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8

Is There a Case for a "Second Demographic Transition"?
Three Distinctive Features of the Post-1960 US Fertility Decline

Martha J. Bailey, Melanie Guldi, and Brad J. Hershbein

Over the course of the last 100 years, American childbearing has changed dramatically. American women reaching childbearing age around 1890 averaged 4.2 live births during their reproductive years. For women reaching childbearing age a century later, this number had fallen to a stable 2, just below replacement levels.[1] The US baby boom temporarily reversed this trend. Between 1940 and 1960, the general and total fertility rates rose by 60 percent and cohort measures of completed fertility rates rose by 45 percent.

The causes of these dramatic fertility swings have been the subject of large literatures in economics and demography. The economics literature

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1. These statistics use completed childbearing from the US Census (for 1890) and the June Current Population Survey (for 1990) and are close to calculations of the US total fertility rate (TFR). In 1890, the TFR was approximately 3.9 (Haines 1989) and had fallen in half to 1.9 by 2010—just below replacement levels (Martin et al. 2012).

has largely focused on demand-side explanations—changes in preferences, income, and the shadow price of children that affect how many children couples choose to have.[2] This literature generally assumes that fertility decline was driven by the same forces before and after the baby boom. The demographic literature has modeled the fertility decline as part of a larger "demographic transition" (Kirk 1996). More recently, Lesthaeghe and van de Kaa (1986) argue that the diffusion of "the Pill" and the women's rights revolution beginning in the 1960s sparked a "Second Demographic Transition," or SDT. This argument builds on Ryder and Westoff's (1971) claim that the "contraceptive revolution" had a large effect on women's childbearing, so large that Westoff's (1975, 579) presidential address to the Population Association of America asserted that, "the *entire* [emphasis added] decline in births within marriage across the decade of the 'sixties' can be attributed to the improvement in the control of fertility."[3]

An obvious counterargument to these claims is that the period looks more like mean reversion rather than a distinct transition in its own right. Becker's *Treatise on the Family* (1981) challenges Ryder and Westoff's claim of post-1960s exceptionalism, noting that the decline in childbearing in the 1920s—before the availability of the Pill—was almost as rapid. In an often-cited response to Lesthaeghe and van de Kaa, Cliquet (1991) argues that the trends they emphasize "already existed before the sixties [for Council of Europe member states]; in fact, most of them emerged with the . . . demographic transition around the turn of the century" (72). In another prominent article, Coleman (2004, 14) criticizes the SDT literature as ahistorical: "A graph truncated at [the 1950s and 1960s] gives a false impression of an inexorable downward slide coinciding with the onset of the [second demographic transition], while in fact in most countries the real decline was forty years earlier. The 1950s and the 1960s are a deceptive aberration in fertility history" (18).

An important open question is whether the case for a SDT remains after comparing the post-1960 period with changes in childbearing during the early twentieth century. Our chapter investigates this question for the United States, and we compare features of the post-1960 fertility decline (roughly 1960 to 1990) with features of the early twentieth-century fertility decline

2. Economists generally model the decline in childbearing as a by-product of rising wages, which increase the opportunity cost of children, or of rising incomes, which induce substitution away from the quantity of children toward child quality (Becker and Lewis 1973). Economic models treat the baby boom as a price shock (Barro and Becker 1989; Greenwood, Seshandri, and Vandenbroucke 2005; Albanesi and Olivetti 2009; Doepke, Hazan, and Maoz 2008) or income shock (Easterlin 1966, 1971, 1980).

3. Economists have also noted the potential importance of the supply side (Easterlin 1975; Michael and Willis 1976; Easterlin, Pollak, and Wachter 1980; Easterlin and Crimmins 1985; Hotz and Miller 1988). For empirical papers on the role of greater access to reliable medical contraceptives, see Goldin and Katz (2002); Bailey (2006); Guldi (2008); Kearney and Levine (2009); Bailey (2010); Bailey, Hershbein, and Miller (2012); and Bailey (2012).

(roughly 1900 to 1930), rather than the baby boom era. To this end, our analysis compiles evidence from many data sets including the decennial censuses, the June Current Population Surveys (CPS), Vital Statistics, and the National Surveys of Family Growth (NSFG).

Our findings affirm many critiques of the SDT literature. Both the early and later periods experienced similar declines in fertility rates, and the affected cohorts averaged the same number of live births over their lifetimes. In contrast to conventional wisdom, the mean ages of household formation (by marriage or nonmarital cohabitation) and first birth for women today are nearly identical to those of women reaching childbearing age in the 1920s and 1930s. Yet three distinct features of the post-1960 period stand out.

Feature 1. The emergence of a two-child norm and *reduction* in childlessness. Among cohorts reaching childbearing age after 1960, the two-child family became more universal and the variance in the number of children born fell significantly from its level in the early twentieth century. Recent cohorts were also significantly *less* likely to be childless. These empirical patterns are consistent with the predictions of a simple economic framework that includes a supply side characterized by changes in contraceptive technology. One key prediction within this framework is that the greater availability of reliable and lower marginal cost contraception should reduce the *dispersion* in childbearing outcomes by reducing both precautionary undershooting and unintended pregnancy.

Feature 2. The decoupling of marriage and motherhood. Age at first union (historically through marriage, more recently through cohabitation) and age at first birth had a strong positive association in the early twentieth century, but this interrelationship broke down among women after 1960. Recent cohorts formed their first households at similar ages to cohorts born earlier in the century but more often cohabited before marriage. Age at first union and age at first intercourse have become less predictive of motherhood timing, as many women give birth outside of marriage. Among women marrying before having children, the interval between first marriage and motherhood has increased.

Feature 3. A transformation in the relationship between mothers' education and childbearing. When comparing highly and less educated women, completed childbearing, childlessness, and the likelihood of marriage are much *more similar* today than in the early twentieth century. Despite these similarities, age at first household formation, age at first birth, and nonmarital childbearing diverged after 1960 by mothers' education, with more educated mothers more likely to delay household formation, motherhood, and childbearing within marriage.

It is unclear whether these changes are significant enough to constitute a SDT or are simply the most recent stage in the ongoing *first* demographic transition (Lee and Reher 2011). Continued shifts in the demand for children due to, for instance, rising wages (Becker 1965) and incomes (Easterlin 1966, 1971, 1980; Becker and Lewis 1973; Willis 1973) are key to understanding the longer-term narrative of US fertility decline. In the absence of important shifts in the demand for children, the contraceptive revolution may have mattered little.

This analysis describes three distinctive features of the post-1960 period that are consistent with the contraceptive revolution playing an important role in fertility decline—a role that complements (but does not supplant) shifts in the demand for children. This suggestive evidence extends a growing empirical literature on the Pill that likely understates its broader significance (Goldin and Katz 2002; Bailey 2006; Guldi 2008; Bailey 2010; Bailey, Hershbein, and Miller 2012; Bailey 2012) by virtue of the fact that the research designs may difference out spillover and general equilibrium effects.

Of particular importance is that these features suggest that the contraceptive revolution has exacerbated economic inequality among children. The decoupling of marriage and motherhood and the changing relationship of women's education with childbearing is consistent with class-based polarization in children's resources (McLanahan 2004). The fact that trends in nonmarital childbearing and age at first birth have not stabilized suggests a continued, if not increasing, polarization in these resources in years to come. The late twentieth-century fertility decline, therefore, has implications for the evolution of children's opportunities, their educational achievement, and the widening inequality in US labor markets.

8.1 The Twentieth-Century US Fertility Transition

"Fertility transitions" are generally defined by population scientists as "long-term declines in the number of children from four or more per woman to two or fewer" (Mason 1997). Until recently, US (marital) fertility decline was believed to have begun in the late eighteenth century, almost seventy-five years before marital fertility rates began to decline in most other nations (France excepted; Haines 2000; Binion 2001). Using new estimates of nineteenth-century mortality and newly available census microdata, Hacker (2003) shows that it is likely that the longer-term decline in US fertility began closer to the mid-nineteenth century. Furthermore, among white women, his estimates suggest that the decline in marital fertility did not begin until after the Civil War. Although the features and timing of demographic transitions vary considerably across places (Guinnane 2011; Lee and Reher 2011), the longer-term demographic transition in the United States was characterized by declines in infant and child mortality, the disappearance of the Malthusian pattern of late marriage, and the emergence of birth-order specific fertility control.

The American fertility transition presents a fascinating challenge to scholars—particularly among those who desire an integrated model of demographic change. The early fertility decline took place in the absence of modern contraception and is believed to have been driven by changes in the demand for children. The baby boom took place in the context of increasing income, urbanization, educational attainment, and women's labor force participation—all trends that are associated with declining fertility in the early twentieth century. Adding to the puzzle is that the post-1960 period saw falling fertility rates even as incomes, urbanization, educational attainment, and women's labor force participation continued to rise.

8.1.1 Models of Fertility Decline in Economics and Demography

The challenge of explaining US fertility transition has led to the development of two main schools of thought in economics. One cornerstone of the literature has been Richard Easterlin's "relative income hypothesis" (1966, 1971, 1980). Easterlin argues that the importance of a cohort's perceived "earnings potential" relative to its "material aspirations" is critical in the formation of adult preferences for material goods and children. In this view, children who grew up in the Great Depression during the 1930s formed modest material aspirations that were surpassed by their actual experience as young adults in the 1940s and 1950s. When these children of the Depression found that they could afford more of everything, they consumed more and had more children. Children growing up in the more affluent 1940s and 1950s had the reverse experience and, consequently, had fewer children. This led to subsequent fertility declines. Problematic for this theory is that fertility rates have not cycled since the baby boom.

Another cornerstone of the literature has been Gary Becker's neoclassical theory (1960, 1965; Becker and Lewis 1973). This school of thought pushes Easterlin's endogenous preference formation into the background and emphasizes the importance of prices and absolute incomes. Becker explains the negative association between childbearing and income as reflecting the difference in the opportunity cost of childbearing (higher wage rates for higher income individuals) as well as the greater income elasticity of child quality (compared to the quantity of children). Becker, in collaboration with Robert Barro, has extended the reach of the neoclassical school to macroeconomics with two joint articles (Becker and Barro 1988; Barro and Becker 1989). These articles reformulated Becker's initially static theory of fertility to extend across generations. This reformulation models decision makers as altruistic parents who care about the utility of their children and, therefore, incorporate their children's utility into their own utility function. The Barro-Becker framework has led to the development of a new subfield in economics called "family macro," which has created several alternative theories of the baby boom (see Greenwood, Seshadri, and Vandenbroucke 2005; Doepke, Hazan, and Maoz 2008; Albanesi and Olivetti 2009). With slightly different formulations of the problem, each of these models examines a different potential price change (as suggested in Barro and Becker's articles) that could have produced the baby boom. In the spirit of Becker

(1965), these models rely upon the increasing *opportunity* cost of child rearing (primarily due to the growth in women's wages) to generate the longer-term decline in US childbearing. Problematic for these models is that when calibrated to match the baby boom, they have difficulty generating the speed of the post-1960 US fertility decline.

Much of the demographic literature has maintained a different focus in explaining the post-1960 fertility decline. Citing newly collected national surveys documenting increased use of the Pill, Ryder and Westoff (1971) heralded the 1960s as a period of "contraceptive revolution." Building on this claim, Lesthaeghe and van de Kaa (1986) hypothesize that the arrival of the contraceptive, sexual, and women's rights revolutions of the 1960s engendered a *distinct* demographic transition—a period *exceptional* enough to be called the "Second Demographic Transition" (SDT). Their initial work focuses on Europe, but recent work by Lesthaeghe and Neidert (2006) argues that a SDT is underway in the United States as well. The distinctive characteristics of the SDT, they argue, are persistently low fertility rates, substantially delayed marriage and childbearing, increases in nonmarital cohabitation and childbearing, and high divorce rates.[4] Even as demographers have stressed these changes, the demand-side formulations of both the Easterlin and Becker schools of thought have continued to shape the theoretical and empirical literature on childbearing in economics.

8.1.2 Integrating the Neoclassical Model with a Supply Side

Augmenting demand-based economic models of childbearing with a "supply side" is one way to operationalize the hypotheses of Ryder and Westoff (1971) and Lesthaeghe and van de Kaa (1986). To this end, the pioneering work of Michael and Willis (1976) provides a useful bridge between the neoclassical demand for children (Becker 1960, 1965; Willis 1973; Becker and Lewis 1973) and the supply side stressed elsewhere (Coale 1973; Sheps 1964; Sheps and Perrin 1964; Westoff 1975; Easterlin, Pollak, and Wachter 1980). Their framework relaxes two assumptions in neoclassical models: (1) that childbearing is deliberately determined and (2) that regulating fertility is costless. In their model, the number of children is a random variable, and couples choose a contraceptive strategy to reduce the monthly probability of conception. In addition, fertility regulation has a price. Each contraceptive strategy—the adoption of behaviors or use of contraceptives—is associated with a fixed and marginal cost and yields an expected number of children. Couples maximize utility by weighing the marginal costs of averting births against the marginal benefit of attaining an ex ante distribution

4. In some formulations, the rise in women's labor force participation is also attributed to the SDT. We omit discussion of women's labor force participation rates here because this is covered in Olivetti's chapter (chapter 5, this volume).

of childbearing. That is, couples optimize by choosing a distribution of possible childbearing with mean, μ^*, to maximize utility net of the costs of fertility regulation, or max $U(\mu) - C(\mu)$.

Within this framework, Ryder and Westoff's "contraceptive revolution" is simply the claim that shifts in $C(\mu)$ became much more important in the determination of childbearing outcomes in the post-1960 period. Lesthaeghe and van de Kaa's (1986) distinction between the first and second demographic transitions is summarized by saying that the first transition was driven by shifts in $U(\mu)$, whereas the SDT was driven by changes in $C(\mu)$. This framework also provides a starting point for conceptualizing why standard demand-side models in economics may fail to capture important features of the post-1960 fertility decline.

Effects on the Mean Number of Children Born

The framework of Michael and Willis provides testable predictions regarding how the introduction of modern contraceptives like the Pill could have changed the distribution of children ever born. The model's insight about the effect of modern contraception on the *mean* number of children ever born is straightforward. Michael and Willis consider a simple division of costs of attaining a fertility distribution, μ, using contraceptive strategy, j, into a fixed cost, α_j, and a marginal cost, β_j. The cost of using strategy j to attain an ex ante birth distribution, μ, is given by $c_j = \alpha_j + \beta_j(\mu_N - \mu)$, where μ_N indexes the expected distribution of children born in the absence of any contraceptive method. The term $\mu_N - \mu$ is, therefore, the expected number of births averted. The (constant) marginal cost of averting a birth, β_j, might be a behavioral cost (abstinence or withdrawal), the inconvenience or discomfort of birth control use (barrier methods), or the necessity of purchasing supplies (as with condoms or the birth control pill). Fixed costs include the price of searching for a supplier, learning about a method, and perhaps side effects as well. The total cost function includes only the lowest cost option for achieving an expected number of births, or $C(\mu) = \min_j\{\alpha_j + \beta_j(\mu_N - \mu)\}$.

Modern contraceptive methods (such as the Pill or IUD) can be modeled as reducing the marginal costs of preventing births, because no interruption, effort, or discomfort at the time of intimacy is required. Thus, modern methods would reduce β for some range of births averted. Holding the demand for births constant, reducing the marginal costs of preventing births would normally lead to a reduction in the number of children born per woman. But because the effectiveness of these methods also reduced the uncertainty surrounding childbearing outcomes, there is potential for offsetting theoretical effects. Michael and Willis point out that more reliable contraception may, somewhat counter to intuition, increase the number of children born by eliminating precautionary undershooting. This effect may be small but it makes the theoretical impact of modern contraception ambiguous.

Effects on the Distribution of Children Born

The Michael and Willis model also provides straightforward predictions of how different contraceptive methods affect the distribution of children ever born. Michael and Willis present figures that show how the expected number of children and variance in the number of children change with contraceptive technique (1976, table 2). Techniques with lower contraceptive efficiency (for example, the rhythm method) tend to have higher mean and variance (5.11, 2.15) than do techniques with higher contraceptive efficacy (for example, condoms, 2.33 and 1.64; or the Pill, 0.19 and 0.18), but this relationship is not monotonic. In particular, the use of no method at all (or reduced frequency of sex) produces a high number of children in expectation but small variance. The intuition for this is that most women achieve near their natural biological fertility without using any method, and that this varies relatively little across women. Less effective methods, while reducing the mean, still fail frequently enough that many women have more children than intended, *increasing the variance*.[5] Thus, for women in the early twentieth century, the methods of fertility control readily available to them would be expected to reduce the mean without reducing the variance, which might *rise* with the use of such methods. In contrast, as women in the latter half of the twentieth century began to use more effective methods in greater proportion, both the mean number of children and the variance should fall, assuming the distribution of preferences, prices, and income remained constant.

Thus, the Michael and Willis framework of fertility choice provides a simple, mathematically tractable bridge between economic and sociodemographic models. It explicitly models the importance of the "supply side" as technologies affecting the marginal costs of averting births in the spirit of Easterlin (1975) and Easterlin, Pollak, and Wachter (1980): the model's birth production function separates natural fertility, μ_N, from targeted childbearing, μ^*, in a stochastic framework with costs of fertility control. Finally, it formalizes Coale's (1973) conceptual framework: "ready" is captured by the formal calculus; "willing" is captured by the utility function, prices, and income; and "able" enters as the technology and cost of contraception based upon the mathematical demography of Sheps (1964) and Sheps and Perrin (1964).

For our purposes (and those of other empirical researchers wishing to examine the appropriateness of different theories), another valuable feature of the Michael and Willis (1976) model is that it provides a richer set of testable predictions than does theory based solely on changes in the number of children. Although Michael and Willis's insights about changes in the

5. The nonmonotonic relationship between the mean and the variance in the Michael-Willis model rests—in part—on their assumption that childbirth is a Markov renewal process, or that intervals between childbearing can be assumed to be independent and identically distributed.

dispersion of outcomes do not cover other features of Ryder and Westoff's (1971) contraceptive revolution or Lesthaeghe and van de Kaa's (1986) SDT, they provide an additional moment of the distribution (the variance) that can be used to test claims of post-1960 exceptionalism.

8.2 How Different Is the Post-1960 Period?

The case for the exceptionalism of the post-1960 fertility decline rests on the claim that there are meaningful differences from the pre–baby boom fertility decline. The implicit hypothesis is that the longer-term forces leading fertility rates to decline in the early twentieth century are the same forces (e.g., the opportunity cost of childbearing or substitution toward child quality) that contributed to fertility decline in the post-1960 period. To examine the similarities across periods, our analysis compares outcomes across birth cohorts. For the early twentieth-century transition, we focus on women born from 1880 to 1910 who reached the age of twenty from 1900 to 1930. We often refer to the cohorts born between 1900 and 1910 as the early twentieth-century or (following the demographic literature) the "low-fertility" cohorts. For the later twentieth-century transition, we focus on the 1940 to 1970 cohorts, who reached the age of twenty from 1960 to 1990. We often refer to these cohorts as the later or mid-twentieth-century cohorts.

8.2.1 Similarities in Early and Later Twentieth-Century Period Fertility Rates

Figure 8.1 presents the general fertility rate (GFR) by year and cohort-based measures of mean "children ever born" (live births excluding miscarriages and still births) to women age forty-one to seventy from the decennial census and the June Current Population Survey (CPS).[6] For the mean number of children born, we have advanced the series twenty-five years (approximating the period when the birth cohort was having children) to correspond to the GFR. The pattern of the cohort-based measure corresponds closely to the period measures. Women born in 1875 (linked to 1900 in figure 8.1) averaged 3.3 births over their lifetimes, whereas women in the early twentieth-century cohorts averaged 2.3 births over their lifetimes. This number rose sharply to over three children for the cohorts reaching childbearing age during the baby boom (born between 1915 and 1935), and then fell to around two births for the 1945 to 1970 cohorts.[7] A second series

6. Because the census stopped asking about children ever born after 1990, we use the June Current Population Survey (CPS) to extend these figures to 2010 (birth cohort of 1969). Changes in age restrictions and regression-based age-at-observation adjustments alter these figures very little.

7. Child survival rates to age ten were historically much lower than today, so—while holding constant the demand for surviving children—increases in survival provide one reason for the reduction in children ever born over the last 100 years. Unfortunately, because the census after

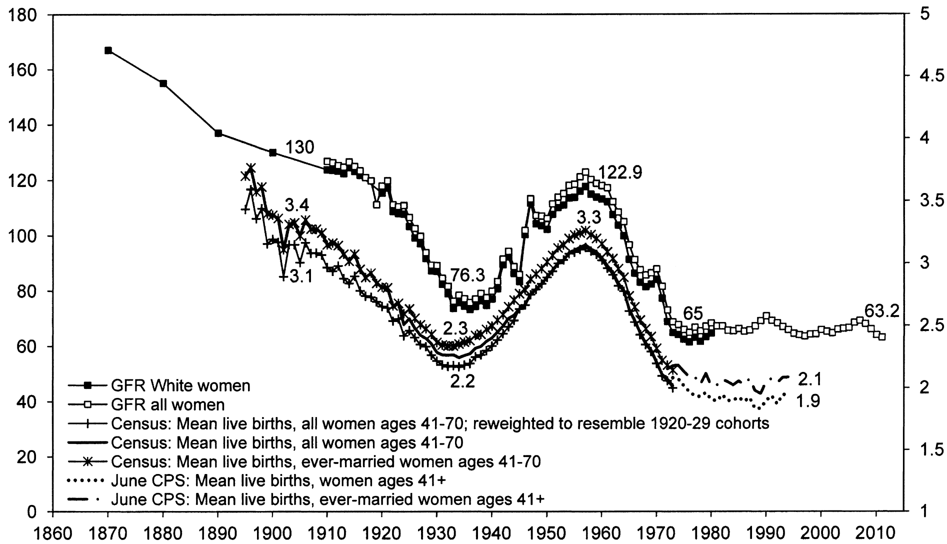

Fig. 8.1 US general fertility rate (GFR) and completed childbearing, 1895–1995

Sources: Fertility rates are from historical statistics, http://www.cdc.gov/nchs/data/statab/t001x01.pdf. Mean live births are computed using the 1940–1990 decennial census IPUMS samples (Ruggles et al. 2010) and the 1995–2010 June CPS.

Notes: The general fertility rate (GFR) (right vertical axis) is the number of births per 1,000 women (all or white women only) age fifteen to forty-four in the population from Vital Statistics. Mean live births (left vertical axis) is the mean self-reported number of children ever born for each birth cohort as measured between the age of forty-one and seventy (indexed to year by adding twenty-five years to mother's year of birth; e.g., mean children ever born to the birth cohort of 1870 corresponds to the year 1895 on the graph's horizontal axis). In addition, we include rates for never-married women as measured in the 1970–1990 censuses. Computations use population weights.

shows that the addition of never-married women (first asked about their childbearing in 1970) alters the overall pattern very little except to reduce the levels of childbearing. Consistent with the literature, figure 8.1 shows that the decline in the mean number of live births was almost identical for the early and late twentieth-century cohorts.[8]

Two kinds of survival bias may influence these estimates. First, income is positively associated with life expectancy, so lower-income women—who also tend to have more children—may be less likely to survive to answer cen-

1910 did not ask about children surviving, we cannot use these data to investigate the role of child survival on completed fertility. That said, because infant and child mortality rates were higher for the early fertility cohorts, differences in surviving children would tend to make the early and later cohorts look even more similar.

8. The decline is slightly faster for the late cohorts at 0.04 versus 0.036 births per year for the early twentieth-century cohorts. The average annual rate of decline in the general fertility rate (GFR) in the 1960s was 2.2 births per 1,000 women of childbearing age per year, only slightly faster than that in the 1920s (approximately two births per 1,000 women of childbearing age per year).

sus questions about their childbearing. Because we observe earlier cohorts at older ages, this differential mortality would be more pronounced for the earlier cohorts. Second, women having more children face greater risk of death from childbirth and are, therefore, less likely to be enumerated later. Both of these sources of survival bias should lead live births to be understated for the older cohorts. As a result, the speed of fertility decline in the early twentieth century will be understated.

To gauge the importance of the first factor, we limit our sample to women age forty-one to fifty, but this has a negligible effect on our estimates. This implies that the mean number of children ever born to women surviving to age forty-one to fifty versus those who survive to age fifty-one to seventy are not appreciably different. Assessing the importance of differential maternal mortality is more difficult, and we can provide only a crude adjustment. Extrapolating average annual maternal mortality rates from Albanesi and Olivetti (2009, figure 1), we determine that approximately 1 in 100 live births resulted in the mother's death. If we assume that mortality risk is equally probable across birth parity and maternal cohorts (which, admittedly, is a big simplification), the probability that a woman survives giving birth to n children is $p = 0.99^n$. Dividing by this factor across the entire distribution of children born to pre-1900 maternal cohorts leads the mean number of children born to be approximately 0.1 higher for women born in 1870. Correcting for these sources of bias tends to increase the rate of fertility decline among the early cohorts and, thus, tends to make the fertility declines for earlier and later cohorts more similar. Neither adjustment, however, alters the broad conclusion that the decline in the mean number of live births was similar in magnitude during the early twentieth century and after 1960.

Compositional changes in the US population, especially those due to urbanization and immigration, may also influence our findings. Potentially important for our conclusions about the speed of the early fertility decline is that the representation of these groups in the US population shifted during the twentieth century. As shown in figure 8.2 (and noted in Easterlin 1961), both the levels and changes in completed childbearing differed across native and foreign-born women as well as women residing in urban and rural areas. Racial differences were also large. To account for these compositional changes, we reweight the individuals within each birth cohort using inverse propensity score weighting (DiNardo, Fortin, and Lemieux 1996). This procedure adjusts the distribution of each cohort's characteristics—the share of the population in urban areas, share of immigrants from different source countries, race and ethnicity, and age composition—to resemble the distribution of characteristics among the cohorts of 1920 to 1929.[9] Figure 8.1 also

9. The specific covariates used to construct the propensity weights include a dummy for whether the woman lives in an urban area, a set of eleven dummies for region of the world (country groups) of birth, a dummy for whether the woman is white, a dummy for whether she is Hispanic, and a set of five dummies for her five-year age group at time of observation.

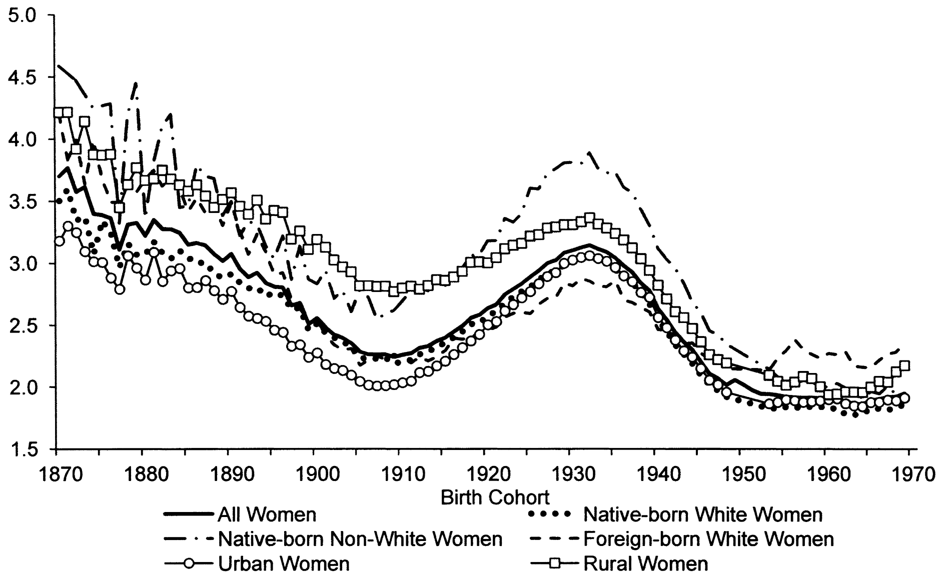

Fig. 8.2 Completed childbearing, by group and birth cohort, 1870–1970

Sources: See figure 8.1.

Notes: The figure plots the mean number of live births among women age forty-one to seventy, by birth cohort, for the census (1870 through 1948 cohorts) and the same statistic for women age forty-one to forty-four in the June CPS (1949 through 1969 cohorts). The native born include women who were born in the fifty US states (including the time in which they were territories) and the District of Columbia. Nonwhites include all races other than white. Urban/rural is based on the "urban" variable for 1960, 1970, and 1990 censuses and on the "metro" variable for the 1940, 1950, and 1980 censuses, as well as the June CPS (urban if in a metro area, rural if outside a metro area). All computations use the recommended population weights and the CPS series are three-cohort moving averages.

plots this reweighted series (the cohorts of 1920 to 1929 corresponds to the years 1945 to 1954). This reweighting has a negligible impact for more recent cohorts and a small (but more noticeable) impact on the early twentieth-century cohorts. After reweighting, mean completed childbearing declined by 0.9 births between cohorts born in 1875 and 1910. Without reweighting, the decline is roughly similar. This also underscores the argument that—in both the early twentieth century and post-1960 period—fertility decline was driven by *within-group* (behavioral) changes rather than changes in population composition.

8.2.2 Similarities in Mean Age at First Union and Birth in the Early and Later Twentieth Century

According to Lesthaeghe and van de Kaa (1986), two further hallmarks of the SDT are delayed marriage and childbearing. This section assesses this claim in historical perspective by comparing outcomes for the cohorts reaching childbearing ages during each period: the low-fertility cohorts (cohorts born from 1900 to 1910 who reached childbearing age in the 1920s and 1930s) and the cohorts born from 1940 to 1950 (who reached childbearing age in the 1960s and 1970s).

Figure 8.3 shows a remarkable correspondence in the age at first union (either through marriage or cohabitation) for the low-fertility cohorts and cohorts reaching childbearing age in the 1960s and 1970s. During the early twentieth-century fertility decline, average age at marriage remained very stable. Even as completed childbearing fell fairly linearly from 3.4 for the birth cohort of 1875 to 2.3 for the birth cohort of 1915, mean age at first marriage hovered around twenty-two and nudged upward only slightly for the low-fertility cohorts. It is unlikely that the stability in marriage age reflects selection into marriage. Figure 8.3 also shows that the share of women ever marrying for these cohorts stayed relatively constant at around 90 percent.

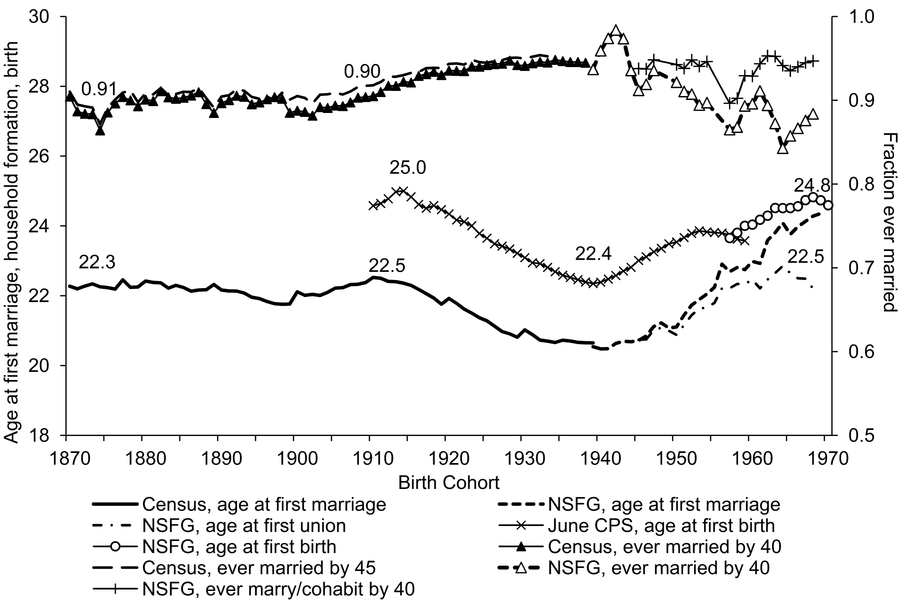

Fig. 8.3 Mean age at first marriage/cohabitation and first birth and share ever marrying, by birth cohort

Sources: 1940–1980 decennial census IPUMS samples (Ruggles et al. 2010); 1979–1995 June CPS; 1982–2010 NSFG.

Notes: The figure plots the mean age at first marriage (conditional on ever married by age thirty-nine), first household formation or union (the younger of first marriage or first non-marital cohabitation), first birth (left vertical axis), and share ever married (right vertical axis) against single year-of-birth cohort. The NSFG and CPS trends are based on three-year cohort moving averages.

The baby boom disrupted these patterns. The share of women ever marrying increased from around 90 percent to 95 percent, and the mean age at first marriage for the 1935 cohort fell by almost two years to 20.7 (figure 8.3). Increases in childbearing during the baby boom were accompanied by earlier, more universal marriage and childbearing. The share of women with their own child in the household rose sharply for cohorts born in the 1930s.

Women reaching childbearing age after 1960 did not delay marriage or shy away from it altogether. The mean age at first marriage remained *stable* for the 1935 to 1945 birth cohorts and began to rise for women born after 1945. Similarly, the share who ever married did not begin to fall until after the 1945 cohort. The mean age at first marriage for the cohort of 1910 (conditional upon being married before age 35) was 22.5. During the baby boom, when completed childbearing was at its fifty-year peak and very few women never married, the mean age at first marriage was lower and more concentrated around age twenty-one. Yet, as the baby boom ended and completed fertility rates fell for cohorts born in the 1940s, early marriage persisted. The mean age at first marriage remained low at 20.6 for the cohort of 1940 and 21.3 for the cohort of 1950.

Age at first marriage rose rapidly for cohorts born after 1950 and surpassed the mean of the low-fertility cohorts. The rise in nonmarital cohabitation, however, makes these trends misleading statistics for the age at first household formation—what we will call "age at first union." For instance, if women born in the 1950s who would have married at younger ages in the past began substituting toward nonmarital cohabitation, the rise in mean age at first marriage may overstate the actual rise in the age at household formation. It also implies that differential selection into marriage by age thirty-five in the lower fertility and later cohorts could bias these comparisons. Figure 8.4 shows that only 78 percent had married by age thirty-five for the most recent cohort we can measure versus 87 percent for the low-fertility cohorts.

Information from the 1988 to 2010 NSFG allows us to investigate how much of the trend toward later marriage has been due to premarital cohabitation—a change in the "label" and definition of a long-term relationship rather than household formation. Assuming that nonmarital cohabitation rates were historically low (or were reported as "marriages" in the census), figure 8.3 shows that—after accounting for nonmarital cohabitation—the current mean age at first union is identical to the mean in the early twentieth century (22.5) and that the post–baby boom increase in age at first household formation is much more gradual. It also shows that the decline in the fraction ever married is completely offset by rising nonmarital cohabitation. Figure 8.4 shows the evolving distribution in age at first union and underscores the similarity in the distribution today with the distribution earlier in the century. Only 20 percent of women born in 1970 had married by age twenty, but 35 percent had cohabited. By age twenty-five, 55 percent of the same cohort

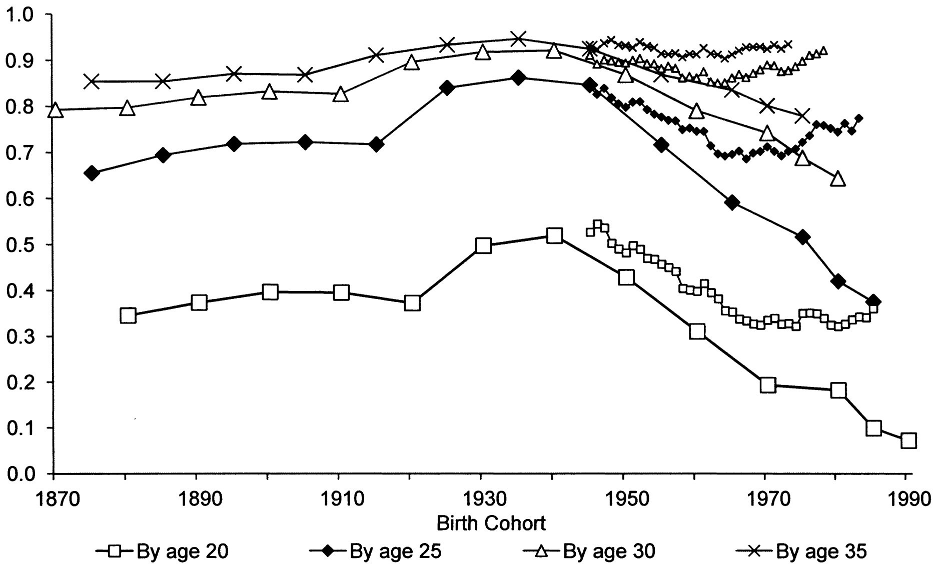

Fig. 8.4 Share of women ever married or cohabiting, by age and birth cohort

Sources: 1900–2000 decennial census IPUMS samples and 2006–2010 ACS (Ruggles et al. 2010); 1988–2010 NSFG.

Notes: The series with larger markers represent the share of women ever married by the indicated age and is based on current marital status being any category other than never married in the census. The smaller markers represent the share of women ever married or cohabiting by the indicated age from the NSFG and are smoothed using three-cohort moving averages.

had married, but over 70 percent had cohabited.[10] Marriage plus cohabitation trends seem to have stabilized around the historical level of age at first union for cohorts born after 1960, and women in their thirties may even be slightly more likely to have married or cohabited than women of the past.

Presuming nonmarital cohabitation was rare in the early twentieth century, combining these nonmarital cohabitation and marriage rates suggests a surprising similarity in the age at first union in the early and later twentieth century. The apparent "delay in marriage" is an artifact of the rise in nonmarital cohabitation, and the share of women married or cohabiting by age thirty-five is higher today than it was earlier in the twentieth century (the share was around 87 percent before the 1915 birth cohort and rose to around 95 percent for cohorts born in the 1930s, where it has remained).

10. Appendix figure 8A.1, panel A, shows the distribution of age at first marriage for select birth cohorts. Appendix figure 8A.1, panel B, shows the effect of including nonmarital cohabitation to this distribution for two recent cohorts. Whereas cohabitation alters the distribution for the birth cohort of 1950 negligibly, it significantly revises the distribution for women born in 1970 to look more like the 1950 distribution.

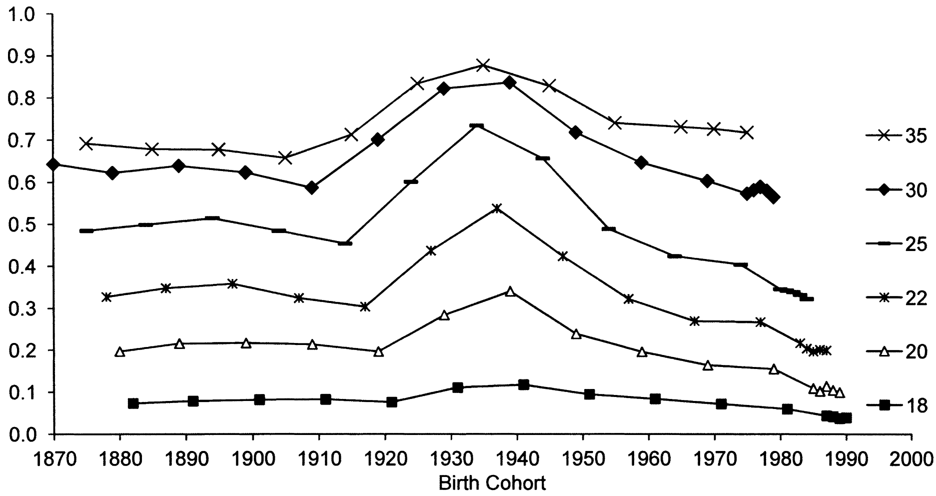

Fig. 8.5 Share of women with own child in their household, by age and cohort

Sources: 1900–2000 decennial census IPUMS samples and 2006–2010 ACS (Ruggles et al. 2010).

Note: The series show the share of all women with at least one own (but not necessarily biological) child in their household at the indicated age.

Changes in the mean age at first birth today are also similar to their early twentieth-century mean. Although the June CPS does not provide information on older cohorts' ages at first birth (so they cannot be included in figure 8.3), figure 8.5 uses census data to track the share of women with their own child in the household for the birth cohorts of 1875 to 1990 across several ages.[11] Consistent with age at first birth rising and birth spacing increasing, the low-fertility cohorts experienced modest reductions in the share of women with children at home by age twenty (2 percentage points), age twenty-two (6 percentage points), age twenty-five (5 percentage points), and age thirty (6 percentage points) and a 6 percentage point *increase* in the share at age thirty-five.

Unlike the low-fertility cohorts, the timing of marriage and age at first birth diverged sharply for cohorts reaching childbearing age after 1960. Figure 8.3 shows that the mean age at first birth was approximately 25 for the low-fertility cohorts, whereas it was 22.4 for the birth cohort of 1940 and about one year older at 23.5 for the cohort of 1950. Although their age at first marriage and age at first birth were both *lower* than the low-fertility cohorts, most of the women born in or after the late 1940s would go on to

11. The census allows us to identify that a child belongs to a particular mother in the household, but we cannot identify whether that child was born to the woman, adopted by her, or is a stepchild.

have just two or fewer children in their lifetimes—fewer than the low-fertility cohorts. For instance, 42 percent of the 1947 birth cohort had a child by age 22, whereas only 32 percent of the 1907 cohort did so (figure 8.5). For the low-fertility cohorts, motherhood delay was not just at very early ages but continued into older ages. By age thirty, 72 percent of the 1949 birth cohort had a child whereas only 59 percent of the 1909 birth cohort did.[12] In fact, in terms of levels, motherhood timing among women born in the 1940s looks more similar to that of baby boom mothers than to that of the low-fertility cohorts. Only recently has motherhood delay reached and then surpassed levels observed in the early twentieth century.[13] The cohorts born in the *late* 1970s were just as likely to be mothers at age thirty as women born seventy years earlier.

In summary, our analysis of completed childbearing, age at first marriage, and age at first birth affirms the findings of other studies. The early and later twentieth-century cohorts both achieved low mean levels of completed childbearing (2.3 and 1.9, respectively), and the speed of fertility decline was comparable for period and cohort-based measures. Lesthaeghe and van de Kaa (1986) argue that today's low rates of childbearing are a hallmark of the SDT, but US fertility rates in the post-1960 period do not appear exceptional relative to the early twentieth century. In addition, comparing today's cohorts to the low-fertility cohorts shows small differences in the mean age at first union after accounting for increases in nonmarital cohabitation. They are also similar in terms of the mean age at first birth. Based on means alone, one might agree with Cliquet (1991), who argues that the hallmarks of the SDT existed before the baby boom and emerged around the turn of the century (72). These similarities also motivate Becker's argument that "the 'contraceptive revolution' . . . ushered in by the pill has probably not been a major cause of the sharp drop in fertility in recent decades . . . [W]omen in the United States born between 1900 and 1910 had quite small families without the pill by using other contraceptives, abstinence, and induced abortions" (1981, 101–102).

As the next sections will show, these similarities in means mask important changes in the underlying distribution of children ever born (feature 1), the distributions of age at first marriage and age at first birth, and the

12. This can also be seen in appendix figure 8A.2, which plots the distribution of age at first birth for these cohorts using data from the June CPS and NSFG.

13. See appendix figure 8A.3. During the early twentieth century, women in their early twenties had the highest birth rates, followed by women in their late twenties, early thirties, late thirties, and then by teens and older women. Consistent with substantial delays in motherhood today, women in their late twenties now have the highest birth rates. In 2010, birth rates to women in their early thirties exceeded those among women in their early twenties for the first time in ninety years (Linder and Grove 1947; Grove and Hetzel 1968; Martin et al. 2012). Age-specific birth rates also show that the levels of teen birth rates today are closer to those of the early twentieth century than they have been since the 1930s. Given frequently cited concerns about high rates of teen childbearing in the United States, only in the last few years have teen birth rates dipped to ninety-year lows (i.e., lower than rates recorded in 1918).

interrelationship between marriage and childbearing (feature 2). They also mask the transformation in the relationship between women's education and childbearing outcomes (feature 3).

8.3 The Emergence of the Two-Child Family and Falling Childlessness

An important part of our story is that the earlier and later cohorts reduced their fertility in strikingly different ways. For instance, the distribution of live births for the 1850 birth cohort looks almost uniform between 0 and 6 live births, as roughly 8 to 10 percent of women each achieved exactly one of those numbers (figure 8.6). For the 1850 cohort, the share having each of 7 to 11 children ranges from 7 to 3 percent, respectively.

Becker (1981, 100) shows that the number of children one could expect to have, n, can be written as $n = E/(C + S)$, where E is the number of months one is at risk of becoming pregnant (the interval from first coitus to when one is no longer fecund), and $C + S$ represents the average number of months between births, often called spacing. He argues that fertility rates could be

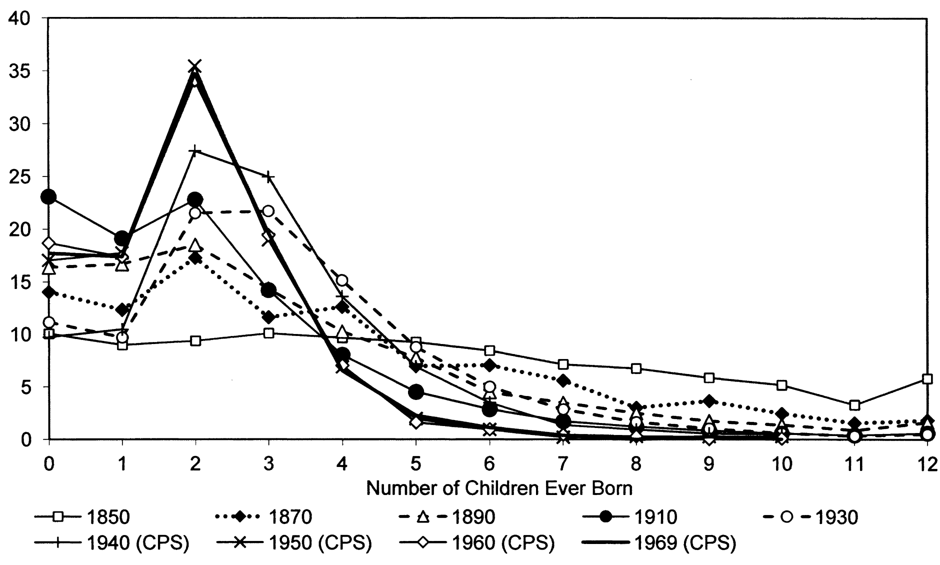

Fig. 8.6 Distribution of completed childbearing, by birth cohort, 1850–1969

Sources: 1850 to 1930 cohorts use the 1900, 1910, and 1940–1990 decennial census IPUMS samples (Ruggles et al. 2010); 1940 to 1969 cohorts use the 1981 through 2010 June CPS.

Notes: The figure plots the percentage of women age forty-one to seventy who report having each number of children. We include never-married women in the 1970 to 1990 censuses and June CPS when available so that figures include the recent rise in nonmarital childbearing. Children ever born is top-coded at twelve in the census and ten in the CPS. Differences between the CPS and census in overlapping cohorts were trivial (see figure 8.1), so seaming issues between surveys should be minimal.

reduced by almost 25 percent by delaying marriage (and thus reducing E) but that they could also be reduced by greater spacing (increasing $C + S$). The reduction in childbearing between the cohorts of 1850 and 1910 is consistent with using these types of strategies to reduce completed childbearing. During the late-nineteenth- to early-twentieth-century period of fertility decline, each generation of women substituted toward fewer children. As we subsequently show, changes in the age at first marriage seem much less important than spacing and stopping in this period of US history. Two-thirds of women in the cohort of 1910 achieved two or fewer children. A striking 23 percent of this birth cohort were childless at ages forty-one to seventy, another 20 percent had only one child, and 23 percent had exactly two children—thus, the commonly used label, the “low-fertility cohorts.”

A similar share of women born from 1940 to 1970 had two or fewer children, yet these cohorts are different in two (related) ways. First, the post-1960 cohorts realized the “two-child norm.” Figure 8.6 shows this as a collapse of the childbearing distribution about the two-child mode. Furthermore, a substantially larger share of the later cohorts achieved *exactly* two children. In contrast to the fairly equal division of mass between zero, one, and two children for the cohort of 1910, 17 percent of the 1950 cohort had no children at age forty-one to seventy. Another 17 percent had one child, and over 35 percent had exactly two children. Moreover, a significantly greater share of the later cohort had three children (19 percent versus 14 percent in the cohort of 1910), though fewer had four or more children. The distributions for the 1960 and 1969 cohorts from the June CPS are almost identical to the 1950 distribution; they are difficult to make out in figure 8.6 because they lie almost exactly on top of one another. The only discernible difference is a very small rise in the share of women remaining childless: from 17 percent for the cohort of 1950 to 18 percent for the cohort of 1969. In contrast to the fairly large changes every twenty years since the 1850s, the distribution of children ever born has been remarkably stable among women completing their childbearing in the last twenty years.

Second, the post-1960 cohorts experienced dramatic declines in within-cohort dispersion, in terms of both standard deviation (and range), and the coefficient of variation, which normalizes the standard deviation by the falling mean.[14] For the birth cohorts of 1880 through 1910, the coefficient of variation suggests that within-cohort dispersion *grew* during the early twentieth-century fertility decline, as certain groups (such as foreign-born white women) decreased their childbearing to native levels while the childbearing of other groups (such as rural women and nonwhite native women) remained much higher (figure 8.2). The within-cohort dispersion

14. The coefficient of variation (the ratio of the standard deviation to the mean) provides a succinct, scale-invariant summary of within-cohort differences. Scale invariance is desirable in this context because the mean number of children born falls so dramatically across cohorts, mechanically reducing the variance and standard deviation.

in live births was highest for women born from 1900 to 1910—the cohorts experiencing the lowest pre–baby boom levels of completed childbearing.

During the baby boom, however, dispersion in childbearing fell, as groups with previously falling fertility rates changed course to have more children. This reversal reduced within-cohort differences in childbearing, and the coefficient of variation reached a one hundred-year nadir for cohorts born in the mid-1930s—those giving birth to the largest number of children during the baby boom. For cohorts reaching childbearing age after 1960, the strong negative relationship between the mean and dispersion in childbearing disappeared. As completed childbearing fell to 1.9 for the later cohorts and the two-child family became far more universal, the coefficient of variation grew only slightly, from 0.66 to 0.73.

These two findings challenge the conventional wisdom about the recent period as well as assertions of exceptional and increasing rates of childlessness. It is true that childlessness rates for the most recent cohort we can measure (born 1969) are 6 to 7 percentage points higher than those for cohorts thirty to forty years older (born 1930 to 1940), but they are 6 percentage points *lower* (17 versus 23 percent) than the low-fertility cohorts. Similarly, a *smaller* share of recent cohorts had exactly one child relative to the low-fertility cohorts. Consistent with Michael and Willis's model that better contraception reduces precautionary undershooting, more recent cohorts are less likely to have fewer than two children. This finding may be surprising given qualitative evidence and media accounts of women having overestimated their ability to get pregnant at older ages. Taking these accounts at face value, however, suggests that childlessness rates may fall even further if younger cohorts of women adapt their behavior to minimize the risk of subfecundity or if medical technology increasingly facilitates births to older women. The two-child mode, decreasing childlessness, and reduced variance in number of children suggest that women have been better able to reach their desired number of children since 1960 than in the 1920s and 1930s.[15]

Both patterns in marriage and childbearing suggest that spacing between births and perhaps stopping at the desired number of children *within* marriage played major roles in the fertility decline of the early twentieth century. During this period, a large market developed for devices and nostrums to limit childbearing, and knowledge—some factual and some quackery—diffused quickly in the late nineteenth century (Tone 2001). Many of the advertised "contraceptives" were highly ineffective, and couples largely relied on natural methods like rhythm and abstinence to achieve their desired numbers (Brodie 1997).

The low-fertility cohorts were not limiting childbearing by delaying

15. Using data on the "ideal" (or desired) number of children for each woman in the NSFG, we have verified that the distribution of actual children born changed substantially more than did the distribution of ideal children between the earlier and later cohorts. This can be seen in appendix figures 8A.4, panel A and 8A.4, panel B.

intercourse and marriage (shortening the period of exposure to the risk of pregnancy) but were limiting childbearing within marriage (David and Sanderson 1987). The shift in figure 8.6 from a more diffuse distribution of children ever born for the birth cohort of 1870 to a distribution with a high concentration of two or fewer births for the birth cohort of 1910 was achieved *within* marriage. Women achieved much smaller families in the early twentieth century by spacing children as in figure 8.5, or by increasing the denominator in $n = E/(C + S)$.

One fascinating pattern of the later twentieth-century fertility decline is that it occurred *despite* a younger (and stable) age at first union and, initially, a younger age at first birth. As with the low-fertility cohorts, women reaching childbearing age after 1960 achieved low completed childbearing without delaying marriage. Yet, completed fertility ended up being lower for women born after 1945 than for the low-fertility cohorts *despite* considerably earlier and more universal marriage. In addition, the mean age at first birth for women born in 1945 was lower than that of many of the baby boom mothers. This pattern, together with the sharp reduction in the variance of childbearing, hints that women were able to stop much more easily at their desired number of children.

8.4 The Decoupling of Marriage and Motherhood

Historically, decisions about whether and when to marry were strongly related to the age at first birth and completed childbearing. They were also tightly connected through their relationships to age at first intercourse. The shift to nonmarital cohabitation, however, foreshadows one of the most distinctive shifts in childbearing since 1960: its disassociation with marriage. The relationship between age at first marriage, sex, and motherhood changed dramatically over the twentieth century and became much weaker during the second half.

Figure 8.3 shows that the mean age at first marriage and the mean age at first birth have become increasingly similar—separated by less than one year for cohorts born in 1970. This convergence could mean that marriage increasingly signals that couples are ready to have children, but in reality the reverse is the case. Marriage and childbearing have become less—not more—interrelated in recent years.

The overall narrowing in the mean age at first birth and the mean age at first marriage is closely related to changes in the interval between first marriage and first birth. Among those who married and gave birth by age thirty-five (but not in a particular order), 57 percent of the 1910 cohort first gave birth within two years after marriage, 45 percent of the 1950 and 1960 cohorts did so, and only 35 percent of the 1970 cohort did so. The mean length of the interval between marriage and motherhood fell from 2.2 years for the cohort of 1910 to 1.5 years for the cohort of 1940 before rising back to 2.0 years for the 1950 cohort. For younger cohorts, the interval between marriage and motherhood fell *again*, to 1.7 for the 1960 cohort and to 0.9 for the 1970 cohort. This pattern conflates two opposing trends. Among women who married *before* giving birth, the interval from first marriage to first birth *increased* from 2.8 years for the 1950 cohort to 3.2 for the 1970 cohort. Aggregate declines in the interval are driven by an increasing number of women marrying *after* the birth of their first child—a negative interval between first marriage and first birth.

Figure 8.7 quantifies what many have referred to as the "sexual revolution." The share of women who first had intercourse in their teens increased sharply for cohorts born in the late 1940s. Although the distribution of age at first intercourse appears relatively stable from the calendar years 1955 to 1965 (calendar year series suppressed for brevity; figure 8.7 shows statistics by cohort), the mean age at first intercourse began to fall rapidly starting in the late 1960s. This strong period effect, less evident in our cohort figure, is consistent with cohorts being affected at different ages. The birth cohort of 1948 was eighteen in 1966, and the share having intercourse by eighteen rose for subsequent cohorts. Similarly, the birth cohort of 1950 was sixteen in 1966, and the share having intercourse by age sixteen rose rapidly for subsequent cohorts. We cannot construct similar statistics for the early cohorts,

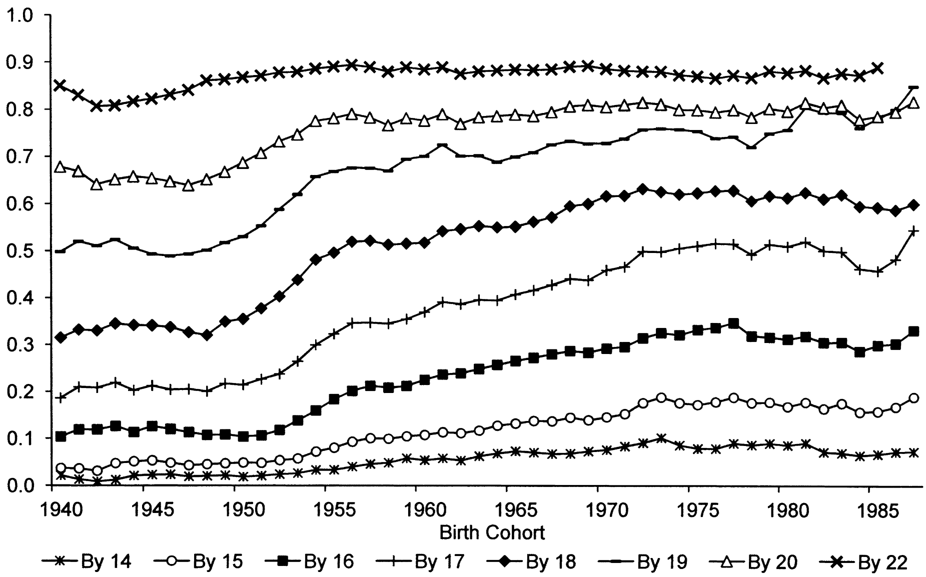

Fig. 8.7 Fraction of women having first sex, by age and birth cohort

Source: 1982–2010 NSFG.

Note: The series show the fraction of women having had vaginal intercourse with a man by the specified ages across birth cohorts. Trends are smoothed using three-cohort moving averages.

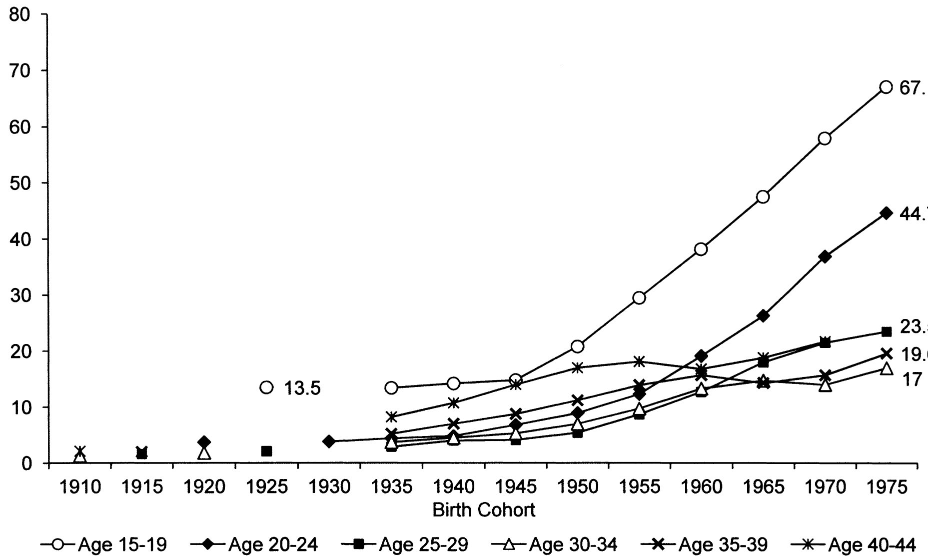

Fig. 8.8 Percentage of births to unmarried women, by birth cohort

Source: National Vital Statistics Reports (Ventura and Bachrach 2000; Martin et al. 2007, 2012).

Notes: The series are the percentage of births to unmarried women for the indicated age groups for each cohort (x-axis). The births are reported for five-year age groups, and we assume the start of the age group for the five-year band. For example, 13.5 percent of births to women born between 1921 and 1925 between the ages of fifteen and nineteen were born to unmarried women.

but all of our analysis thus far suggests that the baby boom period should have led to *earlier* first intercourse (along with earlier first marriage and birth) relative to the low-fertility cohorts.[16] In short, age at first intercourse fell during the 1960s and 1970s as *both* age at first marriage and age at first birth rose.

The post-1960 period has also witnessed a rise in births to unmarried women (figure 8.8). As premarital sex increased, so did the proportion of births that were nonmarital—especially among teens.[17] For cohorts born between 1940 and 1960, nonmarital teen births rose from approximately 14 percent to almost 40 percent of all births. Similarly, the same cohorts experienced a noticeable rise in nonmarital births during their early twenties. As completed fertility for the youngest cohorts has stabilized, the nonmari-

16. We expect that data on age at first intercourse for these earlier cohorts of women would show that even fewer had sex as teens (rather than more). Using the baby boom cohorts as our starting point, therefore, should lead us to understate the increase in sexual activity among younger teens.

17. We do not intend to convey a causal direction with the ordering of this statement. Nonmarital sex may have increased because more women desired children but not husbands.

tal share of births has risen dramatically. Older women have also seen rising nonmarital birth rates, although the increase is more muted. In 2011, over 40 percent of all births were to unmarried women.

These numbers do not imply that premarital sex or premarital *pregnancies* were uncommon in the United States before 1960. Smith and Hindus (1975) argue that in the late 1800s and early 1900s as many as 10 to 15 percent of brides gave birth within six to eight months of marriage. In the past, however, nonmarital *births* occurred far less frequently because nonmarital conceptions more often resulted in "shotgun" marriages.[18] A distinctive feature of the post-1960 period fertility decline is that marriage and motherhood became decoupled—motherhood more frequently occurred before marriage and many married couples increasingly delayed childbearing until later ages in marriage.

8.5 The Changing Relationship between Mothers' Education and Childbearing

A third distinctive feature of the post-1960 period is the changing predictive importance of mothers' education. On the one hand, more and less educated women have converged in terms of the likelihood of marriage and childlessness as well as the number of children they have. On the other, they have diverged, often sharply, in terms of their age at first union, their age at first birth, and nonmarital childbearing.

This section presents trends in women's childbearing outcomes by relative educational attainment because education serves as a consistent proxy for socioeconomic status over the twentieth century. It is related to a woman's family earnings (own and spouse's) and her husband's education. Moreover, each woman's education is observed in the census even when we do not observe her earnings, occupation, or her spouse's earnings. Our analysis uses a *relative* measure of education because the share of women with a given absolute level of education has changed dramatically over the twentieth century.[19] Women whose educational attainment is below the 25th percentile for their cohort are grouped with the "lower quartile" and those above the 75th percentile are grouped with the "higher quartile."

Our analysis summarizes trends across birth cohorts in six outcomes

18. Akerlof, Yellen, and Katz (1996) provide an economic bargaining model that relates availability of abortion and modern contraception to the decline in "shotgun" marriages.

19. We employ a quantile regression of an individual woman's years of schooling on birth year dummies and a quartic in age interacted with dummies for twenty-year birth cohort intervals (1880–1899, 1900–1919, etc.). Predicted values from the quantile regression (either at the 25th or 75th percentiles) are then compared with actual values for each woman. Because there is significant heaping in the education distribution (particularly at twelve and sixteen years), we first "smooth" actual education values by adding a stochastic noise term drawn from a uniform distribution of width 1, centered at 0. This procedure preserves the cohort quantiles while alleviating composition changes due to heaping in the education distribution.

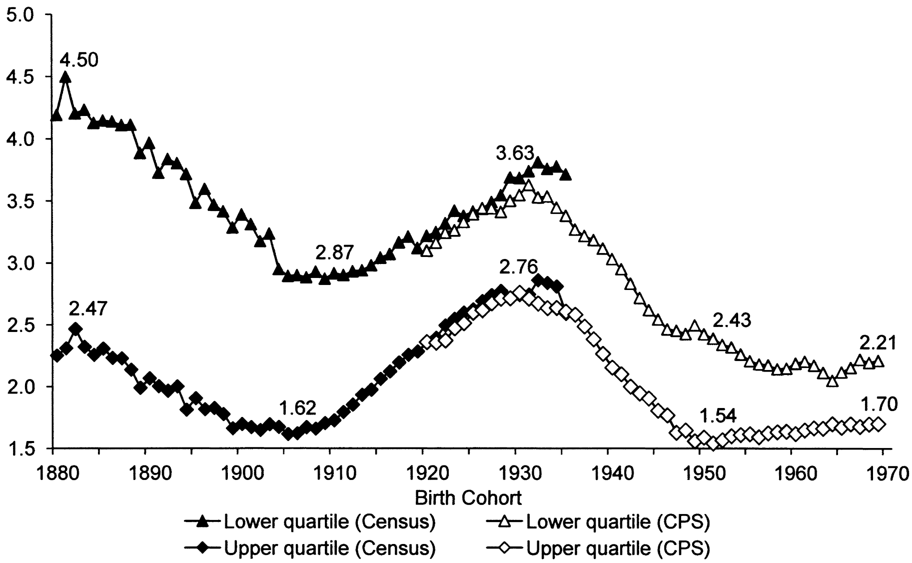

Fig. 8.9 Children ever born, by education quantile and birth cohort

Sources: 1940–1990 decennial census IPUMS samples (Ruggles et al. 2010) and 1979–2010 June CPS.

Notes: The figure plots the mean number of live births among women ages forty-one and older, by birth cohort, for the census (1880 through 1935 cohorts) and the same statistic for women in the June CPS (1920 through 1969 cohorts). See text for education group definitions. All computations use the recommended population weights, and the CPS series are three-cohort moving averages.

associated with the distinctive features of the post-1960 period: (1) mean children ever born, (2) childlessness (the share of women who have not given birth), (3) the share of women ever married or cohabiting by age thirty-five, (4) age at first marriage, (5) age at first birth, and (6) the share of women whose first birth was nonmarital. In the first two cases, we restrict the sample to women at least forty-one years of age for comparison with the trends in figures 8.1 and 8.2. For the other four, we use women at least thirty-six years of age in order to balance the need to preserve sample size (the analysis relies on the smaller samples of the NSFG for the more recent cohorts) and consistency across cohorts.[20]

Figure 8.9 documents changes in childbearing for women in the upper and lower quantiles of the education distribution. It is well known that women with less education have tended to have more children than women with more education. Less well known is that the most educated women in the low-fertility cohorts were having approximately 1.6 children over their

20. We have calculated the trends for outcomes (3) through (6) using women at least forty-one years of age. Although noisy, they are qualitatively similar to the figures we present.

lifetimes—fewer, on average, than today. After reaching a nadir at a mean of 1.5 children for the 1950 cohort, the more educated women increased the number of children they had to approximately 1.7 for the cohort of 1970. In contrast, the less educated women have far fewer children today than did the low-fertility cohorts, reaching a ninety-year low of 2.2 for the 1970 cohort. The result is that inequality in completed childbearing between these two groups of mothers is also at a ninety-year low. The overall narrowing in the education gap in childbearing has been driven not just by falling completed fertility among the less educated but also by an increase in childbearing among the more educated women.

Similarly, childlessness is much lower among the more educated women today than it was for the low-fertility cohorts and cohorts born in the 1950s. Figure 8.10 shows that childlessness rates have tended to be higher among the more educated women (a relationship that almost disappeared during the baby boom). The more educated women in cohorts reaching childbearing age in the 1970s had roughly the same rates of childlessness as the early twentieth-century cohorts (around 29 percent) but, in more recent cohorts, childlessness has *fallen*. Only 21 percent of the more educated women born in 1969 were childless by age forty-one. Similarly, childlessness rates among the less educated are lower for recent cohorts compared to the early twentieth-century cohorts.

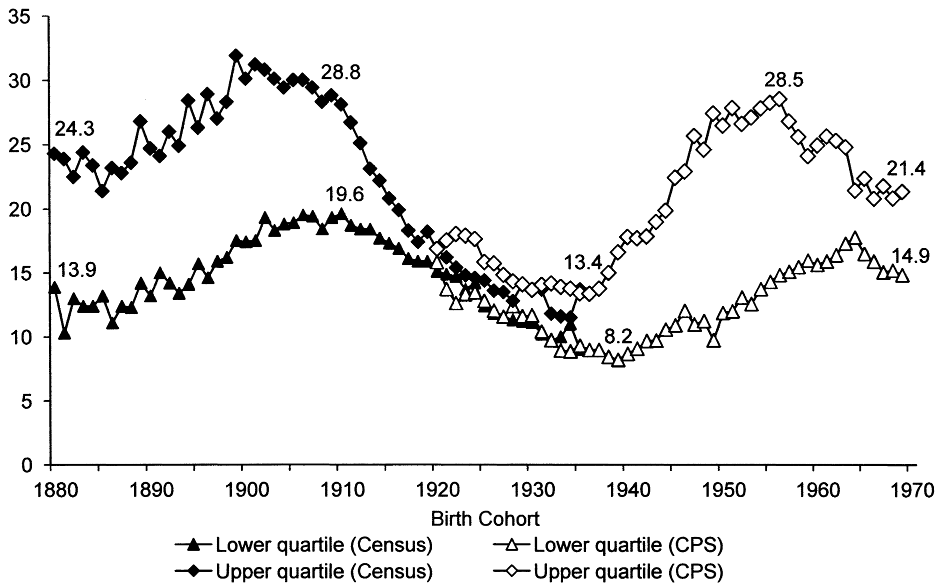

Fig. 8.10 Childlessness, by education quantile and birth cohort

Sources: See figure 8.12.

Notes: The figure plots the percentage of women age forty-one and older who have not had a live birth, by birth cohort, for the census (1880 through 1935 cohorts) and the same statistic for women in the June CPS (1920 through 1969 cohorts). See notes for figure 8.12.

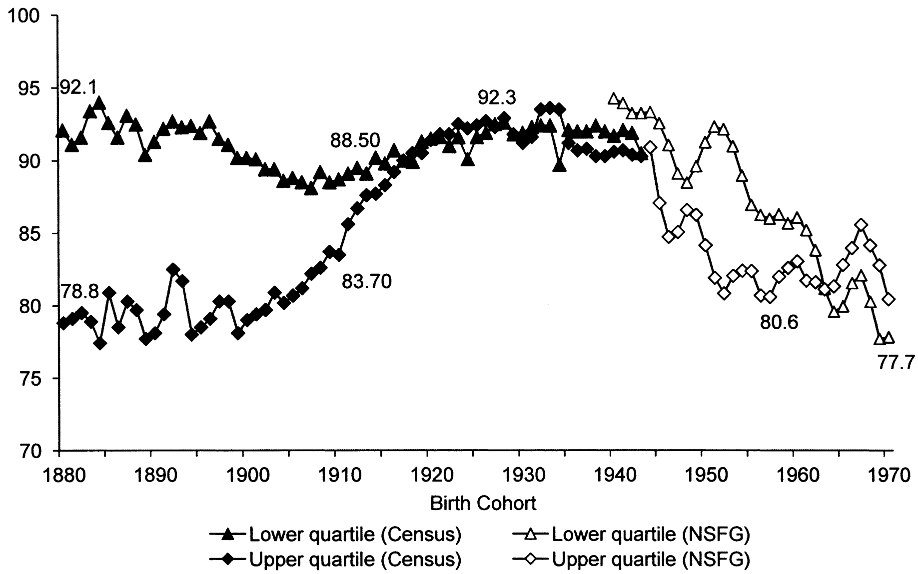

Fig. 8.11 Ever married by age thirty-five, by education quantile and birth cohort

Sources: 1940–1980 decennial census IPUMS samples (Ruggles et al. 2010) and 1982–2010 NSFG.

Notes: The figure plots the percentage of women ever married by age thirty-five among women age thirty-six and older, by birth cohort, for the census (1880 through 1943 cohorts) and the same statistic for women in the NSFG (1940 through 1970 cohorts). See text for education group definitions. All computations use the recommended population weights and the NSFG series are five-cohort moving averages.

Marital decisions have changed differentially by education group as well. Figure 8.11 shows that among women born at the turn of the twentieth century, the less educated were 10 to 15 percentage points *more* likely to have married by age thirty-five. Unlike the other series we present, the education gap began disappearing for women in the low-fertility cohorts—before the baby boom began. Between the cohorts of 1900 and 1920, the likelihood of ever marrying trended upward among the more educated women. For women born over the next twenty years (the mothers of the baby boom), the likelihood of marriage reached parity for both education groups. The education gap reemerged for the 1940s and 1950s birth cohorts, but has since reversed. Today, the more educated women appear slightly *more likely* to marry than do the less educated women, although the NSFG data are too noisy to conclude this definitively.[21]

For these first three series (mean completed childbearing, childlessness, and the likelihood of marriage or cohabitation by age thirty-five), the more educated women today appear more similar to their less educated counterparts than do women in the low-fertility cohorts. That is, women's education

21. This conclusion is unaltered if we restrict the sample to women at least age forty-one.

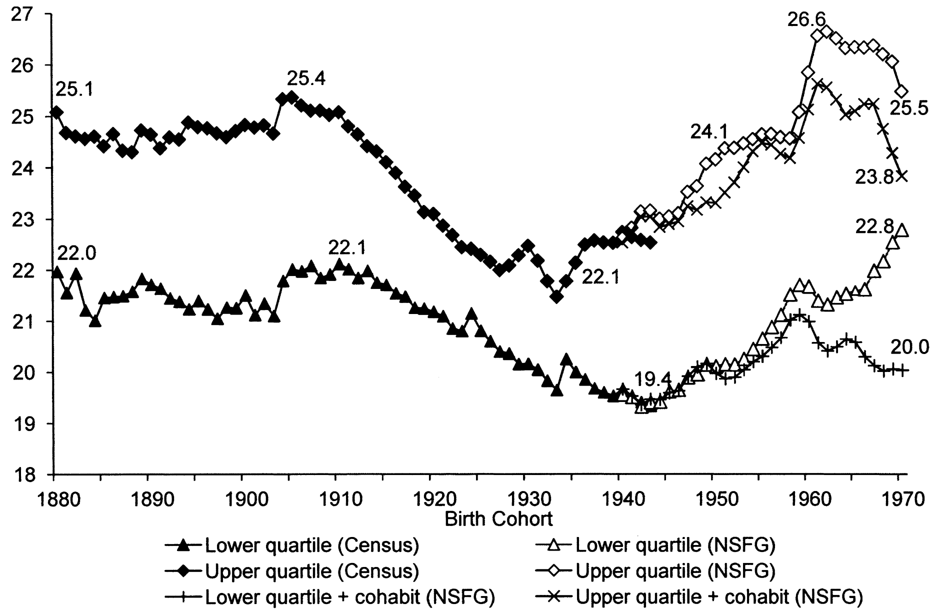

Fig. 8.12 Age at first marriage and cohabitation, by education quantile and birth cohort

Sources: 1940–1980 decennial census IPUMS samples (Ruggles et al. 2010) and 1982–2010 NSFG.

Notes: The figure plots age at first marriage among ever-married women age thirty-six and older by birth cohort using the census (1880 through 1943 cohorts) and the NSFG (1940 through 1970 cohorts). For the NSFG cohorts, there are also series plotted for the younger of age at first marriage or age at first cohabitation (conditional on one of these events occurring by age thirty-five). See text for education group definitions. All computations use the recommended population weights and the NSFG series are five-cohort moving averages.

has become a less important predictor of these outcomes. The reverse is true for age at first union, age at first birth, and nonmarital childbearing.

Age at first union (either through marriage or cohabitation, figure 8.12) for the less educated women is lower today than it was for women born at the beginning of the twentieth century and higher than it was during the baby boom. Excluding cohabitation, on the other hand, age at first marriage is higher than that of the low-fertility cohorts and 3.5 years higher than during the baby boom. The pattern for more educated women is qualitatively similar although the swings have been somewhat larger. As a result, the education gap in age at first union is about one year larger today than it was for the low-fertility cohorts.[22]

22. The education gap is about half a year smaller if one looks strictly at marriage. This smaller gap, however, emerged only for cohorts born in the late 1960s. The education gap in marriage age was larger than that for the low-fertility cohorts as recently as the 1968 cohort.

Age at first birth (figure 8.13) and nonmarital childbearing (figure 8.14) have shown the most dramatic changes by education since 1960. In the early twentieth century, the gap in age at first birth between more and less educated women was around 3.5 years. After falling by about 0.5 years during the baby boom, as mean age at first marriage fell faster for the more educated women, the gap has expanded to almost seven years in the post-1960 period—roughly *twice* the size of the education gap for the 1910 cohort. The more educated women born around 1970 waited two years longer to first give birth than did their counterparts fifty-five years earlier, whereas the less educated gave birth 1 to 1.5 years *earlier* than they did historically—leading to an overall mean that is nearly identical for the 1910 and 1970 cohorts. Interestingly, the mean age at first birth for the less educated has remained essentially the same since the baby boom.

As the age at first birth of the less educated mothers remained at sixty-year lows, their rate of nonmarital childbearing grew rapidly. Following a period of stability during the baby boom, at around 11 to 13 percent for the less educated mothers and 4 to 6 percent for the more educated mothers, the gap in nonmarital births exploded for cohorts born after 1950. Nonmarital

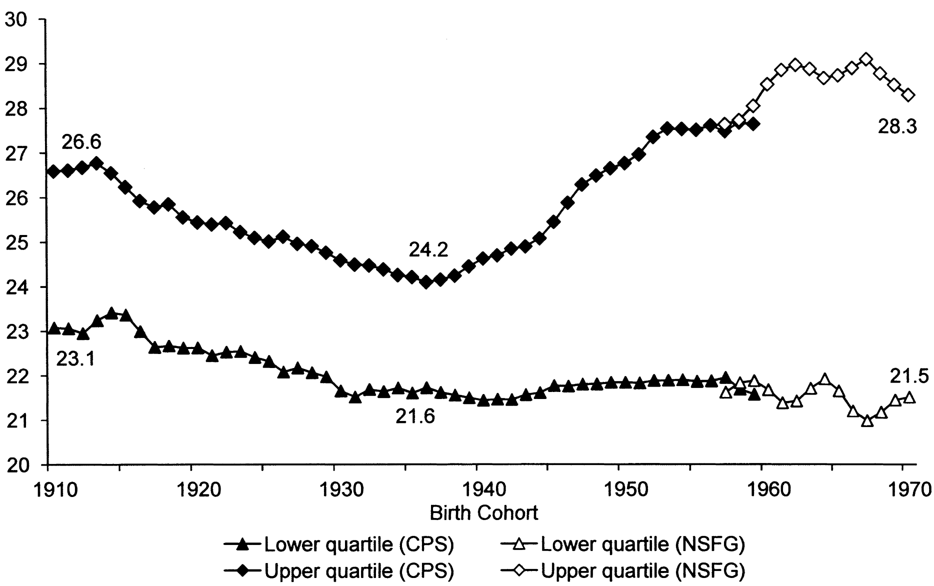

Fig. 8.13 Age at first birth, by education quantile and birth cohort

Sources: 1979–1995 June CPS and 1995–2010 NSFG.

Notes: The figure plots age at first birth among women age thirty-six and older, by birth cohort, for the June CPS (1910 through 1959 cohorts) and the same statistic for women in the NSFG (1957 through 1970 cohorts). See text for education group definitions. All computations use the recommended population weights. The June CPS series use three-cohort moving averages, and NSFG series are five-cohort moving averages.

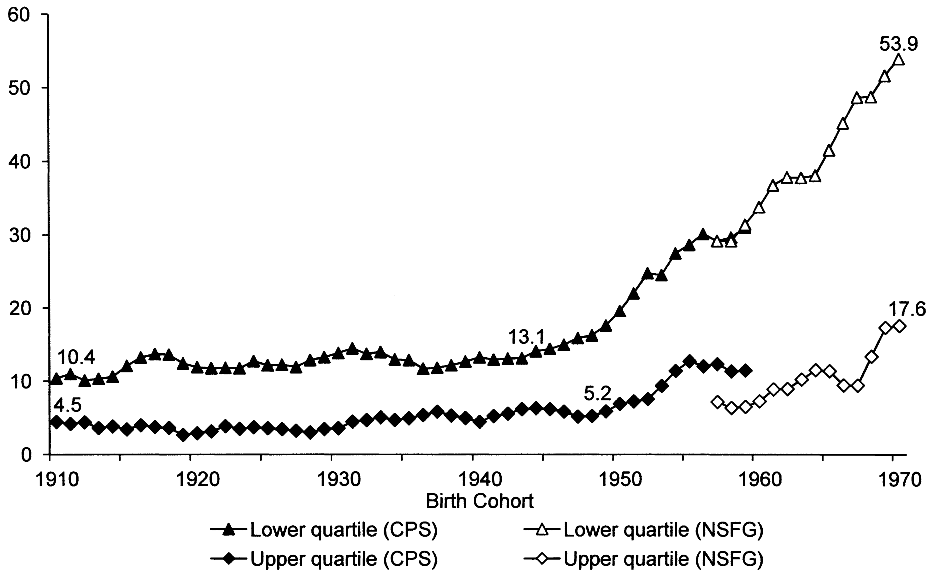

Fig. 8.14 Nonmarital first childbirth, by education quantile and birth cohort

Sources: 1979–1995 June CPS and 1995–2010 NSFG.

Notes: The figure plots the percentage of first births that are nonmarital among women age thirty-six and older, by birth cohort, for the June CPS (1910 through 1959 cohorts) and the same statistic for women in the NSFG (1957 through 1970 cohorts). See text for education group definitions. All computations use the recommended population weights. The June CPS series use three-cohort moving averages and NSFG series are five-cohort moving averages.

childbearing grew across the education distribution, but relatively slowly for the top quartile. Among women born in the late 1960s, the share of nonmarital childbearing reached three times the historic average for more educated women and over four times the historically higher average among less educated women. For the most recent cohorts, 54 percent of first births among the less educated are nonmarital.

This growing divergence indicates that the second distinctive feature of the post-1960 period—the decoupling of marriage and motherhood—has taken place along class lines. Whereas trends in children ever born, childlessness, marriage age and rates, nonmarital childbearing, and age at first birth moved in tandem across the educational distribution during the early twentieth-century fertility decline, the latter three outcomes diverged for more and less educated women after 1960.

8.6 Conclusions and Implications for Human Capital

At first glance, the US fertility decline in the post-1960 period does not appear to be a significant departure from the one in the early twentieth century. Aggregate fertility fell at similar rates in both periods and this similarity reinforces just *how different* the 1940s and 1950s were. In each series presented, the 1940 to 1960 period (or the 1915 to 1935 cohorts) exhibits a substantial departure from earlier and later trends. Changes in sexual behavior within marriage—a *behavioral* revolution before the contraceptive revolution—may in part explain the decoupling of marriage from birth rates in the early twentieth century. The low-fertility cohorts in the United States were successful in limiting childbearing through increased spacing and stopping—especially given the relatively stable age at first marriage during the period. Thus, our analysis presents evidence that Coleman's (2004) argument holds in the United States: many trends in reproductive and relational behavior "already existed before the sixties; in fact, most of them emerged with the . . . demographic transition around the turn of the century" (72).

Yet distinctive features of the post-1960 US fertility decline should give pause to scholars who wish to argue that the two twentieth-century fertility declines are identical. After 1960, women were significantly more likely to have exactly two children and were *less likely* to remain childless. Although women reaching childbearing age in the 1930s and 1970s had similar numbers of children on average, these cohorts achieved these means in very different ways. Most economic models simplify childbearing decisions to the number of children and proxy for this theoretical concept in empirical work by using the mean number of live births (or a measure of period fertility). Our analysis shows that this single moment of the childbearing distribution misses empirical regularities that enhance our understanding of the motivations and constraints individuals faced over the twentieth century—regularities that could help distinguish between theories of childbearing.

After 1960, marriage and motherhood became increasingly disassociated as more children were born outside of marriage. Consistent with Goldin's (2004) claim that recent cohorts are more likely to "have it all" (i.e., achieve career and motherhood), completed childbearing, childlessness, and the likelihood of eventual marriage are *more* similar across educational groups of mothers today than in the early twentieth century. On the other hand, age at first union, age at first birth, and nonmarital childbearing have diverged sharply across educational groups. The decoupling of marriage and childbearing and the changing predictive importance of mothers' education hint that a larger demographic and economic transition is underway. The fact that these patterns have not stabilized suggests that the current fertility transition, perhaps part of a larger gender (Goldscheider 2012) and cultural revolution, is still ongoing.

It is unclear whether these changes are large enough to constitute a "Second Demographic Transition." A different way to think about this debate is in terms of which forces drove fertility decline in the early and later twentieth century—specifically, the relative importance of shifts in the demand or supply (the reliability and cost of preventing pregnancy) for children in both periods. Our argument is not that *either* supply *or* demand mattered, but that both matter and have mattered differently at different points in time. The reduction in childbearing during the early twentieth century surely reflected large shifts in the demand for children. And reduced childbearing was realized at great cost, as individuals reduced the frequency of intercourse with their partners, used dangerous or debilitating contraceptive techniques,[23] attempted often lethal abortions, and missed their targeted number of children due to precautionary undershooting.[24] Shifts in the demand for children certainly played a role during the baby boom as well as in the post-1960 period.

Yet it is hard to ignore the contraceptive revolution (the supply side) of the 1960s, especially as a growing literature in economics—started by Goldin and Katz (2002)—has built an empirical case for its importance. Goldin and Katz (2002) argue that availability of modern and effective contraception (such as the birth control pill) to younger, unmarried women relaxed the constraints on their marital and human capital investment decisions. Bailey (2010) shows that faster diffusion of the Pill in states without preexisting Comstock bans on the sales of contraceptives led to a more rapid decline in fertility rates. The consequence was that younger women delayed their marriages, increased their educational attainment, and pursued previously male-dominated careers (Goldin and Katz 2002; Hock 2008). Modern birth control also increased women's labor force attachment and wages (Bailey 2006; Bailey, Hershbein, and Miller 2012).

Christensen (2011) also suggests that early access to the Pill affected decisions to cohabit before marriage, which in turn may have directly and indirectly altered women's incentives to specialize in household production. Greater cohabitation rates imply important changes in matching between men and women as well as changes in women's bargaining power within marriage. The greater rise in age at first marriage among more educated women means that they have more time to search for a mate, increasing both the quality of their matches and, potentially, the earnings of their households. The rise in cohabitation may also imply substantial changes in matching between men and women as well as in traditional gendered forms of household/labor force specialization. It also implies a shift in the meaning and/or implications of "marriage." For instance, marriage may have increasingly become a status symbol (McLanahan and Watson 2011) or motivated

23. One letter to Margaret Sanger read, "I am the mother of two lovely little girls. I have been married fifteen years. I married at the age of fifteen to escape a home that was overcrowded with unloved and unwanted children, where there was never clothing or food enough to divide among the eight of us . . . I have been pregnant 15 times, most of the time doing things myself to get out of it and no one knows how I have suffered from the effect of it, but I would rather die than bring as many children into the world as my mother did and have nothing to offer them" (Sanger 1923, 181–82).

24. In the Low Fertility Cohorts Study (Ridley 1978), for instance, 14 percent of women indicated that they desired fewer than two children, but 39 percent had fewer than two.

by consumption (rather than production) complementarities (Stevenson and Wolfers 2007).

The distinctive features of the post-1960 period suggest that the contraceptive revolution may have had broader effects on the US economy and may signal longer-term changes. Standard economic models predict that increases in women's human capital, their wages (an important component of the opportunity cost of childbearing), their ages at marriage, and their incomes would tend to increase investments in each child. Modern contraception may also directly reduce the relative price of child "quality" and thereby increase investments in the average child ceteris paribus (Becker and Lewis 1973). These hypothesized effects are consistent with recent evidence by Ananat and Hungerman (2012) and Bailey, Malkova, and McLaren (2013) showing that increased access to contraception increases the economic resources of children. Bailey (2013) also provides evidence that these investments may have affected the economic resources of these children thirty to forty years later.

The decoupling of marriage and motherhood and the changing role of women's education may have distributional implications as well. The recently *growing* educational gap in age at first birth and nonmarital childbearing anticipates a growing divergence in the resources available to children in households of lower and higher socioeconomic status. Consistent with this recent trend, the distribution of resources to children is becoming increasingly polarized—the destinies of higher and lower socioeconomic status children are diverging. McLanahan (2004), for instance, summarizes the empirical support for the idea that a child's environment has become more closely determined by socioeconomic factors. Mothers with higher relative education are more likely to be married, are more likely to work, give birth at older ages, and live in higher income households. Children who have a college-educated father spend more time with him than children who do not. Similarly, studies using data from the American Time Use Surveys have found that more educated mothers not only spend more time on all forms of child care than do less educated mothers (Guryan, Hurst, and Kearney 2008), but that they are also more likely to change the type of child care based on children's developmental needs (Kalil, Ryan, and Corey 2012). Ramey and Ramey (2010) argue that the objective of more educated parents to get their children into competitive colleges has further exacerbated gaps in parental investments.[25] Future research should consider how characteristics of the later twentieth century fertility transition relate to children's opportunities, educational achievement, and widening inequality in US labor markets.

25. To the extent that some of this behavior may be status-seeking signaling rather than productivity-enhancing investment, it may not affect outcomes much among the children of the more educated if the behavior is near universal among them.

Appendix

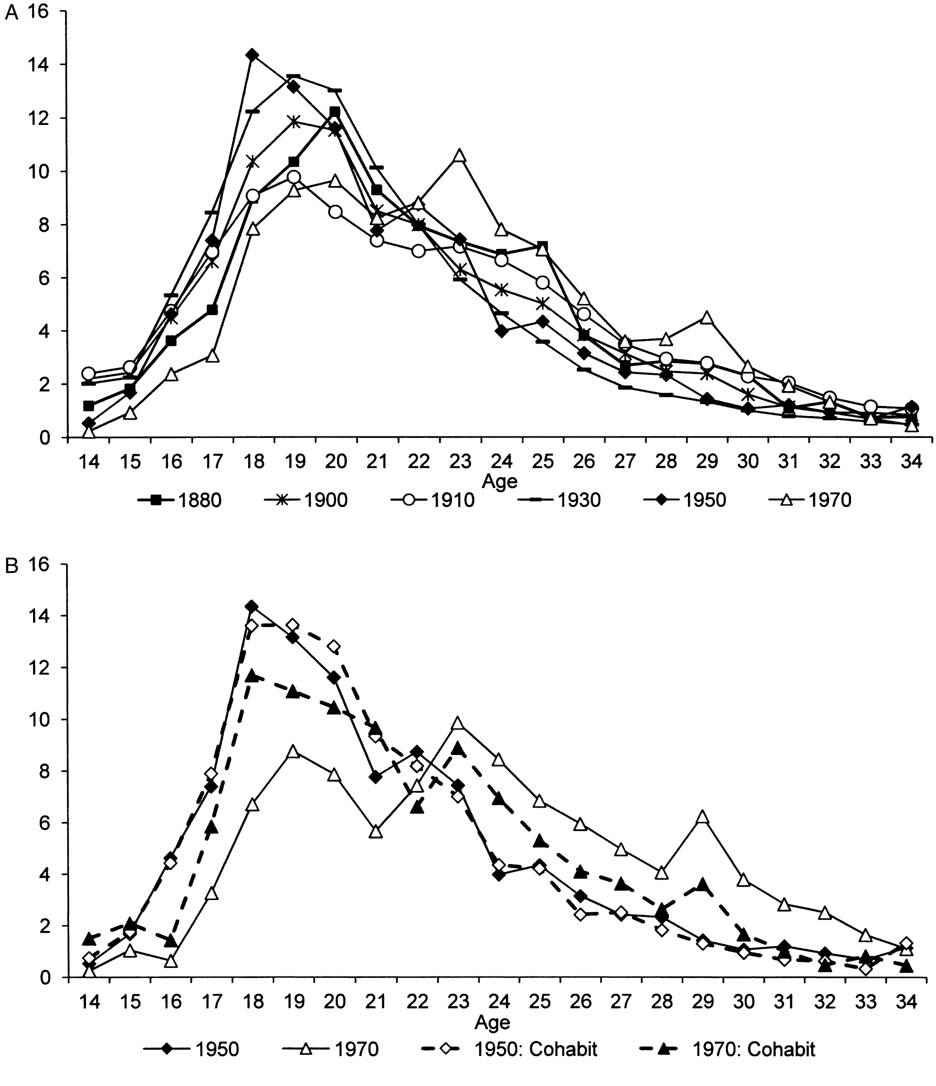

Fig. 8A.1 Percentage of women first marrying or cohabiting at each age, by birth cohort: *A*, distribution of age at first marriage; *B*, distribution of age at first marriage or first cohabitation

Sources: 1900 through 1940 cohorts use the 1940–1980 decennial census IPUMS samples (Ruggles et al. 2010), and 1950 and 1970 cohorts use the 1988–2010 NSFG.

Notes: The figure shows the percentage of women in the indicated single-year-of-birth cohort who had married (panel A), or who had married or cohabited (panel B), by the age on the horizontal axis among those who had married or cohabited by age thirty-four. Distributions for 1950 to 1970 are from the NSFG and are based on three-cohort moving averages. For example, the 1950 birth cohort is an average of the 1949, 1950, and 1951 cohorts.

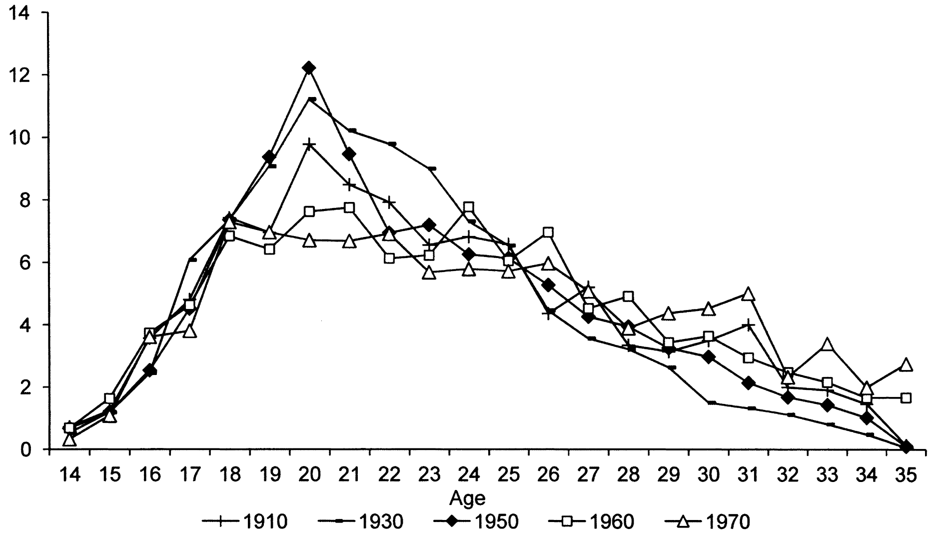

Fig. 8A.2 Percentage of women first giving birth at each age, by birth cohort

Sources: 1979 to 1995 June CPS (1910 through 1950 cohorts); 1995 through 2010 NSFG (1960 and 1970 cohorts).

Notes: The series show the percentage of women having their first birth at the indicated age (x-axis) conditional upon giving birth by age thirty-five and being at least age thirty-six at time of observation. Distributions from the NSFG are based on three-cohort moving averages; thus, the 1960 birth cohort is an average of the 1959, 1960, and 1961 cohorts.

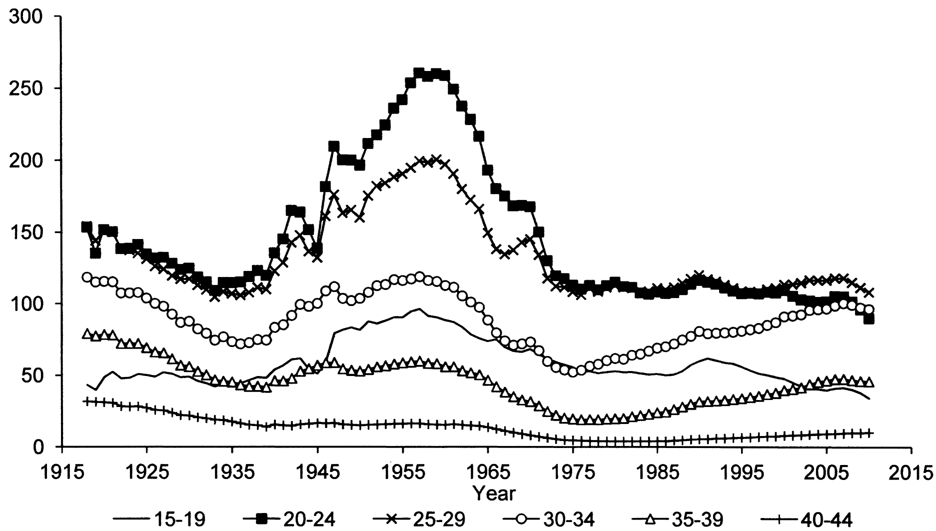

Fig. 8A.3 Age-specific birth rates, by year

Sources: National Vital Statistics Reports (Linder and Grove 1947; Grove and Hetzel 1968; Martin et al. 2012).

Notes: The series plot the number of births per 1,000 women in a given age group by the year that the births occurred (not mother's birth cohort).

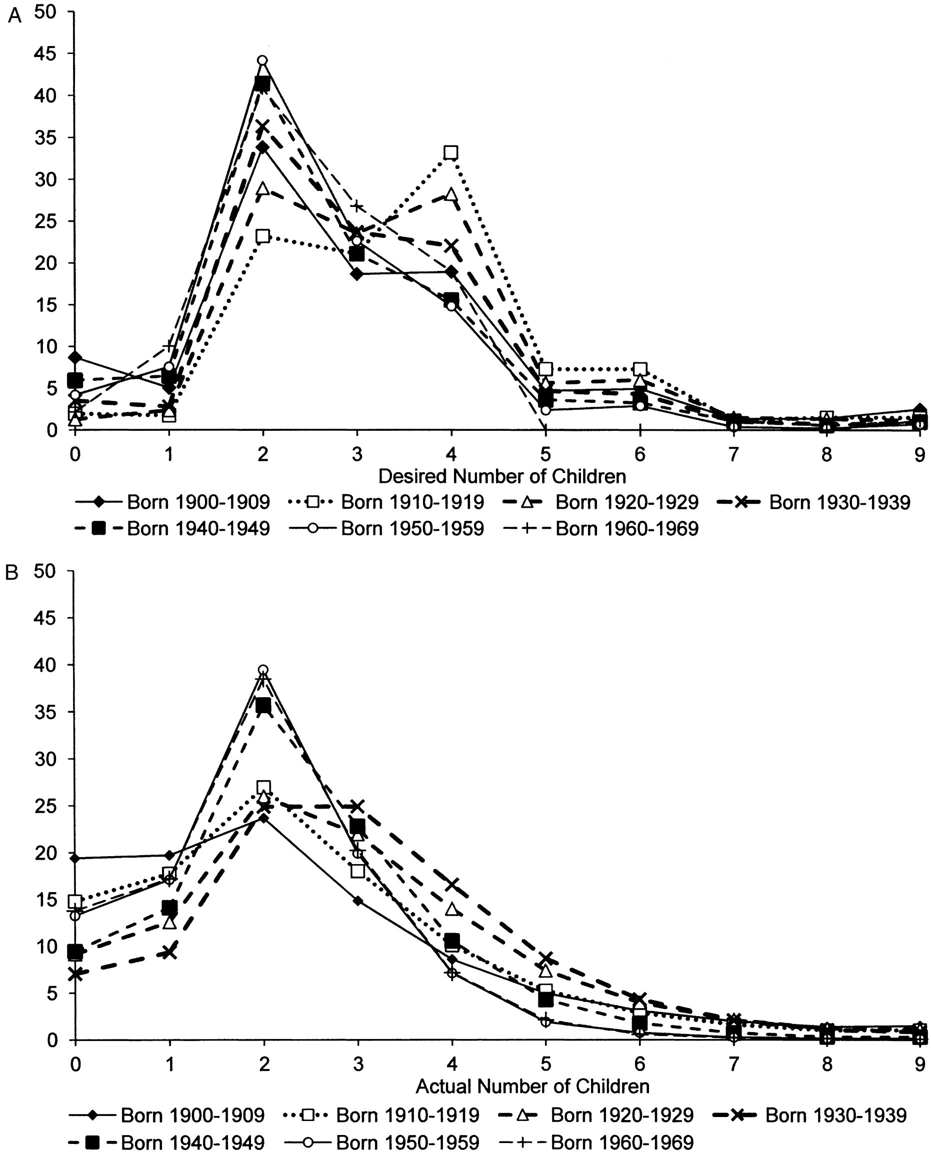

Fig. 8A.4 Percentage of women with desired and actual children born, by decadal birth cohort: *A*, distribution of desired childbearing, women ages 35+; *B*, distribution of actual childbearing, women ages 41–70

Sources: For panel A, 1900–1909 cohorts use the Low-Fertility Cohort Study (Ridley 1978); the remaining cohorts use the Integrated Fertility Survey Series (Smock et al. 1955–2002). For panel B, see sources in figure 8.6.

Notes: The figure shows the percentage of women in the indicated decadal birth cohort who desired the number of children (panel A), or who had given birth to the number of children (panel B), specified on the horizontal axis. Both series are top-coded at nine children. The desired number of children is taken from questions asking about the ideal number of children for the respondent specifically.

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