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ABSTRACT

Past work on the relationship between cohabitation and childbearing shows that cohabitation increases fertility compared to being single, and does so more for intended than unintended births. Most work in this area, however, does not address concerns that fertility and union formation are joint processes, and that failing to account for the joint nature of these decisions can bias estimates of cohabitation on childbearing. For example, cohabitors may be more likely to plan births because they see cohabitation as an acceptable context for childbearing; alternatively, they may be more likely to marry than their single counterparts. In this paper, I use a modeling approach that accounts for the stable, unobserved characteristics of women common to nonmarital fertility and union formation as a way of estimating the effect of cohabitation on nonmarital fertility net of cohabitors' potentially greater likelihood of marriage. I distinguish between intended and unintended fertility to better understand variation in the perceived acceptability of cohabitation as a setting for childbearing. I find that accounting for unmeasured heterogeneity reduces the estimated effect of cohabitation on intended childbearing outside of marriage by up to 50%, depending on race/ethnicity. These results speak to cohabitation's evolving place in the family system, suggesting that cohabitation may be a step on the way to marriage for some, but an end in itself for others.

Childbearing outside of marriage in the United States has risen dramatically over the past four decades, from 5 percent of all births in 1960 to 36 percent in 2004 (Ventura and Bachrach 2000, Hamilton et al. 2005). Along with increases, there have been important changes in the characteristics of nonmarital childbearing. Unmarried mothers tend to be older now than in the past, more likely to have other children, and more likely to be living with a partner (Wu, Bumpass, and Musick 2001). Cherlin (2001:391) notes that "these facts have not been digested by policy-makers and social commentators, nearly all of whom write and speak as if the 'out-of-wedlock birth problem' were entirely an issue of single women, many of them young." Treating nonmarital childbearing as a "problem" of young, single women obscures changes in unmarried parenthood and misrepresents the family contexts of a growing share of children. Indeed, 40-50% of nonmarital births in the 1990s were to cohabiting couples (Bumpass and Lu 2000, Carlson, McLanahan, and England 2004), and much of the growth in nonmarital childbearing between the 1980s and 1990s was due to cohabiting two-parent families (Raley 2001).

The relationship between cohabitation and fertility is critical to understanding childbearing outside of marriage. It is also key to assessing where cohabitation fits into the family system. Researchers have debated the role of cohabitation, asking whether it serves primarily as a precursor to marriage or an alternative to marriage (for reviews, see Seltzer 2000, Smock 2000). Given the centrality of children to definitions of marriage and the family, examining the extent to which cohabitation is a common, accepted arrangement for childbearing is one way of addressing this question. In this vein, past work has compared the reproductive behavior of married, single, and cohabiting women, finding that the fertility patterns of cohabitors lie somewhere between the single and married (Bachrach 1987, Raley 2001). Cohabitation may increase the fertility of unmarried women in a number of ways: by providing a

suitable alternative to marriage for childbearing, by increasing sexual contact, or by selecting on individuals most likely to marry. Studies of fertility intentions show that cohabitors have higher rates of intended births than their single counterparts, lending some support to the notion that cohabitation provides a suitable context for childbearing (Manning 2001, Musick 2002). However, like most analyses of nonmarital childbearing, prior work on the fertility intentions of cohabitors focuses on differential rates of fertility among unmarried women without addressing differences in who marries. Because the processes of marriage, cohabitation, and fertility are so closely related, failing to account for who marries may bias estimates of cohabitation on fertility (Brien, Lillard, and Waite 1999, Upchurch, Lillard, and Panis 2002). For example, cohabitors may be more likely to plan births not because they see cohabitation as an acceptable alternative to marriage, but because they are more likely than their single counterparts to marry. Thus the question remains open: To what extent does cohabitation affect the likelihood of planning a family outside of marriage?

The present analysis addresses this question. I use data from the 1995 National Survey of Family Growth (1995) and methods developed by Lillard and colleagues (e.g., Lillard and Panis 2000) to investigate the relationship between cohabitation and nonmarital childbearing, accounting for the interdependency of childbearing and union formation decisions over the lifecourse. Cohabiting couples who have – and plan – births outside of marriage are different in many ways from those who do not. Differences by race, age at birth, and education, for example, are generally measured in our data sets and can be accounted for in analyses of unmarried fertility. Other differences, including orientations toward family, often go unmeasured and may be common to decisions about marriage. This analysis accounts for stable unobserved differences between women affecting nonmarital childbearing and union formation,

making it possible to estimate the relationship between cohabitation and fertility net of selection into marriage. This work follows that of Brien, Lillard, and Waite (1999) and Upchurch, Lillard, and Panis (2002) on inter-related family processes, but it addresses certain limitations of their samples and is more tightly focused on the relationship between cohabitation and nonmarital fertility, and in particular, intended nonmarital fertility.

MEANING OF COHABITATION

Since the 1970's, cohabitation has gone from a relatively rare behavior to a common experience in the lives of adults and children. Most couples now live together prior to marriage, and one-quarter to two-fifths of children will spend some time in a cohabiting family while growing up (Bumpass and Lu 2000, Graefe and Lichter 1999). This rapid transformation has made it difficult to incorporate cohabitation into understandings of family life. Researchers often frame questions about the meaning of cohabitation in terms of two possibilities: cohabitation as precursor to marriage or as an alternative to marriage. According to the first perspective, cohabitation is a testing ground for marriage, or a step on the way to marriage, much like dating and engagement. Many cohabitors, in fact, seem to think about cohabitation in this way; for example, most report plans to marry, and most cite being sure of compatibility before marriage as the main reason to live together (Bumpass, Sweet, and Cherlin 1991). The second perspective – the alternative to marriage perspective – regards cohabitation as assuming some of the roles and functions of marriage. It sees cohabitation not as a prelude to marriage, but as an "end in itself" (Seltzer 2000:1250). In support of this view, cohabitations are becoming less likely to end in marriage. Between 1987 and 1995, the proportion of cohabitors marrying within five years declined from 60% to 53% (Bumpass and Lu 2000).

The presence of children in cohabiting unions suggests that it may be a marriage-like relationship for many. In a number of ways, cohabiting families with children are

indistinguishable from married families with children: two parents are present in the household to share parenting, household chores, and resources. But there are differences in key regards. On average, cohabiting families are less stable than married families (Manning, Smock, and Majumdar 2004, Osborne, Manning, and Smock 2005). Cohabiting parents tend to have different patterns of parenting (Brown 2004, Thomson, McLanahan, and Curtin 1992) and household consumption (DeLeire and Kalil 2005), and they may not share resources to the same extent as married parents (Manning and Brown 2006). These differences are at least in part due to selection, i.e., preexisting differences between cohabiting and married individuals in characteristics like education, economic resources, and social support networks, that in turn explain differences in union stability, parenting, and the allocation of household resources. It is likely that differences between cohabiting and married families are also due to characteristics of the unions themselves. Most notably, because cohabitations are entered into informally, there are fewer legal (and often social) entanglements to ending them. The greater costs to exiting marriage may keep more marriages together; they may also keep the least committed from marrying at all. The extent to which cohabitation functions like marriage varies by social context. Studies focusing on reproductive behavior conclude that cohabitation is more similar to marriage among the previously married, blacks, Hispanics, and less advantaged whites (Bachrach 1987, Brien et al. 1999, Landale and Fenelly 1992, Loomis and Landale 1994, Manning 1993, Manning and Landale 1996, Manning 2001, Wildsmith and Raley 2006).

Thinking about cohabitation as an alternative to marriage does not necessarily imply a rejection of marriage. Indeed, most women continue to report high aspirations to marry, but many face barriers that stand in the way of meeting their goals. Very important among these is the economic position of men, whose earnings relative to women have declined, particularly at

the lower end of the wage distribution (Casper and Bianchi 2002). Culturally, marriage requires that men have the capacity to provide steady earnings and, moreover, to contribute more to the family pot than their partners (Cherlin 2000). Qualitative studies on unmarried couples provide compelling evidence of the importance of men's financial stability in decisions to marry (Edin 2000, Edin and Kefalas 2005, Gibson-Davis, Edin, and McLanahan 2005, Smock, Manning, and Porter 2005). Survey research also shows that men's earnings are associated with the transition from cohabitation to marriage, and that they are significantly more important than women's earnings (Carlson, McLanahan, and England 2004, Smock and Manning 1997). Marriage may still be preferable to cohabitation as a long-term arrangement for having and caring for children, but cohabitation may provide a suitable alternative when couples perceive marriage as out of their reach.

PRESENT STUDY

This study examines the relationship between cohabitation and intended fertility, net of selection into marriage. I jointly model the hazards of intended and unintended nonmarital fertility, cohabitation, and marriage, controlling for a set of fixed and time-varying covariates, including calendar period, race and ethnicity, education, family background, and prior childbearing. In addition to observed covariates, my modeling approach also accounts for the stable, unobserved characteristics of women common to childbearing and union formation. It provides estimates of the correlation in these unmeasured characteristics across outcomes, and it allows me to parse out the direct effect of cohabitation on nonmarital childbearing from effects due to causes associated with marriage.

Estimates of the strength and direction of association between the unmeasured characteristics affecting intended and unintended fertility, cohabitation, and marriage indicate

how these family processes are related. All may be part of a broad family-building strategy, which would result in a positive correlation in unmeasured characteristics across the four outcomes (Brien et al. 1999, Upchurch et al. 2002). Career-oriented women who want to delay family formation may avoid any type of childbearing or union. By the same token, women with strong orientations toward family may be the most likely to have a child and enter into a union, whether cohabiting or marital. A positive correlation across outcomes, for example, is consistent with the idea that cohabitation is a step on the way to marriage. By contrast, marriage and nonmarital family formation may be independent of family-building strategies, which would result in no correlation between the unmeasured characteristics associated with nonmarital fertility and cohabitation, on the one hand, and marriage, on the other. No correlation is consistent with the idea that cohabitation is an alternative to marriage. Finally, it is possible that marriage and nonmarital family formation constitute two distinct family-building strategies, resulting in a negative correlation between marriage and nonmarital family formation, whether cohabitation or childbearing out of marriage. Women with traditional views about the family or strong religious commitments may be the least likely to cohabit or have a child out of marriage and the most likely to marry. Those who are especially cautious of long-term commitments may be the most likely to cohabit and the least likely to marry. A negative correlation is closest to the idea that cohabitation represents a rejection of marriage. Brien et al. and Upchurch et al. find a positive correlation in the unmeasured factors leading to marital and nonmarital family formation. I examine whether these relationships work the same way on the separate components of intended and unintended fertility.

I incorporate information from women on how they felt at the time of their pregnancy to differentiate between births resulting from intended and unintended pregnancies. Although the

quality of retrospective reports of pregnancy intentions has been frequently debated (Bachrach and Newcomer 1999, Ryder 1973, Trussell, Vaughan, and Stanford 1999, Westoff and Bankole 1996, Williams, Abma, and Piccinino 1999), there is ample evidence of its validity. For example, a high proportion of couples who report wanting no more children choose sterilization soon after their last wanted birth (Bumpass 1987), and reported pregnancy intentions are associated with child outcomes later in life (Baydar 1995, Brown and Eisenberg 1995, Crissey 2005, but see Joyce, Kaestner, and Korenman 2000). Women's reports can be understood as expressing not necessarily a plan or a deliberate course of action leading to a birth, but rather attitudes toward the pregnancy that go beyond using or not using contraception (Klerman 2000, Trussell, Vaughan, and Stanford 1999). Attitudes are affected by the context surrounding the birth: a woman's age, financial stability, and – perhaps predominantly – relationship with the father (Edin et al. Under Review, Stanford et al. 2000, Zabin et al. 2000). I use these attitudes to better understand variation in the perceived acceptability of cohabitation as a setting for childbearing. While cohabiting women may become less vigilant in their contraceptive behavior (and thus more likely to have an unintended birth) if they are planning to marry their partner or if they see cohabitation as an acceptable setting for childbearing, I expect these processes to work more strongly on the intended component of fertility.

Past work shows that cohabitation is associated with higher rates of intended than unintended births relative to being single (Manning 2001, Musick 2002), but it does not address whether this association holds once account is taken of selection into marriage. To the extent that cohabitation serves as a precursor to marriage, I would expect the method used here, which removes the effects of unobserved heterogeneity from the estimated effects of cohabitation, to reduce the measured effects, rendering them closer to actual causal effects. In other words, in

the case of cohabitors planning births in anticipation of marriage, selection into marriage should explain the association between cohabitation and intended fertility. By contrast, to the extent that cohabitation functions as an alternative to marriage, I would *not* expect the correction for common unobserved heterogeneity to reduce the estimated effect of cohabitation on intended fertility. That is, in the case that cohabitors are planning births in what they perceive to be an acceptable setting for having children, without linking that acceptability to marriage plans, selection into marriage should not explain the association between cohabitation and intended fertility. Indeed, if the unobserved characteristics common to cohabiting childbearing and marriage are negatively related (e.g., religious commitment may deter cohabiting births but hasten marriage), accounting for them may actually increase the estimated effect of cohabitation on fertility.

METHODS

Sample and Measures

The National Survey of Family Growth (NSFG) is a periodic, nationally representative fertility survey conducted by the National Center for Health Statistics (Mosher and Bachrach 1996). I use data from the 1995 NSFG, which is based on a national probability sample of 14,000 women ages 15 to 44 drawn from households that responded to the 1993 National Health Interview Survey (Abma et al. 1997). Of those eligible for the NSFG, 10,847 (79 percent) gave complete interviews. Hispanic and Black women were oversampled, making it possible to obtain more reliable estimates of childbearing determinants for these groups. My data complement those of past work in this area: Brien et al.'s sample from the National Longitudinal Study of the High School Class of 1972 includes only high school graduates and covers experiences from an earlier period, 1972-86; Upchurch et al.'s sample from the National

Longitudinal Study of Youth includes women of all education levels and is more recent, but it does not include cohabitation histories. The NSFG covers recent family behaviors – including cohabitation – of a nationally representative group of women.

The dating of births, cohabitations, and marriages is to the month and comes from fertility and union histories. Intention status of births is determined on the basis of retrospective questions about contraceptive use prior to pregnancy and feelings at the time of pregnancy.[1] My sample is restricted to white, black, and Hispanic respondents who gave information on birth intention status and complete, consistent data on the timing of marriage, cohabitation, and

[1] Intention status is based on answers to a series of questions. If contraception had been discontinued prior to pregnancy, respondents were asked, *"Was the reason you (had stopped/were not using) any methods because you* yourself wanted to become pregnant?" Except for those who had discontinued contraception in order to become pregnant, women were asked, *"At the time you became pregnant (this time with your nth pregnancy), did you yourself actually want to have a(nother) baby at some time?"* Women who wanted another baby and women who had discontinued contraceptive use because they wanted to become pregnant were then asked, *"So would you say you became pregnant too soon, at about the right time, or later than you wanted?"* Births are "intended" if a woman discontinued contraceptive use because she wanted to become pregnant and the pregnancy came too late or on time, or if she reported wanting to have a(nother) baby at some time and the pregnancy came too late or on time. Births are "unintended" if a woman reported not wanting a(nother baby) or if she felt the pregnancy came too soon. The unintended category includes what past literature has called “mistimed” as well as what has been called “unwanted.” In neither case did the woman want to get pregnant at the time she did, according to her later report.

education transitions. It is limited to never-married women, and covers the period 1980-95. My final sample includes 7738 women,[2] who contribute at least some exposure to the following events: 1,190 intended nonmarital births, 1,568 unintended nonmarital births, 3,375 pre-marital cohabitations, and 3,997 first marriages. Restricting the analysis to never-married women captures the vast majority of all nonmarital childbearing. About three-fourths of nonmarital births to whites and 90% of those to blacks were to never-married women in the late 1980s and early 1990s (Musick 2000: 78).

While I model four processes, I am primarily interested in the relationship between cohabitation and fertility. Calendar period, race and ethnicity, education, and family background are associated with both nonmarital childbearing and cohabitation and are thus included as control variables. I also control for prior childbearing, as well as interactions exploring key differences by cohabitation status, race, and time. With the exception of interaction terms, controls are identical across models; they are listed in Table 1.

-- Table 1 about here --

Calendar period. Period effects have been the primary force behind changes in fertility rates (Rindfuss, Morgan, and Swicegood 1984), marriage formation (Rodgers and Thornton 1985), and marital dissolution (Thornton and Rodgers 1987). I include controls for three time periods: 1980-84, 1985-89, and 1990-95. I explore differences in fertility rates over time by cohabitation status and race.

[2] Of the 10,847 NSFG respondents, 442 had missing data on intention status and incomplete or inconsistent fertility, union, and education histories; 345 reported a race/ethnicity other than white, black, or Hispanic; and 2322 were either married or ever-married by 1980.

Race and ethnicity. There are striking differences in levels of unmarried fertility by race and ethnicity: 24 percent of white, 45 percent of Hispanic, and 69 percent of black births were to unmarried mothers in 2004 (Hamilton et al. 2005). The share of unmarried births to cohabiting couples also varies greatly: about half of all unmarried births to whites and Hispanics were to cohabiting women in the early 1990s, but only 20 percent of those to blacks (Bumpass and Lu 2000). I explored differences in models run separately by race and ethnicity and found that, although the magnitude of explanatory variables differed in many instances, the main findings did not (with one exception noted below). Moreover, the effects of incorporating heterogeneity did not vary by race and ethnicity. For these reasons, and given the already vast number of parameters involved in a four-process model, I present results of pooled models controlling for white, black, and Hispanic race/ethnicity. In the fertility models, I include terms capturing key interactions between race, cohabitation status, and time. In the marriage model, I include interactions between race and education, since, in these models, education appears to work very differently for blacks than for whites or Hispanics.

Education. The inverse relationship between education and nonmarital fertility is well-documented (Bumpass and Lu 2000, Bumpass and Sweet 1989, Rindfuss and Parnell 1989). Although cohabitation is now common among all social groups, women with less education remain those with the highest rates of cohabitation (Bumpass and Lu 2000). All models include time-varying controls for four education levels, determined on the basis of retrospective education histories: less than high school, high school, some college, and college or more.

Family background. Childhood family structure and socioeconomic status are associated with nonmarital childbearing and cohabitation (Thornton 1991, Bumpass and Sweet 1989, McLanahan and Bumpass 1988, Wu 1996, Wu and Martinson 1993). In each of the

models, I include controls for whether the respondent spent any time in a single-parent family growing up, as well as dummies for father's and mother's educational attainment.

Prior childbearing. Second- and higher-order births account for about half of all births to unmarried women (Wu, Bumpass, and Musick 2001). They are more likely to be intended than first births to unmarried women, and they are more likely to occur within cohabiting unions (Musick 2000). Despite their importance, research to date has focused almost exclusively on the first nonmarital birth. An exception is work by Rindfuss and Parnell (1989), who find that having a child increases the rate of subsequent fertility among unmarried women. They provide two possible explanations: unmarried mothers have difficulty finding a suitable spouse and eventually decide to continue their childbearing outside of marriage, and unmarried mothers feel more able to cope with a second or third birth after going through the experience of being a new mother. An alternative to such explanations is one based on selection: unmarried mothers have demonstrated that they are willing to have children outside of marriage. They have characteristics, unmeasured in our analyses, that distinguish them from unmarried women with no children. Selection common to other family processes can be explored in the analysis presented here. In each of the models, I control for a set of variables representing a woman's prior childbearing experience, including whether she has had a child and, for those with a child, the parity, duration since last birth, cohabitation status of last birth, and intention status of last birth.

Continuous-Time Hazard Models with Heterogeneity

I use a technique developed by Lillard and colleagues in a series of papers (Brien et al. 1999, Lillard 1993, Lillard and Waite 1993, Lillard, Brien, and Waite 1995, Upchurch et al. 2002) and software created by Lillard and Panis, aML or Applied Maximum Likelihood for Multiprocess Multilevel Modeling (Lillard and Panis 2000). I jointly model rates of intended

and unintended nonmarital childbearing, entry into cohabitation, and entry into marriage among never-married women. In the fertility models, I include multiple birth spells and treat first marriage as a competing risk, i.e., I censor spells on the date of first marriage. In the cohabitation model, I also include multiple spells and treat first marriage as a competing risk. Finally, in modeling marriage, I include only the first marriage spell. Limiting the sample to never-married women simplifies the analysis, alleviating the need to consider remarriage and marital disruption, at little cost to understanding what leads to a nonmarital birth.

The models specify the continuous log-hazard of fertility, cohabitation, and marriage as a function of duration dependence, fixed covariates, time-varying covariates, and unobserved heterogeneity. The fixed and time-varying covariates and the heterogeneity component combine to shift the baseline hazard proportionally. Taking the intended fertility model as an example (and suppressing the subscript denoting individual women), the log hazard at time *t* for the *k*th occurrence of an intended birth may be written:

$$\ln h_k(t) = \beta_0 + \beta_1 \text{Cohabitation}(t) + \gamma' \mathbf{Age(t)} + \beta'_2 \mathbf{Period(t)} + \beta'_3 \mathbf{Race/ethnicity} + \beta'_4 \mathbf{Education(t)} + \beta'_5 \mathbf{Family\_background} + \beta'_6 \mathbf{Prior\_childbearing_k} + \beta'_7 \mathbf{Duration\_since\_last\_birth_k(t)} + \lambda\varepsilon.$$

The key coefficient of interest is on current cohabitation status, which varies over time. The baseline hazard is a function of age, which is specified as a piecewise-linear spline, where γ' is a vector of six slopes for ages below 17, 17-20, 20-25, 25-30, 30-35, and older than 35.[3] As described earlier, control variables are categorical and enter the analysis as dummies; some vary over time (period and education), and others do not (race/ethnicity and family background).

[3] Age is specified as a piecewise-linear spline in the union formation equations, as well, but inflection points are at 20, 25, 30 and 35 years. Piecewise-linear splines do not force any particular shape on the age pattern of fertility or union formation.

Controls capturing a woman's childbearing history (whether she has had a child and, for those with a child, the cohabitation and intention status of the last birth) vary across multiple birth spells, but not within birth spells. Dummies for duration since last birth vary both within and across birth spells. Although not shown above, the fertility models also include interactions between time, race, and cohabitation status.

Unmeasured heterogeneity, ε, is specified as a univariate, normally distributed residual that is time invariant and person-specific. In the models reported here, heterogeneity is captured by one factor common to all four of the family processes, and a path λ is estimated for each process to capture the strength and direction of association between each of the processes and the unmeasured heterogeneity common to them.[4] Identification of multiequation models typically requires exclusion restrictions, i.e., variables that are included in one equation but not another. The approach used here, however, exploits the fact that many individuals in the sample experience multiple birth and cohabitation transitions. The observation of multiple transitions, along with variation in covariates over time, identifies the heterogeneity factor and its relationship to each of the family processes. For any given woman, conditional on the heterogeneity factor common to fertility, marriage, and cohabitation, the joint probability of

[4] An alternative to modeling heterogeneity as one factor common to all processes is to model heterogeneity terms for each of the processes and allow for correlation among them. The joint model of intended fertility, unintended fertility, cohabitation, and marriage did not provide enough identifying information to estimate four separate heterogeneity factors and six separate correlation terms. However, I looked at pairs of processes with separate, correlated, heterogeneity terms, and results were similar to those reported here.

these processes is independent (for more detail on these models, see Brien et al. and Upchurch et al., especially the Technical Appendix).

This modeling approach explicitly accounts for the potential endogeneity of cohabitation and nonmarital childbearing by linking these processes through a common heterogeneity factor. Implicitly, it also accounts for the potential endogeneity (or selectivity) of marriage. In modeling nonmarital fertility, it is standard to treat marriage as a competing risk, i.e., to censor cases at the date of marriage, such that women who marry before having a child contribute a spell censored by marriage to the hazard of nonmarital childbearing. If nonmarital fertility and marriage are dependent processes, this censoring may be nonrandom. Substantively, censoring on marriage means analyzing differential rates of fertility among unmarried women – without addressing overall differences in nonmarital childbearing due to differences in who marries. Lillard's joint modeling approach can be used to control for nonrandom censoring. In particular, it makes it possible to distinguish between the direct effect of cohabitation on nonmarital childbearing and effects due to causes associated with marriage.

RESULTS

I present two sets of results: the first comes from modeling fertility, cohabitation, and marriage without accounting for shared, unmeasured variation (Model 1), and the second comes from linking these processes through the specification of a heterogeneity factor common to them (Model 2). Although I review key findings from each of the processes modeled, I focus on nonmarital fertility and, specifically, on the estimated effect of cohabitation on the intended and unintended components of nonmarital fertility with and without controls for heterogeneity. Appendix Table A1 contains the full set of parameters for each of the processes modeled. Table 2 provides a summary of key estimates, namely the estimated effects of cohabitation on fertility

with and without heterogeneity, as well as estimates of the heterogeneity factor and its relationship to fertility and union formation.

Model 1: Family Processes without Heterogeneity

Nonmarital fertility. Results from Model 1 (without heterogeneity) for intended and unintended childbearing outside of marriage are consistent with past findings (Musick 2002): cohabitation increases the rate of fertility outside of marriage and has a greater impact on the intended than unintended component. Interactions test differences in the effects of cohabitation by race/ethnicity and time; the only statistically significant interaction in Model 1 is in the effect of cohabitation for blacks. That is, there is no evidence of change in the effect of cohabitation over time, nor is there evidence of different effects for whites and Hispanics. Among whites and Hispanics, cohabitation increases the rate of intended childbearing by 5.7 times ($\exp[ß_{coh}] = \exp[1.74]$) and unintended childbearing by 3.2 times ($\exp[ß_{coh}] = \exp[1.17]$); among blacks, it increases the rate of intended childbearing by 2.5 times ($\exp[ß_{coh}+\beta_{black\ x\ coh}] = \exp[1.74-0.82]$) and unintended childbearing by 1.3 times $\exp[ß_{coh}+\beta_{black\ x\ coh}] = \exp[1.17-0.93]$). The first column of Table 2 (panel A) summarizes the estimated effects of cohabitation based on Model 1 (with no heterogeneity) by race and ethnicity.[5]

-- Table 2 about here --

The calendar period coefficients indicate an upward trend in the rate of intended and unintended nonmarital fertility between 1980-95. Interactions between race/ethnicity and time show a slower rate of increase over time among blacks and Hispanics than whites; nevertheless, the nonmarital fertility rates of these groups remain higher than those of whites. For example, in

[5] In calculating cohabitation's effect, I include only statistically significant interaction terms, i.e., for Model 1, I adjust only for differences in the effect of cohabitation between blacks and others.

the most recent period, blacks had rates of intended and unintended childbearing about 1.5 higher than their white counterparts; Hispanics had rates of intended childbearing 2.4 times higher and rates of unintended childbearing 1.4 times higher than their white counterparts.

Differentials by education are also striking, with similarly strong, negative effects on both intended and unintended childbearing. Compared to women without a high school degree, women with a high school degree are about 45 percent less likely to have a birth outside of marriage, women with some college are about 75 percent less likely, and women with a college degree are about 85 percent less likely. Although the strong inverse relationship between education and fertility holds for both the intended and unintended components of nonmarital childbearing, these effects likely work through different mechanisms. Higher education is associated with greater opportunity costs and more rigid norms around childbearing, which would lower the chances of an intended birth outside of marriage. It is also associated with more consistent and effective contraceptive use, which would likewise lower the risk of an unintended birth (Forrest 1994). Consistent with past research (Wu 1996, Wu and Martinson 1993), spending time in a single-parent family growing up and low parental education increase the rate of childbearing outside of marriage (intended and unintended).

Having one child (and being within two to five years of the first birth) increases the rate of subsequent intended and unintended childbearing outside of marriage. Second- and higher-order births are associated with much reduced rates of subsequent fertility, particularly intended fertility. Short and long durations since last birth (less than two years and more than five) are also associated with substantially lower rates of fertility. A last cohabiting birth reduces the chances of having another birth outside of marriage, intended or unintended. Note, however, that since current cohabitation status is included in the model, this variable represents women who

had a last cohabiting birth, are still unmarried, and are no longer cohabiting with their partner. If current cohabitation status is left out of the model, a last cohabiting birth has a positive, significant effect on intended childbearing and virtually no effect on unintended childbearing. A last intended birth increases the chances of having another intended birth and reduces the chances of having an unintended birth. This finding suggests that the intendedness of past births may not motivate change in contraceptive behavior; rather, it appears to reflect a woman's ability or willingness to avoid an unintended birth.

First marriage. Still focusing on Model 1 (without heterogeneity), I turn now to a summary of key results pertaining to entry into first marriage. Current cohabitation status increases the rate of first marriage by over 4 times. It is not surprising that, compared to all single women, cohabitors have higher rates of marriage. The NSFG does not have retrospective histories on dating relationships, and thus it is not possible to compare the chances of marriage between women in coresidential and non-coresidential partnerships.

Black women have lower marriage rates than whites, as has been well documented (Bennett, Bloom, and Craig 1989, Lichter et al. 1992, Mare and Winship 1991). Analyses run separately by race/ethnicity revealed important differences in the effects of education among blacks; interactions capturing these differences are included in the models reported here and are highly significant. Compared to whites and Hispanics, blacks with no high school degree have marriage rates nearly 70 percent lower; blacks with a high school degree, 55 percent lower; blacks with some college, 25 percent lower; and blacks with a college degree or more, only 15 percent lower. Among blacks, education (undoubtedly a proxy for many things, including earning and social status) is a powerful predictor of marriage formation.

While education increases marriage chances among blacks, it has relatively weak, inconsistent effects among whites and Hispanics. The positive effect of educational attainment on marriage is likely confounded here with the delay effects of school enrollment (e.g., see Oppenheimer 1994, Oppenheimer, Kincade, and Lew 1995). This is likely true, as well, for parental education: parental education would lead to more years of schooling, increasing marriage chances in the long-run, but delaying them in the short-run.

Having a birth outside of marriage has been found to impede subsequent marriage formation (Bennett, Bloom, and Miller 1995, Graefe and Licther 2002, Lichter and Graefe 2001, Qian, Lichter, and Mellot 2005), but results here suggest that this is not true in the two years immediately following a first birth. Women marrying the child's father within a short time of their birth may offset lower rates of marriage among women whose search opportunities are constrained by the demands of parenthood. Marriage chances decline at higher parities and with duration since birth. A last cohabiting birth reduces the chances of marriage. Again (as in the fertility models), this result is net of current cohabitation status; when cohabitation status is left out of the marriage model, a last cohabiting birth increases marriage chances by 50 percent over a last single birth. Couples who have a child within cohabitation may be jointly planning children and marriage, or they may plan a birth that later leads to marriage, or perhaps they marry in response to an unintended pregnancy. A last intended birth has no effect on subsequent marriage, compared to a last unintended birth, providing no evidence that intended childbearing is a proxy for marriage plans.

Cohabitation. I turn now to an overview of results pertaining to entry into cohabitation, still focusing on Model 1 (without heterogeneity). All else equal, cohabitation rates are lower for blacks (by 40 percent) and Hispanics (by little more than 10 percent) compared to whites.

Despite the high prevalence of cohabitation among all social groups (Bumpass and Lu 2000), there remain important education differentials: compared to women without a high school degree, women with a high school degree are 20 percent less likely to enter into a cohabiting relationship, and women with some college or more are about half as likely. Parental education seems to have little effect on cohabitation (net of education), but spending time in a single-parent family growing up increases rates by about 40 percent.

Giving birth to a child out of marriage leads to increases in cohabitation, but this effect diminishes quickly with time since birth and strongly with each additional birth. A last cohabiting birth decreases the chances of entering into a new cohabiting union, compared to a last single birth. Similarly, a last intended birth decreases the chances of transitioning to cohabitation.

Model 2: Family Processes with Heterogeneity

Model 2 incorporates a heterogeneity factor common to fertility and union formation. Parameters (shown in Table 2, panel B) are estimated to measure the strength of association between the common heterogeneity factor and unintended childbearing, cohabitation, and marriage, all relative to intended childbearing. Consistent with Brien et al. (1999) and Upchurch et al. (2002), I find that these family processes are positively associated: whatever unmeasured variables increase the chances of intended childbearing at the same time increase the chances of unintended childbearing, marriage, and cohabitation. These findings provide further evidence of a broad family-building strategy that extends to marital and nonmarital family formation. Women most likely to have a child out of marriage, whether intended or unintended, are also those most likely to enter into a union, whether cohabiting or marital. The positive correlation in unobserved characteristics across processes is consistent with the idea that cohabitation is a step on the way to marriage, and that cohabitors planning births out of marriage may be doing so in

anticipation of marriage. Couples close to marriage may also be less vigilant about contraception. Moreover, women least likely to marry may indeed be those least likely to carry an unintended pregnancy to term.

Despite clear evidence of a positive correlation in unobserved characteristics across family processes, accounting for this unobserved heterogeneity does not change the key conclusions drawn from Model 1: cohabitation increases the rate of childbearing outside of marriage, and it has a stronger effect on the intended than the unintended component of unmarried fertility. The effect of cohabitation on both intended and unintended childbearing is driven down by the introduction of heterogeneity (as expected in the case of a positive correlation in heterogeneity across processes), but the effect of cohabitation remains strong, at least among whites and Hispanics. The second column of Table 2 (panel A) shows the effects of cohabitation from Model 2 by race/ethnicity for the most recent period. Among whites, cohabitation increased the rate of intended childbearing by 2.9 times and unintended childbearing by 2 times; among Hispanics, it increased intended childbearing by 4.2 times and unintended childbearing by 3.5 times; and among blacks, it increased intended childbearing by 1.4 times and had a very small, negative effect (less than a 10 percent reduction) on unintended childbearing. The third column of Table 2 (panel A) compares change in the estimated effects of cohabitation from Models 1 and 2, with and without heterogeneity. There is up to a 50% reduction in the effect of cohabitation estimated from Model 2 versus Model 1, i.e., up to one-half of cohabitation's effect on fertility appears to operate indirectly via factors also associated with union formation. Controlling for unmeasured heterogeneity accounts for relatively little of the cohabitation effect among Hispanics: it reduces the estimated effect of cohabitation on intended fertility by about a quarter; it marginally *increases* the estimated effect on unintended

fertility. This is consistent with past work suggesting that cohabitation may be more likely to act as a "surrogate marriage" for Hispanics than others (Wildsmith and Raley 2006: 505, also see Landale and Fennelly 1992, Manning 2001, Manning and Landale 1996, Musick 2002).

Accounting for heterogeneity affects variables across models similarly, reducing the effect of cohabitation and magnifying the effects of race/ethnicity, education, and family background. In general terms, the magnitude of variables changes with the introduction of heterogeneity, but the direction of effects remains the same. The marked exception to this statement is prior childbearing. While Model 1 shows positive effects of having a nonmarital birth on subsequent nonmarital fertility and entry into cohabitation, and it shows no effect on marriage, Model 2 reveals strong, negative effects of nonmarital fertility on all of the family processes. This finding substantiates the hypothesis that the association between prior childbearing and subsequent fertility (e.g., Rindfuss and Parnell 1989) reflects selection: unmarried women with children are "different from" unmarried women without children in ways that increase their chances of having additional births outside of marriage.

By examining how the coefficients on explanatory variables change with the introduction of heterogeneity, it is possible to infer relationships between them and the heterogeneity factor. For example, given that accounting for unmeasured heterogeneity diminishes the effect of cohabitation on nonmarital fertility, and given that unobserved heterogeneity and nonmarital fertility are positively related, the relationship between unmeasured heterogeneity and cohabitation must be positive.[6] Similarly, because the positive association between nonwhite

[6] This is analogous to an associated causes model, where $\rho_{yz} = p_{zy} + p_{zx}\rho_{xy}$, z representing nonmarital fertility, y representing cohabitation, and x representing the heterogeneity factor common to union formation and fertility (Duncan 1975). Given that the coefficient on

race/ethnicity and nonmarital fertility strengthens, as does the negative association between education and nonmarital fertility, the heterogeneity factor must be negatively associated with being black and Hispanic and positively associated with education. In sum, whatever "pro-family" unmeasured factors are represented by the heterogeneity factor, they are positively associated with cohabitation and education and negatively associated being black and Hispanic.

If the heterogeneity factor represented something like traditional orientations toward the family, I would expect it to be negatively associated with cohabitation (Bumpass 1990, McLanahan and Casper 1995, Clarkberg, Stolzenberg, and Waite 1995), which it is not. But I would also expect it to be negatively associated with being black or Hispanic, as blacks and Hispanics tend to be more tolerant of nonmarital fertility (Oropesa 1996, Trent and South 1992) and are more willing to consider having a child outside of marriage (Abrahamse, Morrison, and Waite 1988, Trent and Crowder 1996). Moreover, I would expect it to be positively associated with education, since unmarried women with less education and lower educational aspirations are more willing to consider having a child outside of marriage (Abrahamse et al. 1988, Musick 1999). The traditional family orientations interpretation works for race/ethnicity and education, but not cohabitation. A marriage expectations interpretation does better, as this might be positively associated with cohabitation (Bumpass, Sweet, and Cherlin 1991); negatively associated with being black, given the lower marriage chances of black women (Bennett, Bloom, and Craig 1989, Lichter et al. 1992); and positively associated with education, given the higher

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cohabitation gets smaller when heterogeneity is added to the model, and given that the association between nonmarital fertility and the heterogeneity factor is positive, the association between cohabitation and the heterogeneity factor must be positive.

marriage chances of the more educated (Oppenheimer, Kincade, and Lew. 1995). This interpretation works for all key variables.[7]

SUMMARY AND DISCUSSION

This study set out to address the following question: To what extent does cohabitation affect the likelihood of planning a family outside of marriage? Births to cohabiting women are increasingly common. Because childbearing is so central to definitions of marriage and family, examining the relationship between childbearing and cohabitation can shed light on cohabitation's role in the family system. Past work shows that cohabitation increases rates of fertility compared to being single, and does so more for intended than unintended births. This suggests that, for some couples, cohabitation may provide a suitable context for having children. However, most studies of fertility outside of marriage do not address concerns that fertility and union formation are joint processes, and that failing to account for the joint nature of these decisions can bias estimates of cohabitation on nonmarital childbearing. For example, cohabitors may be more likely to plan births not because they see cohabitation as an acceptable alternative

[7] Similarly, it is possible to infer a negative relationship between the heterogeneity factor and spending time with a single parent growing up and a positive relationship between the heterogeneity factor and prior childbearing out of marriage. Traditional family attitudes are negatively related to spending time with a single parent growing up (Axinn and Thornton 1996; Thornton and Camburn 1987), but they are also negatively related to nonmarital childbearing (Musick 1999). Marriage expectations, by contrast, might be negatively related to spending time with a single parent (Goldscheider and Waite 1986), but positively associated with prior childbearing out of marriage. The marriage expectations interpretation is consistent with all of the changes observed between Models 1 and 2.

to marriage, but because they are more likely than their single counterparts to marry. Here, I use a modeling approach that accounts for stable, unobserved characteristics of women common to nonmarital fertility and union formation as way of estimating the effect of cohabitation on nonmarital fertility net of cohabitors' potentially greater likelihood of marrying. I distinguish between intended and unintended fertility to better understand variation in the perceived acceptability of cohabitation as a setting for childbearing.

I find that most of what we can learn from standard fertility models appears to hold once account is taken of unmeasured heterogeneity common to nonmarital fertility and union formation: Cohabitation increases the rate of childbearing among unmarried women and has a greater effect on intended than unintended births. Accounting for common unmeasured heterogeneity reduces the estimated effect of cohabitation on intended childbearing outside of marriage by up to 50%, depending on race/ethnicity. This suggests that, for some couples, cohabitation is not so much an alternative to marriage as it is a step along the way to marriage. Nonetheless, half or more of cohabitation's effect remains net of factors associated with union formation. For these couples, cohabitation may indeed provide a suitable context for childbearing. It may be an acceptable alternative when the perceived costs of marriage are too high. Or, given the declining normative imperative to marry, it may simply be an end in itself, arrived at independently of marriage. The effect of cohabitation among Hispanic women is particularly robust to the introduction of unmeasured heterogeneity. Consistent with past work (e.g., Wildsmith and Raley 2006), this indicates that among Hispanics more than others, cohabitation may serve as a surrogate to marriage.

My findings confirm that the stable, unmeasured characteristics of women common to nonmarital fertility and union formation are positively related (Brien et al. 1999, Upchurch et al.

2002). That is, women most likely to marry are also most likely to cohabit and have a child out of marriage. Accounting for heterogeneity affects variables across the intended and unintended fertility, cohabitation, and marriage processes similarly, reducing the estimated effects of cohabitation and magnifying those of race/ethnicity, education, and family background. There are a range of mechanisms that might generate links across life course processes. Given how estimated coefficients change with the introduction of the unmeasured heterogeneity factor, this factor appears to represent something like women's unobserved marriage expectations, desires, or capacities.

This work was motivated in part by debates about the meaning of cohabitation. In the end, however, it may not be productive to argue over whether cohabitation is a stage in the marriage process, a substitute for marriage, or just another way of being single (Rindfuss and VandenHeuvel 1990). Framing the meaning of cohabitation in terms of competing hypotheses assumes a "typical" experience that adequately describes cohabitation, but average differences between cohabitors and others may mask heterogeneity in the meanings and functions of cohabitation. Variation likely exits across couples, as well as within couples over time (Musick and Bumpass 2006, Gibson-Davis et al. 2005). While the meaning of marriage is in flux (Cherlin 2004; Sweeney 2002), there arguably remains a shared understanding of what marriage ought to entail. There is less consensus over what cohabitation ought to entail: Is it a matter of economizing on household expenses? A testing ground for marriage? A commitment between two people to stay together and raise a family? Cohabitation is surely becoming more institutionalized as it becomes a more common part of the life course. Nonetheless, the relative flexibility of roles, obligations, and expectations within cohabitation may be part of what makes it attractive to growing numbers of people.

Finally, while modeling the relationships across fertility and union formation processes provides useful insights, two aspects of this joint modeling approach are unsatisfying. First, the unobserved characteristics of women linking processes are assumed to be fixed in time, even as a recurrent theme in sociology and demography concerns the fluid nature of individual circumstances (Wu 2003). These models allow for the observed characteristics of women to change over time, but they do not address any such fluidity in the unobserved characteristics of women. Second, and perhaps more importantly, although a marriage expectations interpretation of unmeasured heterogeneity is consistent with these results, it can only be inferred. Ultimately, the unmeasured heterogeneity linking life course processes remains a black box, and only direct observation of the potentially relevant characteristics of women will allow us to get inside.

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Table 1. Processes and Model Specifications

	Fertility		Union Formation	
Explanatory variables	**Intended**	**Unintended**	**Marriage**	**Cohabitation**
Current cohabitation status	X	X	X	
Age	X	X	X	X
Calendar period				
1980-84	X	X	X	X
1985-89	X	X	X	X
1990-94	X	X	X	X
Race/ethnicity				
White	X	X	X	X
Black	X	X	X	X
Hispanic	X	X	X	X
Current education level				
Less than high school education	X	X	X	X
High school degree	X	X	X	X
Some college	X	X	X	X
College degree or more	X	X	X	X
Childhood family structure				
Spent time in a single-parent family growing up	X	X	X	X
Father's education				
Less than high school	X	X	X	X
High school	X	X	X	X
More than high school	X	X	X	X
Mother's education				
Less than high school	X	X	X	X
High school	X	X	X	X
More than high school	X	X	X	X
Any children				
Any children x parity 2	X	X	X	X
Any children x parity 3+	X	X	X	X
Any children x duration since last birth 0-2 years	X	X	X	X
Any children x duration since last birth 2-5 years	X	X	X	X
Any children x duration since last birth 5-10 years	X	X	X	X
Any children x duration since last birth 10+ years	X	X	X	X
Any children x last birth cohabiting	X	X	X	X
Any children x last birth intended	X	X	X	X
Time x race/ethnicity interactions				
1985-89 x black	X	X		
1990-95 x black	X	X		
1985-89 x Hispanic	X	X		
1990-95 x Hispanic	X	X		
Time x cohabitation interactions				
1985-89 x cohabitation	X	X		
1990-94 x cohabitation	X	X		
Race/ethnicity x cohabitation interactions				
Black x cohabitation	X	X		
Hispanic x cohabitation	X	X		
Race x education interactions				
Black x high school			X	
Black x some college			X	
Black x college or more			X	

Notes: 1995 NSFG. [X] indicates which variables are included in fertility and union formation models.

Table 2. Summary of Key Results

	Model 1	Model 2	% Change
Panel A: Relative risks associated with cohabitation by race/ethnicity, 1990-94			
Intended nonmarital fertility			
White	5.68	2.88	49
Hispanic	5.68	4.20	26
Black	2.49	1.44	42
Unintended nonmarital fertility			
White	3.24	2.03	37
Hispanic	3.24	3.50	-8
Black	1.28	0.91	29
Panel B: Unobserved heterogeneity			
Sigma (factor common to fertility and union formation	--	1.41	
Lambda 1 (intended birth)	--	1.00	
Lambda 2 (unintended birth, relative to intended birth	--	0.90	
Lambda 3 (first marriage, relative to intended birth)	--	0.81	
Lambda 4 (cohabitation, relative to intended birth)	--	0.72	

Notes: 1995 NSFG. Model 1 includes no heterogeneity. Model 2 includes one heterogeneity factor common to intended and unintended childbearing, cohabitation, and marriage. In Panel A, relative risks are calculated as the exponentiated sum of the main effect of cohabitation and statistically significant interactions between cohabitation and race and time. All parameters shown in Panel B are statistically significant at the .01 level. The full set of parameters for all processes is shown in Appendix Table A1.

Appendix Table A1. Parameters for Joint Models of Union Formation and Fertility

	Model 1		Model 2	
Panel A: Hazard of intended childbearing				
Cohabiting	1.7364	***	1.5198	***
	(.1712)		(.1819)	
Intercept	-21.6582	***	-23.6235	***
	(2.4577)		(2.5213)	
Age				
up to 17	.8912	***	.9499	***
	(.1490)		(.1524)	
17-20	.5168	***	.8876	***
	(.0557)		(.0607)	
20-25	.0021		.2245	***
	(.0236)		(.0280)	
25-30	.0159		.1677	***
	(.0287)		(.0299)	
30-35	-.1307	**	-.0193	
	(.0532)		(.0543)	
over 35	-.2343		-.2157	
	(.1433)		(.1476)	
Calendar period (1980-84 omitted)				
1985-89	.8155	***	.7489	***
	(.2086)		(.2162)	
1990-95	1.2559	***	1.3000	***
	(.1903)		(.1984)	
Race/ethnicity (white omitted)				
Black	1.7673	***	1.9476	***
	(.1783)		(.1900)	
Hispanic	1.2621	***	1.4626	***
	(.2139)		(.2300)	
Education (less than high school omitted)				
High school	-.5714	***	-.8046	***
	(.0671)		(.0776)	
Some college	-1.2810	***	-1.9851	***
	(.0955)		(.1137)	
College or more	-1.8307	***	-2.6659	***
	(.2222)		(.2492)	
Childhood family structure				
Spent time in a single-parent family growing up	.1696	***	.4630	***
	(.0612)		(.0740)	
Father's education (less than high school omitted)				
High school	.0449		.0056	
	(.0686)		(.0824)	
More than high school	-.4568	***	-.6907	***

Appendix Table A1 (continued)

	(.1120)		(.1256)	
Missing data on father's education	-.1389		-.1911	
	(.1018)		(.1246)	
Mother's education (less than high school omitted)				
High school	.0042		-.1315	*
	(.0656)		(.0777)	
More than high school	-.1807	*	-.4667	***
	(.1051)		(.1181)	
Missing data on mother's education	.6497	**	.7053	*
	(.2916)		(.3699)	
Prior childbearing experience				
Any children	.5483	***	-.5302	***
	(.0933)		(.1124)	
Any children x parity 2	-.6900	***	-1.5504	***
	(.1091)		(.1247)	
Any children x parity 3+	-1.1327	***	-3.1131	***
	(.1414)		(.1783)	
Any children x duration since last birth 0-2 years	-1.8334	***	-1.3060	***
	(.1012)		(.1042)	
Any children x duration since last birth 5-10 years	-.5389	***	-.4588	***
	(.1119)		(.1168)	
Any children x duration since last birth 10+ years	-1.3217	***	-1.3082	***
	(.2468)		(.2602)	
Any children x last birth cohabiting	-.3857	***	-.3435	***
	(.0956)		(.1024)	
Any children x last birth intended	.3345	***	.3960	***
	(.0838)		(.0934)	
Time x race/ethnicity interactions				
1985-89 x black	-.0930		-.2472	
	(.2164)		(.2262)	
1990-95 x black	-.5041	**	-.7565	***
	(.1985)		(.2089)	
1985-89 x Hispanic	-.2657		-.2600	
	(.2465)		(.2567)	
1990-95 x Hispanic	-.4030	*	-.5029	**
	(.2358)		(.2498)	
Time x cohabitation interactions				
1985-89 x cohabitation	-.1439		-.3476	**
	(.1605)		(.1697)	
1990-94 x cohabitation	-.1945		-.4613	***
	(.1584)		(.1692)	
Race/ethnicity x cohabitation interactions				
Black x cohabitation	-.8242	***	-.6959	***
	(.1521)		(.1619)	
Hispanic x cohabitation	-.0374		.3759	*
	(.1851)		(.2003)	

Panel B: Hazard of unintended childbearing

Cohabiting	1.1744	***	.9765	***
	(.1577)		(.1680)	
Intercept	-19.1570	***	-20.8562	***
	(.9953)		(1.0259)	
Age				
up to 17	.8261	***	.8810	***
	(.0609)		(.0619)	
17-20	.2320	***	.5199	***
	(.0380)		(.0418)	
20-25	-.0775	***	.1107	***
	(.0221)		(.0249)	
25-30	-.1037	***	.0196	
	(.0348)		(.0355)	
30-35	-.0844		.0099	
	(.0678)		(.0688)	
over 35	-.1414		-.1110	
	(.1772)		(.1801)	
Calendar period (1980-84 omitted)				
1985-89	1.0846	***	1.0454	***
	(.1529)		(.1568)	
1990-95	1.2855	***	1.3423	***
	(.1468)		(.1547)	
Race/ethnicity (white omitted)				
Black	1.6835	***	1.8770	***
	(.1329)		(.1408)	
Hispanic	.8015	***	.9729	***
	(.1905)		(.1996)	
Education (less than high school omitted)				
High school	-.6031	***	-.6797	***
	(.0659)		(.0725)	
Some college	-1.3687	***	-1.7956	***
	(.0924)		(.1013)	
College or more	-2.1598	***	-2.7063	***
	(.2202)		(.2348)	
Childhood family structure				
Spent time in a single-parent family growing up	.3064	***	.5192	***
	(.0543)		(.0639)	
Father's education (less than high school omitted)				
High school	-.0046		-.0552	
	(.0627)		(.0759)	
More than high school	-.1399	*	-.3300	***
	(.0787)		(.0973)	
Missing data on father's education	-.0783		-.1493	
	(.0861)		(.1053)	
Mother's education (less than high school omitted)				
High school	-.0602		-.1738	**

Appendix Table A1 (continued)

	(.0598)		(.0729)	
More than high school	-.2233	***	-.4367	***
	(.0775)		(.0965)	
Missing data on mother's education	.2885		.3263	
	(.2694)		(.2943)	
Prior childbearing experience				
Any children	.5724	***	-.4294	***
	(.0845)		(.1061)	
Any children x parity 2	-.3901	***	-1.0131	***
	(.1024)		(.1142)	
Any children x parity 3+	-.5379	***	-2.0856	***
	(.1155)		(.1409)	
Any children x duration since last birth 0-2 years	-1.4089	***	-.9575	***
	(.0931)		(.0954)	
Any children x duration since last birth 5-10 years	-.5645	***	-.4069	***
	(.1334)		(.1374)	
Any children x duration since last birth 10+ years	-.9840	***	-.8498	***
	(.2825)		(.2916)	
Any children x last birth cohabiting	-.4147	***	-.3210	***
	(.0997)		(.1026)	
Any children x last birth intended	-.6087	***	-.5209	***
	(.0942)		(.0954)	
Time x race/ethnicity interactions				
1985-89 x black	-.3883	**	-.5658	***
	(.1690)		(.1742)	
1990-95 x black	-.4006	**	-.6232	***
	(.1608)		(.1699)	
1985-89 x Hispanic	-.5889	**	-.6056	**
	(.2341)		(.2433)	
1990-95 x Hispanic	-.4984	**	-.5434	**
	(.2107)		(.2185)	
Time x cohabitation interactions				
1985-89 x cohabitation	-.0042		-.2696	
	(.1649)		(.1718)	
1990-94 x cohabitation	.0543		-.2686	*
	(.1542)		(.1610)	
Race/ethnicity x cohabitation interactions				
Black x cohabitation	-.9295	***	-.8005	***
	(.1398)		(.1497)	
Hispanic x cohabitation	.1889		.5455	***
	(.1710)		(.1820)	

Panel C: Hazard of first marriage

Cohabiting	1.4799	***	1.2537	***
	(.0323)		(.0425)	
Intercept	-14.4607	***	-17.2102	***
	(.4622)		(.5407)	
Age				
up to 20	.5893	***	.7311	***
	(.0249)		(.0286)	
20-25	-.0036		.1655	***
	(.0122)		(.0153)	
25-30	.0140		.1292	***
	(.0152)		(.0174)	
30-35	-.1275	***	-.0445	
	(.0280)		(.0291)	
over 35	-.0973	*	-.0926	*
	(.0547)		(.0551)	
Calendar period (1980-84 omitted)				
1985-89	.4303	***	.2698	***
	(.0383)		(.0434)	
1990-95	.3571	***	.2577	***
	(.0396)		(.0496)	
Race/ethnicity (white omitted)				
Black	-1.1383	***	-.8921	***
	(.1050)		(.1154)	
Hispanic	.0642		.3345	***
	(.0440)		(.0586)	
Education (less than high school omitted)				
High school	.1258	**	.1537	**
	(.0533)		(.0643)	
Some college	-.2525	***	-.5530	***
	(.0623)		(.0764)	
College or more	.0563		-.2799	***
	(.0696)		(.0897)	
Childhood family structure				
Spent time in a single-parent family growing up	-.1406	***	.0224	
	(.0347)		(.0439)	
Father's education (less than high school omitted)				
High school	.0216		-.0140	
	(.0395)		(.0506)	
More than high school	-.1247	***	-.2909	***
	(.0472)		(.0618)	
Missing data on father's education	-.1696	**	-.1876	*
	(.0809)		(.0974)	
Mother's education (less than high school omitted)				
High school	-.0391		-.1614	***
	(.0403)		(.0504)	
More than high school	-.1245	**	-.3304	***

Appendix Table A1 (continued)

	(.0505)		(.0652)	
Missing data on mother's education	-.1885		-.1228	
	(.2473)		(.2613)	
Prior childbearing experience				
Any children	.0147		-.8320	***
	(.0792)		(.0878)	
Any children x parity 2	-.1694	*	-.8439	***
	(.0907)		(.0982)	
Any children x parity 3+	-.3182	***	-1.8432	***
	(.1186)		(.1332)	
Any children x duration since last birth 2-5 years	-.3331	***	-.3462	***
	(.0879)		(.0882)	
Any children x duration since last birth 5-10 years	-.4119	***	-.3385	***
	(.1044)		(.1095)	
Any children x duration since last birth 10+ years	-.3282	**	-.2803	
	(.1625)		(.1772)	
Any children x last birth cohabiting	-.4977	***	-.4173	***
	(.0819)		(.0874)	
Any children x last birth intended	-.1098		-.0067	
	(.0748)		(.0834)	
Race x education interactions				
Black x high school	.3424	***	.0897	
	(.1196)		(.1303)	
Black x some college	.8481	***	.5524	***
	(.1276)		(.1404)	
Black x college or more	.9751	***	.5596	***
	(.1474)		(.1730)	

Panel D: Hazard of cohabitation

Intercept	-14.5119	***	-17.0746	***
	(.3946)		(.4580)	
Age				
up to 20	.6002	***	.7369	***
	(.0214)		(.0245)	
20-25	.0056		.1500	***
	(.0139)		(.0157)	
25-30	-.0097		.0779	***
	(.0194)		(.0202)	
30-35	-.0911	***	-.0342	
	(.0326)		(.0330)	
over 35	-.0745		-.0595	
	(.0522)		(.0523)	
Calendar period (1980-84 omitted)				
1985-89	.4877	***	.4585	***
	(.0467)		(.0494)	
1990-95	.5312	***	.5788	***
	(.0460)		(.0507)	
Race/ethnicity (white omitted)				
Black	-.5196	***	-.4923	***
	(.0483)		(.0552)	
Hispanic	-.1299	**	-.0043	
	(.0548)		(.0633)	
Education (less than high school omitted)				
High school	-.1891	***	-.2228	***
	(.0509)		(.0577)	
Some college	-.6505	***	-.9716	***
	(.0593)		(.0684)	
College or more	-.7455	***	-1.0944	***
	(.0820)		(.0940)	
Childhood family structure				
Spent time in a single-parent family growing up	.3402	***	.5276	***
	(.0381)		(.0448)	
Father's education (less than high school omitted)				
High school	.0100		-.0280	
	(.0456)		(.0540)	
More than high school	-.0556		-.1949	***
	(.0545)		(.0633)	
Missing data on father's education	-.0200		-.0997	
	(.0710)		(.0860)	
Mother's education (less than high school omitted)				
High school	.0026		-.1128	**
	(.0451)		(.0525)	
More than high school	.0194		-.1634	**
	(.0555)		(.0656)	
Missing data on mother's education	.3477	***	.5408	***
	(.1240)		(.1875)	

Appendix Table A1 (continued)

Prior childbearing experience				
Any children	.5378	***	-.2019	**
	(.0720)		(.0801)	
Any children x parity 2	-.4023	***	-.9760	***
	(.0997)		(.1064)	
Any children x parity 3+	-.7484	***	-2.0489	***
	(.1303)		(.1379)	
Any children x duration since last birth 2-5 years	-.3020	***	-.2933	***
	(.0833)		(.0871)	
Any children x duration since last birth 5-10 years	-.6092	***	-.5018	***
	(.1056)		(.1108)	
Any children x duration since last birth 10+ years	-1.0820	***	-.8342	***
	(.1884)		(.1975)	
Any children x last birth cohabiting	-.7210	***	-.6668	***
	(.1086)		(.1159)	
Any children x last birth intended	-.2727	***	-.2661	***
	(.0826)		(.0862)	
Panel E: Unobserved heterogeneity				
Sigma (factor common to fertility and union formation)	--		1.4078	***
	--		(.0681)	
Lambda 1 (intended birth)	--		1.0000	
	--			
Lambda 2 (unintended birth, relative to intended birth)	--		.8999	***
	--		(.0555)	
Lambda 3 (first marriage, relative to intended birth)	--		.8066	***
	--		(.0493)	
Lambda 4 (cohabitation, relative to intended birth)	--		.7150	***
	--		(.0441)	
Log-Likelihood	-70878.57		-70102.21	

*** p < .01; ** p < .05; * p< .10

Notes: 1995 NSFG. Regression coefficients are reported, with standard errors in parentheses. Model 1 includes no heterogeneity. Model 2 includes one heterogeneity factor common to union formation and fertility.