

# U.S. FERTILITY RATES AND CHILDBEARING, 1800 TO 2010

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Over the past two centuries, the U.S. has witnessed dramatic changes in fertility rates and childbearing. This chapter describes shifts in childbearing and family size from 1800 to 2010 and describes the role of different factors in this evolution. Demand factors such as industrialization, urbanization, rising family incomes, public health improvements, and the growth in women's wages generally reduced the benefits and raised the costs of having many children. Supply factors such as increases in infant and child survival and improvements in the technology of birth control and abortion have also altered parents' decisions about their childbearing.

This chapter begins by summarizing the long-run trends in U.S. fertility rates and completed childbearing, both overall and how these patterns varied by mothers' race/ethnicity and across geographic space. For the purposes of exposition, two hundred years are grouped into three broad periods: the 1800 to 1930 decline in fertility rates, the 1930 to 1960 stabilization in fertility rates followed by the baby boom, and the post-1960 decline and subsequent stabilization in fertility rates. The chapter next summarizes evidence on the determinants of childbearing in each period, including both economic and demographic explanations for these patterns. A final section weighs the evidence supporting the existence of *two* fertility transitions: a first transition driven by shifts in the demand for children and a second transition catalyzed by changes in supply side factors.

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## I. CHANGES IN U.S. FERTILITY RATES, 1800-2010

The standard fertility rate timeseries (figure 1; see also Haines chapter in the *Oxford Handbook of American Economic History*) shows that American women reaching childbearing age around 1800 averaged around seven to eight live births during their reproductive years and that this number fell to between two and three children by 1930. This decline also occurred in other industrialized countries and is considered part of a general demographic transition (Guinnane 2011). After the Great Depression, these patterns reversed and the “baby boom” emerged. Between 1940 and 1960, the general fertility rate rose by around 60 percent and cohort measures of completed fertility rates rose by 45 percent.<sup>3</sup> Note that this is more than a World War II phenomenon: fertility rates began increasing before mobilization, and they remained high for 15 years after V-Day. After 1960, the decline in fertility rates resumed and rates stabilized by the mid-1970s to around their levels today. For the past 25 years, completed childbearing has hovered around two children, even as the timing of marriage, the timing of first birth, and the composition of parents has shifted in important ways.

### A. *Early Declines in Fertility Rates: The Timing of Onset and Characteristics of Change*

These broad facts are well established, but the exact timing of the onset of fertility decline is disputed. Until recently, U.S. (marital) fertility decline was believed to have begun in the late eighteenth century, almost 75 years before marital fertility rates began declining in most other nations (Haines 2000, Binion 2001, Guinnane 2011). This would make the U.S. distinctive, more similar to France—where marital fertility began declining *before* industrialization—than England, Germany or Italy, where marital fertility began declining *after* industrialization.

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<sup>3</sup> The general fertility rate is the number of live births for every 1,000 women of childbearing age (typically ages 15 through 44) in a given calendar year. Completed childbearing is a cohort measure and represents the average number of live births to women born in a certain year.

Less well known is that U.S. fertility rates before 1880 are estimated using indirect methods and implicitly rely on assumptions about mortality rates, immigration, and the quality of census enumeration. These assumptions are important. Hacker (2003) shows that fertility rate estimates can change in important ways with the use of earlier census microdata (1860 and 1870) and alternative methods. Figure 1 presents Hacker's estimates, which account for *increasing* mortality rates in the early 20<sup>th</sup> century. Hacker's revised series shows that the fertility rates of the U.S. white population declined *only slightly* (if at all) between 1800 and 1840. The Hacker series estimates that the total fertility rate of white women in 1843 was around 6.95 versus 7.04 in 1800. Hacker (2003) also shows that marital fertility rates began to decline in earnest after 1860. The implication of these revised numbers is that little of the decline in fertility rate occurred until after the Civil War (~1865). In short, this revised series would make the U.S. experience look less exceptional relative to other industrialized countries. The sensitivity of Hacker's estimates to earlier data and alternative assumptions remains an open research question.

An alternative method for examining changes in childbearing involves estimating cohort fertility rates based on census questions. The 1900 and 1910 census as well as most later twentieth-century censuses asked ever-married women to report their number of live births. Answers to this question among women ages 41 to 70—who should have completed their childbearing—also suggest that the decline in fertility began in the mid to later nineteenth century. Figure 2 plots this series against the general fertility rate for reference. Women born around 1850 averaged about 5 births during their childbearing years, whereas women born twenty-five years later in 1875 averaged 3.3 births over their lifetimes. This trend continued: women born in the early twentieth century averaged just 2.3 births over their lifetimes.

These census figures appear consistent with Hacker’s argument and inconsistent with the early decline in the CBR or GFR timeseries: completed childbearing changed little before the Civil War among ever-married women (cohorts born before 1850, reaching childbearing ages before the 1870s) and only modestly among women born between 1850 and the conclusion of the Civil War (reaching childbearing age after 1870). However, reductions in childbearing appear to have gained momentum among women born in the 1870s and persisted until the Great Depression (cohorts born around 1910).<sup>4</sup>

Figure 2 makes apparent that each generation of women in the late nineteenth and early twentieth centuries substituted toward fewer children. This reduction resulted primarily from improvements in spacing and stopping rather than changes in the age at first marriage (Bailey, Guldi and Hershbein 2014). The distribution in the number of children born shifted from nearly uniform for ever-married women born in 1850 (childbearing age in the 1870s) to highly concentrated over the next 50 years. For instance, Figure 3A shows that two thirds of ever-married women in the birth cohort of 1910 bore two or fewer children; a striking 23 percent remained childless. Consequently, U.S. women born in the aughts (1900–1910) are commonly referred to as the “low-fertility cohorts.”

### *B. The Birth Registration Area and the Baby Boom and Baby Bust*

Measurement of fertility rates in the twentieth century is more accurate and requires fewer assumptions. The voluntary adoption of national standards in vital statistics reporting by

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<sup>4</sup> The census figures are unadjusted for differential survival of women by their number of children born and for unmarried childbearing. Figure 2 shows a sharp decline in completed fertility for women born in the late 1860s, but this decline coincides with seaming issues between the 1910 and 1940 censuses (1920 and 1930 censuses did not ask about completed childbearing). This means that estimates for cohorts born in the late 1860s are drawn from the 1910 census (when these women were in their 40s). Estimates for cohorts born in the early 1870s are drawn from the 1940 Census, when these women were in their 60s and may reflect age-based mortality rates that are correlated with completed childbearing. Investigating this is a subject for future research.

states in the early twentieth century facilitated the creation of national statistics on birth rates.<sup>5</sup> The entry of all states into the birth registration area (BRA) by 1933 enabled the federal government to publish statistics based on actual birth records rather than census enumeration and assumptions about mortality rates based on small geographic areas. (Entry into the BRA was based on “tests” of whether at least 90 percent of a state’s births were registered (Shapiro 1950).)

The availability of fairly complete birth registrations makes the size and duration of the baby boom much less controversial and even more impressive. This remarkable departure from longer-term trends was not a short-lived aberration reflecting postponed births from the Great Depression or World War II. The baby boom stretched over two decades and was driven by increases in completed childbearing (Ryder 1980, Rogers and O’Connell 1984). Between 1940 and 1960, the general and total fertility rates each rose by more than 50 percent, and cohort measures of completed fertility rose by 45 percent. Measured as the number of live births by cohort of women (reported at ages 41 to 70), completed childbearing increased by around one child per woman, from 2.3 to 3.3, between the low-fertility cohorts and the cohort of mothers born a generation later, around 1930. In a remarkable historical twist, women born in the mid-1930s had completed-fertility rates as high as their grandmothers born fifty years earlier (Figure 2).

The baby boom also reflected an increase in the fraction of women who ever had children. Figure 3B shows that, between the low-fertility cohorts and the mothers of the baby boom (1930s birth cohorts), childlessness among ever-married women fell from 23 percent to 8 percent, and the share of women having more than two children increased. 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 was almost two years younger at 20.7 (Bailey, Guldi et al. 2014). In short,

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<sup>5</sup> See Shapiro (1950) for a detailed history on the development of the national vital statistics registration areas.

increases in the period fertility rates during the baby boom were achieved both by earlier and more universal marriage and by married women giving birth to more children. These changes were pervasive. Women born in different census regions, women living in both urban and rural areas, and women of different races and nativity experienced sharp upward changes in completed childbearing. Even the Amish experienced a dramatic baby boom (Bailey and Collins 2011).

Elevated fertility rates quickly subsided in the 1960s and early 1970s. Within roughly 15 years of the baby boom's peak, U.S. fertility rates had fallen to around replacement levels, and below those of the low-fertility cohorts born around the turn of the twentieth century. Importantly, this post-1960 decline represented different shifts in behavior than those accompanying prior decline in the nineteenth and early twentieth centuries. Figure 3B shows that the low-fertility cohorts achieved low fertility rates with many more women remaining unmarried and large increases in childlessness among those who did. In contrast, a much larger share of women reaching childbearing age after 1960 had exactly two children (35 percent versus 22 percent for the previous generation), with the distribution of childbearing collapsing around a two-child mode.

The current stabilization in childbearing was reached in the mid 1970s among women born in the late 1940s and in the 1950s. In fact, both the distribution and mode of completed childbearing have changed very little over the past quarter century; Figure 3B shows nearly identical distributions in completed childbearing among cohorts born between 1950 and 1970. An additional feature worth noting is that childlessness among women born around 1970 is *lower* (at 16 percent) than it was among the low-fertility cohorts. Today's rates of childlessness are, however, higher than they were during the peak of the baby boom (10 percent).

### *C. Differences in Childbearing by Race and Geography*

Although broadly similar, these aggregate trends mask a great deal of heterogeneity in outcomes across racial and ethnic groups and geography. Figure 4A plots differences across time for both whites and nonwhites as well as the U.S. average.<sup>6</sup> In the early 1800s, childbearing was around 1.5 births per woman higher for nonwhites than for whites. This difference fell to roughly half that for women born in the mid 1870s, with an average racial gap of around 0.8 births. The difference narrowed some 50 percent further for cohorts born around the turn of the 20<sup>th</sup> century, approaching 0.4 births per woman. After expanding briefly during the baby boom, the gap returned to its pre-baby boom level.

The US experience also differed a great deal across regions, with the more economically developed regions generally having lower fertility rates. Figure 4B shows that the Northeast had significantly lower completed fertility (just over four births) for women born as early as the 1830s, whereas other, less economically developed regions averaged closer to six births per woman. The Midwest, however, had converged to lifetime childbearing averages that were similar to those in the Northeast by the turn of the 20<sup>th</sup> century (women born around 1880); lifetime childbearing in the West was actually lower than in the Northeast for women born from around 1860 to 1870. Childbearing in the South began falling for women born after the Civil War and continued until around 1910. Today, differences in fertility rates across regions are very small relative to historical standards, and women born in all regions of the country average around 2 births over their lifetimes. Figure 4B also plots fertility rates for women born outside of the United States and shows that fertility rates for this group followed a similar pattern as those for Southern-born women until the turn of the twentieth century.

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<sup>6</sup> “Nonwhite” is an unsatisfactory category for racial and ethnic group, but it is the only classification that can be made consistently over such a long period.

## II. CHANGES IN THE DEMAND FOR CHILDBEARING, 1800-1960

The *proximate* causes of the nineteenth century U.S. fertility transition are well known. These fertility declines accompanied the disappearance of the Malthusian pattern of late marriage and the emergence of fertility control after the desired number of children had been reached. They took place in the absence of modern contraception and are widely believed to have been driven by changes in the demand for children due to industrialization, urbanization, increasing population density and land scarcity, public health improvements, rising educational attainment, and growth in women's market wages. All of these forces tended to raise incomes and increase the implicit "price" of having children, which gradually drove fertility rates down. A complementary demand-side model emphasizes how rising incomes tended to increase investments in children's health and education and reduce fertility rates, a change that is often referred to as substitution between child quantity and quality.

In contrast, the Great Depression and the baby boom pose challenges to the simple demand-side narrative. As the economy entered the Depression, the downward trend in fertility rates changed little in pace. Even as per-capita disposable income plummeted by 23 percent between 1929 and 1932 (Bureau of Economic Analysis 2015: Table 7.1), the general fertility rate fell by a mere seven births per 1,000 women (55.9 to 48.6) between 1930 and 1933 (lagged one year because births occur nine months after pregnancies). But the fertility rate had declined by about 6 births per 1,000 women between 1927 and 1930 (61.4 to 55.9) (Linder and Grove 1947). Thus, the speed of fertility decline barely budged from its earlier trend. Additionally, fertility rates stabilized—but did not appreciably grow—as the economy slowly rebounded between 1933 and 1938. This is surprising, given recent evidence on the strong relationship between fertility rates and unemployment (Currie and Schwandt 2014).



Another challenge lies in explaining the complete and rapid reversal of these trends. Between 1940 and 1960, the baby boom took place in the context of increasing wages, urbanization, and educational attainment—all trends associated with declining fertility rates before 1930. Adding to the apparent puzzle is that fertility trends again reversed as these trends in incomes, urbanization, educational attainment, and women’s labor-force participation continued. The next sections summarize the explanations for these phenomena from both the demographic and economic literatures.

*A. Demographic Explanations for Declining Fertility Rates, 1800–1930*

Much of the demographic literature has emphasized “demographic transition” theory as an explanation for the decline in nineteenth century fertility rates. Based on the empirical observation that decreases in aggregate mortality rates were followed in many developed countries by declining birth rates, Notestein (1945) theorized a causal connection: high mortality rates *lead* married couples to have many births so that they can achieve their desired surviving family size. As mortality rates fall, couples have fewer births because fewer are necessary to achieve their desired family size. Interestingly, this story does not fit well with the U.S. experience. Guinnane (2011: 599) and others point out that the U.S. fertility decline began *before* mortality rates began falling in the 1890s: “Fertility in the United States declined for decades before any noticeable decline in mortality.” This fact has provided additional motivation for claiming American exceptionalism.

The demographic literature has also focused on innovations in contraceptive methods, what economists might call the “supply side.”<sup>7</sup> Generating systematic, empirical evidence on fertility control within marriage in the nineteenth and early twentieth century is difficult.

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<sup>7</sup> Economics models innovation in contraceptive technology as a reduction in the marginal cost of averting births (Michael and Willis 1976).

Contraceptives and contraceptive practice were not often discussed openly and, therefore, were not well documented except in special cases. As an alternative, historical demographers have studied “spacing” and “stopping” to identify effective contraceptive practice. For instance, being able to “stop” childbearing *before* one is no longer fecund is associated with highly effective contraceptive practice. Longer “spacing” between births, on the other hand, is generally associated with the consistent use of less-effective contraceptive practices.

For the sake of illustration, consider the following simple formula. Observe that the number of children one could expect to have,  $n$ , can be written as  $n = \frac{E}{C+S}$ , where  $E$  is the number of months a woman 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. Fertility rates could be reduced delaying marriage (and thus reducing  $E$ , the Malthusian recommendation, in a paradigm where non-marital fertility is rare) or by greater spacing, either by increasing the length of the sterile period during pregnancy and after birth,  $S$ , or the length of the fecund interval,  $C$ , by using different contraceptive techniques. Extended breastfeeding offers one natural method for increasing  $S$ , and coitus interruptus (withdrawal) and reduced frequency of coitus offer others. Women in the nineteenth and early twentieth century likely used other contraceptive methods as well (including abortifacients), though prevalence is difficult to document. Lahey (2014a, 2014b) shows that anti-obscenity statutes regulating primitive, pre-modern contraceptive techniques are associated with *higher* fertility rates. This indirect evidence suggests that these early contraceptives, when not restricted by laws, may have helped couples control childbearing within marriage in the late nineteenth century.

### *B. Economic Explanations for Declining Fertility Rates, 1800-1930*

The economics literature explains the nineteenth century's negative association between rising income and falling fertility rates with two complementary models: the opportunity cost (Becker 1965) and the child-quality models (Becker and Lewis 1973). The motivating questions in this literature relate to what led couples to desire fewer children (so that they use different contraceptive techniques or change their sexual behaviors). The basic premise of both models is that children generate utility for parents, both because parents enjoy their children (children have "consumption value") and because children bring many other benefits to their parents (children have "production value") in addition to their costs. For instance, children might help with household chores, farm production, or care for parents in old age.

In standard economic formulations parents weigh utility from children against their cost to the family. This cost includes both the costs of goods (such as food, clothing, and other necessities) as well as the opportunity costs (time of both parents away from other productive activities) of bearing and raising a child (Becker 1965). In this setting, benefits generated by children such as their contribution to household production or their insurance value for parents in old age can be modeled as reducing their net cost. Commensurately, the net cost of children rises if the value of these benefits fall or bearing and raising children become more expensive. A key assumption of these models is that children are "normal" goods. That is, if parents' incomes increase, these models generally assume that parents want more ("high-quality") children.

#### The Opportunity Cost of Childbearing and Falling Returns to Having More Children

In explaining the decline in fertility, the "opportunity cost" model emphasizes the importance of parents' incomes and implicit (or shadow) prices of children. The cost of raising children (net of their benefits) did not rise because food prices or clothing prices increased. On

the contrary, rising productivity in manufacturing and agriculture tended to reduce the cost of clothing and feeding children (Gallman 1972; Craig and Weiss 2000; Atack, Bateman and Margo 2008). But increasing agricultural productivity and industrialization mattered in another way: by increasing potential wages, these forces increased the opportunity cost of having children.<sup>8</sup> This could have been especially important to the extent that the value of women's time increased with industrialization.

Increasing population density and urbanization should also have powerful effects on childbearing through both income and opportunity cost channels. Three-quarters of the U.S. labor force worked on farms in 1800 (Weiss 1992). But as Americans settled the interior of the country, farmland became increasingly expensive and agriculture began mechanizing (see Rhode chapter in *Oxford Handbook of American Economic History*). Reductions in the demand for family labor to work on farms led to lower fertility rates as well. Consistent with this idea, Wanamaker (2012) shows that fertility rates among Southern white households who had small slave workforces in the antebellum period *rose* after 1865, when the emancipation of their slaves increased their need for family farm labor.

Moreover, employment opportunities increasingly drew the young to cities and away from farms (see Boustan chapter in *Oxford Handbook of American Economic History*). This reflects both the fact that parents had smaller farms to bequeath to their children (Easterlin 1976) and that children would earn less if they remained on farms. Sundstrom and David (1988) argue that these forces may have reduced the likelihood that children cared for their parents in old age, which further reduced the benefits of children to parents. Steckel (1992) and Basso, Bodenhorn, and Cuberes (2014) show that fertility rates were lower in Northeastern counties with greater

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<sup>8</sup> This is defined as the amount of time required to bear and raise a child valued by the dollar equivalent of the relevant adult's marginal product in her most productive activity.

availability of banking and financial services, which enabled parents to save directly for retirement outside of their investments in children.

Industrialization and urbanization also altered the locus of production in ways that increased the opportunity cost of childbearing. Both trends imply that the place of work and place of residence became increasingly separate. Moving to a city meant that jobs were more often outside the home and difficult to combine with child supervision. If parents worked in factories or out of the home, parents would have to pay for childcare—either directly or by foregoing work—both of which tended to increase the opportunity cost of childrearing. A second implication of urbanization is the rising cost of space. Because adding more children requires more space (or increases crowding), which is more expensive in cities, urbanization also raised the implicit price of childrearing (Simon and Tamura 2009).

The U-shape in women’s labor force participation (Goldin 1990) is also consistent with a rising opportunity cost of childbearing. Saxonhouse and Wright (1984: Table 1) note that almost 60 percent of those employed in cotton textiles in the South in 1880 were women. Because many industries laid off women at marriage (Goldin 1991), industrialization may have also worked to limit completed childbearing by causing women to delay marriage, perhaps reducing the number of years exposed to the risk of childbearing.

#### Child Quality and Changes in Investments in Children

The second model of the neoclassical school stresses the value of parental *enjoyment* of their children, or “child quality” (Becker and Lewis 1973, Willis 1973). Here, “quality” generally refers to the level of parents’ investments in their children in terms of time or economic resources. In Becker and Lewis’s canonical model of parental choice over child quantity and quality, an increase in household income is posited to induce substitution toward higher “quality”

(but fewer) children. Consequently, increasing incomes (through rising productivity) lead parents to invest more in each child but perhaps have fewer children, which could also generate a negative association between income and fertility rates. Exogenous changes in the shadow price of child quality due to, for instance, improvements in public health could also lead parents to have fewer, but healthier children. The neoclassical models allow both infant mortality and fertility rates to decline simultaneously or fertility rates to decline first (as was the case in the U.S.), rather than in the sequence posited by demographic transition theory.

Evidence that parents invested more in their children is difficult to document empirically, but this model is consistent with other evidence. For instance, Moehling (1998) argues that the 75 percent decline in the employment of children ages 10 to 15 between 1880 and 1930 does not appear to be accounted for by changes in state labor legislation. Moreover, Stephens and Yang (2014) show that compulsory schooling laws explain very little of the shift in the quadrupling of American youth earning a high school diploma between 1910 and 1940 (see Goldin 1998 for graduation rate estimates). One interpretation of these findings is that changes in parent's investments in children both increased children's human capital and also caused complementary changes in public infrastructure benefitting children. This might involve the building of schools (Goldin and Katz 2008) and investment in public health. Municipal sanitation, water filtration, and the expansion in water and sewer infrastructure, among other improvements, resulted in dramatic declines in infant and child mortality rates (Cain and Rotella 2001, Troesken 2002, Cutler and Miller 2005, Ferrie and Troesken 2005, Alsan and Goldin 2015). These investments continued with federal funding for maternity and child care through the 1922 Sheppard-Towner Act, which Moehling and Thomasson (2014) show accounts for between one-tenth and one-fifth of the decline in infant mortality rates over the 1920s.

The quantity-quality model, therefore, suggests an important causal chain leading from reductions in fertility rates (or other changes in the implicit price of child quality), to increased investments in children and ultimately to faster economic growth. That is, dynamic versions of the quantity-quality model describe how economies transition from a “Malthusian” equilibrium of high fertility rates and slow growth to low fertility rates and rapid economic growth (Becker, Murphy and Tamura 1991, Galor and Weil 2000).<sup>9</sup> This literature provides important links between childbearing, investments in children, and the dynamics of the economy.

Economists, therefore, explain the nineteenth and early twentieth century declines in childbearing as driven by changes in demand. Falling fertility rates are a by-product of rising costs (due to rising adult wages and productivity as well as the separation of production from the home), diminishing returns (due to falling farm sizes and changes in children’s care of their aging parents), and rising incomes (which induces greater investments in each child and a reduction in total number).

### *C. Demographic and Economic Models of Childbearing, 1930–1960*

Explanations for changes in childbearing during the 1930 to 1960 period are more disputed. Two schools of thought have emerged: one emphasizing shifting preferences and the other stressing the neoclassical paradigm of relative prices and incomes. More recently authors differ even *within* their schools of thought.

Richard Easterlin’s “relative income hypothesis” (1966, 1971, 1980) represents one school of thought. Easterlin’s model provides a unified explanation for the low fertility rates during the Great Depression and the baby boom and bust. It emphasizes the importance of a cohort’s perceived “earnings potential” relative to its “material aspirations” as a key input to

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<sup>9</sup> Galor and Weil call this “Unified Growth Theory.” Their formulation endogenizes population growth and human capital investment decisions to explain the transition dynamics from a Malthusian equilibrium to a post-Malthusian system in which income grows while population is stable.

adult preference formation. Children who grew up during the 1930s, according to the hypothesis, formed modest material aspirations due to the Great Depression. Rapid economic growth in the 1940s and 1950s, however, meant that this cohort's actual experience as young adults much surpassed these aspirations. When these cohorts realized they could achieve a higher standard of living than expected, they also decided to have more children. On the other hand, children growing up in the more affluent, postwar period of the late 1940s and 1950s had the reverse experience. Their preferences for material goods were shaped by the booming post-war economy, but they entered the labor market in the late 1960s and early 1970s when the U.S. economy was struggling. Consequently, these cohorts had fewer children, which led to the post-1960 fertility decline. One advantage of this theory is that it integrates an explanation of fertility change over three decades. Problematic for this theory, however, is that fertility rates have not cycled since the baby boom despite sizable economic fluctuations.

Becker's neoclassical theory represents an alternative school of thought and emphasizes relative prices and incomes rather than preferences. In a dynamic reformulation of the static models of the 1960s and 1970s (including the opportunity cost and quantity-quality models discussed previously), Robert Barro and Becker (1988, 1989) stress how a one-time shock to the price of childbearing or rearing could explain both low fertility rates during the Great Depression and the baby boom and bust. They are, however, non-committal on the mechanism.

Although the earlier neoclassical and Easterlin schools of thought in economics have moved closer together over time (Sanderson 1976), a voluminous empirical literature has failed to reach consensus on the appropriate model. In a comprehensive overview of studies of the Easterlin hypothesis, Pampel and Peters (1995: 165) conclude that "different methods often result in conflicting findings." Similarly, in their exhaustive review of tests of the neoclassical



model, Hotz, Klerman, and Willis (1997: 342) conclude that, “the theory and econometric methods are much better developed than the empirical literature.”

Promising recent developments have extended both the theoretical and empirical literatures. In terms of theory, the Barro-Becker reformulation launched a new subfield in economics called “family macro.” Papers in this new subfield generally model the long-run downward trend in childbearing (in the nineteenth and early twentieth centuries) as the increasing opportunity cost of childrearing. Although unified in their emphases on prices and incomes, recent variations on the Barro-Becker formulation claim different price mechanisms explain the baby boom. Greenwood, Seshadri and Vandenbrouke (2005) argue that increases in household productivity due to mechanization reduced the shadow price of having children. Doepke, Hazan and Maoz (2008) claim that the flood of older women into labor markets during World War II depressed younger women’s wages and therefore temporarily decreased the opportunity cost of childbearing. In response, younger women temporarily had more children until shifts in the demand for women’s labor again raised the opportunity cost. Albanesi and Olivetti (2009) assert that medical innovations that benefitted the delivery of babies and artificial feeding (e.g., infant formula) reduced the price of childbearing and led to a temporary increase in childbearing. In a novel twist, they also argue that medical innovations contemporaneously altered parents’ investments in girls’ education (because these medical innovations raised their life expectancy), which increased the opportunity cost of childbearing for the next generation.

These theories illuminate how temporary shifts in the economy can influence a variety of outcomes for several generations. More problematic is that calibrations have difficulty predicting the baby boom *and* the speed of the post-1960 U.S. fertility decline. Moreover, the proposed mechanisms are inherently difficult to test in empirical work. Two recent papers by Bailey and

Collins (2011) and Lewis (2014) provide the only empirical tests of the electrification hypothesis. Using newly-encoded, county-level data on appliance ownership and fertility for 1940, 1950, and 1960, Bailey and Collins (2011) shows that the diffusion of modern household technologies—which began in earnest decades before the baby boom and continued afterwards—does not align well with the burst in household productivity required to generate the baby boom. They also present regression evidence that measures of improved household productivity (such as electrification) are *negatively* correlated with fertility rates. Furthermore, the authors demonstrate that census data on completed fertility (the number of children ever born by ages 41 to 60) is negatively correlated with exposure to electrical service in early adulthood. Finally, Bailey and Collins show that the Old Order Amish—a group that strictly limited their use of modern appliances that increased household productivity on religious grounds—also had a relatively large and coincident baby boom. Recent work by Lewis (2014) uses the expansion of the electrical grid between 1930 and 1960 to show that, consistent with electrification causing couples to substitute toward child quality, electrification caused decreases in both fertility and infant mortality rates.

This evidence provides a considerable challenge to arguments that modern household technology *necessarily* precipitated the U.S. baby boom. It also challenges explanations that would not alter fertility rates among the Amish, including market wages for young women (Doepke et al. 2008) and the introduction of infant formula (Albanesi and Olivetti 2009). In short, bursts in technologies boosting the productivity of women in the household do not appear, at least by themselves, to explain the baby boom. More theoretical and empirical research on the explanations for baby boom and bust is needed to vet existing theories and, perhaps, develop new explanations.

### III. THE BABY BUST AND CHILDBEARING AFTER 1960: CHANGES IN DEMAND, SUPPLY OR BOTH?

Given that the baby boom interrupted the long-run decline in U.S. fertility rates, it is sensible that the long-run decline eventually resumed. Yet the timing of this event is curious. By cause or coincidence, the end of the baby boom corresponded to revolutionary changes in contraception. The U.S. Food and Drug Administration's approval of the first oral contraceptive in 1960, which became known as "the Pill," provided a more reliable and effective way to prevent pregnancy. The Pill required no attention or action at the time of intercourse and no cooperation or consent from male partners (Trussell 2004, Bailey 2006). And it was wildly popular: within five years of its release, almost one quarter of married women had used the Pill (Bailey 2010).

Cursory empiricism attributed the post-1960 reduction in fertility rates to the causal role of the Pill. More rigorous survey research did as well. Ryder and Westoff (1971) heralded the 1960s a period of "contraceptive revolution." In Westoff's (1975) Presidential Address to the Population Association of America, he argued that the effect of the Pill was so large 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."<sup>10</sup> In the parlance of economics, the Pill presented a large shift in the supply of births.

An obvious counterargument is that the post-1960 fertility decline appears more like a reversion to trends before the baby boom—a decline typically attributed to the demand-side factors (as outlined in the previous sections). Becker's *Treatise on the Family* (1991: 143) states

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<sup>10</sup> Economists have also noted the potential importance of the supply side (Easterlin 1975, Michael and Willis 1976, Easterlin, Pollack 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).

plainly what became the dominant view in economics: “the ‘contraceptive revolution’ ... ushered in by the Pill has probably not been a major cause of the sharp drop in fertility in recent decades”. But recent empirical work challenges this assertion with new causal evidence.

*A. Empirical Studies Testing the Role of the Supply Side, 1960-2010*

The central challenge in testing these assertions about the role of the Pill and, more broadly, other supply-side developments (e.g., other modern contraceptives like the I.U.D. or injectable or implantable contraceptives) is finding a credible empirical design. Solid theoretical reasoning argues that causal effects run in *both* directions. As Becker has argued, women who desire fewer children are more likely to use the Pill. On the other hand, as Ryder and Westoff posit, users of the Pill are more likely to have fewer children due to lower failure rates.<sup>11</sup> In the U.S., access to the Pill has never been intentionally randomly assigned to a representative set of locations or group of participants, making it difficult to quantify the magnitude of the causal channels running in either direction.<sup>12</sup>

Recent empirical studies, therefore, use natural experiments that effectively randomized the availability of the Pill across locations to shed light on this question. One paper uses state-level Comstock-era restrictions on the sale of contraceptives. Bailey (2010) shows that when the Pill was introduced, anti-obscenity statutes (“Comstock laws”), which had existed for almost

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<sup>11</sup> Theoretical models suggest that women who use family planning services are different in many ways from those who do not. Sah and Birchenall (2012) show why women who use family planning services may be expected to differ in terms of their unobserved preferences as well as in the price associated with a conception. Theory also suggests that cross-sectional associations in childbearing and family planning may reflect both greater local demand for services and the effects of those services.

<sup>12</sup> The earliest studies on this question used multivariate regressions to adjust estimates of the relationship between access to family planning (whether areas had a program or individuals used them) and fertility rates. These largely cross-sectional studies were limited by well-known omitted variables and endogeneity problems (see Rosenweig and Wolpin 1986 and Hotz et al. 1997) and it is not surprising that these studies led to mixed evidence on the effects of different types of family planning programs (see Mellor 1998 for a review). Very recent studies use localized, randomized interventions that target teen pregnancies but generally conclude that these interventions had little effect (DiCenso et al. 2002). See Bailey (2013) for a more detailed discussion of these studies.

three-quarters of a century, varied significantly in their language regarding the *sale* of contraceptives. These legal restrictions in 24 states affected the diffusion of oral contraception and reduced the speed of fertility declines in restrictive states from 1958 to 1965. After the *Griswold* Supreme Court decision invalidated these sales bans for married women, however, fertility rates in states with sales bans dropped sharply relative to those without these bans. There is little reason to expect the demand for children to change with this pattern, but it is clear that the supply of contraceptives did. Counterfactual estimates imply that, without sales bans, the marital fertility rate could have been eight percent lower in states with sales bans and four percent lower in the U.S. as a whole. Bailey (2010) uses a back-of-the envelope calculation to show that as much as 40 percent of the decline in the marital fertility rate from 1955 to 1965 might be attributable to the Pill.

A second empirical test of the relevance of the Pill and other supply side developments uses the county-level expansion of federally funded family planning programs in the 1960s and early 1970s to quantify the effects of subsidized contraception on the childbearing of lower-income women. Beginning with the 1964 Economic Opportunity Act (EOA) and continuing with the passage of Title X (“Title Ten”), over 650 family planning programs started or expanded in U.S. communities from 1964 to 1973. Bailey (2012) uses the idiosyncratic timing of the EOA and Title X granting process at the county level to estimate the program’s effects on fertility rates using models that also account for the availability of abortion. The results show that family planning programs, which reduced the cost of contraceptives and increased the availability of contraceptive-related services, led to substantial and sustained declines in fertility rates. The general fertility rate fell by roughly two percent within five years of the establishment of a federal family planning program and remained almost as low up to 15 years after the program’s

inception. Assuming these programs were used only by poor women, they imply a reduction in fertility rates among treated women of 20 to 30 percent within a decade—magnitudes large enough to account for half of the 1965 gap in childbearing between poor and non-poor women. Follow-up work by Bailey, Malkova, and McLaren (2014) shows that children born after these family planning programs began were significantly less likely to grow up in poverty or reside in households collecting public assistance. In summary, family planning programs reduced birth rates among poor women and increased economic resources in childhood.

Changes on the supply side were not, however, independent of changes in demand for children. A recent literature suggests that changes in contraceptive technology shifted the demand for children in meaningful ways. In particular, access to the Pill as influenced by changes in state-level age-of-majority laws altered young women's decisions to invest in their careers. Using variation in access to the Pill between ages 18 and 21<sup>13</sup>, Goldin and Katz (2002); Bailey (2006, 2009); Guldi (2008); Hock (2008); and Bailey et al. (2012) show that legal access to the Pill affected marital and birth timing and had broad effects on women's and men's education, career investments, and lifetime wage earnings.<sup>14</sup> Young women and men in states where the Pill was legal around age 18 were more likely to enroll and complete college. Women in these states were also more likely to work for pay, invest in on-the-job training, and pursue non-traditional professional occupations. And as women aged, these investments paid off: Bailey et al. (2012) approximate that 30 percent of the convergence of the gender wage gap in the 1990s can be attributed to these changing investments made possible by the Pill. Ananat and

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<sup>13</sup> Bailey, Guldi, Davido, and Buzuviz (2011) summarize the legal coding used in different studies.

<sup>14</sup> In a recent working paper, Myers (2012) argues that the effects of changes in legal access to the Pill for younger women differs from Goldin and Katz's and Bailey's estimates when she changes the legal coding. While smaller, the magnitudes of her updated estimates are not statistically different from published estimates.

Hungerman (2012) additionally show that access to contraception at younger ages improved the economic resources of children born to these women.

In summary, a variety of studies using different empirical strategies document the important role of the Pill and other supply-side developments in changing childbearing outcomes. Although the empirical literature has been silent on the role of different demand-side factors in the post-1960 period, it is clear that continued shifts in the demand for children due to rising wages and incomes are key to understanding the post-1960 period as well as the longer-term narrative of the U.S. fertility decline. In the absence of important shifts in the demand for children, the contraceptive revolution may have mattered little. Also key to the story is that shifts in supply and demand can have strong influences on one another. As Becker (1991) argued, shifts in the demand for children were integral to the funding and development of innovations in contraception. Importantly, changes in contraceptive technology appear to have influenced the demand for children in the last 50 years.

#### *B. What Is the Case for a Second Demographic Transition?*

A growing body of empirical work suggests that the Pill and other supply-side factors had quantitatively important effects on childbearing and women's careers. While internally valid, the short-term comparisons in these studies shed little light on how changes on the supply side may have had larger, general equilibrium consequences. For instance, they could have shifted attitudes, changed gender roles and women's bargaining power, and altered the culture of dating, cohabitation, and marriage. This means that recent empirical work documenting the short-term impact of the Pill is inherently silent on the bigger picture. This final section weighs evidence related to whether the U.S. is in the midst of a *second* demographic transition, or SDT, and more

broadly whether the same factors that led to the earlier fertility decline can satisfactorily explain the patterns observed in the post-1960 decline.

The concept of a SDT was introduced by Lesthaeghe and van de Kaa (1986), who hypothesized that the arrival of the contraceptive, sexual, and women's rights revolutions of the 1960s engendered a *distinct* demographic era—a period *exceptional* enough to be called a transition in its own right. The distinctive characteristics of the SDT, they argue, are persistently low-fertility rates and high rates of childlessness, substantially delayed marriage and childbearing, increases in non-marital cohabitation and childbearing, and high divorce rates. (Some formulations also invoke increases in women's labor-force participation.)

Other demographers have countered these claims. Cliquet (1991: 72) argues that the SDT characteristics “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 [twentieth] century”. Others contend the SDT literature is 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” (Coleman 2004: 18).

This critique of the SDT literature implicitly claims that the *same* forces (e.g. opportunity cost of childbearing, shadow price and income elasticity of child quality) drove fertility to decline in both periods. Under this hypothesis, the “right” test of recent exceptionalism is not an examination of the last 50 years but the comparability of the early and later periods of fertility decline. By this metric, Bailey, Guldi, and Hershbein (2014) and figures 1 and 2 in this chapter show that fertility rates are not much lower today than earlier in the twentieth century, nor did



they decline much more quickly during the baby bust than they had some 40 years earlier. Although cohabitation rates have increased, age at first union (including both marriages and non-marital cohabitations) is at its pre-baby boom level, as is age at first birth. Divorce rates are not appreciably different today from what their pre-baby boom trends would predict (Stevenson and Wolfers 2007).

Although this historical comparison of timeseries and trends appears inconsistent with the notion of a second demographic transition, Bailey, Guldi, and Hershbein (2014) also present empirical evidence that the current period is much more exceptional than often credited. Generating timeseries spanning more than 100 years of U.S. history, they show that the post-1960 fertility transition exhibits three features distinct from the nineteenth century and early twentieth century fertility decline.

Feature 1. The post-1960 period is distinguished by the emergence of a two-child norm, a reduction in the variance of completed childbearing, and a *reduction* in childlessness (see figure 4). 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 *how many* children to have and proxy for this theoretical concept in empirical work with the mean number of live births (or a measure of period fertility). 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.

Consistent with demand-side explanations and patterns of increased spacing and stopping, the nineteenth century and early twentieth century fertility declines are associated with increasing variance in outcomes. That is, this period of fertility decline was characterized by both

high rates of childlessness as well as still relatively high rates of women with high parity. On the other hand, consistent with supply-side models (Michael and Willis 1976), the post-1960 fertility decline is associated with *reductions* in the variance in childbearing. Rates both of childlessness and high parity (e.g., more than four live births) were relatively low.

Feature 2. The post-1960 period exhibits an unprecedented decoupling of marriage and motherhood. The age at first union (historically through marriage, more recently through cohabitation) and the age at first birth were strongly correlated in the early twentieth century, but this inter-relationship began to disappear after 1960. Recent cohorts formed their first households at ages similar to cohorts born earlier in the century, but they more often cohabited before marriage and were more likely to switch partners. However, age at first union and age at first intercourse have become less predictive of motherhood timing, as many women give birth outside of marriage.

Feature 3. The post-1960 period has witnessed a transformation in the relationship between mothers' education and childbearing. When comparing relatively more- and less-educated women, completed childbearing, childlessness, and the likelihood of marriage are all much *more similar* today than in the early twentieth century. Despite these similarities, age at first household formation, age at first birth, and non-marital childbearing diverged after 1960 by mothers' education, with more educated mothers more likely to delay household formation, motherhood, and childbearing within marriage.

These distinctive features should give pause to scholars who wish to argue that the fertility declines in the earlier and later parts of the twentieth century are part of the same, though interrupted, trend. After 1960, women were significantly more likely to have exactly two children and were less likely to remain childless. Patterns of completed childbearing and

childlessness and the likelihood of eventual marriage are more similar across educational groups of mothers today than in the late nineteenth or early twentieth centuries. On the other hand, age at first union, age at first birth, and non-marital 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 yet stabilized suggests that the current fertility transition, perhaps part of a larger gender and cultural revolution, is still on-going (Goldscheider 2012). Future research should invest more work into understanding how these changes may impact the longer-term evolution of families and childbearing.

#### **IV. CONCLUDING REMARKS**

This chapter characterizes changes in childbearing over two hundred years of U.S. history. Summarizing trends in fertility rates and the economic and demographic literature on the determinants of childbearing in three periods (1800 to 1930, 1930 to 1960, and 1960 to 2010), the first two periods of change appear to reflect demand-side factors. Fueled by economic development, the nineteenth and early twentieth century fertility decline reflected the rising cost of childbearing (due to rising adult wages and productivity as well as the separation of production from the home), falling returns (due to falling farm sizes and changes in children's care of their aging parents), and rising incomes (which induced greater investments in each child and a reduction in total number). The explanation for the stabilization of fertility rates and then baby boom (1930 to 1960) is disputed, but changes in childbearing in this period also appear consistent with changes in the demand for children due to rising incomes and possibly large reductions in the relative prices of factors related to childbearing. The explanations for changes in childbearing in the post-1960 period, however, are still evolving, and likely reflect both

demand factors and supply factors. Ultimately, it remains unclear whether the post-1960 supply-side changes are significant enough to constitute a second demographic transition or are simply the most recent stage in the ongoing *first* demographic transition (Lee and Reher 2011).

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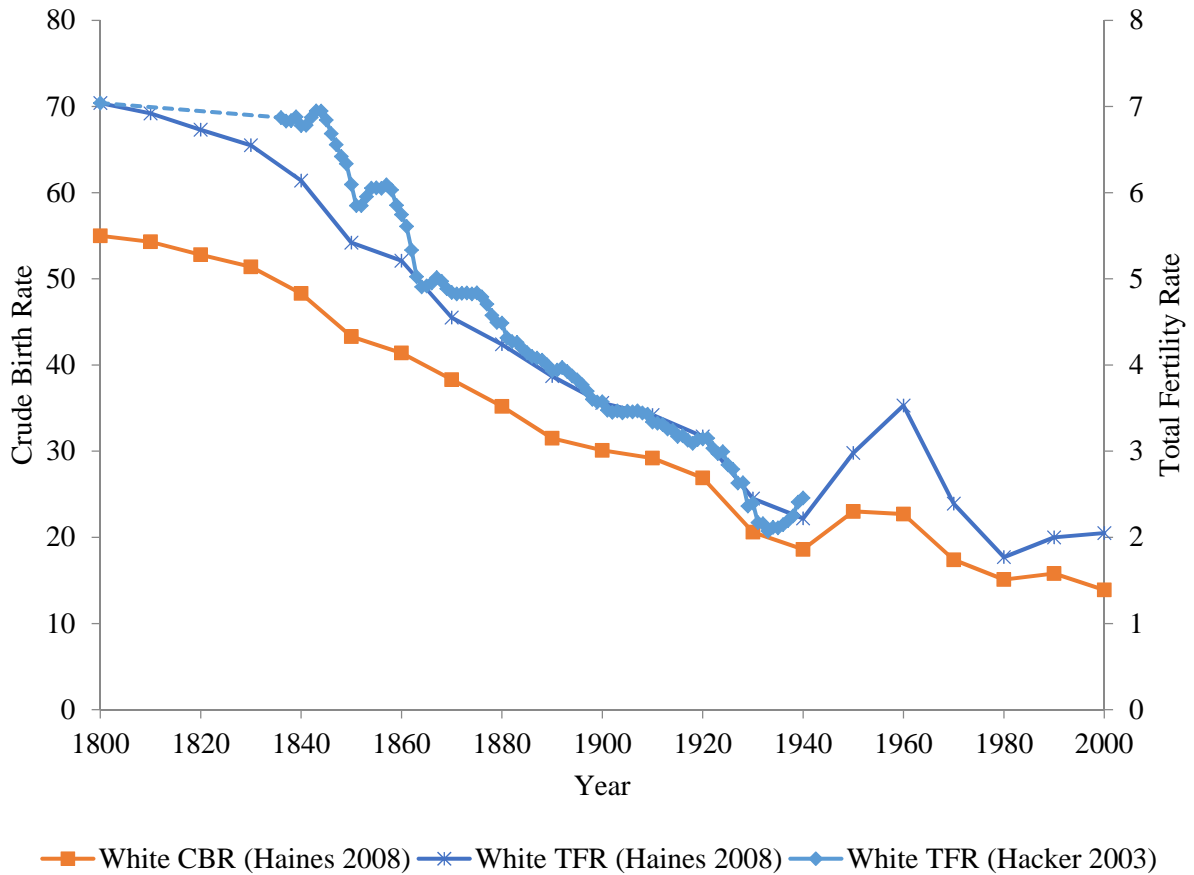
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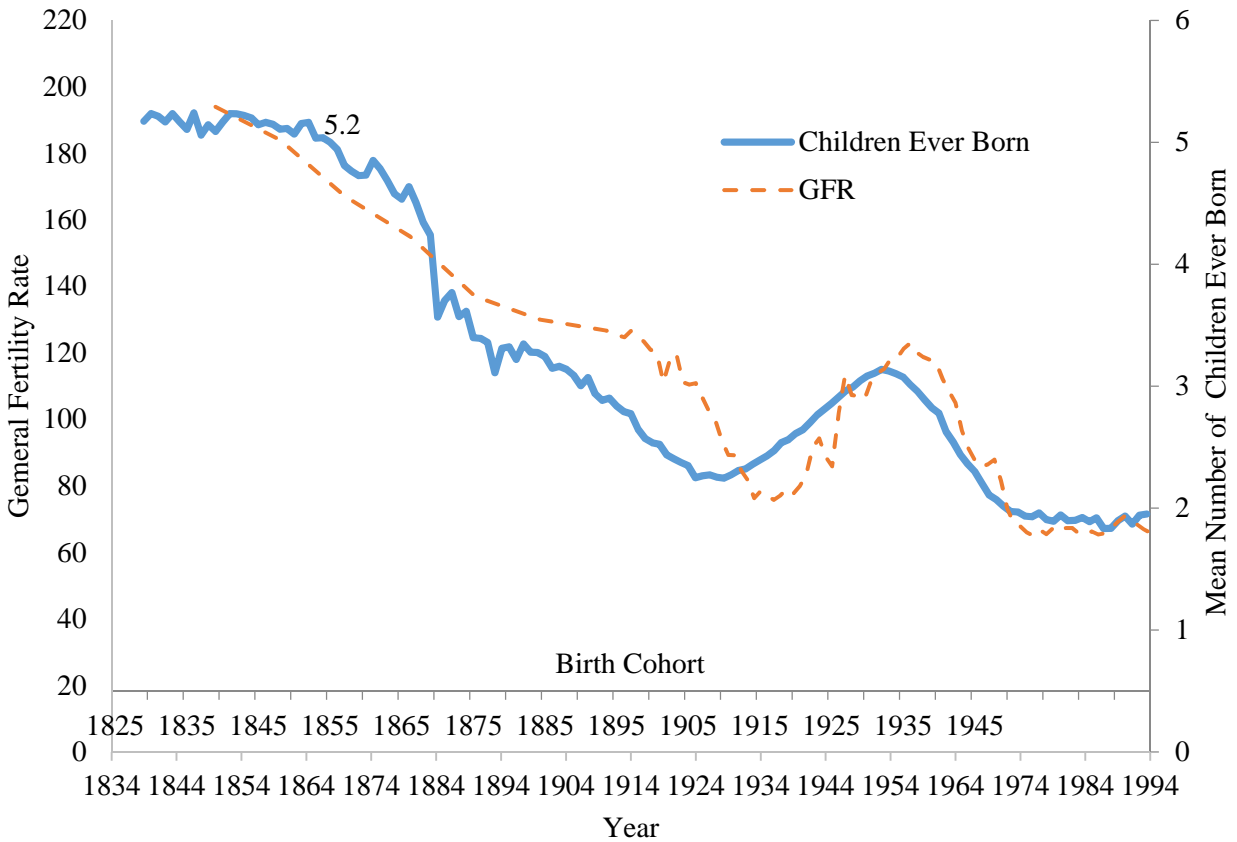
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**Figure 1. U.S. Crude Birth Rate (CBR) and Total Fertility Rate (TFR), 1800-2000**



Notes: The CBR is plotted on the left vertical axis and is measured as the number of births per 1,000 whites in the population. The TFR is plotted on the right vertical axis and measures the cumulative number of births a woman would be expected to have over her lifetime if she experienced the current period's age-specific birth rates. Sources: Haines (2008) and Hacker (2003).

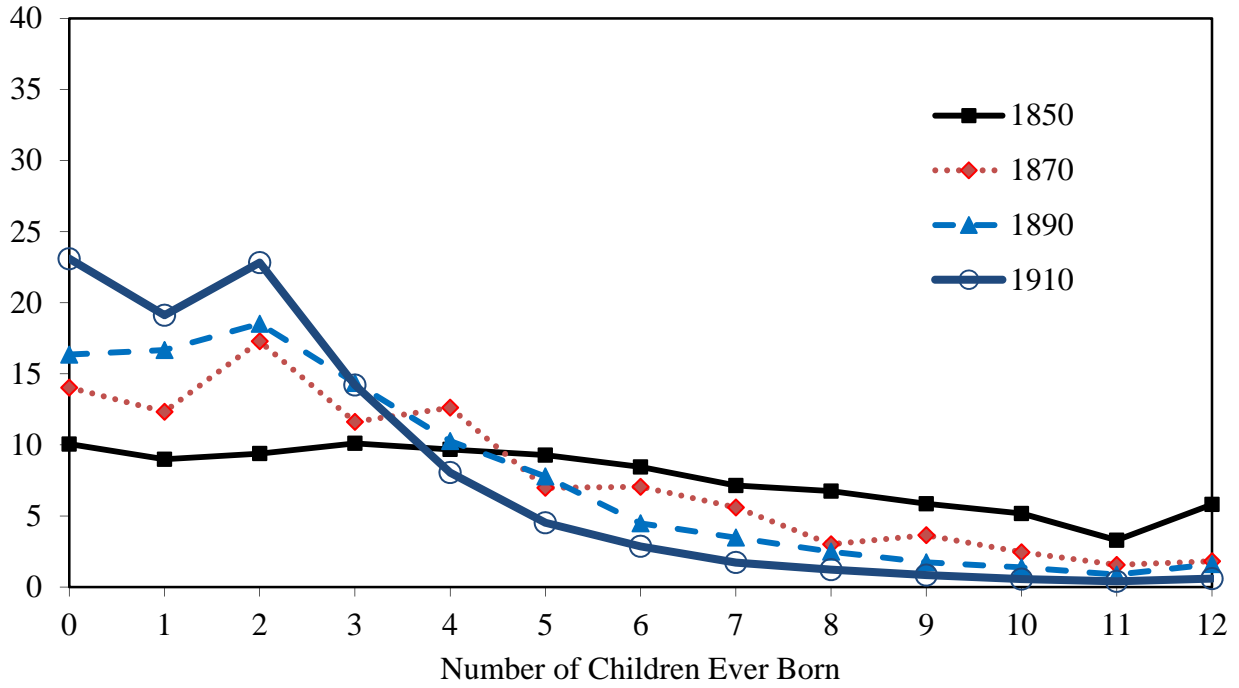
**Figure 2. General Fertility Rate and Completed Childbearing, by Year and Cohort**



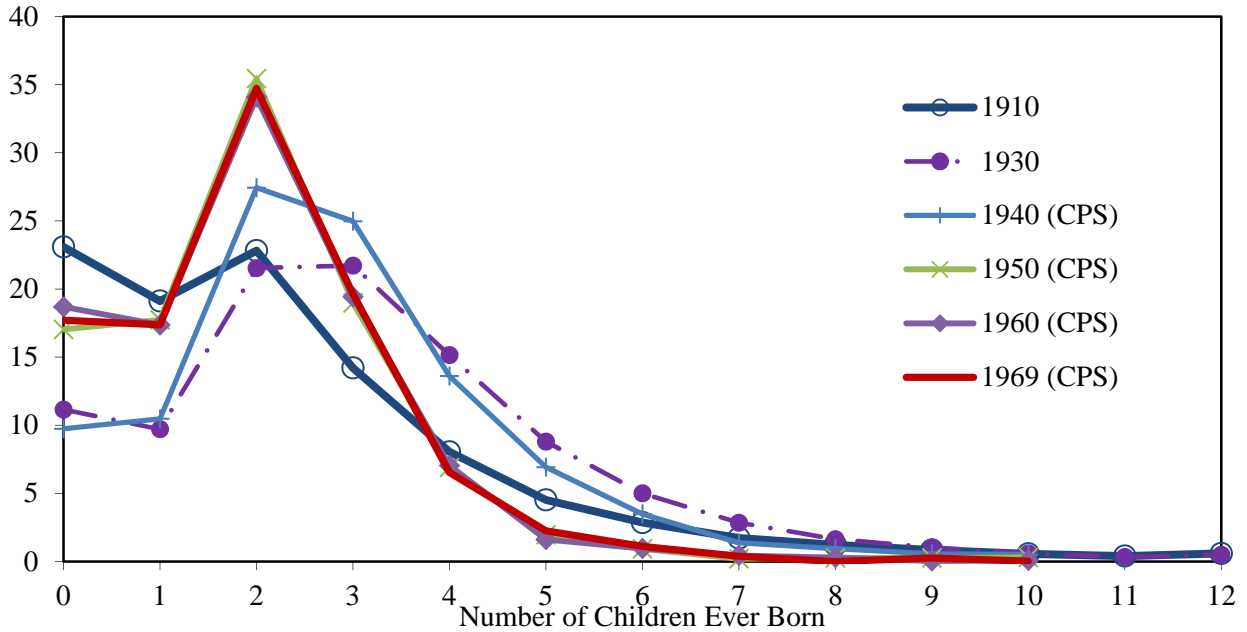
Notes: The general fertility rate (GFR) is plotted on the left vertical axis and is measured as the number of births per 1000 women ages 15 to 44 in the population (lower x-axis). Before 1910, this series is for white women only. Mean live births is plotted on the right vertical axis and is the mean self-reported number of children ever born for each birth cohort as measured between the ages of 41 and 70. This series is plotted by birth cohort (upper x-axis). Sources: Fertility rates are from the National Center for Health Statistics, <http://www.cdc.gov/nchs/data/statab/t001x01.pdf>. Mean live births are computed using the 1900, 1910 and 1940-1990 Decennial Census IPUMS samples (Ruggles et al. 2010) and the 1995-2010 June Current Population Survey.

**Figure 3. The Distribution of Children Ever Born, by Cohort**

*A. Completed Childbearing by Parity, Birth Cohorts of 1850 to 1910*

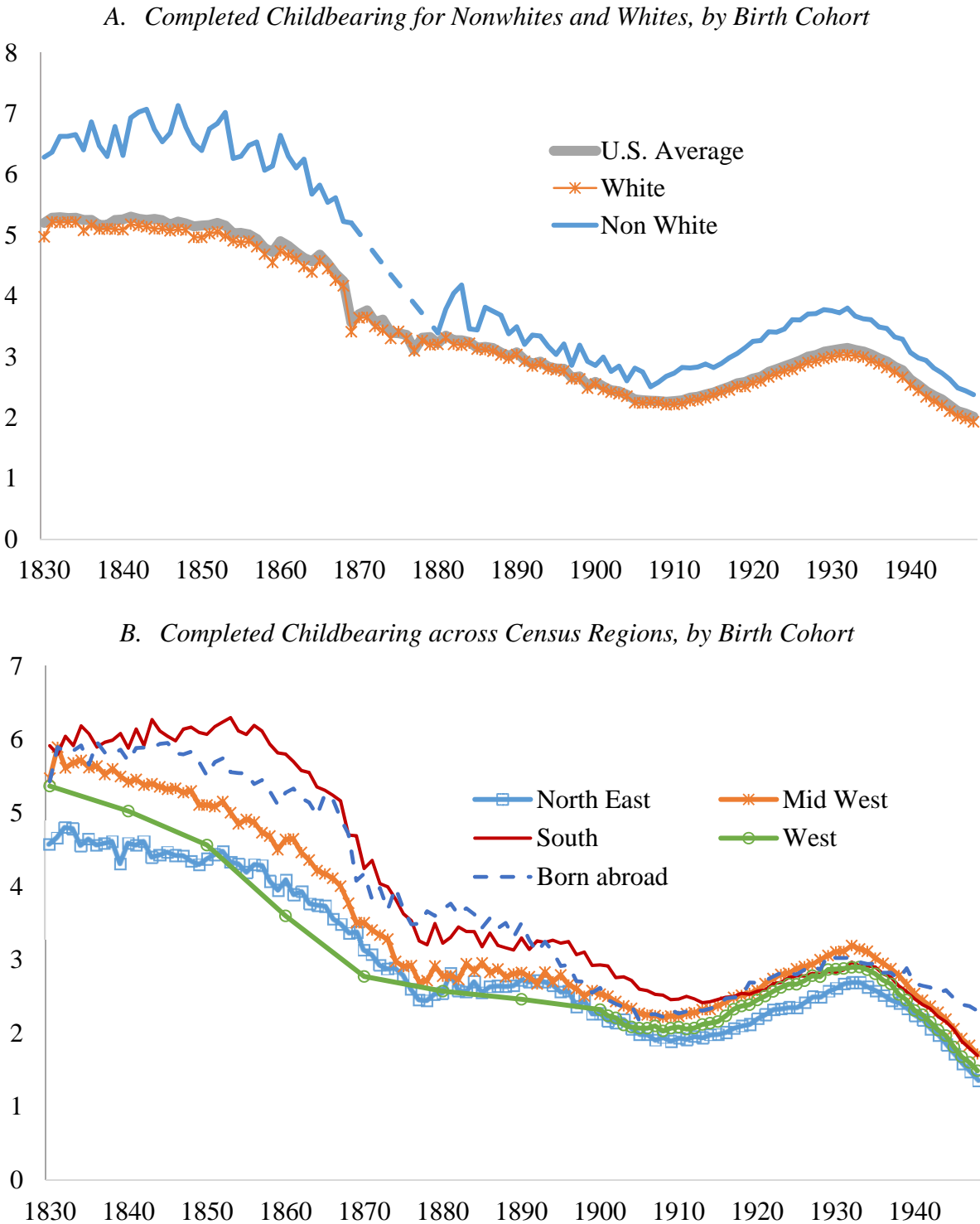


*B. Completed Childbearing by Parity, Birth Cohorts of 1910 to 1969*



These figures plots the percent of women ages 41 to 70 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 non-marital childbearing. Children ever born is top-coded at 12 in the Census and 10 in the CPS. Source: 1850 to 1930 cohorts use the 1900, 1910, 1940-1990 Decennial Censuses (Ruggles et al. 2010); 1940 to 1969 cohorts use the 1981 through 2010 June Current Population Survey (CPS).

**Figure 4. Completed Childbearing across Race/Ethnicity Group and Geographic Area**



Notes: See notes to figure 2. Due to small sample sizes, points between 1870 and 1879 in panel A for nonwhites and before 1900 in panel B for the west are averaged into one cell. In panel A, this average is plotted as 1874 and in panel B it is plotted by decade. Sources: Fertility rates are from the National Center for Health Statistics, <http://www.cdc.gov/nchs/data/statab/t001x01.pdf>. Mean live births are computed using the 1900, 1910 and 1940-1990 Decennial Census IPUMS samples (Ruggles et al. 2010).