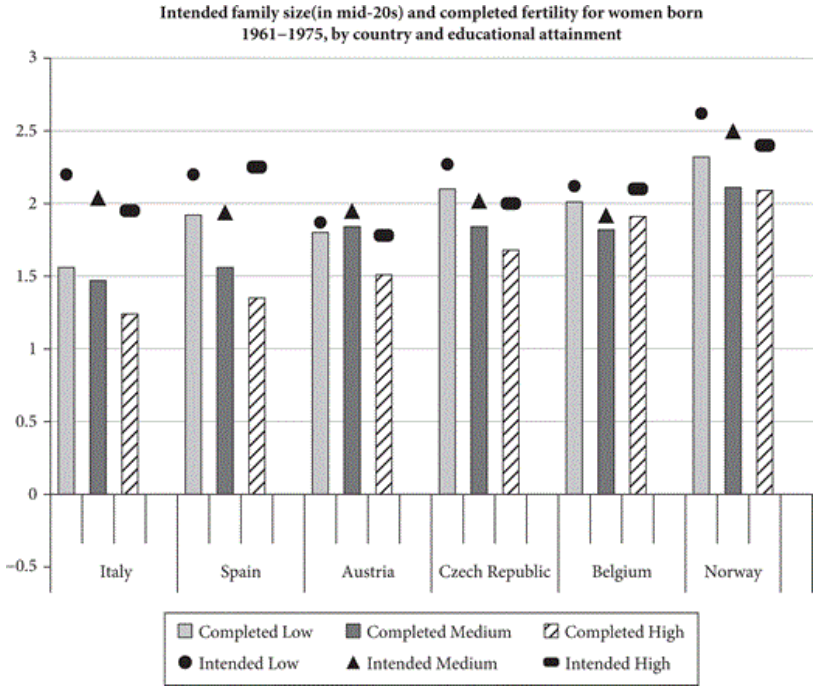
Even though both ideals and intentions have indeed fallen somewhat in low-fertility countries, they remain consistently above completed fertility, even for highly educated women. This is apparent in Figure 7.2, which presents data on mean intended and completed family size among women born from 1961 to 1975 by their level of educational attainment; all women were aged 25 to 29 at the time of measurement of intended fertility. Data is shown for a few representative European countries to highlight country heterogeneity in intended family size and fertility across Europe. The difference between completed cohort fertility and intended family size is always negative, indicating that the number of children born falls short of the intended number.

Given that the cross-country differences in intended family size are smaller than those of fertility rates, the gaps between intended and actual fertility vary substantially by country and by level of education and have been growing overall for the later cohorts (d'Addio and D'Ercole 2005). Countries with the largest gaps are

p. 156 mostly in Southern ↳ Europe: they have large intentions and low fertility (Italy and Spain in Figure 7.2). Among those with small gaps, some have both high intentions and actual fertility (such as France and the United Kingdom) and others have both low intentions and fertility (such as German-speaking countries like Austria in Figure 7.2) (Sobotka et al. 2015). This mismatch has been attributed in part to the postponement of childbearing and lower fecundity in older ages, difficulty in establishing stable partnerships, couple disagreements about timing and number of births, and adverse economic conditions such as unemployment, unstable contracts, or rising housing costs (Adserà 2006; Morgan and Rackin 2010; Spéder and Kapitány 2014). We discuss these in further detail later.

Consistent with the data presented in Figure 7.2, the shortfall in births in Europe is larger among highly educated women who, despite having higher fertility intentions in some countries than less educated women, also have smaller (or similar) family sizes. Using Eurobarometer data from 2006 and 2011 in
p. 157 twenty-seven European countries, ↳ Testa (2014) shows that both the country's mean intended family size and the mean fertility of high educated women are positively correlated with the share of high educated women in the country. Countries with higher average education generally have better institutional and economic conditions that increase the relevance of the income effect arising from higher human capital in childbearing decisions than where family–work tradeoffs are challenging.

**Figure 7.2**




Intended family size and completed fertility for women born 1961–1975, by country and educational attainment.
*Notes:* Authors' calculations with data from the fertility dataset by Sobotka et al. (2015). Low education is either no education, primary, or lower secondary; middle is upper secondary; and high is tertiary. Completed cohort fertility is current observed fertility for cohorts born 1961–1975 and mean intended fertility expressed when they were 25 to 29 years of age. See http://www.fertilitydatasheet.org/.

Finally, to account for the persistence of fertility intentions around replacement rates, in the context of advanced societies with robust welfare states and in which traditional economic and insurance reasons for childbearing are outdated, a recent strand of literature explores how well-being and happiness are linked to the number of children (Kohler and Mencarini 2016).

## Economic Drivers of Low Fertility

This section discusses additional factors that have shaped the declining fertility trends described previously. By facilitating women's incorporation into the labor market, medical advances, such as the development of contraceptives, increased the return to their human capital investments and reduced demand for children. In addition, recent adverse economic conditions or high housing costs have further depressed fertility by decreasing household income and by increasing the cost of children. Persistent difficulties in combining family and work in the twenty-first century among dual-earner families pose further challenges for couples to attain their fertility plans.

### Family Planning

In general, economists have been more skeptical than demographers about whether access to reliable contraception was a key mechanism for the permanent decrease in fertility. Some model estimates show that even consistent use of *coitus interruptus* could have produced a drastic decrease of fertility as long as the demand for children had also dropped (Guinnane 2011; Becker 1981). However, with the arrival of modern contraception since the early 1960s, demographers had long noted a decrease in unplanned marital childbearing (Ryder and Westoff 1971), although lack of consistent data on contraceptive use constrained the ability to conduct robust empirical tests. Recent research provides innovative identification strategies to show that access to the birth control pill seems to have accelerated the post-1960 postponement of childbearing and the decline in marital fertility, in a context of an already low demand for children. Goldin and Katz (2002) and Bailey (2010) both exploit differences across US states in early legal access to the pill in the late 1960s and early 1970s due to both changes in age of majority and the language of Comstock laws (obscenity laws) in the United States. These laws, which date from the late nineteenth century, were used as
p. 158 a basis for imposing restriction of access ↳ to contraception or banning sales (in thirty-one and twenty-four states, respectively) and were not revised until after the 1965 *Griswold v. Connecticut* US Supreme Court decision. The pill lowered the costs of long-term human capital investment directly by decreasing the risk of unplanned pregnancy and indirectly by improving the marriage market for more-educated women. Goldin and Katz (2002) find that college students in states with earlier access were more likely to delay marriage, decrease the desired number of children, and increase their representation in nontraditional professional occupations that required additional investment in schooling. Bailey (2010) finds that women in states with restrictive regulations were 25 percent to 30 percent less likely to have ever used the pill and that their fertility took longer to drop than for women elsewhere. Similarly, Bailey (2006) uses the variation of age of consent for medical treatment, which expanded across states from 1960 to 1976, to argue that fertility was postponed after legal access to the pill; she finds significant reductions in the likelihood of becoming a mother before age 22. Consistent with Goldin and Katz (2002), she demonstrates that this delay had a causal impact on the extent and intensity of women's labor force participation.

Besides contraception, easier access to abortion had an independent impact on delaying age at marriage (and subsequent childbearing), though, Goldin and Katz (2002) argue, not as significant as the pill. Fertility was around 4 percent lower between 1971 and 1973 in the states with access to abortion than in those where it was illegal; the reduction was particularly large among teens and older mothers (Levine et al. 1999), whose children would have been approximately 50 percent more likely to have been born in poverty (Gruber, Levine, and Staiger 1999).[4] In recent research, Myers (forthcoming) revisits the relative importance of contraception (that facilitated the sexual revolution) versus abortion, arguing that legal and easy access to abortion by young women was the key to reducing their fertility.[5]

An unintended effect of the postponement of childbearing that the pill facilitates is an increased risk of infertility. Research finds that women overestimate the likelihood of conception later in life, as well as the

efficacy of artificial reproductive techniques (ARTs).[6] Buckles (2013) investigates the importance of infertility insurance mandates in some US states by looking at multiple births and finds insignificant effects on the number of births, but a significant effect on triplet and higher-order births. Since ARTs are expensive treatments, it is plausible that infertility associated with the pill and childbearing postponement has induced differential access to fertility. The same study by Buckles (2013) seems to suggest that this is the case. The largest increases in multiple births occurred among relatively wealthy and educated married white women over age 30. This finding is consistent with previous findings by Bitler and Schmidt (2012) that, even with increased coverage, disparities in treatment use prevailed.[7]

## Economic Conditions and Uncertainty

Changes in both relative wages and labor market opportunities for women, as well as recent increases in
p. 159 economic uncertainty (particularly unemployment and ↳ poor labor market prospects among young workers), are considered important mechanisms to explain current low fertility levels in developed countries. The economic environment under which households make childbearing decisions is a central component of Becker's model and had long before been acknowledged as key for understanding fertility behavior. In Becker's model, improvements in male labor market conditions are conducive to higher fertility, whereas income and substitution effects work in opposite directions when women's labor market conditions change. In addition to its impact on the level of household income, it is important to consider dynamic channels through which unemployment affects childbearing, namely, by increasing the uncertainty of employment in subsequent periods and by the loss of human capital it implies (Del Bono, Weber, and Winter-Ebmer 2012). Further, a sudden economic recession can depress fertility, as families adjust down the number of children they have to improve the chances for economic success of their offspring in line with parental aspirations (Easterlin 1980). Consequently, families can respond to both aggregate and individual-level economic uncertainty by delaying or even forgoing some births (Adserà 2005, 2011; Kravdal 2002; Sobotka 2004, among others).

A large empirical literature studies whether fertility is boosted by rising employment and earnings or whether women prefer to have children in times of job scarcity when the opportunity cost of childbearing in terms of forgone wages decreases. Butz and Ward (1979) posited the emergence of countercyclical fertility in the United States during the early 1970s, driven by the massive entry of women into the labor force since the late 1960s. They argued that economic downturns would be associated with increases in fertility, since the opportunity cost for women during a negative employment shock would be lower than in times of abundance. Subsequent analyses starting with Macunovich (1996) revealed, instead, procyclical patterns, and both unemployment and particularly long-term unemployment are associated with low fertility since the mid-1980s across OECD countries (Adserà 2004, 2005). The latest economic recession also contributed to stop the moderate recovery of fertility rates that some European countries had experienced in the early 2000s (Goldstein et al. 2013). Some middle-income countries display similar procyclical patterns (see Adserà and Menendez 2011 for Latin America; Billingsley 2010 for former Communist countries). Sobotka, Skirbekk, and Philipov (2011) offer a comprehensive review of the empirical findings on the impact of economic recessions on fertility in developed countries. Overall, most studies find individual fertility to be procyclical, with small long-run aggregate effects and short-lived impacts on the timing of births.

A challenge to properly identify the role of economic conditions on fertility behavior is finding exogenous variation in household income and particularly in female labor market conditions. Schaller (2016) notes that using aggregate measures of unemployment to proxy for economic conditions is problematic as they (1) are endogenous to the supply of labor, which, in turn, is related to fertility; (2) display large measurement error; and (3) do not differentiate men's and women's labor market conditions separately, as each is likely to serve as a proxy for the total unemployment rate.

p. 160 To overcome these problems of identification, the literature resorts to variation in local sectoral conditions, such as plant closures, and shocks to housing wealth to provide exogenous variation in women's labor supply. Black et al. (2013) look at changes in the world price of energy (oil and types of coal), as well as coal endowments across counties in Kentucky in the 1970s. They find that a coal boom, which they estimate permanently increased income by 6 percent, increased fertility by approximately 3 percent. Del Bono et al. (2012) exploit heterogeneity in plant closures in Austria to conclude that (temporary) job losses lead to a decrease of around 5 percent to 10 percent in average fertility.

To identify the impact of labor market conditions to male and female income separately, Schaller (2016) uses gender-education shift-share indices of labor demand as an instrument. The indices reflect variation in employment shares by industry across US states, the rates of growth of those industries at the national level, and how the composition by gender-education varies within them. She finds fertility to be procyclical, particularly in instrumental variable estimates, but, while improvements in men's labor market conditions lead to increases in fertility, the coefficients for female labor demand are negative and smaller. In a similar spirit, Autor, Dorn, and Hanson (2015) exploit the likely exogenous large-scale, trade-induced shocks to local manufacturing across the United States from increases in import competition from China and find small aggregate impacts on marriage and childbearing patterns. Negative shocks to male employment significantly reduce marriage rates and fertility, but raise the shares of teen births and of poor and single-headed households.

The timing of exposure to an economic shock seems to matter for its ultimate impact on fertility. Meager opportunities in the labor market typically result in youth spending additional time in education to acquire human capital that can protect them from economic uncertainty; this in turn may delay household formation and parenthood. Adserà (2004, 2006, 2011) finds that during the 1990s, across Europe (and in Spain, in particular), both high unemployment and exposure to a large share of temporary contracts in the economy when women were in their early 20s reduced fertility rates of women aged 20 to 24, affected women's ultimate transition to second parities, and was positively related with the gap between ideal and actual fertility. Consistent with these findings, Currie and Schwandt (2014) examine data for over 140 million birth records in the United States for 1975 to 2010. They find that a one percentage point increase in the average unemployment rate when women were ages 20 to 24 implies a drop in fertility among young women and a reduction of 14.2 in the total number of conceptions per 1,000 women by the time they reach age 40.

## Fertility, Labor Markets, and the Gender Wage Gap

The interdependence between fertility and labor markets concerns not just pregnancy and childbirth, as discussed in the previous section. Probably the most significant effect of fertility on labor market outcomes of women originates from childrearing needs, which compete with time available for work. Hence, for most
p. 161 of the twentieth century, ↳ the relationship between work effort and fertility in developed economies had been negative, as predicted by Becker's model. This secular trend continued during the 1970s and 1980s when women's participation rates increased sharply in most OECD countries.[8]

However, the cross-country negative relationship between fertility and aggregate female employment reversed after the 1980s (Adserà 2004, 2005). Despite this reversal, at the individual level, inactive women still had more children than those working full time in the private sector, though not necessarily more than women working part time and in the public sector (Adserà 2006, 2011). This suggests that institutional factors affecting labor markets, such as employment security or availability of part-time jobs, play a role in supporting this trend.

Women with young children more often work part time, are out of the labor market for longer periods, prefer more flexible schedules, and self-select into more family-friendly jobs than childless women.[9] Moreover, these jobs are likely lower-paying jobs than those with more demanding schedules. Empirical evidence overwhelmingly supports the idea that, besides formal education, experience is a key factor determining workers' remuneration and, within occupations, it is the single most important reason that men earn more than women (Blau and Kahn 2017). The rise in women's labor market experience contributed to the reduction in the gender wage gap substantially in the United States during the 1970s and 1980s. The narrowing of the gender gap, however, stalled during the 1990s and has remained stable at 75 percent to 80 percent in the United States since the early 2000s; across Europe it is, on average, around 83 percent (Eurostat 2015).[10] The stagnation of the gender gap, even among highly educated workers, has been attributed to the failure of labor markets to accommodate the need of mothers for a more flexible approach to work. This is suggested by the high concentration of more-educated women in particular fields of study or sectors like teaching and health care that offer family-friendly positions (Van Bavel 2010). Goldin (2014) notes that gender wage convergence among full-time employed college-educated individuals in the United States is far from complete, with hourly wages increasing with total working hours in some sectors and, as a result, penalizing workers unable to increase their effort. The gender wage gap is smallest in occupations where hours are relatively flexible and physical collaboration between coworkers is less crucial. However, the gap is larger in occupations that by nature or culture do not allow a balanced division between work and family, such as law, medicine, and business.[11]

Lately, fertility rates across educational groups seem to be converging, as a larger share of women in OECD countries are college educated and likely less selective in their childbearing preferences than in the past. Higher-order births no longer display a negative educational gradient in some European countries, particularly those with family-friendly labor market institutions.[12] Gauthier (2007) and d'Addio and D'Ercole (2005) review the literature on the impact of family-friendly policies and legislative modifications on fertility behavior. Rønsen (2004) and Lalive and Zweimuller (2009) find positive impacts on fertility from extensions of maternal leave in Norway, Finland, and Austria. The widespread availability of part-time
p. 162 employment and child care acts to ↳ boost both fertility and female labor supply in Italy, France and the UK (Del Boca, Pasqua, and Pronzato 2005).

## Housing and Fertility

Access to proper housing is generally viewed as an important precondition for household formation and childbearing (Kulu and Vikat 2007). Rising housing costs in developed countries appear among some of the mechanisms for unfulfilled fertility plans. For instance, in surveys that ask women about their intentions to have any or more children, lack of living space appears sometimes as a constraint to fertility. However, while rising housing prices are often cited as a reason for lower fertility (Kulu and Vikat 2007), the fact that housing is one of the largest components of family wealth implies that an increase in the price of housing could raise fertility of existing home owners through *wealth effects*. This observation suggests that changes in housing prices may have very different (and contradictory) effects on the fertility of different groups of individuals, such as home owners versus home renters. The net effect of housing prices on fertility is thus an empirical question, depending on whether the substitution or the income effect dominates.

There is some evidence that, in recent years, the large increase in real housing prices that coexisted with stagnant youth wages and high unemployment explains part of the delay in family formation and fertility, particularly in countries where the rental housing market is thin. Among others, Cherlin et al. (2013) note that residential independence among (married) youth has been diminishing since the 1990s. However, studies that have looked at the relationship between total fertility and housing prices have found no evidence of a negative relationship in cross-country analysis, whereas a positive relationship is identified in US state-level analysis (Feyrer, Sacerdote, and Stern 2008). Simon and Tamura (2009) employ successive

waves of the US Census linked with the median Consolidated Metropolitan Statistical Area (CMSA) rental rate per room to find a significant negative correlation between the price of living space and the number of children living in households. The study also finds that a higher rental price per room is significantly correlated with older ages at first birth and lower completed fertility among women aged 40 or more. More recently, a study of fertility across metropolitan areas in the United States reveals no correlation between how expensive housing markets are and fertility, although it shows an effect on postponement of first birth (Clark 2012). Along these lines, Curtis and Waldfogel (2009) also find that the fertility of unmarried mothers seems negatively associated with high-priced housing markets.

Estimating a causal effect of housing prices on fertility is complicated due to the difficulty of separating the effect of house prices from other economic conditions that likely affect both prices and fertility, and because households may sort themselves into different geographic areas according to fertility preferences. Lovenheim and Mumford (2013), Detting and Schettini-Kearney (2014), and Clark and Ferrer (2016) all address endogeneity concerns by explicitly distinguishing between home owners and renters ↳ to isolate income and substitution effects of wealth increase on fertility. These studies find strong evidence of a positive relationship between house prices and fertility for homeowners (meaning wealth effects dominate substitution effects), and some evidence of a negative/neutral effect for renters (where only substitution effects should be in operation) in the United States and Canada, respectively. All three papers infer causality through the inclusion of regional fixed effects and time-specific trends, to control for sorting, as well as regional economic characteristics that can affect housing prices and fertility. In addition, Detting and Schettini-Kearney (2014) implement an instrumental variable design that further confirms the robustness of their results.

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## Fertility and Union Formation

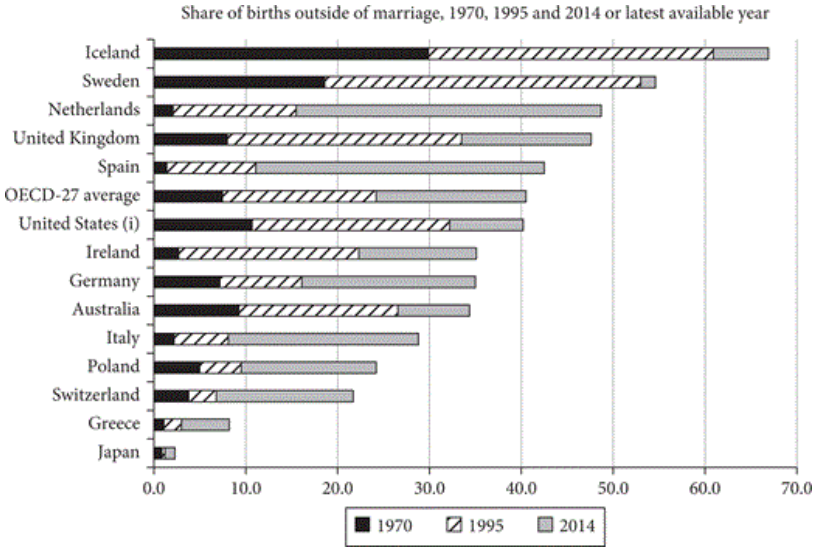
Changes in union formation such as delay in marriage, increase in divorce, decrease in remarriage, and rise in pre- and postmarital cohabitation feature prominently within the Second Demographic Transition theory. These changes in partnership formation started earlier in Nordic and a few other Northern European countries and only then spread to Central and Southern Europe and the United States. In many European countries, cohabitation was relatively more prevalent among the more educated at first and then permeated across society. In Anglo-Saxon countries, and especially in the United States, the educational gradient of cohabitation is strongly negative.

Nonmarital childbearing rose in parallel to changes in partnership formation. Figure 7.3 shows the share of births outside marriage in 1970, 1990, and 2014 for OECD countries. Consistent with changes in the prevalence of cohabitation, the share of nonmarital births was already high in Nordic countries and France by the early 1990s, but rose dramatically elsewhere in Europe since the late 1990s; the OECD average stands above 40 percent as of the mid-2010s. Together with the differential rates of marriage, nonmarital fertility rates also vary by education, with more children being born outside marriage among the least educated (Perelli-Harris et al. 2010; Bailey, Guldi, and Hershbein 2014). For the period 2005–2009, while 64 percent of births to US women with less than a high school education occurred outside of marriage, the corresponding share was only 8 percent among those with a college degree (Manning et al. 2014).[13]

Recent economic recessions have also contributed to delaying stable partnership formation and with it, fertility, particularly in areas such as Southern Europe, where until recently childbearing was more strongly linked to marriage (Sobotka, Skirbekk, and Philipov 2011). Moreover, more young adults are returning to the parental home or opting for cohabitation and postponing or abandoning marriage altogether. In the United States, this has prompted questions about the marriageability of the least educated men (Cherlin et al. 2013).

Autor et al. (2015), for example, find negative impacts on marriage from shocks to men's economic
p. 164 opportunities, using shocks from Chinese competition as an instrumental variable. ↳

**Figure 7.3**




Share of births outside marriage, 1970, 1995, and 2014, for selected Organization for Economic Cooperation and Development (OECD) countries.
*Notes:* Author's calculations with data from OECD Family Database. See notes for sources by country.
http://www.oecd.org/els/family.

Lundberg, Pollak, and Stearns (2016) argue that, especially in the US context, even though cohabitation is also accepted by the more educated, these couples prefer to bear children within a formal marriage arrangement to elicit a commitment for their preferred large human capital investment in children.[14] Nevertheless, across countries, the incidence of potential negative children's outcomes arising from differential investments depends largely on the workings of the welfare state and on whether unions are stable. Even though births outside marriage are a significant share of births (above 50 percent) in Nordic countries, for example, they are not as significantly associated with higher rates of poverty, as in the United States.

## Immigrant Fertility

The fertility behavior and family structure of immigrants have become very relevant for understanding the future trajectory of fertility and demographic structure of developed countries. Even though their contribution to the total fertility rate is still small, the fertility rate of immigrants across European countries is somewhat higher on average than that of natives (Sobotka 2008). In the context of Becker's model, immigrants' childbearing preferences may differ from the norm prevailing in the host country. However,
p. 165 the new economic ↳ environment in the destination country, the socioeconomic integration of immigrants (particularly of women) as they enter the labor market, and the cost of migration itself will have an effect on the household's family budget that might either reinforce or offset the differential fertility choices implied by those preferences. Since most international immigrants move from less developed countries with relatively high fertility, the general expectation has been that their fertility would initially exceed that of the native-born at destination. However, currently this prediction may be more ambiguous, considering the fast drop of fertility across the world and the likely selectivity of immigrants within source countries.

The literature that studies the fertility patterns of immigrants in OECD countries focuses on various mechanisms to explain the differential fertility behavior of immigrants: selection, disruption, and adaptation. All three mechanisms likely shape immigrant fertility to some extent (see Adserà and Ferrer 2016 for a review). The *selection* argument posits that those who migrate might differ systematically from nonmigrants in their countries and their fertility behavior should resemble that of the destination population. Lack of both appropriate pre-migration information on immigrants and data on fertility among those who remain in the country of origin limits the ability to test for selectivity. Several authors have compared the educational attainment of immigrants to that of similar birth cohorts at the destination and have generally found positive selection, particularly in countries with more selective migration regimes that attract relatively highly educated immigrants (Choi 2014).

A temporary decrease (*disruption*) in fertility just before or at the time of migration followed by rebound not long after arrival in the host country is a second mechanism that may explain immigrant childbearing behavior. The disruption results from temporary spousal separation, from deliberate postponement until after settlement in the new home, and from economic disruption when the potential income of both wife and (particularly) husband are temporarily depressed at the time of migration. Nonetheless, it is difficult to measure the extent of the disruption before migration since lack of pre-migration information and measures of selectivity interfere with this task.[15]

Finally, the *adaptation* (or assimilation) mechanism hypothesizes that immigrants' fertility norms and behavior will slowly converge to native fertility patterns with time in the country. This conflicts with the hypothesis that preferences mimic those prevalent where individuals are socialized, in this case the origin country for most immigrants, and that adaptation occurs among the second generation. The speed of adaptation may be endogenous to opportunities offered to immigrants (e.g., labor market, education, and social integration) and to the host country's cultural expectations (Abbasi-Shavazi and McDonald 2000). Limited access to longitudinal information hinders the ability to identify behavior changes with time in the host country, and most research has resorted to the use of synthetic migration cohorts. In general, the literature finds some convergence of immigrant fertility to native patterns, particularly among the second generation and in selective regimes that attract relatively highly educated immigrants (Adserà and Ferrer 2016; Choi 2014; Georgiadis and Manning 2011; Fernandez and Fogli 2006, among many others). Nonetheless, there is some variation in speed and degree of convergence across origins and contexts of reception (Georgiadis and Manning 2011, among others).



To explain immigrant behavior, the literature identifies age at migration as distinctly separate from duration in the destination, since there may be *critical ages* at which skills such as language fluency (that are associated with socioeconomic behavior including fertility) are acquired. Bleakley and Chin (2010) instrument fluency by age at migration (before age 9 or after) and whether or not immigrants to the US arrive from an English-speaking country, and show that immigrants with higher English fluency have fewer children, but are not less likely to be parents or to have children outside marriage. Consistently, Adserà et al. (2012) find that there is no fertility gap with natives among immigrants who arrive as young children to Canada, France, or the United Kingdom.

One way to measure the role of culture on fertility convergence has been to include measures of fertility levels of the countries of origin of immigrants (Fernandez and Fogli 2006), and for those of the second immigrant generation, of their parents' country (Blau et al., 2008). These papers find that "culture" affects the fertility of the second generation, but suggest an even larger convergence effect toward native fertility.

Finally, with the increase of the foreign-born population, intermarriage rates have grown. Mixed marriages may increase marital instability and in turn decrease fertility (Van Bavel 2012), though among highly educated couples, more information and openness to cultural differences could taper union conflict and sustain fertility. Conversely, natives that value more traditional roles for women may choose to enter mixed

unions and have larger family sizes. This latter type of mixed marriages is likely more prevalent among less educated couples and should strengthen a negative educational gradient of fertility and may boost fertility.

## Conclusion: Is Low Fertility Here to Stay?

The existent gap between desired and actual fertility, with fertility preferences across developed countries slightly above replacement, suggests that there is a potential for a moderate increase in fertility if better institutions in the labor market and more economic security reduce the postponement of childbearing and encourage families about the economic prospects of their offspring. However, research finds that public policy that aims to increase fertility has only a moderate impact on timing of births and a small impact on the total number of children (d'Addio and D'Ercole 2005; Gauthier 2007; Lalive and Zweimuller 2009; Lopoo and Raissian, this volume). Further, despite current large rates of female labor force participation, the slowdown in the closing of gender wage gaps in some countries suggests that there are still barriers to combining work and family (Emery and Ferrer 2009; Goldin 2014; Blau and Kahn 2016; Blau and Winkler, this volume; Rossin-Slater, this volume; and Kimmel and Connelly, this volume). Moreover, in countries seeing significant increases in immigration flows, the institutions affecting the socioeconomic integration of immigrant women into mainstream society will have significant weight in shaping future fertility trends.

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## Notes

1. Portner, this volume, discuss childbearing patterns in developing countries.
2. Recent data on cohort fertility points toward convergence in both the number of children and rates of childlessness between the top and bottom quartiles of the educational distribution in the United States, but to an increase in the differences in age at first birth (starting with the 1940 cohort) (Bailey, Guldi, and Hershbein 2014). Among the 1970 cohort, for example, the number of children stood at 1.7 for the most educated and at 2.2 for the least educated, and their corresponding ages at first birth were 28.3 and 21.5, respectively.
3. See Rose, this volume, for more on child gender and the family.
4. In a controversial paper, Donohue and Levitt (2001) have further linked that selective fertility drop to lower crime rates beginning seventeen years after *Roe v. Wade*.
5. Bailey and Lindo, this volume, have an extensive discussion of contraception and women's economic outcomes.
6. Success rates of in vitro fertilization on women over age 40 is generally under 10 percent (Bewley, Davies, and Braude 2005), while the share of total babies conceived this way is well under 2 percent in the United States and Europe (Ferraretti et al. 2012).
7. A more detailed look at these policies and fertility can be found in Buckles (this volume).
8. Historically, female labor force participation follows a U-shape with the level of development. It is relatively high in poor societies and drops as countries develop, only to grow again. Goldin (2006) offers a historical account of changes in the role of women in the labor market in the later phase of development, from being secondary workers to becoming workers whose attachment to the labor force becomes part of their identity.
9. Even recently, Bertrand, Goldin, and Katz (2010), in a study of the careers of MBAs who graduated from 1990 to 2006, find that maternity is the main cause for lesser experience and hours and more career discontinuity of women compared to men.
10. This ratio for the United States is for annual earnings of year-round full-time workers. For Europe, the measure is gross hourly earnings for all paid employees in enterprises with ten employees or more.
11. See Kunze (this volume) for further discussion of the gender wage gap.

12. See Kravdal and Rindfuss (2008) for Sweden.

13. See Fletcher and Polos (this volume) for more discussion of nonmarital births.

14. McLanahan and Jacobsen (2015) note that the unequal educational, material, and emotional resources that children in different types of families receive sets them on different paths toward their adulthood (diverging destinies). Those childhood differences can contribute to persistent intergenerational inequality.

15. Evidence of short-lived fertility disruption has been shown in most OECD countries except for Germany (Adserà and Ferrer 2016).

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