RETHINKING THE "EARLY" DECLINE OF MARITAL FERTILITY IN THE UNITED STATES*

J. DAVID HACKER

In this article, I rely on new estimates of nineteenth-century mortality and the Integrated Public Use Microdata Series to construct new estimates of white fertility in the nineteenth-century United States. Unlike previous estimates that showed a long-term decline in overall fertility beginning at or before the turn of the nineteenth century, the new estimates suggest that U.S. fertility did not begin its secular decline until circa 1840. Moreover, new estimates of white marital fertility, based on "own-children" methods, suggest that the decline in marital fertility did not begin in the nation as a whole until after the Civil War (1861–1865).

A sustained decline in marital fertility is believed to have begun in France and the United States in the late eighteenth century, at least three-quarters of a century before marital fertility began to decline in other nations (Binion 2001). Unfortunately, empirical data on the "early" decline of marital fertility in the United States are weak. Most estimates of fertility before 1880 have been based on the age structure of the population reported in federal censuses, and thus are sensitive to changes in mortality, immigration, and census underenumeration. The lack of information on marital patterns also hinders interpretation. Upon the weak foundation of child–woman ratios and indirect estimates of crude birth rates, however, demographic historians have built increasingly sophisticated theories of the U.S. fertility decline that emphasize the importance of controlling fertility within marriage.

According to the dominant interpretation of fertility decline first posited by Yasuba (1962) and subsequently elaborated on by a number of historians, the long-term decline in child–woman ratios and crude birth rates in the early nineteenth-century United States is most closely associated with the cost of establishing new farms. Greater population densities led to a rise in the cost of farmland, especially near the Atlantic coast and navigable rivers where population densities were the highest. As parents increasingly found themselves unable to endow their sons with adequate farmsteads nearby, they adapted by limiting their fertility. Couples in the Northeast, where relatively little undeveloped farmland remained after the turn of the nineteenth century, were the first to practice successful family-limitation strategies. Couples on the frontier, where cheap land was readily available, were relatively late in limiting marital fertility. Many variations of the "adaptation" thesis have been posited, including models that account for internal migration, the availability of credit markets, the relative costs and benefits of children, and parents' demand for support in old age. Although a few researchers have acknowledged that rising mortality or declining nuptiality could have contributed to declining child–woman ratios, most have interpreted the decline as evidence of marital-fertility control (for a recent summary of the literature on the decline in U.S. fertility, see Haines 2000).[1]

*J. David Hacker, Department of History, Binghamton University, SUNY, PO Box 6000, Binghamton, NY 13902; E-mail: hacker@binghamton.edu. This article is a revised version of a paper presented at the Minnesota Population Center, the California Center for Population Research, and the 2002 annual meeting of the Population Association of America and benefitted from the comments of the participants in the sessions.

1. A few cross-sectional studies have relied on measures of marital fertility to test hypotheses (see, e.g., Easterlin, Alter, and Condran 1978; Hacker 1999a; Steckel 1992).

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This article relies on new estimates of nineteenth-century mortality and recently constructed Integrated Public Use Microdata Series (IPUMS) samples of the 1850, 1860, 1870, and 1880 censuses to reexamine the decline in white fertility in the nineteenth-century United States. In the first part of the article, I present new estimates of the crude birth rate for the white population between 1800 and 1930. Unlike previous estimates that showed a long-term decline in fertility beginning at or before the turn of the nineteenth century, the new estimates suggest that white birth rates did not begin their secular decline until circa 1840. Because there is also strong evidence that nuptiality declined over the course of the nineteenth century, I hypothesize that the onset of marital-fertility decline in the United States was not as early as previous investigators have suggested. I test this hypothesis in the second part of the article by presenting an analysis of estimates of white marital fertility for 1847–1879 using "own-children" methods. The results suggest that the control of marital fertility cannot be detected in the nation as a whole until after the Civil War (1861–1865). Marital fertility in the United States was slightly higher than marital fertility in England and Wales until 1861, when the Civil War led to a sharp fall in U.S. marital fertility. Indices of marital fertility, constructed from age-specific marital fertility rates, also suggest a relatively later onset of the control of marital fertility than has typically been assumed. Evidence of parity-dependent control, for example, cannot be detected until the period 1867–1869. Although there were undoubtedly subgroups of the population who controlled marital fertility before this date—as there were in other countries—I conclude that marital fertility decline in the United States was not as exceptionally early as previous researchers have contended. Rather, the decline of marital fertility in the United States more closely paralleled the decline in the English-speaking countries of England and Australia than it did in France.

PREVIOUS ESTIMATES OF NINETEENTH-CENTURY FERTILITY

The most commonly reported measures of fertility in the nineteenth-century United States are crude birth rates and child–woman ratios. Because a comprehensive birth-registration system was not in place in the United States until 1933, the calculation of crude birth rates requires indirect methods. Yasuba (1962) and McClelland and Zeckhauser (1982) estimated white birth rates in the census years 1800–1860 with stable population methods. Thompson and Whelpton (1933) and Coale and Zelnik (1963) estimated white birth rates with reverse-survival techniques, the latter providing annual estimates for the period after 1855. These studies have generally agreed that the white birth rate was over 50 births per 1,000 population in 1800, declined to nearly 40 in 1850, and was lower than 30 at the end of the century, a decline of approximately 45%.

Most cross-sectional studies of fertility in the nineteenth-century United States have relied on child–woman ratios, defined as the number of children aged 0–4 or 0–9 per 1,000 women aged 16–44. Because the Census Bureau published data on ages by state and county, child–woman ratios have proved useful in estimating geographic differences in fertility. Yasuba's (1962) examination of differential fertility during the antebellum period revealed that child–woman ratios were closely correlated with state-level measures of population density, the availability of land, literacy, and other variables. Yasuba's study stimulated other investigations that were based on the child–woman ratio, including those by Easterlin (1976), Easterlin et al. (1978), Forster and Tucker (1972), Haines and Hacker (2002), Leasure (1982), Leet (1977), Smith (1987), and Vinovskis (1976), all of which shifted the analysis from the state to the county level.

Indirect estimates of the crude birth rate and interpretations of trends and differences in child–woman ratios require reliable estimates of mortality by age and sex. Until recently, however, few life tables were available for the nineteenth-century United States. Indirect estimates of the crude birth rate typically relied on a life table constructed from the 10 states that were part of the Death Registration Area (DRA) in 1901 and one or two

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scattered life tables that were constructed with data for nineteenth-century Massachusetts, although they differed somewhat in their underlying assumptions. Thompson and Whelpton (1933) assumed a long-term decline in mortality between 1800 and 1880 and an acceleration thereafter. Yasuba (1962) relied on Jacobson's (1957) 1850 life table for Massachusetts and Maryland to represent the entire nation and assumed that there was no change in mortality between 1800 and 1860, as did McClelland and Zeckhauser (1982), although both included "high" and "low" mortality estimates. Coale and Zelnik (1963) assumed that there was no change in mortality between 1800 and 1850 and that there was a linear decline in mortality between 1850 and 1901.

Knowledge of nineteenth-century mortality has improved dramatically in the past decade. Haines (1998) published life tables for census years between 1850 and 1910 that showed that mortality was variable without a trend for most of the late nineteenth century. According to Haines's estimates, mortality did not begin its sustained decline until after 1880. Knowledge of early nineteenth-century mortality is more fragmentary, but also improved. Given rising per capita incomes in the antebellum period, it is surprising that research has indicated that mortality increased after 1830. Genealogical-based investigations by Kunze (1979) and Pope (1992) reported that adult life expectancy at age 20 fell about four years between 1830 and 1850. Indirect evidence of increasing mortality in the period was provided by data on the stature of North American men, which declined several inches in the antebellum period (Steckel 1995). If mortality did increase between 1830 and 1880, as these studies have suggested, existing fertility estimates overstate the timing and extent of the nineteenth-century decline in fertility.

NEW ESTIMATES OF THE WHITE CRUDE BIRTH RATE

Figure 1 plots new estimates of the white crude birth rate that were constructed with life tables derived from Pope (1992), Kunze (1979), and Haines (1998).[2] The stable population estimates rely on published census data between 1800 and 1860 and the method outlined by Yasuba (1962). The back-projection estimates rely on the 1850–1870 IPUMS samples, published data for the census years from 1880 to 1940, and the back-projection method developed by Coale and Zelnik (1963). Yasuba's and Coale and Zelnik's original estimates are included for comparison. The new estimates suggest that there was little or no change in the white birth rate between 1800 and 1835, a modest increase between 1835 and 1845, and a modest decline between 1845 and 1860. The white birth rate was approximately 5% lower in 1860 than it was at the beginning of the nineteenth century. After a sharp decline and partial recovery, coinciding with the years of the Civil War, birth rates began their secular decline. Although there is still considerable doubt about the level and trend in nineteenth-century mortality, these results suggest that one should be cautious about interpreting the shift in the population's age structure between 1800 and 1860 as evidence of declining fertility.

Even if U.S. fertility was declining in the early half of the nineteenth century, one should not be too eager to assume that the decline was due to the conscious control of fertility within marriage. An increase in the average age at marriage, an increase in the

2. I fitted Pope's (1992) and Kunze's (1979) period estimates of adult life expectancy in 1800–1890—adjusted slightly to compensate for the tendency of genealogical sources to overstate adult life expectancies (see Hacker 1997; Smith 1979; Willigan and Lynch 1982)—to life tables constructed for the original states in the 1901 DRA (Glover 1921:64–65, 70–71). I first constructed "standard" life tables for each sex in each decade between 1800 and 1890 by combining the life table for all states in the 1901 DRA (62.9% urban, according to modern census definitions) with the life table for "rural" areas in the 1901 DRA (7.4% urban according to modern definitions) to approximate the proportion urban in each decade; I then fitted the adjusted adult life expectancies reported by Kunze and Pope to the standard tables using a two-parameter logit model with a fixed slope. I relied on Haines's (1998) "U.S. Model" life tables of the white population for 1900, and life tables for the white population from the DRA for later periods, modified slightly by Coale and Zelnik (1963:184).

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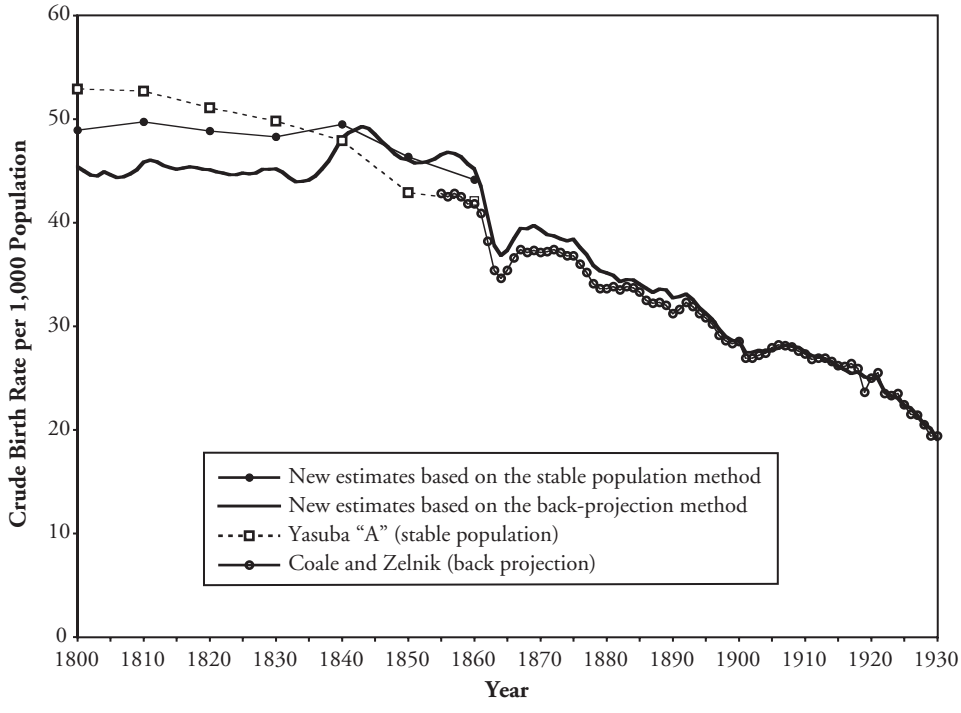
Figure 1. Comparison of New Estimates of the Birth Rate for Whites in the United States, 1800–1930, to Previous Estimates



Source: 1850–1870 IPUMS samples (Ruggles et al. 1997); Coale and Zelnik (1963); Yasuba (1962).

proportion of the female population who never married, or a decline in remarriage would have resulted in a decline in general fertility, even if marital fertility remained unchanged. Smith (1987) noted that early observers, such as Benjamin Franklin and Thomas Malthus, explained the higher fertility in America than in Europe as being the result of the American pattern of early and near-universal marriage. The widespread availability of inexpensive land in the seventeenth and eighteenth centuries allowed couples to marry earlier than their European counterparts, who had to delay marriage until they had accumulated enough resources to set up independent households. By the nineteenth century, however, land was becoming increasingly scarce and expensive in the eastern United States, with the probable consequence of lower nuptiality. Although Smith ultimately concluded that the decline in child–woman ratios between 1800 and 1860 reflected some decline in marital fertility, he considered the neglect of nuptiality to be a major weakness in research on U.S. fertility. "Declining fertility as a consequence of later and less universal marriage," he contended, "requires no special theory of the uniqueness of the American experience; America was simply becoming Europeanized in its fundamental economic environment" (Smith 1987:76).

Australia provides a good example of an English-speaking frontier population that was becoming Europeanized in its patterns of marriage and the impact of that change on fertility in the nineteenth century. In the early nineteenth century, high sex ratios in Aus-

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tralia led to early and near-universal female marriage and high levels of overall fertility. Declining nuptiality over the course of the nineteenth century, however, led to sharp declines in child–woman ratios and measures of general fertility. Between 1861 and 1881, I_f (overall fertility) in Australia fell 24%. I_g (marital fertility), however, rose 5% over the same period (Caldwell 1999).

Although U.S. data are scarce, it is clear that nuptiality declined between the colonial period and 1890, when the Census Office first published data on marital status (Haines 1996). The recent construction of IPUMS samples of the 1850–1880 federal censuses allows nuptiality to be examined in the 1850–1880 period for the first time. Although the 1850–1870 censuses did not include a question on relationship to the household head or current marital status, it is possible to impute relationship using surname, age, sex, and position in the household (see Ruggles 1995, for details) and, from the imputed relationship, whether individuals were "ever married" or "never married."[3]

Table 1 depicts the imputed proportion of white women who were currently married and ever married in the 1850–1870 IPUMS samples, the reported proportion currently married and ever married in 1880, and the singulate mean age at marriage (SMAM) for a synthetic cohort of women in each census year. The results indicate that the mean age at marriage for white women rose approximately one year, from 23.0 in 1850 to 23.8 in 1890. The trend in marriage age before 1850 was also likely upward, although the magnitude of the increase remains unclear. Haines (1996) reported an average SMAM of 22.7 years centered at 1780 from community studies—implying that there was little change between 1780 and 1850—but noted that the greater representation of older settled communities in New England and the Mid-Atlantic region likely imparted an upward bias to the estimate. Using indirect methods, Sanderson (1979) suggested an average SMAM of 19.5 years for white women in 1800, although Haines (1996) showed that Sanderson's method underestimated the average SMAM reported by the 1880–1920 censuses by as much as one year. Smith (1993) suggested a reasonable compromise estimate of 21 years, which implies a 2-year increase in white women's age at marriage between 1800 and 1850 and a 2.8-year increase between 1800 and 1890. Given this increase and the more modest decline in crude birth rates noted in Figure 1, it seems reasonable to hypothesize that marital fertility did not decline in the first half of the nineteenth century.

OWN-CHILD ESTIMATES OF U.S. FERTILITY

Information on relationships that is included in the IPUMS samples allows researchers to use own-child fertility methods to construct age-specific fertility estimates in the mid-nineteenth-century United States for the first time (Ruggles et al. 1997). I relied on the 1850, 1860, 1870, and 1880 IPUMS samples to estimate general fertility from 1835 to 1879 and marital fertility from 1847 to 1879. Various indices of fertility have been constructed from age-specific marital fertility rates to measure the level of fertility in the

3. Women with imputed spouses or children present in the household were considered ever married, and those without imputed spouses or children present were considered never married. Although they represent a relatively small proportion of the population—especially at peak marriage ages—separated, divorced, and widowed women who were living without children were erroneously imputed as never married and thus introduce some bias into the estimates. I used the 1880 IPUMS sample—which includes imputed relationship to household head, reported relationship, and reported marital status—to estimate the error for each five-year age group and to construct adjustment factors. Correction factors were near 1 for most age groups younger than age 40, reflecting the small proportion of the population younger than age 40 who were separated, divorced, or widowed without resident children. Over age 40, however, the error was significant. The imputed never-married variable, for example, suggests that 11.0% of white women aged 45–49 in 1880 were never married. The actual percentage was 7.6, implying the need for a relatively large correction factor. I calculated singulate mean ages at marriage (SNAMs) for white women in each census region in 1880 to test the accuracy of the procedure. Despite a wide range of marital patterns—the SMAM ranged from 21.4 in the Mountain and Pacific regions to 24.6 in New England—the greatest error in the imputed SMAMs was –0.19 year in the East–South Central region.

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Table 1. Proportion of White Women in the United States Who Were Currently Married and Ever Married, by Five-Year Age Groups and the Singulate Mean Ages at Marriage, 1850–1890

	Census Year				
White Women	1850	1860	1870	1880	1890
Proportion Currently Married					
Aged 15–19	.120	.120	.106	.102	
Aged 20–24	.492	.512	.493	.464	
Aged 25–29	.720	.733	.706	.710	
Aged 30–34	.780	.801	.767	.785	
Aged 35–40	.807	.804	.784	.792	
Aged 40–44	.772	.775	.769	.770	
Aged 45–49	.746	.760	.756	.738	
Proportion Ever Married					
Aged 15–19	.122	.124	.109	.110	
Aged 20–24	.527	.540	.526	.494	
Aged 25–29	.773	.785	.765	.761	
Aged 30–34	.856	.873	.852	.854	
Aged 35–40	.903	.903	.898	.891	
Aged 40–44	.912	.920	.917	.909	
Aged 45–49	.932	.939	.939	.924	
Singulate Mean Age and Marriage	23.0	22.9	23.3	23.3	23.8

Source: 1850–1880 IPUMS samples (Ruggles et al. 1997); Haines (1996).

Note: 1850–1870 estimates are based on an imputed relationships.

United States relative to "natural" fertility populations and to estimate the onset of parity-dependent fertility control.

The own-child method of fertility estimation is a reverse-survival method for estimating age-specific births in years preceding a census. Developed by Grabill and Cho (1965) in the 1960s for research on tabulations of young children by the ages of their mothers in the 1910 and 1940 censuses, the method has been refined and elaborated (Cho, Retherford, and Choe 1986) and applied to public-use microdata samples (PUMS) of the U.S. census, including the 1960 and 1970 PUMS (Rindfuss and Sweet 1977) and the 1900 PUMS (Tolnay, Graham, and Guest 1982). Haines (1978) applied the method to the 1850–1900 censuses of the Pennsylvania Anthracite region.

Own children are defined as children who can be identified in the census as living with their mothers. By linking own children in census microdata samples to their mothers' records, it is possible to create a partial birth history for each mother in the sample. In the basic method of own-child fertility analysis, own children are cross-tabulated by their mothers' ages, and then reverse survived to estimate the number of births by the ages of mothers in years preceding the census. Women who were present in the census are also reverse survived to estimate the total number of women who were alive in a given year. Age-specific birth rates are then calculated by dividing the number of back-projected births by the number of back-projected women of a particular age, and the total fertility rate is

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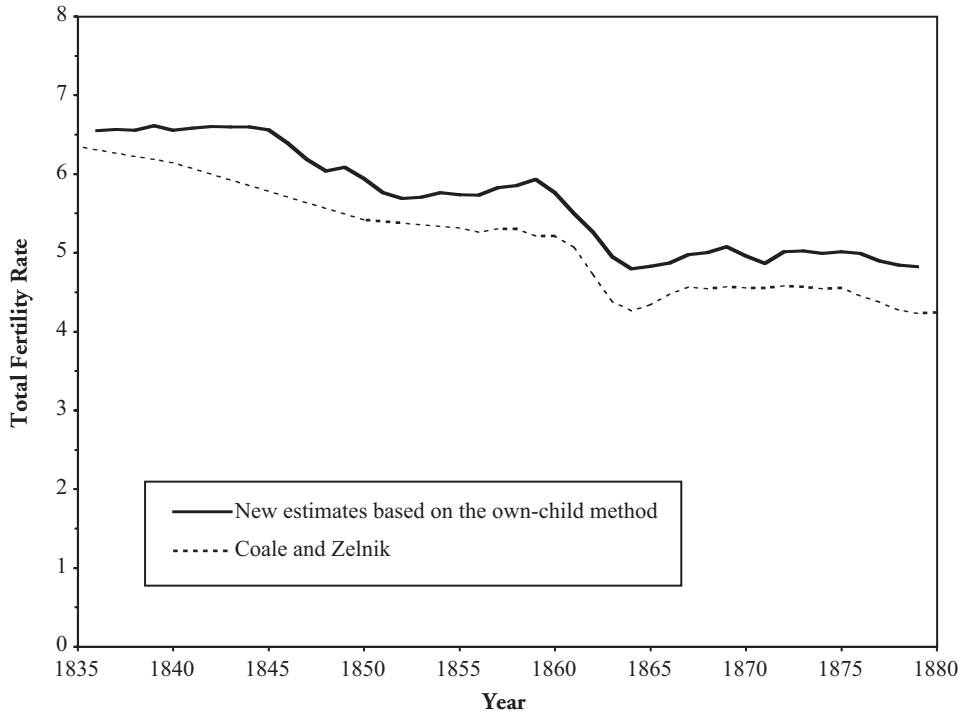
Figure 2. Comparison of New Estimates of Total Fertility of the White Population in the United States, 1835–1880, to Previous Estimates



Source: 1850–1880 IPUMS samples (Ruggles et al. 1997); Coale and Zelnik (1963).

obtained by summing the age-specific birth rates of women aged 15–49. Finally, age-specific marital fertility rates are obtained by multiplying the age-specific fertility rates by the inverse of the proportion of the women in each age group who were currently married.

I applied the procedures detailed by Cho et al. (1986) to white women and their children in the 1850–1880 IPUMS samples. Adjustments were made for net census underenumeration (Hacker 2000) and the proportion of children who were not living with their own mothers before children and mothers were reverse survived. Because children left home at an increasing rate after age 15, I limited own children to ages 0–14, corresponding to births 1–15 years before the census. The use of the 1850, 1860, 1870, and 1880 IPUMS samples allowed me to average rates for the periods 1845–1849, 1855–1859, and 1865–1869.

General Fertility

Age-specific and total fertility rates were calculated for synthetic cohorts of white women in each year between 1835 and 1879. Total fertility rates are shown with Coale and Zelnik's (1963) estimates in Figure 2. Because the new estimates are based on higher mortality assumptions, fertility rates are higher than those estimated by Coale and Zelnik. Both series, however, indicate similar trends and closely correspond with the crude birth rates shown in Figure 1. The own-children estimates that were constructed with the IPUMS indicate that the total fertility rate for whites was approximately 6.6 in 1840. The

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Table 2. Age-Specific and Total Fertility Rates (TFRs) for the White Population of the United States, 1835–1879

Period	Age-Specific Birth Rates: Five-Year Age Groups							TFR Ages 15–49	TFR Ages 20–49
	15–19	20–24	25–29	30–34	35–40	40–44	45–49		
1835–1839	0.097	0.251	0.299	0.286	0.225	0.126	0.031	6.6	6.1
1840–1844	0.083	0.249	0.312	0.292	0.236	0.117	0.026	6.6	6.2
1845–1849	0.076	0.235	0.290	0.281	0.217	0.115	0.026	6.2	5.8
1850–1854	0.080	0.224	0.274	0.249	0.197	0.102	0.022	5.7	5.3
1855–1859	0.080	0.235	0.277	0.260	0.193	0.101	0.021	5.8	5.4
1860–1864	0.064	0.196	0.244	0.226	0.184	0.094	0.020	5.1	4.8
1865–1869	0.065	0.201	0.241	0.219	0.166	0.089	0.017	5.0	4.7
1870–1874	0.069	0.208	0.241	0.215	0.165	0.079	0.015	5.0	4.6
1875–1879	0.057	0.206	0.243	0.218	0.164	0.078	0.013	4.9	4.6

Source: 1850–1880 IPUMS samples (Ruggles et al. 1997).

rate remained level and even increased slightly until 1845, after which it dropped steadily, reaching 5.7 in 1852. No trend in total fertility is evident in the 1850s, but total fertility again dipped sharply during the Civil War, reaching a low of 4.8 in the last few years of the conflict. Rates recovered slightly after the war to about 5.0 and then remained relatively stable until 1879. Over the 43-year span of the series, total fertility fell from 6.6 to 4.8, a decline of 27%.

Table 2 aggregates the data into five-year age groups and quinquennial periods. The results indicate that fertility fell in each age group between 1835–1839 and 1875–1879. Although declines at ages between 25 and 34 had the greatest impact on the overall decline in fertility, the largest percentage declines occurred at older ages. The fertility rate of women aged 45–49, for instance, fell 56% between 1835–1839 and 1875–1879, compared with an 18% decline among women aged 25–29.

Marital Fertility

Although valuable, general fertility measures are sensitive to the timing and incidence of marriage. As I noted earlier, the SMAM of white women increased an estimated 2.8 years between 1800 and 1890. Thus, despite the long-term decline in total fertility rates evident in Figure 2, rates of childbearing within marriage may have remained unchanged, indicating no substantial change in parents' desire or ability to limit family size.

Although there is qualitative evidence that some upper-class women in the mid-nineteenth century wanted to control their fertility (Brodie 1994; Degler 1980; McMillen 1990), no nationally representative estimates of age-specific marital fertility are available for the period. Several studies, however, have suggested that increasing mortality and declining nuptiality likely played important roles in the overall decline in fertility. Sanderson's (1979) indirect estimates indicated that roughly half the decline in child–woman ratios before 1850 was due to the effects of nuptiality. Thereafter, most of the decline could be attributed to reductions in marital fertility. Wahl's (1986) analysis of a large genealogical sample of American families reported similar results, although a decrease in the proportion of women who ever married and in the life expectancy of women during their childbearing years were found to be the principal factors associated with declining fertility for women who were born before 1850.

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Age-specific marital fertility rates can be calculated with the 1850–1880 IPUMS, although the data are less than ideal. With the exception of the 1880 census, there is no information on women's current marital status. In addition, none of the four censuses included a question on the duration of current marriages. As I noted in the discussion of marriage age, however, it is possible to impute current marital status in each census year with a high level of accuracy (see Table 1).[4] Following Cho et al. (1986:18), I interpolated age-specific proportions of white women who were currently married in five-year age groups for all years between 1850 and 1880. I also extrapolated the proportions currently married to 1847–1849 by fitting a simple ordinary least-squares regression to the proportions who were currently married in 1850–1880.[5] Term-by-term division of the age-specific fertility rates in each year by the proportion who were currently married yields age-specific marital fertility rates for each year between 1847 and 1879. The procedure assumes that all births occur within marriage, a reasonable assumption for the nineteenth-century United States.

Table 3 compares recent age-specific marital birth rates, total marital fertility rates, and various indices of marital fertility among white women in the 1850, 1860, 1870, and 1880 IPUMS samples. The results are limited to the three years before each census because of the increasing potential for error in interpolating the proportions who were currently married in noncensus years and the potential impact of the Civil War to bias the results in 1862–1866. Over the 30-year period, total marital fertility fell from 8.28 to 6.85, a 17% decline. Tolnay et al. (1982) estimated a total marital fertility rate of 5.3 in the period 1886–1889, implying a rapid decline of marital fertility in the early 1880s, but their estimates were based on different mortality assumptions, and Ewbank (1991) cautioned that their estimates appear to be too low. Although slightly more than half the decline in 1850–1880 occurred for women aged 35 or younger, the largest proportional declines in marital fertility occurred at older age groups. Martial fertility rates among white women aged 20–24 fell only 8% over the period, while rates among women aged 40–44 and 45–49 fell 30% and 47%, respectively.

Dating the onset of the decline in marital fertility has become a contentious issue in historical demography. The criterion established by the European Fertility Project (for the project's summary volume, see Coale and Watkins 1986) was a 10% decline in the index of marital fertility, I_g, defined as the ratio of births in a population to the potential births to married women. If one assumes that the estimated index of 0.767 for 1847–1849 represents the pretransition level of marital fertility in the United States, the onset of the decline in martial fertility began in the 1860s. That decade, however, coincided with the Civil War (1861–1865), which engaged and killed a larger proportion of white men than any other war in American history. An estimated 40% of white men aged 13–43 in 1860 fought in the war, and 8% are estimated to have died (Vinovskis 1989). The war's impact on marital fertility is readily apparent in Figure 3, which plots the index of marital fertility for white women in the United States for all years between 1841 and 1879 with estimates for France (Weir 1994) and England and Wales (Woods 2000). Despite the consensus that marital

4. Because I was interested in the proportion of women who were *currently* married, the problem of incorrectly identifying separated, divorced, and widowed women with no children present in the 1850–1870 IPUMS samples as "never married," described in footnote 3, is not a source of error. Only the accuracy of the imputed spouse-location variable could bias the results. The 1880 IPUMS sample—which includes both the imputed spouse-location and the reported spouse-location variables—suggests that the imputation is robust at all ages except 15–19, when it overstates the number of currently married women by 7.5%. At ages 20–49, however, the average error is 0.026%, with the greatest error (0.261%) at ages 40–44.

5. Because nuptiality is believed to have declined at a faster rate in the first half of the nineteenth century than in the second half, the extrapolation of the proportion who were currently married before 1850 from the 1850–1880 censuses is likely to understate the true proportion who were married and thus to bias estimates of marital fertility upward. I therefore limited the extrapolation to the three years prior to the 1850 census.

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Table 3. Age-Specific Marital Birth Rates, Total Marital Fertility, and Selected Indices of Marital Fertility: Currently Married White Women in the United States, 1847–1849, 1857–1859, 1867–1869, and 1877–1879

Rates, Indices, and Women's Age	Period			
	1847–1849	1857–1859	1867–1869	1877–1879
Age-Specific Marital Birth Rates				
20–24	.462	.466	.416	.424
25–29	.393	.385	.345	.339
30–34	.353	.329	.285	.279
35–40	.265	.247	.211	.206
40–44	.148	.134	.116	.103
45–49	.035	.028	.024	.018
Total Marital Fertility Rate				
Ages 20–49	8.28	7.94	6.98	6.85
Index of Marital Fertility				
I_g	0.767	0.739	0.647	0.630
Coale and Trussell (1974, 1975, 1978)				
M	0.924	0.917	0.825	0.855
m	0.089	0.182	0.217	0.289
Hinde and Woods (1984)				
M	1.130	1.139	1.018	1.037
m	–0.027	0.074	0.101	0.186
Weir (1993)				
MAC	30.2	29.9	29.8	29.6

Source: 1850–1880 IPUMS samples (Ruggles et al. 1997).

fertility began to decline in the United States nearly a century before it did so in Britain, the figure shows that martial fertility was somewhat higher in the United States than in England and Wales before 1861. It was only after the onset of the Civil War that marital fertility in the United States declined below that in England and Wales, reaching a period low in 1865 and 1866. Some convergence in the levels occurred in the 14 years after the war, so that the marital fertility index in the United States remained only 5% to 10% below England and Wales's in the 1870s (in contrast, marital fertility in France in the 1870s was 30% lower than that in England and Wales). Marital fertility in the United States never recovered to within 10% of its antebellum level, however, so the beginning of the decline in marital fertility in the United States should perhaps be dated to the 1860s. Although this period predates the decline in marital fertility in England by a few decades, the results indicate that the level of and trend in marital fertility in the United States more closely paralleled the level of and trend in marital fertility in England and Wales than in France, which had experienced a 10% decline in I_g circa 1800.

In addition to I_g, two indices of marital fertility developed by Coale and Trussell (1978) have proved to be popular measures for inferring the degree and onset of conscious fertility control. Termed *M* and *m*, the indices estimate the degree to which marital

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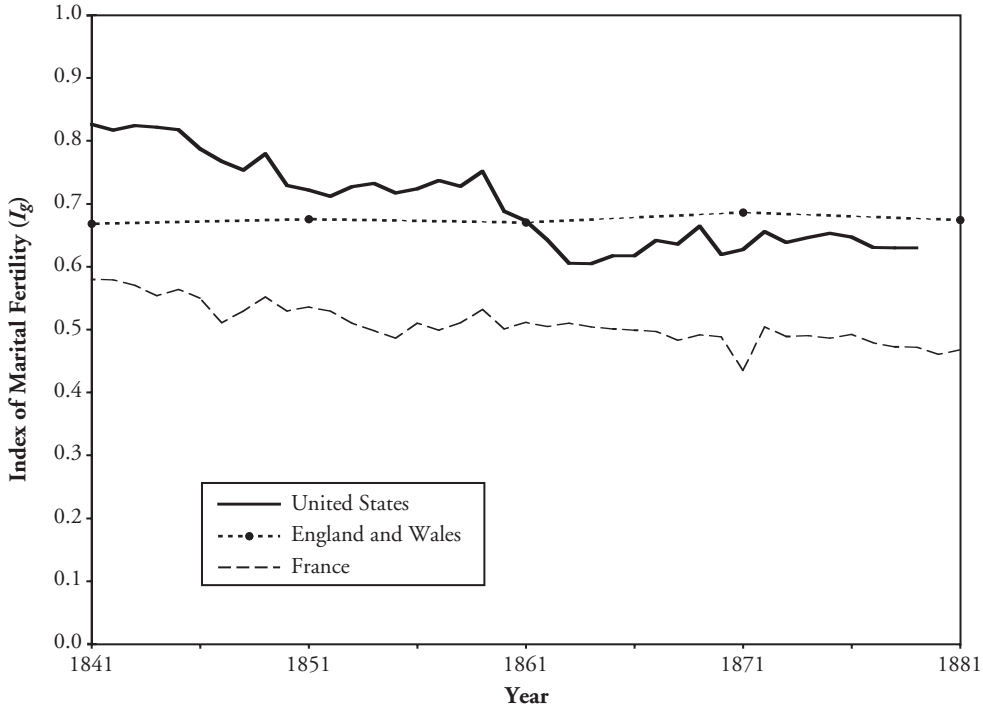
Figure 3. Comparison of the Index of Marital Fertility (I_g) for the White Population in the United States, 1841–1879, With France and England and Wales, 1841–1881



Source: 1850–1880 IPUMS samples (Ruggles et al. 1997); Weir (1994); Woods (2000).

fertility in a given population departs from "natural" fertility. Natural fertility was first assumed to be equal to the age-specific birth rates of Hutterite women but was later modified slightly (Coale and Trussell 1974:188, 1975:572). *M* can be thought of as a scale factor for the underlying level of marital fertility (or, more simply, as the ratio of marital fertility at ages 20–24 to that of natural fertility), and *m* can be considered the degree to which couples stop having children after they reach a desired number. Values of *m* near zero suggest natural fertility, and values of *m* near or higher than 1.0 indicate a high degree of conscious fertility control. In practice, demographers assume that values of *m* lower than 0.3 or 0.2 are indicative of noncontrolling populations. Coale and Trussell (1978), for instance, contended that "any value of *m* less than 0.2 can be taken as evidence of no control" (p. 203).

M and *m* parameters were calculated with the weighted least-squares procedure recommended by Broström (1985) and are shown in Table 3. In addition to the Coale and Trussell parameters, Table 3 also reports *M* and *m* parameters that were calculated with the British standard fertility schedules suggested by Hinde and Woods (1984) and Woods (2000) and the Mean Age at Childbearing (MAC) suggested by Weir (1993). The results indicate that *M* declined a moderate 7% in the period, from 0.924 in 1847–1849 to 0.855

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in 1877–1879. Although the decline in *M* reflects a decline in martial fertility rates among women aged 20–24, the mean age at childbearing also fell slightly during the period, from 30.2 to 29.6, indicating an increasing tendency for white women to concentrate childbearing at younger ages. The falling mean age at childbearing is also reflected in the steady increases in both Coale and Trussell's and Hinde and Woods' *m* parameter. It is interesting that the Coale and Trussell-specified *m* parameter exceeds 0.2 only in the period 1867–1869, again suggesting the onset of marital fertility control in the 1860s. The index remained under 0.3 as late as 1877–1879, however, indicating that the decline in marital fertility was only partially the result of stopping behavior. With the British standard fertility schedules, *m* remains under 0.2 in 1877–1879.

In the past decade, critics have charged that neither I_g nor *m* accurately detects the early stages of a fertility transition. Using simulation techniques, Guinnane, Okun, and Trussell (1994) demonstrated that the *m* parameter cannot reliably detect the presence of a significant minority of controllers in the pretransition period. Okun (1994b) reported that *m* can take values lower than 0.2 in simulated populations with as many as 40% of the population practicing parity-dependent control. It is therefore possible that some population subgroups in the United States were effectively curtailing fertility before the 1860s. Indeed, Wells (1971) and Kantrow (1980) have documented that small groups practiced effective marital fertility control in the eighteenth century. In addition, marital fertility likely varied by region, urban-rural residence, occupation, class, and ethnicity. Smith (1994) convincingly argued that women in New England were the vanguard of the decline in marital fertility in the United States. More evidence of New England's early marital-fertility transition was presented in Main's (2000) ongoing genealogical-based investigation of New England fertility.

Because there are no reliable estimates of mortality and census underenumeration by population subgroups, however, it is difficult to assess accurately the size of differences in marital fertility in the nineteenth-century United States. Under assumptions of equal mortality, the Northeast United States is indeed the region of the lowest marital fertility, with an index of marital fertility that is 20% lower than that in the nation as a whole (Hacker 1999b). It is likely, however, that the more urban and industrial Northeast suffered higher infant mortality than the rest of the nation, which would bias the results. Ferrie's (1996) analysis of the 1850 Census of Mortality reported that adult male mortality was higher in the Northeast, although questions remain about regional differences in underenumeration and infant mortality. In an analysis of a linked 1850–1860 census sample, Steckel (1988) noted that infants in large cities with populations of 25,000 or more were more than twice as likely to die than were those in rural areas, which further suggests that differences in mortality bias attempts to compare indirect estimates of differences in marital fertility. Analyses of parity-dependent control are perhaps less likely to be biased by assumptions of equal mortality. Hacker's (1999b:176–201) analysis indicated that there was no clear evidence of parity-dependent control by region before 1859–1860, when couples in the Northeast began curtailing fertility. Parity-dependent control is then evident among couples in other northern census regions in 1869–1870. There is no clear evidence that southern white women practiced effective stopping behavior before 1880.

It is also plausible that couples in New England achieved their lower level of marital fertility through spacing behavior at low parities, a rational approach of limiting family size in the context of the relatively ineffective contraceptive methods that were available in the nineteenth century. Unfortunately the *m* parameter cannot detect spacing behavior and may therefore confuse the onset of conscious fertility control with a shift in birth control strategies from spacing to stopping (Bean, Mineau, and Anderton 1990). David and Sanderson's (1986) cohort-parity analysis of parity data in the 1900 and 1910 PUMS concluded that both spacing and stopping behaviors were important in the decline in nineteenth-century fertility, although their method has been criticized (Okun 1994a,

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1994b). Tolnay and Guest's (1984) own-child fertility analysis of the 1900 PUMS, in contrast, suggested that only stopping was important. The utility of *m* for assessing nineteenth-century U.S. fertility control may also be limited because of the substantial amount of fertility that took place under age 20. Coale and Trussell's (1974, 1975, 1978) focus on the European experience and its low age-specific birth rates under age 20 led them to rely on fertility at age 20–24 as the first meaningful point of comparison to the natural fertility population. As a result, a reliance on *m* may understate any shift to increased childbearing at younger ages in the United States (Wetherell 2001). As a result of these criticisms, researchers should be wary of relying on *m* as the sole indicator of marital fertility control. Taken in the context of declining *M*, I_g, and total marital fertility in the period after 1860, however, the increase in *m* provides further support that the decline in marital fertility in the United States was later than has typically been assumed.

CONCLUSION

The "early" decline in nineteenth-century American fertility has long fascinated social scientists. Unfortunately, the quality of the quantitative data has limited our understanding of the onset of marital fertility control and thus the factors that are associated with the transition to smaller families. Most prior evidence on the decline in fertility was based on indirect estimates of the crude birth rate and child–woman ratios, which are sensitive to changes in nuptiality, mortality, and census underenumeration. These studies suggested that differences in fertility between regions were pronounced early in the nineteenth century, and thus most scholars have speculated that American couples were consciously changing their reproductive behavior to control the size of their families as early as 1800.

I relied on the 1850, 1860, 1870, and 1880 IPUMS samples and new estimates of nineteenth-century mortality to revise estimates of the crude birth rate in the nineteenth-century United States and to make own-children estimates of white marital fertility. The results challenge the view that a large proportion of white couples were actively engaging in family-limitation practices in the early nineteenth century. Revised estimates of the crude birth rate suggest that there was little or no change in general fertility before 1840. The moderate decline in the birth rate that was observed between 1800 and 1860 can be explained by changes in nuptiality, which is believed to have declined significantly during the period.

The conclusion that the onset of marital fertility control in the United States should not be dated until the late nineteenth century is further supported by own-child estimates of marital fertility. The results indicate that marital fertility in the United States was higher than that in England and Wales until the onset of the Civil War in 1861. The index of marital fertility remained over 0.600 as late as 1877–1879, which also suggests the likely absence of deliberate fertility control within marriage. Finally, Coale and Trussell's *m* parameter, which estimates the degree to which couples limit childbearing after they obtain a desired number of children (engage in parity-dependent control), provides little evidence of parity-dependent fertility control until 1867–1869. Although recent criticism of the Coale and Trussell model has strongly contended that it should not be used as the sole means of identifying the onset of marital fertility control, the results correspond with the other measures noted earlier. Thus, the decline in American marital fertility should perhaps be dated to the 1865–1870 period, bringing the fertility transition in the United States more in line with the fertility experience of most other Western countries.

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