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The Decoupling of Sex and Marriage: Cohort Trends in Who Did and Did Not Delay Sex until Marriage for U.S. Women Born 1938–1985

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Abstract: In this study, we examine cohort trends in who did and did not delay sex until marriage for U.S. women born between 1938 and 1985 using Cycles 3–7 of the National Survey of Family Growth. We find that roughly half of women born in the late 1930s and early 1940s were already sexually active prior to marriage. Especially rapid increases in not delaying sex until marriage occurred for women born between 1942–43 and 1954–55, with subsequent cohorts experiencing less rapid increases and with premarital sex reaching a plateau of roughly 85 to 90 percent for those born after 1962. Our continuous-time competing-risk models illustrate the methodological dangers of using single-decrement procedures for questions such as who did and did not delay sex until marriage. More generally, our findings suggest that the decoupling of sex and marriage was underway well before the so-called "sexual revolution" of the late 1960s and early 1970s.

Keywords: sexuality; marriage; sexual revolution; cohort analyses; competing risks

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In this article, we document how the decoupling of sex and marriage in the United States evolved historically by examining trends in who did and did not delay sex until marriage for successive birth cohorts of U.S. women. The near-universality of premarital sex in the United States was not true historically (D'Emilio and Freedman 2012; Laumann and Michael 2001; Regnerus and Uecker 2011), yet as our review of the literature shows, there exists surprisingly little empirical evidence on when shifts occurred, let alone the pace at which historical change took place. The findings of this study fill this gap.

Our analyses use data from Cycles 3–7 of the National Survey of Family Growth (NSFG) to document cohort trends in who did and did not delay sex until first marriage. We use the large samples in these data to analyze trends for two-year birth cohorts, which allows us to determine with substantial precision the timing and magnitude of shifts in behavior. To foreshadow our results, we find that roughly half of women born in the late 1930s and early 1940s—the earliest birth cohorts in these data—reported that they did not delay sex until marriage. For women born after 1962, fewer than one in 10 reported abstaining from sex until marriage. Change was especially rapid for women born between 1944–45 and 1954–55, corresponding roughly to the period of the early 1960s to the mid 1970s. Taken together, these findings suggest not only that very rapid change was occurring during the so-called "sexual revolution" of the late 1960s and early 1970s but also that at least a decade earlier, roughly 50 percent of women were already sexually active while never-married. These results lead us to speculate that the decoupling of sex and marriage

was part of a far longer process of historical change in the sexual behaviors of successive birth cohorts of U.S. women.

In this article, we emphasize that any understanding of who did not delay sex until marriage also requires consideration of the complementary question of who did delay sex until marriage. We thus highlight the methodological dangers of studies that employ single-decrement procedures to answer questions such as who did and did not delay sex until marriage because at issue is which event—sex or marriage—occurs first. We turn instead to a competing-risk model that avoids these problems and use the resulting regression estimates to decompose cohort trends, with results from these decompositions helping to shed light on factors that influenced trends in who did and did not delay sex until marriage.

The organization of this article is as follows. We begin with a brief review of the existing literature. We then provide details about our data, our continuous-time competing-risk models, and our procedures for analyzing cohort trends. We next turn to our descriptive findings, including assessments of the data quality of our outcome variables, which are based on retrospective self-reports. We then present our analyses of cohort trends, using estimates and derived predictions from our continuous-time competing-risk hazard models, which allow us to control for compositional shifts across successive cohorts. We conclude with some brief speculative remarks.

Previous Studies

In our review of the literature, we have chosen to focus on studies specifically relevant to the sexual behavior of never-married U.S. women. We think it nevertheless important to emphasize that this focus clearly overlooks an enduring double standard that has held women to a far stricter code of behavior than men. With this critical caveat in mind, a nearly universal theme throughout this literature is that sex and marriage were once tightly coupled but have become increasingly less so.

In their historical study of sex in the United States from the colonial era to the close of the twentieth century, D'Emilio and Freedman (2012) argue that "the dominant meaning of sexuality has changed . . . from a primary association with reproduction within families to . . . emotional intimacy and physical pleasure" (p. xiv) and that

> The idea that marriage was acceptable primarily as a way to channel lust and prevent sexual sin gave way to a belief that marital love, as well as the need to produce children, could justify sexual intercourse. At the same time, by placing a new emphasis on the importance of sexuality within marriage, Protestantism distinguished more clearly between proper sexual expression—that which led to reproduction—and sexual transgressions—acts that occurred outside of marriage and for purposes other than reproduction (P. 4).

They nevertheless note that the line between proper and transgressive behavior was not absolute—most "remained chaste at least until betrothal," leading them

to argue that "sexual relations between engaged couples were tolerated because a subsequent marriage was virtually assured" (p. 5).

What led to the decoupling of sex and marriage? A conclusive causal answer to this question will likely remain elusive, but many have argued, on plausible theoretical grounds, that advances in contraceptive technology and the introduction and diffusion of the birth control pill in particular were decisive factors by allowing women and couples far greater control over whether and when to become pregnant. Yet, the feminist historian Bailey, while acknowledging the pill's importance, cautions that "it is crucial to understand that the pill was introduced, in the early 1960s, into a society that publicly denounced sex outside marriage. The pill was not freely available, but rather controlled by physicians who did not stand above or outside the mores of the larger society" (Bailey 1997:845). Goldin and Katz (2002) similarly note that "Although the pill was approved in 1960 by the Food and Drug Administration and spread rapidly among married women, it did not diffuse among young, single women until the late 1960s after state law changes reduced the age of majority and extended 'mature minor' decisions" (p. 370). They concluded that the pill's influence on the behaviors of single, never-married women primarily affected those born 1950 or later.

The arguments reviewed above can be seen as part of a larger body of research on the so-called "sexual revolution" (Bailey 1997; Joyner and Laumann 2001; Robinson et al. 1991; Smith 1973; Smith 1990). As noted by the demographic historian Daniel Scott Smith (1973), "the very notion of a 'sexual revolution,' defined here narrowly as a substantial sustained increase in nonmarital coitus and broadly as a qualitatively more positive evaluation of sex as a human activity, implicitly embodies an attempt at historical periodization" (p. 321–322). Yet, a review of the literature reveals a range of views on the specific timing of the sexual revolution. Perhaps the majority view is that the sexual revolution encompassed a broad period beginning in the early 1960s and extending through the 1970s that coincided with the rise of the feminist and civil rights movements, the coming of age of the early waves of the baby boomers, the growing numbers of young adults on college campuses, the Vietnam war, the Stonewall riots of 1969, and a counterculture of "sex, drugs, and rock-and-roll." Implicit in such arguments is the assumption that prior to the sexual revolution, intercourse before marriage was unusual among never-married females. And as Goldin and Katz argue, the pill's influence on the sexual behaviors of single, never-married women primarily affected those U.S. women born after 1950, which, given mean ages at first coitus, would imply a late 1960s start date for the sexual revolution, at least as it pertained to young, never-married U.S. women.

Others question if what changed in fact deserves to be labeled a "revolution." Thus, the careful review of the historical and demographic evidence compiled by Daniel Scott Smith (1973) led him to caution that "the 'revolutionary' character of the sexual revolution can easily be overstated" and to conclude that "the trend toward increasing nonmarital sexual intercourse has been ongoing for nearly a century" (p. 321–322; see also Smith and Hindus 1975; and Smith 1990).

What is clear is that both popular and academic interest in the "sexual revolution" led to sharp increases in the 1960s and 1970s in research on the sexual behaviors of young adults. Much of the published research relied heavily on convenience

samples such as surveys of students on college campuses, limiting their usefulness for the questions we pose. For these reasons, we choose not to discuss these studies (see Clayton and Bokemeier 1980; Clement 1990; and Heer and Grossbard-Shechtman 1981 for comprehensive reviews of these studies).

We now turn to the handful of studies that used nationally-representative data, the most important of which is perhaps that by Klassen et al. (1989), who estimated cohort trends in premarital sex for U.S. women born during the first half of the twentieth century. This study utilized data from a survey conducted in 1970 by the Kinsey Institute at Indiana University that provided a nationally representative sample of 3,018 U.S. adults aged 21 and older. The survey obtained standard background and demographic information during an initial portion of the face-to-face interview. The survey then turned to questions on sex in a portion of the interview that was self-administered, with responses entered in a questionnaire booklet that was returned to the interviewer in a envelope sealed by the respondent so as to better ensure confidentiality. The resulting retrospective self-reports covered a variety of topics, including age (to the nearest year) at first sexual intercourse, direct questions on whether sex was or was not delayed until marriage, and the number of premarital sexual partners, including if sex before marriage was only with the respondent's eventual spouse.

Klassen et al. used these data to construct 10-year birth cohorts, with estimated trends showing that the percent of women reporting premarital sexual intercourse was 7.6 percent for those born before 1900, doubling to 14.5 percent for those born 1900–1909, doubling again to roughly 30 percent for those born 1910–1919 and 1920–1929, increasing to 38.9 percent for those born 1930–1939, and increasing very sharply to 62.9 percent for those born 1940–1949. Of those reporting premarital sexual intercourse, roughly half in each birth cohort reported that intercourse was only with a single partner who was their eventual husband (5.1 percent for those born before 1900 increasing to 19.5 percent for those born 1930–1939 and 30.5 percent for those born 1940–1949).

One limitation of this study was the female data contained only 1,388 women with nonmissing data. Estimates therefore rely on relatively modest numbers of women in each birth cohort, with the smallest sample (n = 79) for those born before 1900 and the largest (n = 397) for those born 1940–1949. Perhaps more importantly, the use of 10-year birth cohorts resulted in a fairly coarse level of detail for estimated cohort trends, with this lack of detail especially consequential for the very large 24.0 percentage point increase in premarital sex between the 1930–1939 and 1940–1949 birth cohorts. Note in particular that women in these two cohorts reached their late teens and early 20s during the period stretching from the late 1940s to the early 1970s, a period thus coinciding with the late 1960s and early 1970s, identified by Goldin and Katz as the years of the sexual revolution relevant for never-married young women. Thus, one of the most important contributions of this study—the more than fifty years of cohort experience available in these data—is counterbalanced by the relatively coarse level of detail provided by the study's use of 10-year birth cohorts.

Teen sexual activity was a focus of many studies during this period. Kanter and Zelnik (1972) were among the first to conduct a nationally representative survey,

sampling never-married women aged 15–19 in 1971. Of those aged 19 and thus born in 1952, they estimated that 46.1 percent had engaged in sexual intercourse. Note, however, that their sample of never-married teens excluded any woman who had married in her teens, thus complicating at least somewhat comparisons of their results with those of Klassen et al., an issue that we return to below.

An important study by Hofferth, Kahn, and Baldwin (1987) provides estimates of cohort trends in premarital sex among U.S. teens. They used retrospective first sex and first marriage histories in Cycle 3 of the NSFG to examine trends in sexual activity for three-year birth cohorts of U.S. women. They find substantial increases in premarital sexual intercourse among teens, which they argue are consistent with a sexual revolution that began in the late 1960s and extended into the early to mid 1970s.

A final study by Finer (2007) used, as will we, Cycles 3–7 of the NSFG. We postpone our review of it to the next section on data and methods, where we discuss the differences between single- and multiple-decrement methods for answering questions such as who did and did not delay sex until marriage.

To summarize, our brief review of the literature shows, perhaps unsurprisingly, that there is a firm consensus concerning the decoupling of sex and marriage but debate over whether this decoupling was gradual or sudden. With a few exceptions, empirical studies providing nationally representative evidence also tended to focus on the premarital sexual activity of never-married teens.

Data and Methods

Data

Our analyses use data from Cycles 3–7 of the NSFG. The NSFG has been fielded periodically by the National Center for Health Statistics to monitor the fertility-related behaviors of a nationally representative sample of U.S. women aged 15–44. The 1982, 1988, 1995, 2002, and 2006–10 NSFG are the third through seventh cycles of these data. Although the sampling frames differ very slightly, all cycles employed a stratified sampling procedure that included oversamples of black, Hispanic, and teen women. When pooled, Cycles 3–7 yield a sample of 47,188 women born between 1937 and 1995. We use the retrospective self-reports on the dates of first sexual intercourse and first marriage to determine who did or did not delay sex until first marriage. A limitation of these data is that they do not allow us to identify women who had sex prior to marriage but only with the man who was their eventual (and first) husband.

A robust finding in the survey research literature is that the dates of many events are not easily recalled by survey respondents, with an emerging consensus holding that the recall of events instead involves memories that are stored and accessed in different ways that will affect the accuracy of respondent reports (Schwarz and Sudman 1994). A particularly useful distinction is between event dates that are "frequently rehearsed" versus those that must be reconstructed by the respondent during an interview. This distinction thus accounts for the extremely high quality of survey data on a respondent's date of birth from both males and females and the

equally high quality of dates of first marriage by female (but not male) respondents even for first marriages that occurred decades earlier. By contrast, the calendar year and month of first sexual intercourse appears not to be a frequently rehearsed date, at least for many, as our results below suggest. Premarital sex may also be under-reported in our earliest cohorts of women who came of age when norms against sex before marriage were strong. Finally, there exists no "gold" standard by which to judge the quality of self-reports of sexual behavior, unlike the case for survey data on births and marriages, which can be compared to data from vital registers. Studies have nevertheless found a high degree of consistency, both across and within surveys (see, e.g., Hofferth et al. 1987; Wu, Martin, and Long 2001), thus providing some degree of empirical evidence concerning the quality of data on first sexual intercourse.

Three of the five NSFG cycles provide both unedited and recoded data on the timing of first marriage and first sexual intercourse, with NSFG recodes reflecting imputations for missing data. Whenever possible, we worked with the unedited data to avoid relying on NSFG imputations.

To construct the respondent's age at first marriage, we used retrospective self-reports contained in all NSFG waves for the (1) calendar month and year of the respondent's date of birth, (2) the calendar month and year of the respondent's date of first marriage, and (3) the calendar month and year of the NSFG survey. Data on these three items is essentially complete. For example, incomplete or missing data on a woman's first marriage history led us to code as missing only 140 of out of our sample of 47,188 women (0.3 percent). Data for another 199 women contained a valid calendar year of first marriage but a missing calendar month of first marriage. For these cases, we employed a hot-deck imputation procedure by imputing calendar month with draws from the nonmissing calendar month distribution, with this imputation procedure intended to preserve the seasonality of first marriage for the small number of cases in which we imputed a calendar month of first marriage.

Cycles 3 through 7 likewise contained retrospective questions asking respondents if they had ever had sexual intercourse and, if so, the calendar month and year of first sexual intercourse. In Cycle 7, respondents who reported a calendar year of first sex but who had difficulty recalling calendar month were asked if first sex occurred during the winter, spring, summer, or autumn. In other cycles, respondents who had difficulty recalling the calendar year of first sex were then asked their age (to the nearest year) at first intercourse.

As with data on first marriage, we chose whenever possible not to rely on NSFG imputations for first sex when components (calendar month or season) were missing. We thus regarded data on first sex as complete when a respondent supplied a valid calendar year and month at first sex, which we then converted to the respondent's age (to the nearest month) at first sex; conversely, we treated data as missing if a respondent supplied neither a valid calendar year nor a valid age at first sex. If the respondent supplied age to the nearest year only or if the respondent supplied a calendar year but not a calendar month, we imputed a calendar month, again using a hot-deck procedure to follow the seasonality of first coitus.

We constructed data on who did and did not delay sex until marriage using the dates of first sex and first marriage described above. We coded data on these two outcomes as missing if a respondent had a missing date for either first sex or first marriage. We coded respondents who reported the same month and year for first marriage and first intercourse as having delayed sex until first marriage. We censored women at their age at survey if they reported neither entering a first marriage nor having initiated sexual intercourse by survey.

Table 1 presents a descriptive summary of patterns by survey for the NSFG data on first sex. As noted above, the 2006–10 questionnaire allowed respondents to indicate a season if they had difficulty recalling the precise calendar month of first intercourse. Table 1 shows that for respondents in the 2006–10 NSFG, we imputed calendar month for 19.6 percent of our sample. Roughly similar proportions of respondents in the 1982 and 1988 surveys (25.1 and 15.2 percent, respectively) supplied a calendar year (or age to the nearest year) but not a calendar month of first sex. Note, however, that the 1995 and 2002 surveys depart sharply from these patterns, with extremely few respondents requiring that we impute calendar month. In these two surveys, the public-use files do not provide unedited versions of this variable, nor is it possible (with very few exceptions) to identify which cases have ages at first intercourse that were imputed by NSFG.

Table 2 reports descriptive statistics by NSFG survey and two-year birth cohorts for women who, by age 25, did and did not delay sex until first marriage. Estimates in Table 2 are restricted to NSFG women who were 25 or older at survey, an age by which most women in these cohorts had one of the two events of interest. For most birth cohorts, sample sizes are large enough so that estimates across surveys are in close agreement, but this is less true for the earliest and most recent birth cohorts, in which samples are small and obtained from a single NSFG survey. Note especially that estimates for the very earliest cohorts exhibit fluctuations that are sometimes larger than might be expected statistically; similarly, there is more missing data in the earliest birth cohorts. Nevertheless, the close agreement of estimates across surveys for most birth cohorts provides some evidence of the internal consistency of these data, except for the earliest birth cohorts, in which estimates are noisier and data quality may be poorer.

Methods

We use a multiple-decrement (or competing risk) framework that explicitly recognizes that accounting for who did not delay sex until marriage also requires accounting for who did delay sex until marriage. Figure 1 depicts our conceptual model, which posits an origin state and two "competing" transitions (see also Michael and Joyner 2001). In this model, we assume that all women begin life in an origin state in which they are never-married virgins. From this origin state, women may transition either to sexual intercourse prior to first marriage or to a first marriage prior to sexual intercourse. Note also that at any given age, some women may have experienced neither transition, thus remaining in the origin state.

The conceptual model in Figure 1 clarifies the multiple-decrement nature of this problem and hence the importance of identifying which of two events—sex or

Table 1: Percent of women by NSFG survey who: (a) had not initiated sexual intercourse by survey, (b) had complete data on age at first sexual intercourse, (c) required imputation for calendar month of first sexual intercourse, or (d) had missing data on age at first sexual intercourse. Women aged 15–44 at NSFG survey.

Survey	virgin	complete	imputed	missing	sample size
1982	13.6	55.3	25.1	6.0	7,969
1988	11.5	69.5	15.2	3.8	8,450
1995	10.6	88.0	0.4	1.0	10,847
2002	11.9	86.3	1.0	0.8	7,643
2006	13.3	66.5	19.6	0.6	12,279

marriage—occurs first. That this problem involves multiple decrements has implications for the study by Finer (2007), which reports cohort trends in premarital sex estimated using a single-decrement Kaplan–Meier (1958) procedure. The difficulty with such single-decrement estimates is that they require careful interpretation under a rather convoluted counterfactual in which all other alternative transitions are eliminated (see, e.g., Cox and Oakes 1984; Preston, Heuveline, and Guillot 2001; Wu 2003). Thus, for the question of who did and did not delay sex until marriage, estimates for premarital sex obtained from single-decrement methods will refer to the probability of premarital sex among those who will continue to remain never-married; likewise, single-decrement estimates for marriage will refer to the probability of marriage among those who will continue to remain virgins. The error is thus to interpret such single-decrement estimates as simple probabilities—that is, as the (unconditional) probability of premarital sex or of first marriage, thus ignoring the condition "among those who will continue to remain." For example, Finer (2007) interprets the single-decrement Kaplan–Meier estimate for premarital sex for NSFG women born 1939–48 as showing that "among those . . . turning 15 from 1954 to 1963, 82 percent had premarital sex by exact age 30" (p. 76). Our single-decrement Kaplan–Meier estimate by exact age 30 for premarital sex for this same NSFG cohort is virtually identical to Finer's (81.0 percent vs. 82 percent), but this eight in 10 figure differs dramatically from our estimates at exact age 30 of the percent in the three states depicted in Figure 1: 54.6 percent for not delaying sex until marriage, 42.9 percent for delaying sex until marriage, and 2.5 percent for "neither"—that is, the origin state consisting of those who reported remaining never-married virgins at exact age 30. See Appendix 1 in the online supplement for a detailed discussion of these issues.

Because the NSFG data provide ages at first sex and first marriage to the nearest month, we use the following continuous-time competing-risk hazard model, in which we assume proportional effects of covariates:

$$r_{ij}(t|\mathbf{x}_i) = q_j(t)\exp(\mathbf{b}_j\mathbf{x}_i)\,, \tag{1}$$

or equivalently

$$\log r_{ij}(t|\mathbf{x}_i) = \log q_j(t) + \mathbf{b}_j\mathbf{x}_i\,, \tag{2}$$

Table 2: Sample size and percent by age 25, birth cohort, and NSFG survey who: (a) delayed sex until first marriage, (b) did not delay sex until first marriage, (c) had neither entered a first marriage nor initiated sexual intercourse, or (d) had missing data. Women aged 25 or older at NSFG survey.

		Sample size		Delayed sex until first marriage?			
Cohort	Survey	Unweighted	Weighted	Yes	No	Neither	Missing
1936–37	1982	33	38.87	54.2%	24.0%	17.6%	4.2%
1938–39	1982	292	328.28	37.2	42.6	9.3	10.9
1940–41	1982	314	400.96	46.9	36.7	6.8	9.6
1942–43	1982	359	423.33	34.3	46.6	8.3	10.8
	1988	161	176.56	41.0	45.7	7.6	5.7
1944–45	1982	340	419.99	41.9	44.5	3.9	9.7
	1988	439	442.25	38.8	47.7	6.9	6.5
1946–47	1982	446	534.61	33.0	50.2	6.4	10.4
	1988	517	512.06	36.2	51.6	7.5	4.7
1948–49	1982	511	551.89	26.3	62.7	4.4	6.6
	1988	521	517.83	25.5	61.3	6.9	6.2
1950–51	1982	529	510.69	21.9	69.0	4.4	4.7
	1988	604	590.39	23.0	65.8	7.2	4.0
	1995	589	573.81	26.5	67.6	5.1	0.8
1952–53	1982	612	623.47	26.7	62.1	6.0	5.2
	1988	616	581.79	18.7	71.6	5.7	4.0
	1995	797	778.58	19.8	72.6	6.4	1.2
1954–55	1982	602	612.00	14.1	76.3	3.0	6.7
	1988	682	636.05	18.5	70.8	6.0	4.7
	1995	810	782.55	14.6	78.4	6.0	1.0
1956–57	1982	553	556.74	14.8	73.1	6.1	5.9
	1988	678	635.56	15.6	73.6	5.6	5.1
	1995	852	814.79	13.6	78.6	6.3	1.5
	2002	76	79.15	5.8	85.3	8.9	0.0
1958–59	1988	655	618.90	10.6	78.2	7.0	4.2
	1995	870	807.65	10.5	81.0	7.2	1.3
	2002	480	533.35	14.5	77.3	5.5	2.8
1960–61	1988	639	635.18	10.0	80.3	6.3	3.4
	1995	846	787.22	11.1	80.8	7.0	1.0
	2002	473	576.04	13.6	78.5	5.3	2.5
	2006	11	12.02	4.8	45.3	50.0	0.0

Table 2 continued.

Cohort	Survey	Sample size		Delayed sex until first marriage?			
		Unweighted	Weighted	Yes	No	Neither	Missing
1962–63	1988	408	419.14	9.7%	81.5%	7.0%	1.8%
	1995	888	822.66	7.4	83.5	8.0	1.2
	2002	456	537.76	8.4	80.4	9.4	1.8
	2006	265	379.78	7.7	84.9	7.3	0.1
1964–65	1995	809	748.22	7.2	85.7	6.0	1.1
	2002	545	581.82	10.4	82.8	5.8	1.0
	2006	598	709.63	6.7	84.8	7.1	1.4
1966–67	1995	702	714.81	10.5	82.0	6.3	1.2
	2002	523	530.72	7.5	84.5	6.0	2.0
	2006	625	780.16	9.4	82.8	6.8	1.0
1968–69	1995	653	668.63	8.3	86.5	4.4	0.8
	2002	511	513.57	7.6	85.3	5.9	1.2
	2006	700	871.76	8.4	83.7	6.6	1.3
1970–71	1995	106	112.31	3.5	87.5	8.0	1.0
	2002	559	483.86	7.5	85.6	6.5	0.4
	2006	758	896.04	8.9	82.9	7.3	0.9
1972–73	2002	557	508.01	8.3	85.5	5.4	0.8
	2006	706	732.80	7.9	84.2	7.6	0.4
1974–75	2002	489	420.11	7.1	85.1	7.4	0.4
	2006	744	707.79	8.1	84.5	6.1	1.4
1976–77	2002	465	434.42	11.1	84.4	4.3	0.3
	2006	856	737.43	7.0	86.5	5.8	0.8
1978–79	2002	4	6.79	0.0	100.0	0.0	0.0
	2006	953	821.39	5.2	89.6	4.6	0.6
1980–81	2006	960	859.58	7.2	83.6	8.2	1.0
1982–83	2006	612	545.28	5.7	88.5	5.6	0.2
1984–85	2006	121	99.40	2.4	89.6	5.5	2.5

where t denotes age, i indexes women, $j = 1,2$ indexes the two destination states, $r_{ij}(t)$ denotes the hazard rate for woman i associated with the transition to state j, $q_j(t)$ is the baseline hazard associated with $r_{ij}(t)$, $\mathbf{x}_i$ is a vector of covariates for woman i, and $\mathbf{b}_j$ is a vector of coefficients for the jth transition. We model $\log q_j(t)$ as a piecewise linear spline with knots at exact ages 17, 21, 23, and 25 (204, 252, 276,

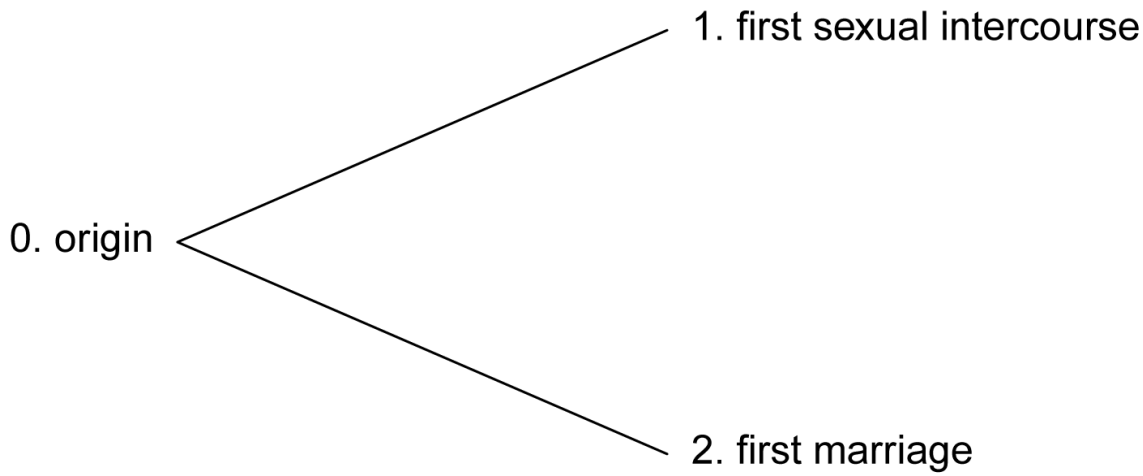

Figure 1: Conceptual model of the transition to sexual intercourse while never-married ($0 \rightarrow 1$) versus the transition to a first marriage before sexual intercourse ($0 \rightarrow 2$).

and 300 months), which yields a highly flexible specification for the two baseline risks. We model cohort trends using a series of dummy variables for birth cohort; hence, this model, roughly speaking, can be viewed as specifying main effects of age, cohort, and the other control variables. We dropped women from the 1936–37 birth cohort because of the very small numbers of these women.

In our analyses, we control for the limited set of background variables available in Cycles 3–7. These were as follows: race and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other), religion (Catholic vs. non-Catholic), family structure at age 14 (intact vs. nonintact), mother's education (less than high school, high school, some college, college or more, and a residual category for respondents who reported having no mother figure when growing up), and metropolitan residence (metropolitan central city, metropolitan noncentral city, nonmetropolitan). Our analyses also include dummy variables for survey year and for imputed calendar month at first marriage or first sex.

We use a computationally-intensive procedure that acknowledges the multiple-decrement nature of the questions we pose and that provides results that are more easily interpreted for the competing risk hazard regression model in Equation (2). See Appendix 2 in the online supplement for a detailed description of this procedure.

Results

Table 3 presents estimates from our competing-risk model. Model 1 specifies a series of dummy variables for a series of two-year birth cohorts (1940–1941, 1942–43, . . ., 1984–85) using 1938–39 as the omitted category. Model 2 adds controls for sociodemographic and other background variables available in NSFG Cycles 3–7. The estimated coefficients show steep increases for premarital sexual intercourse for successive birth cohorts and correspondingly steep decreases for delaying sex until

first marriage for successive birth cohorts. Estimates change only modestly when adding background controls, suggesting that cohort trends were largely unaffected by compositional change in the sociodemographic characteristics of successive birth cohorts of U.S. women.

Note that in Table 3, each covariate has two estimated coefficients: one for not delaying sex until marriage, and a second for delaying sex until marriage. At first glance, one might suppose that a covariate that has a positive coefficient for one transition will necessarily have a negative coefficient for the other transition. Consistent with this intuition, we see that relative to white women, black and Hispanic women have a higher risk of not delaying sex until marriage and a lower risk of delaying sex until marriage. But as seen in Figure 1, some women will also fall into a "neither" category by remaining in the origin state, which in turn implies that there is in fact no mechanical relationship between delaying versus not delaying sex until marriage. The estimated coefficients for mother's education, a measure of socioeconomic background, provide examples of this point. Relative to respondents whose mothers were high school graduates, those whose mothers were college graduates have negative coefficients for the two competing risks (-0.27 and -0.38), implying that women from the highest SES backgrounds are slower to marry before having sex but are also slower to have sex before marriage. For these women, both transitions are delayed, with more remaining in the origin state at any given age relative to those whose mothers graduated from high school. Women whose mothers had some college are also slower to make either transition relative to those whose mothers have only a high school degree. Growing up in a family in which both a biological mother and father were present at age 14 is associated with delays in both transitions, although sex before marriage is deterred more strongly than marriage before sex. The dummy variable for Catholic religion is similarly associated with delays in both transitions, but in this case, marriage before sex is deterred more strongly than sex before marriage.

We now turn to Figure 2, which compares observed and predicted percents by birth cohort for women who, by age 25:, had either (a) delayed sex until first marriage, (b) did not delay sex until first marriage, or (c) neither had sex nor had entered a first marriage. Predicted values are obtained from model 2 of Table 3 using the computationally intensive procedure described in Appendix 2 in the online supplement. Observed (solid) and predicted (dashed) estimates agree closely, showing good fit of our proportional hazard specification to these data.

Estimates are noisy for the very earliest birth cohorts because of small sample sizes and possible data quality issues. Yet, what is strikingly clear is that even in these very early cohorts—those born in the late 1930s and early 1940s—the number of women who did not delay sex until marriage was roughly equal to the number who did delay sex until marriage. This decoupling of sex and marriage continued apace for subsequent cohorts, with sharp increases in the percent who did not delay sex until marriage and equally sharp decreases in the percent who did delay sex until marriage. Especially rapid increases in the percent not delaying sex until marriage occurred for women born between 1942–43 and 1954–55. Increases were less rapid for later birth cohorts and reached a plateau between 85 and 90 percent for those born after 1962.

Table 3: Estimates of covariate effects for the competing risks of (a) not delaying sex until marriage vs. (b) delaying sex until marriage.

	Did not delay sex until marriage		Delayed sex until marriage	
	Model 1	Model 2	Model 1	Model 2
Birth cohort				
born 1940–41	−0.17	−0.13	0.31†	0.37†
	(0.11)	(0.11)	(0.11)	(0.11)
born 1942–43	0.11	0.19	0.11	0.31†
	(0.10)	(0.10)	(0.11)	(0.11)
born 1944–45	0.10	0.20*	0.24*	0.38†
	(0.09)	(0.09)	(0.10)	(0.10)
born 1946–47	0.14	0.26†	−0.04	0.14
	(0.09)	(0.09)	(0.10)	(0.10)
born 1948–49	0.40†	0.50†	−0.15	0.03
	(0.09)	(0.09)	(0.10)	(0.11)
born 1950–51	0.46†	0.57†	−0.24*	−0.06
	(0.08)	(0.08)	(0.10)	(0.10)
born 1952–53	0.54†	0.66†	−0.27*	−0.10
	(0.08)	(0.08)	(0.10)	(0.10)
born 1954–55	0.74†	0.86†	−0.44†	−0.20
	(0.08)	(0.08)	(0.10)	(0.10)
born 1956–57	0.76†	0.87†	−0.54†	−0.36†
	(0.08)	(0.08)	(0.10)	(0.11)
born 1958–59	0.77†	0.92†	−0.74†	−0.57†
	(0.08)	(0.08)	(0.10)	(0.11)
born 1960–61	0.82†	0.99†	−0.68†	−0.46†
	(0.08)	(0.08)	(0.10)	(0.11)
born 1962–63	0.80†	0.97†	1.09†	−0.88†
	(0.08)	(0.08)	(0.11)	(0.11)
born 1964–65	0.89†	1.05†	−0.94†	−0.81†
	(0.08)	(0.08)	(0.11)	(0.12)
born 1966–67	0.89†	1.08†	−0.96†	−0.76†
	(0.08)	(0.08)	(0.11)	(0.12)
born 1968–69	0.97†	1.19†	−0.95†	−0.85†
	(0.08)	(0.08)	(0.11)	(0.12)
born 1970–71	0.98†	1.19†	−0.96†	−0.84†
	(0.08)	(0.08)	(0.11)	(0.13)
born 1972–73	1.03†	1.25†	−0.99†	−0.88†
	(0.08)	(0.08)	(0.12)	(0.13)
born 1974–75	0.98†	1.19†	−1.08†	−1.04†
	(0.08)	(0.08)	(0.12)	(0.14)
born 1976–77	1.05†	1.28†	−0.95†	−0.86†
	(0.08)	(0.08)	(0.12)	(0.14)
born 1978–79	1.07†	1.31†	−1.23†	−1.20†
	(0.08)	(0.08)	(0.14)	(0.15)

Table 3 continued.

	Did not delay sex until marriage		Delayed sex until marriage	
	Model 1	Model 2	Model 1	Model 2
Birth cohort				
born 1980–81	0.97†	1.25†	−1.01†	−0.90†
	(0.08)	(0.08)	(0.13)	(0.14)
born 1982–83	1.00†	1.29†	−1.20†	−1.08†
	(0.08)	(0.09)	(0.15)	(0.16)
born 1984–85	0.90†	1.21†	−1.51†	−1.40†
	(0.08)	(0.09)	(0.17)	(0.19)
Race and ethnicity				
black		0.22†		−0.80†
		(0.02)		(0.07)
Hispanic		−0.34†		0.34†
		(0.02)		(0.04)
other		−0.76†		−0.22†
		(0.03)		(0.05)
Mother's education				
less than HS		0.02		0.32†
		(0.01)		(0.03)
some college		−0.11†		−0.21†
		(0.02)		(0.04)
college or more		−0.27†		−0.38†
		(0.02)		(0.05)
no mother figure		0.12		0.50
		(0.08)		(0.29)
Other controls				
intact family at age 14		−0.46†		−0.12†
		(0.01)		(0.03)
Catholic		−0.08†		−0.38†
		(0.01)		(0.03)
central city		0.00		−0.13†
		(0.01)		(0.03)
nonmetropolitan		0.08†		0.25†
		(0.02)		(0.03)

Note: Model 2 also includes controls for survey and for imputed values of calendar month at first sex or at first marriage. See text for additional details.
$*$ $p < 0.05$; † $p < 0.01$ (two-tailed tests).

Figure 3 provides some additional descriptive information on the ages at which the two transitions typically occurred. We again restrict attention to women aged 25 or older at NSFG survey. For women who did not delay sex until marriage, Figure 3 shows that the mean age at first sex declined from roughly age 19 for those born in

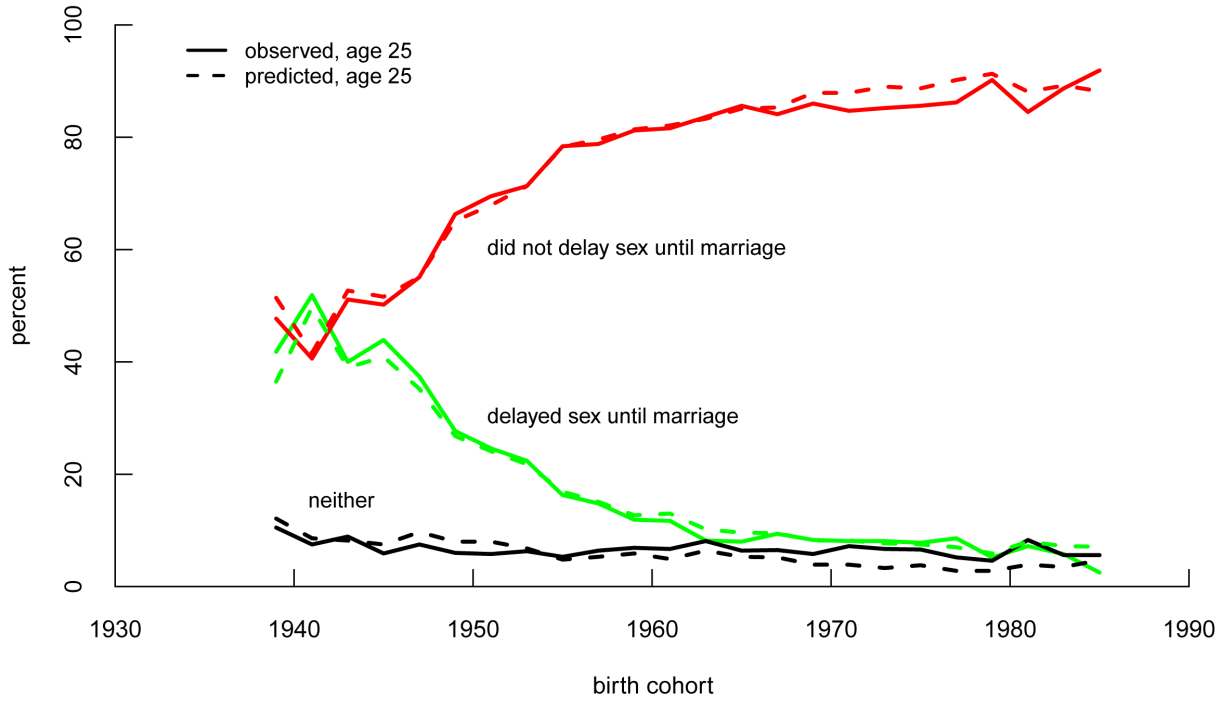

Figure 2: Observed and predicted percent by birth cohort who, by age 25, (a) delayed sex until marriage, (b) did not delay sex until marriage, and (c) neither had sex nor entered a first marriage.

Note: Predicted values are obtained from model 2 of Table 3 using the procedure described in Appendix 2 in the online supplement.

the late 1930s to about age 17 for those born in the early 1980s. For women who did delay sex until marriage, the mean age at first marriage was around age 21 for early birth cohorts, increasing for women born in the late 1950s, and reaching a plateau of roughly 22.5 for women born in the mid-1960s to the late 1980s. For both transitions, trends are modest, with the pace of change fastest for those born in the late 1950s and early 1960s. Thus, women who delayed sex until marriage appear to be an exception to the well-documented trend toward delayed marriage (see, e.g., Casper and Bianchi 2002; Fitch and Ruggles 2000). Overall, then, Figure 3 shows that there were only modest cohort trends in the typical ages at first marriage for those who delayed sex until marriage and equally modest cohort trends in the typical ages at first sex for those who did not delay sex until marriage, despite the very marked cohort trends in Figure 2 in the proportions of women who did and did not delay sex until first marriage.

Table 4 presents in tabular form the observed and predicted estimates by age 25 for not delaying sex until marriage. As was seen in Figure 2, model predictions track observed percentages closely, save for the very earliest birth cohorts, in which sample sizes are small. Yet even for these birth cohorts, Table 4 shows that a sizable number of women reported that they did not delay sex until marriage, with observed percentages of 47.7 percent and 40.6 percent, respectively, for the

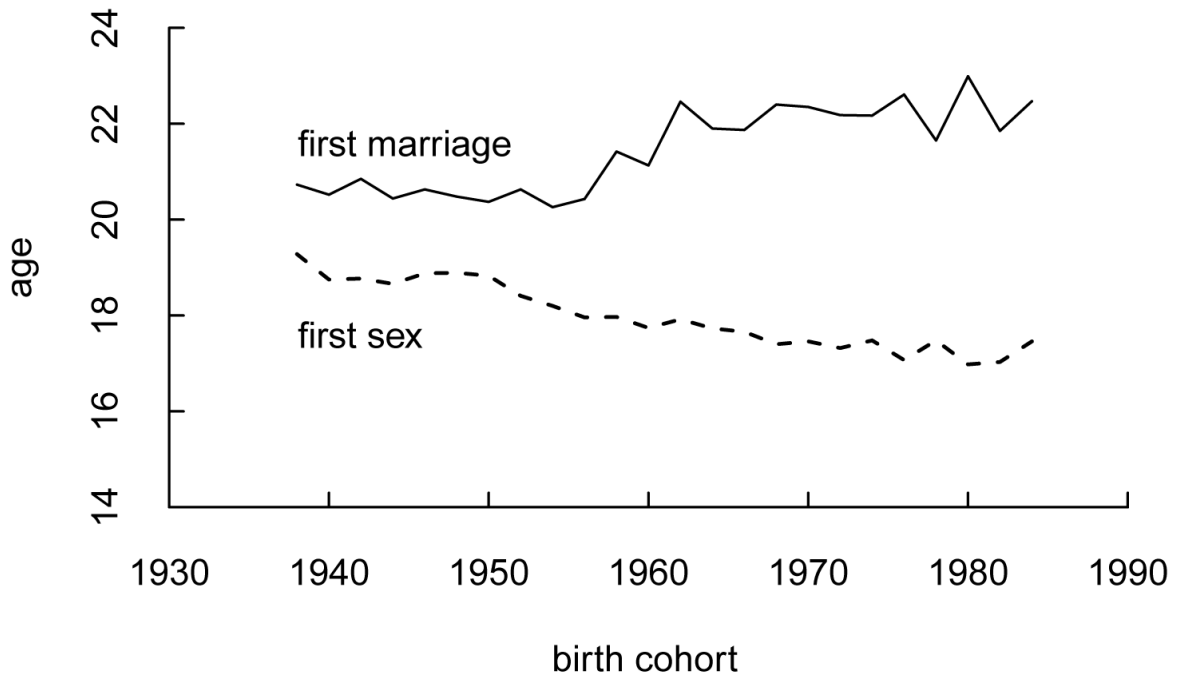

Figure 3: Trends by birth cohort in mean age at (a) first marriage for those who delayed sex until marriage and (b) first sex for those who did not delay sex until marriage.

1938–39 and 1940–1941 birth cohorts. The mean age at first sex was 19.3 for those born 1938–39 and 18.8 for those born 1940–1941, thus corresponding roughly to the period 1957–1960. There was an exceptionally steep 28.6 percentage point increase between the 1942–43 and 1954–55 birth cohorts, resulting in an increase of nearly 2.4 percentage points per year, corresponding roughly to the period 1961–1973, given mean ages at first sex of 18.8 for those born 1942–43 and 18.2 for those born 1954–55. Increases continued for women born in the late 1950s but then plateaued, with the percent of women not delaying sex until marriage fluctuating between roughly 85 and 90 percent for women born after 1964.

These results thus lead us to three broad conclusions. First, our estimates, although noisy, suggest that between 40 percent and 50 percent of women during the late 1950s and early 1960s did not delay sex until marriage. A second is that our rough period calculations are consistent with arguments that posit a "sexual revolution" among the never-married that occurred during the late 1960s and early 1970s, a period coinciding with an expanding Vietnam war, burgeoning numbers on college campuses, and the widespread adoption of the pill by never-married U.S. women. Our results thus show that the late 1960s and early 1970s were indeed a period of extremely rapid change, with increases of roughly 2.4 percentages points per year in the percent of U.S. women reporting that they did not delay sex until marriage. A final broad conclusion is that this extremely rapid increase of 2.4 percentage points per year began earlier, during the early 1960s, when the pill was

Table 4: Observed, predicted, and counterfactual trends in the percent by age 25 who did not delay sex until first marriage.

Cohort trends in:	Observed	Predicted	Counterfactual					
Sociodemographic composition		y	y	n	n	y	y	n
Virgin until first marriage		y	n	y	n	y	n	y
Sex before first marriage		y	n	n	y	n	y	y
1938–39	47.7	51.4	51.4	51.4	51.4	51.4	51.4	51.4
1940–41	40.6	41.6	49.0	48.0	47.0	45.7	44.8	43.8
1942–43	51.1	52.7	49.1	48.6	57.7	46.6	55.4	54.8
1944–45	50.2	51.6	48.1	48.0	58.2	45.0	54.9	54.6
1946–47	55.1	55.1	47.3	50.2	60.4	46.3	56.3	59.1
1948–49	66.3	65.1	48.4	51.2	68.2	48.2	65.4	67.9
1950–51	69.5	67.9	48.1	51.9	70.5	48.5	67.5	71.0
1952–53	71.3	71.3	48.3	52.2	73.2	48.9	70.6	74.0
1954–55	78.4	78.3	48.5	52.9	79.0	49.7	76.8	80.5
1956–57	78.8	79.6	48.3	53.9	79.2	50.5	77.0	81.9
1958–59	81.2	81.4	47.8	55.1	80.3	50.9	77.8	84.1
1960–61	81.6	82.1	47.1	54.5	82.1	49.6	79.1	85.1
1962–63	83.6	83.3	47.1	56.4	81.7	51.2	78.8	86.5
1964–65	85.6	85.1	47.3	56.1	83.5	51.2	81.0	87.9
1966–67	84.1	85.3	47.1	56.0	84.0	50.6	81.6	88.2
1968–69	86.0	87.9	46.8	56.3	86.2	50.6	84.0	90.5
1970–71	84.7	87.9	46.8	56.3	86.2	50.6	84.1	90.5
1972–73	85.2	89.0	46.4	56.4	87.3	50.4	85.0	91.6
1974–75	85.6	88.7	47.2	57.0	86.2	51.7	84.3	91.1
1976–77	86.2	90.2	47.9	56.3	87.7	51.8	86.4	91.9
1978–79	90.2	91.3	47.1	57.5	88.2	51.9	86.6	93.4
1980–81	84.5	88.1	45.2	56.5	87.2	49.0	84.2	91.6
1982–83	88.7	89.2	44.8	57.1	87.8	49.3	84.6	92.7
1984–85	91.9	88.2	44.1	58.1	86.6	49.5	82.3	92.5
Change, 1938–39 to 1984–85	44.2	36.8	−7.3	6.7	35.2	−1.9	30.9	41.1
Percent of change accounted for		100.0	−19.8	18.2	95.7	−5.2	84.0	111.7

by and large not available to young, never-married U.S. women. Moreover, as early as the late 1950s, we find that the decoupling of sex and marriage held for at least two out of every five never-married U.S. women. The decoupling of sex and marriage proceeded especially rapidly during a period that coincided with, but also substantially pre-dated, the large-scale adoption of the pill by young, never-married U.S. women.

We next turn to "what if" counterfactuals to examine cohort trends in who did or did not delay sex until marriage. These counterfactual decompositions answer questions such as, "What would have been the trend in premarital sex were there to have been no cohort trend in X?" We examine three such Xs in our counterfactual decompositions for the percent who, by age 25, did or did not delay sex until marriage:

1. Sociodemographic composition. What would trends have been under a counterfactual of no change in the composition of cohorts on our observed sociodemographic variables?

2. Delaying sex until marriage. What would trends have been under a counterfactual of no trend in delaying sex until marriage—that is, no trend across successive birth cohorts in the age-specific risk of a first marriage that was not preceded by sex?

3. Not delaying sex until marriage. What would trends have been under a counterfactual of no trend in not delaying sex until marriage—that is, no trend across successive birth cohorts in the age-specific risk of first intercourse by never-married women?

As noted above, one might assume that delaying and not delaying sex until marriage should be mechanically related, so that as fewer women delay, more women will not delay. But our competing-risk conceptual model posits that women begin life in an origin state in which they are never-married virgins, which in turn implies that there is in fact no such mechanical relationship. Thus, for example, decreases across successive cohorts in the age-specific risks associated with delaying sex until marriage could in principle be accompanied by an increasing trend, a decreasing trend, a nonmonotonic trend, or no trend in not delaying sex until marriage.

Table 4 presents results that decompose trends in not delaying sex until marriage. To examine the role of cohort change in sociodemographic composition, we used covariate means for those born in 1938 or 1939 to generate predictions for the 1938–39 birth cohort, covariate means for those born in 1940 or 1941 to generate predictions for the 1940–1941 birth cohort, and so forth. To operationalize counterfactuals positing no compositional change (columns labeled "n"), we fixed covariate values at the covariate means for the 1938–39 cohort, thus using covariate means for the 1938–39 cohort for the 1940–1941, 1941–42, . . ., and 1984–85 cohorts. For the other two factors, we operationalize counterfactuals positing change in a factor by letting the factor trend as estimated (columns labeled "y"); likewise, for counterfactuals positing no change in the factor, we fixed estimated coefficients for the factor to the relevant model estimates for the 1938–39 birth cohort. We thus obtained the predicted percent who, by age 25, did not delay sex until marriage

(column 2, labeled "y y y") by letting all three factors trend as estimated in our model. We report predictions for each two-year birth cohort as well as an overall summary that gives the percentage point change between the 1938–39 and 1984–85 birth cohorts.

Columns 3–5 in Table 4 give results for counterfactuals that let only one of the three factors trend. The counterfactual allowing the sociodemographic composition of successive birth cohorts to trend but positing no trends in the other two factors (column 3, labeled "y n n") performs poorly, yielding a counterfactual trend in which the percent sexually active before marriage declines slightly, thus yielding a trend opposite to that observed.

The next counterfactual (column 4, labeled "n y n") lets the age-specific risk of remaining a virgin until first marriage trend as estimated while positing no trend in the other two factors. As shown in Figure 2, letting this one factor trend as estimated generates sharp decreases in the percent by age 25 who delayed sex until marriage. This in turn will imply, ceteris paribus, increases in the duration spent exposed to the risk of premarital sex, particularly given that the typical ages at a virgin marriage are uniformly higher than the typical ages at premarital sex, as seen in Figure 3. Consistent with this expectation, this counterfactual generates a slight upward trend in premarital sex of 6.7 percentage points, from 51.4 to 58.1 percent between the 1938–39 and 1984–85 cohorts, thus accounting for less than 20 percent of the overall trend in premarital sex.

Consider, by contrast, the counterfactual that lets only the age-specific risks for sex before marriage trend as estimated (column 5, labeled "n n y"). This counterfactual generates a predicted increase between the 1938–39 and 1984–85 cohorts of 35.2 percentage points, or 95.7 percent of the 36.8 percentage point increase that is predicted when all three factors are allowed to trend as estimated.

Letting two of the three factors trend as estimated yields similar results. The counterfactual positing no trend in the age-specific transition for sex before marriage but letting the other two factors trend as estimated performs poorly; by contrast, much of the trend predicted by the full model can also be generated by either of the two counterfactuals that let the age-specific transition for sex before marriage trend as estimated.

Table 5 presents results that decompose cohort trends in the percent who, by age 25, reported delaying sex until marriage. The analyses in Tables 4 and 5 thus parallel one another exactly except that in Table 5, we decompose cohort trends in delaying sex until marriage whereas in Table 4, we decomposed cohort trends in not delaying sex until marriage. Table 5 shows that model predictions for delaying sex until marriage track observed percentages closely, save for the very earliest and most recent birth cohorts. The percent delaying sex until marriage fluctuated between 40 and 50 percent for women born between 1938–39 and 1944–45. This was followed by a steady but substantial decline of 35.7 percentage points between those born 1944–45 and 1962–63, a decline averaging 1.6 percentage points per year over the 22 years separating these birth cohorts. There was little trend for subsequent birth cohorts, with observed and predicted percentages fluctuating around 8 percent for those born 1964–65 or later.

Table 5: Observed, predicted, and counterfactual trends in the percent by age 25 who delayed sex until first marriage.

Cohort trends in:	Observed	Predicted	Counterfactual					
Sociodemographic composition		y	y	n	n	y	y	n
Virgin until first marriage		y	n	y	n	y	n	y
Sex before first marriage		y	n	n	y	n	y	y
1938–39	41.8	36.5	36.5	36.5	36.5	36.5	36.5	36.5
1940–41	51.9	49.7	38.1	44.8	39.3	46.6	40.8	48.0
1942–43	40.0	39.0	36.4	43.4	32.4	43.4	32.6	38.7
1944–45	43.9	40.9	37.1	44.8	32.1	45.7	33.0	39.7
1946–47	37.4	35.2	37.8	39.6	30.7	41.0	32.3	33.3
1948–49	27.7	26.8	36.7	37.2	25.4	37.4	26.3	25.9
1950–51	24.6	24.1	36.7	35.2	23.9	35.7	24.9	23.0
1952–53	22.4	21.8	36.3	34.4	22.0	35.3	22.7	20.7
1954–55	16.3	16.9	35.9	33.1	17.9	33.9	18.6	15.9
1956–57	14.8	15.1	36.5	31.1	17.7	31.0	18.7	14.3
1958–59	11.9	12.7	36.7	27.2	17.0	27.1	18.1	11.9
1960–61	11.7	13.0	37.0	29.3	15.6	29.6	17.1	11.9
1962–63	8.2	10.2	36.5	22.0	16.0	22.9	17.2	9.3
1964–65	8.0	9.6	36.4	23.0	14.6	23.0	15.7	8.8
1966–67	9.4	9.5	36.4	23.8	14.2	23.2	15.1	8.9
1968–69	8.3	8.2	36.6	22.4	12.5	23.1	13.5	7.3
1970–71	8.1	8.2	36.6	22.6	12.5	23.1	13.4	7.3
1972–73	8.1	7.7	36.9	22.0	11.7	23.1	12.9	6.6
1974–75	7.8	7.5	36.4	20.8	12.6	22.3	13.3	6.6
1976–77	8.6	7.0	35.9	22.3	11.4	22.6	11.8	6.4
1978–79	5.2	5.9	36.4	20.3	11.0	21.7	11.7	5.1
1980–81	7.2	8.0	37.5	21.7	11.8	23.5	13.4	6.5
1982–83	5.8	7.2	37.8	20.7	11.3	23.1	13.2	5.6
1984–85	2.5	7.1	38.8	19.7	12.3	21.0	14.9	5.3
Change, 1938–39 to 1984–85	39.3	29.4	−2.3	16.8	24.2	15.5	21.6	31.2
Percent of change accounted for		100.0	−7.8	57.1	82.3	52.7	73.5	106.1

An objection to the decompositions previously reported in Table 4 is that our main finding—that cohort change in a factor X drove trends in X—could easily be seen by many as almost tautological in that most of the trend in the percent who, by age 25, did not delay sex until marriage was accounted for by increases in the age-specific risk of premarital sex across cohorts. That this seeming tautology need not hold as a general matter can be seen in the counterfactuals in Table 5. Consider, for example, the counterfactuals in columns 4 and 5 of Table 5, in which only one of the age-specific risks is allowed to trend as estimated. The counterfactual in column 4 (labeled "n y n") lets the age-specific risk of remaining a virgin until first marriage trend as estimated while positing no trend in the other two factors. It accounts for 57.1 percent of the 29.4 percentage point decrease in delaying sex until marriage between the 1938–39 and 1984–85 cohorts. The counterfactual in column 5 (labeled "n n y") lets the age-specific risk of premarital sex trend as estimated while positing no trend in the other two factors. It accounts for more of the trend than the previous counterfactual: 82.3 percent of the decrease in delaying sex until marriage between the 1938–39 and 1984–85 cohorts. The final three counterfactuals let two of three factors trend as estimated. Results are qualitatively similar to those for the counterfacturals that let only one of the three factors trend as estimated. The counterfactual that lets sociodemographic factors and the age-specific risk of remaining a virgin until marriage trend as estimated performs least well, accounting for 52.7 percent of the decrease between the 1938–39 to 1984–85 cohorts. The counterfactual that lets sociodemographic factors and the age-specific risk of premarital sex trend as estimated performs better, accounting for 75.5 percent of the decrease in the percent delaying sex until marriage as predicted by our full model for the 1938–39 and 1984–85 cohorts. The final counterfactual that lets the age-specific risks of premarital sex and of remaining a virgin until marriage trend as estimated performs best of these three counterfactuals, accounting for 106.1 percent of the decrease predicted by our full model for the 1938–39 and 1984–85 cohorts. The results in Table 5 thus show that when accounting for trends in a factor Y (remaining a virgin until marriage), it is possible for a factor X (premarital sex) to play a primary role, with the factor Y playing a secondary role.

Overall, then, the decompositions from the counterfactuals in Tables 4 and 5, while clearly descriptive in nature, nevertheless suggest that trends in both delaying sex until marriage and not delaying sex until marriage were driven primarily by increases in the age-specific risk of premarital sex across successive birth cohorts of U.S. women. Declines in the age-specific risk of marrying while still a virgin played at best a secondary role. Changes in the sociodemographic composition of cohorts played little role in accounting for trends.

Discussion

The behaviors of recent cohorts of U.S. women represent a clear shift from those of older cohorts of women, many of whom delayed sex until marriage. Yet, there exists surprisingly little empirical evidence on when this shift happened, let alone the pace at which these changes occurred. We used retrospective data on age at first sexual intercourse and age at first marriage from Cycles 3–7 of the NSFG to examine

cohort trends in who did and did not delay sex until marriage. We exploited the very large samples in these data to document trends for two-year birth cohorts of women born 1938–39 to 1984–85, thus providing an exceptionally fine-grained level of detail for changes experienced across birth cohorts of U.S. women spanning more than 45 years. Our estimates suggest an extremely rapid pace of cohort change in delaying sex until first marriage, with more than one in three women born before 1950 reporting that they delayed sex until marriage but fewer than one in 10 women born after 1965 reporting abstaining from sex until marriage. Yet, even in the earliest birth cohorts in these data, the proportions who reported engaging in premarital sex roughly equaled or slightly exceeded the proportions who reported that they were virgins at marriage.

Our analyses employed a multiple-decrement or competing-risk framework that is critical when asking who did and did not delay sex until marriage because at issue is which of two events—sex or marriage—occurs first. We noted that our use of a multiple-decrement framework departed from two important prior studies (Hofferth et al. 1987; Finer 2007) that reported estimates using single-decrement life-table or Kaplan–Meier procedures.

Does this difference—using a single- or multiple-decrement procedure—matter? The answer is yes. Using the same NSFG data analyzed in this article, Finer (2007) obtained a single-decrement Kaplan–Meier estimate of 82 percent for premarital sex by age 30 for NSFG women born between 1939 and 1948, a result that led him to conclude that premarital sex was close to universal even, for U.S. women born in the 1940s. In analyses reported in Appendix 1 in the online supplement, we replicate this result, obtaining a single-decrement Kaplan–Meier estimate by age 30 of 81.0 percent for this same NSFG cohort of women. But the identical single-decrement procedure for first marriage by age 30 yielded a single-decrement Kaplan–Meier estimate of 86.6 percent. Clearly, estimates such as 81.0 and 86.6 that do not sum to 100.0 percent cannot be interpreted as simple percentages, with the textbook explanation being that such estimates require careful interpretation under a rather convoluted set of counterfactuals. By contrast, the observed (weighted) frequencies at age 30 yield estimates for this cohort of 42.9 percent who delayed sex until marriage, 54.6 percent who did not delay sex until marriage, and 2.5 percent who, at age 30, reported being never-married virgins, with these three percentages (by contruction) summing to 100.0 percent. The very large 26.4 percentage point difference between the 54.6 percent observed percent and the 81.0 percent single-decrement estimate for premarital sex thus provides a simple but vivid example of the dangers of interpreting single-decrement estimates as simple percentages when asking which of two or more events occurs first.

We then estimated competing-risk hazard regressions and used a procedure described in Appendix 2 in the online supplement to obtain predictions for the percent who by age 25, had (1) delayed sex until marriage, (2) did not delay sex until marriage, or (3) remained a never-married virgin. The resulting predicted percentages were in close agreement with observed percentages, even after controlling for background variables. This procedure also allowed us to pose and provide descriptive answers to a series of counterfactual "what if" questions about observed trends. Findings from these analyses suggested that cohort trends in delaying sex

until marriage do not appear to be driven by compositional change but rather reflect more fundamental changes in the two behaviors—delaying (or not delaying) sex until marriage.

More generally, our findings lead us to question whether there were in fact abrupt shifts in sexual behaviors during the late 1960s and early 1970s that many have argued constituted a "sexual revolution." Our findings suggest, on the one hand, that the late 1960s and early 1970s were indeed a period in which the decoupling of sex and marriage proceeded at an especially rapid pace, but we find an equally rapid pace of change during the early 1960s, a period when new contraceptive technologies such as the pill were not readily available to young, never-married U.S. women. These findings, coupled with the substantial numbers who engaged in sexual intercourse before marriage even in the earliest birth cohorts in our data, lead us to speculate that the decoupling of sex and marriage was part of a far longer process of historical change in the sexual behaviors of successive cohorts of U.S. women.

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