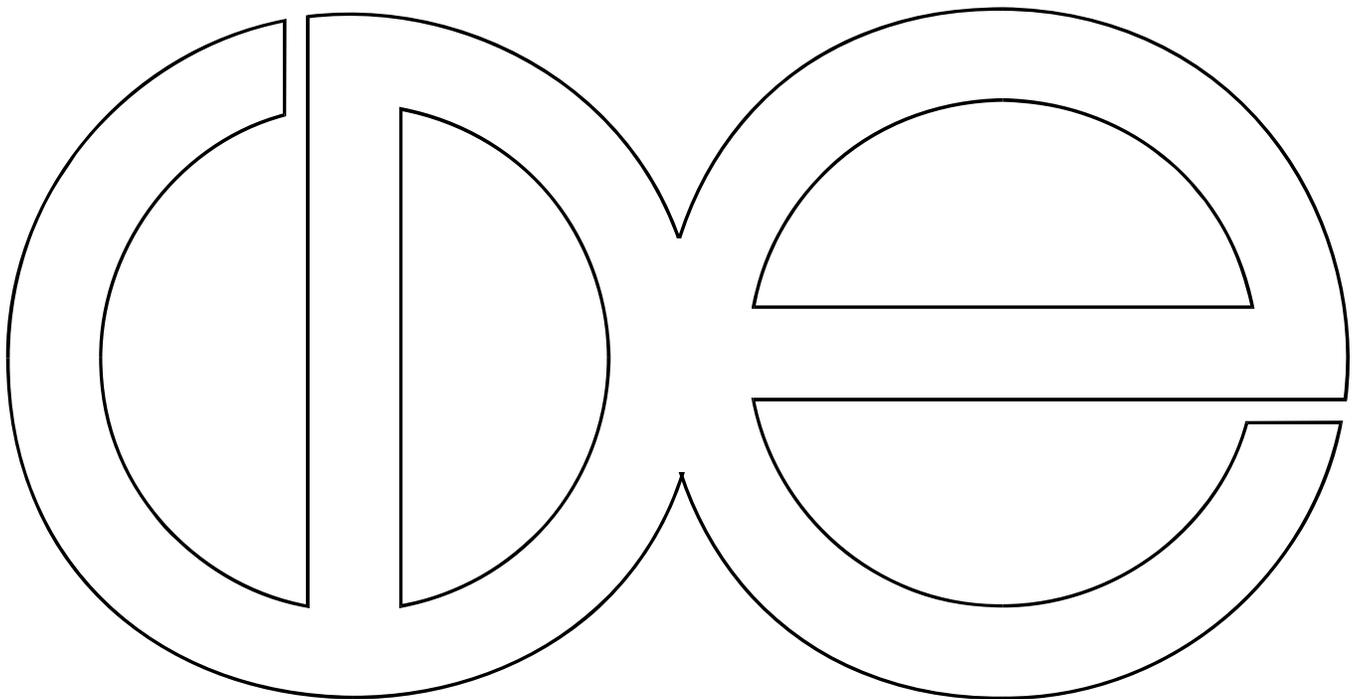


**Center for Demography and Ecology
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**Marital Fertility Schedules of American Women
in Stepfamilies: Empirical Regularities and
Behavioral Interpretations**

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ABSTRACT

This paper compares qualitative marital fertility schedules in intact- and stepfamilies using data from the U.S. June 1995 Current Population Survey. Stepfamily is defined through demographic configuration of women's marital parity and lifetime parity. Substantial empirical regularities in fertility schedules are identified. Marital fertility schedules are similar for women in both intact- and stepfamilies: Conditional on a woman's lifetime parity, fertility schedules for all first marital births consistently peak at one year of marriage, and fertility schedules for second and higher-order marital births are almost identical, regardless of stepfamily status. The only exception to the similarities between stepfamily fertility and intact-family fertility is that there are crossovers in fertility schedules between first marital births in stepfamilies and all subsequent marital births that are resolved as a difference in "pace" by horizontally shifting fertility schedules by a constant of 36 months. I propose behavioral interpretations of these findings in view of stepfamily processes, suggest qualifications regarding temporality to existing theories of stepfamily fertility, and speculate on implications for population dynamics.

INTRODUCTION

Demographers have been interested in identifying the characteristic time patterns of life events since the inception of the discipline (e.g., Graunt 1662; Gompertz 1825; Makeham 1860; Malthus 1830). In recent decades, mortality experience has been described in the model life tables (Coale and Demeny 1966); first marriages have been portrayed by novel mathematical functions (Coale and McNeil 1972; Hernes 1972); and marital fertility has been summarized by the model fertility schedules (Coale and Trussell 1974). Although its demographic applications have proved fruitful in understanding childbearing behaviors especially in relatively traditional societies (Hacker 2003; Knodel 1977, 1978; Lavelly 1986; Lavelly and Freedman 1990; Page 1977; Rodriguez and Cleland 1988; Van Bavel 2003; Wetherell 2001; Xie 1991; Xie and Pimentel 1992), the model fertility schedule has not yet managed to accommodate recent family changes in the United States—most notably, rising rates of divorce and nonmarital childbearing and the increasing prevalence of stepfamilies as a reproductive institution.

In this paper, I carry on the scientific interest in identifying the model fertility schedules, focusing on the qualitative characteristics of fertility schedules and on the comparison between married women in intact families and those in stepfamilies. The sample consists of American women surveyed in the late twentieth century, whose childbearing behaviors—especially in a legal marriage—are subject to careful planning and timing. The empirical approach departs from the quantitative construction of model fertility schedules in two respects. First, I relax the assumption that fertility rates are primarily, if not exclusively, a function of age and explore qualitative patterns of the duration dependence of fertility rates on three time axes (including age, marriage duration, and birth interval), and adopt a nonparametric statistical method resistant to the misspecification bias of the functional form of time dependence of fertility rates.

Empirical regularities in fertility schedules are obtained inductively by inspecting qualitative fertility schedules, rather than imposed deductively from demographic theories. Second, I highlight the comparison between stepfamilies and intact families by applying a demographic framework that defines stepfamilies through combinations of a woman's lifetime parity and marital parity. Behavioral interpretations are inferred from empirical regularities identified through comparisons of qualitative fertility schedules in intact families and stepfamilies. The findings not only are consistent with recent research on stepfamily processes but provide a new look at the fertility behaviors of American women in the late twentieth century in general, and stepfamily fertility in particular.

BACKGROUND

Family Change and the Context of Childbearing

Social changes in recent decades have profoundly altered the family as a reproductive institution (Ryder 1997). Whereas the majority of women born in the early twentieth century gave birth only within intact first marriages, increasing proportions of women in subsequent cohorts have experienced diverse family trajectories involving divorce, remarriage, or nonmarital childbearing even during their early adulthood (Casper and Bianchi 2002; Cherlin 1992; Wu and Li 2004). Stepfamily—"a family with one or more stepchildren" (American Heritage Dictionary 2000) either from a previous marriage or an unwed motherhood—has become a common context in which childbearing takes place (Bumpass 1984a). If demographic theories of fertility are, as Bumpass (1990) argued, "intrinsically about changes in the family as an institution" because childbearing "cannot be isolated from the institutional context in which it is embedded" (p. 483),

we need to reconsider the presumption of intact family as the primary reproductive institution and extend fertility research to accommodate the emerging reproductive context of stepfamilies.

Model Schedules of Marital Fertility

Coale and Trussell (1974) proposed the quantitative model schedules of marital fertility. They viewed marital fertility as following a characteristic age pattern determined jointly by overall fertility level and voluntary fertility control. In particular, they specified the age-specific fertility rate, $r(a)$, in the following form: $r(a) = M \cdot n(a) \cdot \exp(m \cdot v(a))$, where $n(a)$ is the rate of “natural fertility” at age a , $v(a)$ is a set of negative values to indicate decreasing fertility with age, and M and m are the parameters for overall fertility level and voluntary fertility control.

Although this model has proved useful in demographic applications, it cannot readily incorporate stepfamily fertility due to three limitations. First, it assumes that fertility is primarily a function of age, while recent research has shown there are other important factors omitted— notably, marriage duration (Page 1977; Van Bavel 2003), and parity-specific fertility control (David, Mroz, Sanderson, Wachter, and Weir 1988; Pullum 1990). Although the omission of marriage duration may not be very problematic for studying fertility in intact families because marriage duration and age are highly correlated, it can be consequential for stepfamily fertility research in which these two time dimensions are largely independent. Parity-specific fertility control is also commonplace in contemporary societies, and the failure to model parity-specific fertility control is compounded by the difficulty of untangling the effects of “multiple parities” in stepfamilies (see the discussion under the heading, “Childbearing in Stepfamilies”). The interpretations of the parameters M and m are not unambiguous, especially in the presence of intentional birth spacing and sterilization (Preston, Heuveline, and Guillot 2001, chap 9), and especially unclear in the stepfamily context. Finally, this model assumes homogeneous marital

fertility schedules in a population such that age-specific fertility rates can be specified as the product of the proportion married at age a and the age-specific fertility rate, $r(a)$, as if there were no births out-of-wedlock and no divorces.¹ However, neither the homogeneity assumption nor the intact-family assumption seems plausible. In fact, they fundamentally contradict the existence and reality of stepfamilies. These limitations mean that further research needs to be done to explore time axes other than age that are associated with fertility, such as marriage duration and birth interval, and heterogeneities in marital fertility schedules with respect to stepfamily status. In addition, we need to move beyond our satisfaction with the statistical properties (e.g., the goodness of fit between the data and the mathematical representations) of current model fertility schedules and search for behavioral interpretations of fertility behaviors.

Stepfamily Processes

Cherlin (1978) argued that stepfamilies suffer from a lack of social norms and well-defined social roles, and are “incompletely institutionalized” as compared to intact families. Members of a stepfamily need to invent their own ways of social interaction, to redefine family roles well established within intact families, and to cope with higher levels of economic and emotional strains. Therefore, they had higher divorce rates than those of first marriages (McCarthy 1978; Castro Martin and Bumpass 1989). Subsequent research has challenged this thesis and cautioned a fundamental difficulty of making comparisons between stepfamilies and intact families: Stepfamilies may consist of a selective group of individuals who are, relative to intact families, less religious (or of less strict religious denominations), less inclined to stay in an unhappy marriage, and more likely to first marry at younger ages (Booth and Edwards 1992;

¹ Formally, this statement can be written as $f(a) = G(a) \cdot r(a)$, where $f(a)$ denotes the fertility rate at age a , $G(a)$ the proportions of population married at age a , and $r(a)$ the marital fertility rates at age a .

Castro Martin and Bumpass 1989; Furstenberg and Spanier 1984; Halliday 1980). Thus, the differences observed in stepfamilies and intact families may not reflect substantively meaningful differences in marital relationships or family processes, but instead reflect these selective characteristics. Besides, Cherlin's explanation of the difference in divorce rates between first marriages and second marriages is sometimes misinterpreted to exaggerate the differences between stepfamilies and intact families. This misinterpretation is due to an overemphasis on the differences in *average* behaviors between family types and a lack of awareness of the fact that actual divorce differential between family types is substantively small (Furstenberg and Spanier 1984).² The selectivity criticism discussed earlier also implies that it gains little by comparing *average* behaviors if the average is taken from a heterogeneous group of stepfamilies. Recent research has increasingly shifted focus to the majority of "successfully institutionalized" stepfamilies and diversity among stepfamilies (Coleman et al. 2000).

With this shift in research focus, substantial similarities, rather than differences, between intact and stepfamilies are documented. For example, stepfamilies do not necessarily inflict higher frequencies of marital conflict (MacDonald and DeMaris 1995). Differences in marital satisfaction between stepfamilies and intact families are found to be small and of little practical significance (Vemer et al. 1989). On four extensively used family assessment scales, there are only differences in the levels of family cohesion, flexibility, openness, and interaction skills, but

² Sweet and Bumpass (1987) estimated that about 37% of remarriages and 30% of first marriages have dissolved in the first decade of a marriage. That is, almost two-thirds of stepfamilies survived to their tenth anniversary, although the average success rate of remarriages was still lower than first marriages by about 7%. Weed (1980) reported an even closer estimate of the lifetime probabilities of ever divorcing between first marriages and remarriages. The large divorce differentials between first marriages and remarriages reported in McCarthy (1978) might suffer from truncation biases (White and Booth 1985).

not in patterns of family functioning between stepfamilies and intact families. Because it is patterns, rather than levels of family functioning, that are more important to the adjustment of family members, members in a stepfamily are not necessarily worse off than their intact-family counterparts (Peek et al. 1988). In fact, similar processes among stepfamilies and intact families have been reported (Bogenscheider 1997; O'Connor, Hetherington, and Reiss 1998; Waldren et al. 1990), and the similarities are especially pronounced for stepfamilies of longer durations (O'Connor et al. 1998; Vuchinich et al. 1991; Vuchinich et al. 1993). Clinicians also observed that many stepfamilies gradually consolidate and stabilize (Papernow 1984, 1993), and having mutual children provides a vehicle to grasp the opportunity of holding the family together (Bernstein 1989). As Coleman et al. (2000) stated, "Even for those eventually disrupted remarriages, it is difficult to believe that they have made so many efforts to form a new family and never struggled to 'institutionalize' it and worked hard to 'make it work.' Social science research, however, has by and large been silent about these issues and this segment of the remarried populations." (p. 1289). This present paper will join the force to fill in this vacuum and address fertility behaviors of (motivated) "successfully institutionalized" stepfamilies.

Childbearing in Stepfamilies

A fundamental question in stepfamily fertility research, as in stepfamily process research, is, "In what respects and to what extent do stepfamilies and intact families differ from and/or resemble each other?" A consistent finding is that the presence of stepchildren decreases fertility in marriages and cohabitations (Bumpass 1984a; Lillard and Waite 1993; Loomis and Landale 1994; Stewart 2002; Toulemon 1997; Wineberg 1990, 1992; but see Griffith et al. 1985).³ This

³ This inverse relationship between stepchildren and fertility is taken somewhat for granted in the empirical research testing the hypotheses on the values of children (see Appendix A), in which the coefficients for stepchildren on

inverse relationship between the number of pre-union children and fertility rates may reflect the economic costs of childbearing that depress excessive demand for children, as suggested in neoclassical economic theory (Becker 1991). This finding is akin to commonly observed parity progression patterns (e.g., Ryder 1980, 1986; Westoff, Potter, and Sagi 1963); that is, only a proportion of women at a given parity proceeds to have another child, and this proportion generally decreases as parity increases. However, parity progression studies have rarely examined the implications of nontraditional family trajectories (Stewart 2002).

A major struggle in stepfamily fertility research has arisen because there are multiple parity progressions. Thomson and colleagues (Thomson 1997; Thomson et al. 2002; Thomson and Li 2002) took a “gendered” perspective and recognized that there are potentially his, her, and their children in the stepfamily context, which makes at least three potential parity progressions. It is more than a thorny task to untie the relative effects of all three parity progressions, and attempts to model three parity progressions simultaneously have suffered from both specification and interpretation difficulties. For example, a comparison of Thomson (1997), which adopted a reasonably complete parameterization of all three parity progressions, and Thomson and Li (2002), which settled to a much simplified parameterization that assumes linear additivity of both partners’ parities, suggests that (1) the complexity of the “saturated” model can make results hard to interpret when all three parity progressions are taken into account and (2) simplifications are necessary even if simplifications also impose a strong (and sometimes untested) theory on

fertility are consistently found to be negative. Besides, whether nonresident stepchildren have equally negative effects, however, is not clear and may differ across societies (Buber and Prskawetz 2000; Vikat et al. 1999; Vikat et al. 2004).

fertility patterns.⁴ Such difficulties are compounded by data quality concerns: for example, male respondents are notoriously unreliable on their reports of marital and fertility histories.

The effects of age of the youngest child have also been consistently documented (Buber and Prskawetz 2000; Bumpass 1984a; Griffith et al. 1985; Loomis and Landale 1994).⁵ Younger children are more likely to obtain a half sibling when their custodial parent enters a remarriage. This finding implies that a large proportion of stepfamilies acquire a mutual child soon after remarriage (Buber and Prskawetz 2000; Bumpass 1984a; Wineberg 1990, 1992). Behavioral interpretations for the effects of age of the youngest child have rarely been proposed, despite the fact that researchers sometimes loosely refer to this finding as how quickly a subsequent birth takes place.

CONCEPTUAL AND ANALYTIC ISSUES

⁴ The comparison is warranted because both Thomson (1997) and Thomson and Li (2002) analyzed the same panel data from the first two waves of the National Survey of Families and Households (NSFH) and addressed the same hypotheses on the values of children (see Appendix A). Another paper by Stewart (2002) also examined stepfamily fertility using the same NSFH data but tested different hypotheses. Her paper falls in the tradition of studying the effects of stepchildren on childbearing, as we reviewed earlier, which simplifies the parity progression issue by imposing a different theory on fertility patterns (that is, briefly, “parentage” matters, whereas parity does not).

⁵ The specification of the effects of age of the youngest child is different in several recent studies (e.g., Thomson et al. 2002; Thomson and Li 2002) using the econometric software, aML, and it is less straightforward to translate these results. In the language of aML developers, age of the youngest child is treated as a “duration spline” and incorporated in the functional form of the baseline hazard in the piecewise splined Gompertz specification (Lillard and Panis 2000). Despite the statistical subtlety, these studies basically yield the same substantive conclusions on the age of the youngest child.

As the preceding literature review suggests, childbearing behaviors in intact families and in stepfamilies may resemble each other because they have similar family processes. This resemblance may be especially pronounced at longer marriage durations for “successfully institutionalized” stepfamilies. Previous research also suggests that fertility rates are, on average, lower in stepfamilies than in intact families. There is some indication from the effect of age of the youngest child that “paces” of fertility (i.e., how quickly a subsequent birth takes place) may be different between intact families and stepfamilies. However, neither statistical specifications nor the behavioral mechanisms have been unambiguously spelled out in the literature, due to the complexity of parity configurations in stepfamilies and the lack of conceptual clarity when we talk about “pace.” I address these two difficulties in this section. First, I develop a demographic approach to deal with complexity of parity configuration by defining stepfamily status in terms of a woman’s marital parity and lifetime parity. Second, I engage the conceptual and analytic issues of “pace” and distinguish a unique conceptualization of “pace” from those in the conventional “relative risks” approach. The treatment of these issues will build the foundation for subsequent analyses to identify qualitative fertility schedules.

Parity Progressions and Stepfamily Status

I define stepfamily via two parity progressions as determined by a woman’s joint marital and childbearing history—marital parity (P^m) and lifetime parity (P^l). The marital parity of N ($P^m = N$) indicates the N th birth to a woman in the same marriage; similarly, the lifetime parity of K ($P^l = K$) indicates the K th birth to a woman throughout her lifetime irrespective of her marital history. The configurations of the two parity progressions define stepfamily in a way consistent with our common sense of stepfamily as “a family with one or more stepchildren,” (American Heritage Dictionary 2000). Specifically, a child was born into a stepfamily if the

woman's lifetime parity at the birth of this child is higher than her marital parity (i.e., $P^l > P^m$) because at least one child was born before the current marriage was formed. Similarly, a child was born into an intact family if the woman's lifetime parity at the birth of this child is the same as her marital parity (i.e., $P^l = P^m$) because all children born to a woman were born in the same marriage. Consider, for example, a woman who had a first birth unmarried at age 21, married at age 25, and had a second birth in the marriage two years later. When she has another child, she is moving from lifetime parity 2 to 3, and from marital parity 1 to 2. This latest child is considered born to a woman in a stepfamily.⁶

The Issue of “Pace” in Fertility Schedules

The term “pace” is not new in fertility research, but there is no consensus over its use. In some studies, it is another way of referring to “relative risks,” as commonly modeled in conventional event history analysis specifying multiplicative effects of parity. In other studies, it means child spacing when conceptualized as the effect of the age of the youngest child in the same “relative-risks” framework (or as the average length of open and close birth intervals). In still other studies, it is an intuitive life-table translation of “relative risks,”—that is, the difference in cumulative proportions of a population having had a child of a particular parity by a certain time, measured as age, marriage duration, or birth interval.

⁶ Under certain conditions, the language referring to intact and stepfamily according to this definition can be slightly inconsistent with our common sense because we define stepfamily status solely on the basis of parity configurations. For example, it is possible that some families we consider as intact are indeed second marriages if the woman had never given birth before the current marriage was formed. Similarly, certain stepfamilies by our definition may be first marriages if the woman had had births prior to her first marriage. This potential confusion indeed shows how complicated the family trajectories of stepfamily can be and how difficult it is to attack the research problem on both theoretical and empirical fronts.

Following Wu (2003), I distinguish a conceptualization of “pace” different from that conceptualized in these “relative-risks” approaches. “Relative-risks” event history models typically assume proportional differentials in fertility rates, which translate into *vertical* differences in fertility rates (Figure 1). This approach stipulates that the differences in fertility rates are always higher for one group than the other *at any given time*. Therefore, the cross-group differences may be explained by similar underlying behavioral mechanisms that are time invariant. In contrast, Wu’s conceptualization of “pace” implies *horizontal* shifts on the same fertility schedule.⁷ As shown in Figure 2, this approach usually produces crossovers between fertility schedules: The higher fertility group in the early stage (i.e., before the crossing) becomes the lower group at longer durations (i.e., after the crossing). Although underlying behavioral mechanisms may still be similar for all groups because they share the same qualitative patterns in fertility schedules, the explanation for group differences may be highly contingent upon time.

[Figure 1 and Figure 2 about here]

The cumulative probabilities of ever having an additional child at extended durations in the “relative risks” approach will be different, and be proportional to the differentials between fertility schedules (i.e., compare the areas under the three curves in Figure 1). However, all three curves in Figure 2 will eventually have equal cumulative probabilities, except the “equilibrium”

⁷ The idea of horizontal shifts of event schedules has its roots in demography. For example, the Coale-McNeil (1972) nuptiality model specifies the proportion of individuals having entered a first marriage in a population by age

a , relative to that of a standard population denoted by superscript, S , as the following: $G(a) = C \cdot G^S \left(\frac{a - a_0}{\kappa} \right)$.

The parameter a_0 suggests that the age patterns of nuptiality in one population may be derived from the nuptiality patterns in another population by a horizontal shift (or “sliding” as being called in Preston et al. 2001, p. 203) along the age dimension. A recent example of such extension in age-specific fertility schedules is Schmertmann (2003).

probability is reached at different durations. This result suggests that the distinction between “relative risks” and “pace” may have very important implications for completed fertility—a key demographic parameter that associates fertility to population size. An important insight that is in line with recent discussion on “tempo versus quantum” effects of fertility (Bongaarts and Feeney 1998) is that a sheer change in “pace” will *not* affect completed cohort fertility but a change in “relative risks” will.

Statistically, one can usually specify Wu’s (2003) conceptualization of “pace” in terms of nonproportional hazards in the “relative risks” paradigm. This specification accommodates the issue by allowing *vertical* fertility differentials across groups to vary, and even reverse, at different points in time.⁸ In the literature on childbearing in stepfamilies, Buber and Prskawetz (2000) explored the interaction of all covariates with birth interval in their analysis of fertility in second unions in Austria, to avoid possibly violating the proportionality assumption in their hazards regression model. They found evidence for nonproportional hazards as indicated by statistically significant interaction effects between birth interval and number of stepchildren and between birth interval and age of youngest child. In another comparative analysis of fertility in former East and West Germany, Henz (2002) speculated that fertility differentials might not be proportional across time because the time variables used in her regression models are different: for the first mutual child it is union duration, while for second and higher-order births it is birth interval. Her estimates supported this speculation. Although both studies are aware of the

⁸This specification of nonproportional hazards model in the “relative risks” paradigm implies different behavioral models, although it may seem to nicely bridge the empirical gap between the two conceptualizations of “pace.” It may even be sometimes disguising. In the context of this present paper, for example, a nonproportional hazards “solution” to the “pace” problem will never reveal the regularities of the consistently three-year horizontal shift (see the “Results” section).

potential nonproportional fertility rates in their empirical analysis of European stepfamily fertility, they choose to focus primarily on the methodological aspects of the problem and pay much less attention to the behavioral model behind the nonproportional fertility rates.⁹

METHODS

Data

The data come from the June Supplement of the 1995 Current Population Survey (CPS). The CPS consists of a large probability sample of households residing in the continental United States. Retrospective histories are collected for the first four and the most recent births and for the first three and the most recent marriages, which allow us to construct two progressions of marital parity and lifetime parity. Despite concerns being raised about the imputation of reported dates in the CPS, empirical studies have rarely found that the potential data limitations systematically bias the substantive results and methodological research has suggested these data are of good quality (Bumpass 1983; Cherlin and Horiuchi 1980; Wu, Martin, and Long 2001).

Statistical Method

An event is recorded when a birth is reported and record censoring when separation, divorce, or survey interview occurs prior to the incidence of a potential subsequent birth. Time is measured in months and, accordingly, monthly fertility rates are calculated and presented on the natural-logarithm scale. I explore fertility schedules along three time axes, including age, marriage duration, and birth interval.

⁹ To be sure, Henz (2002), although based on a methodological speculation, makes an important contribution to the theory on the values of children (see further reviews in Appendix A). Buber and Prskawetz (2002) also explored the theoretical implications of their various nonproportional hazards findings.

The fertility schedules are obtained by a nonparametric smoother of hazard rates developed by Wu (1989) and presented in graphics, which adopts a nonparametric estimator of empirical hazards described in Cox and Oakes (1984)¹⁰ and smoothes the natural logarithm of this hazard estimator. Requiring each time interval to contain at least 10 events and using a variable-span running-line smoother developed by Friedman (1984), this method gives estimates of empirical hazards that largely reduce noises and are quite resistant to the influence of outliers. Following the advice from Cox and Oakes that “Comparisons of groups of individuals are sometimes most incisively made via the hazard” (p. 16), our strategy to examine marital fertility schedules in a heterogeneous population is to apply Wu’s nonparametric method to subsamples jointly defined by marital parity and lifetime parity. Both partitioning the sample into subgroups and the nonparametric approach demand a large amount of data; thus, the large sample size of CPS is a highly desirable feature. This nonparametric method makes weak assumptions of the functional form of time dependence and population heterogeneity in hazard rates, whereas the majority of available parametric approaches (including the semiparametric Cox model) may yield biased results when the “true” functional forms of time dependence and population heterogeneities are misspecified.

Analytic Sample

The analytic sample is constrained to the first two marriages and the first four lifetime births. There are relatively few cases of fifth and higher order births even in this reasonably

¹⁰ This estimator is closely related to the conventional life table method in demography, in which the life table estimator is an approximation to it (see Wu 1989:136). It is also closely related to the actuarial estimator but free of the assumption that the event time be measured at infinite accuracy (Cox and Oakes 1984:53-55). This procedure is an estimator of hazard rates and thus differs from the more commonly used estimators of cumulated hazards (Nelson 1972; Aalen 1978) or survivorship (Kaplan and Meier 1958).

large sample and the number of births becomes particularly thin after decomposition by marital parity. Insufficient data will yield unreliable results due to sampling variability. Women married more than twice at the interview are likely to be a highly selective group and differ from the rest of the population in their family formation and dissolution, as well as their childbearing behaviors. They are excluded to maintain a relatively homogeneous sample and ensure internal validity of our interpretations. These restrictions result in an analytic sample representative of all American women between ages 15 and 65, married up to two times, having no more than four children, and surviving until June 1995.

Maintaining homogeneity within each subsample (as the data being partitioned by two progressions of marital parity and lifetime parity) is essential because each smoothed logged-hazard curve describes the fertility schedule of a group of respondents of the same lifetime parity and same marital parity. My analysis assumes that each subsample of women follow the same underlying behavioral mechanism of childbearing as represented by the curve. Within-group heterogeneity may potentially yield biased results as are now well known among social scientists (e.g., Vaupel and Yashin 1985). There are possible within-subsample heterogeneities that I cannot address in this analysis for sample size concerns, such as racial differences, because sample sizes, especially for higher parity configurations for black and Hispanic women, are too small to yield reliable estimates. Besides, these data have potential problems to adequately address educational differentials, since many of these women acquired further education while getting married and having children. Finally, I examine only marital fertility schedules due to the lack of cohabitation information in the CPS, which may increase homogeneity at the price of ignoring substantial diversity among stepfamilies (Bumpass, Raley and Sweet 1995). Moreover, it is unlikely for cohabiting stepfamilies to become institutionalized and have more than one

child without being married. Hence, the omission of cohabiting couples should not be consequential to most of my conclusions.

RESULTS

The full set of parity-specific fertility schedules on all three time dimensions (i.e., age, marriage duration, and birth interval) are presented in Appendix B and Figures A1 through A10. In the main text, I only discuss the most intriguing empirical regularities obtained inductively from inspecting all results documented in Appendix B. These empirical regularities are based on fertility schedules for first marriage-specific births on axis of marriage duration, and second and higher-order marriage-specific births on the axis of birth interval. The results section is organized as follows: I will begin with descriptive statistics of these fertility schedules, followed by results that compare fertility schedules, holding constant marital parity and varying lifetime parity (Figures 3 through 5). I will then present results that compare the same set of fertility schedules but in the opposite fashion—holding constant lifetime parity and varying marital parity (Figures 6 through 8). Results addressing the “pace” issue will follow (Figures 9 through 11). Whenever possible, I will speculate on behavioral explanations for these results.

Descriptive Statistics

Table 1 presents descriptive statistics for each marital-parity, lifetime-parity specific subsample. Births to intact families are on the main diagonal when marital parity equals lifetime parity (in bold face). There were 27,672 women in our sample at risk of having a first child in an intact family, and 77% of them had one before the observation was censored due to either marital dissolution or survey interview. Similarly, 75% of those at risk of having a second child and 46% of those at risk of having a third child in an intact family successfully did so (see across the

diagonal). Among births into stepfamilies, there were 4,377 women in our sample who had their first child before this marriage and were at risk of having a first child in the current stepfamily marriage (i.e., the cell of marital parity one and lifetime parity two), and 56% of them did so before censoring. Similarly, the last two cells across the same row indicate that 31% and 23% of stepfamilies at higher lifetime parity (i.e., lifetime parity three and lifetime parity four) had their first mutual child in the marriage.

Marital Parity Held Constant

Figure 3 shows fertility schedules for first births in a marriage, including the first through fourth births in a woman's lifetime. The time axis is marriage duration, measured in months. The solid curve, which is also the first birth in a woman's lifetime, represents births in intact families. The next (long-dashed) curve is the fertility schedule for the second birth in a woman's lifetime—that is, the first child in the current marriage, given that her previous child was fathered by a former spouse or partner. The last two curves are similar: The third (short-dashed) curve is for the third lifetime and first marital birth, and the final (dashed-dotted) curve is for the fourth lifetime and also the first marital birth of the respondent. The last three curves represent the first mutual child born in stepfamilies, according to our definition of stepfamily. All curves in Figure 3 follow a unimodal shape with peaks occurring around one year following the wedding. These results also show relatively large declines in fertility differentials while moving from the first curve to the second (from lifetime parity 1 to 2) and from the second to the third (from lifetime parity 2 to 3), and relatively small fertility differentials between the third curve and the fourth curve (from lifetime parity 3 to 4).

[Figures 3, 4, and 5 about here]

Fertility schedules for second marital births, including second to fourth lifetime births, are presented in Figure 4. The time axis for these second marital births is birth interval, which is different from that of the first marital births as in Figure 3. The qualitative shapes of fertility schedules in Figure 4 are similar to those of the first marital births in Figure 3: the instantaneous fertility rates first rise, peak, and then decline, but the peaks of these fertility schedules occur later (about 1.5 years for births in stepfamilies and about 3 years for births in intact families). As in Figure 3, the fertility differential between having a second lifetime birth and subsequent births is relatively large; and the fertility differential between having a third versus having a fourth lifetime birth is much smaller. Similar results exist for third births in a marriage (Figure 5), despite the presence of only two groups of women: those who had all three children with the same spouse (i.e., intact family) and those who had a first child with a previous spouse or partner and all subsequent births in the current marriage (i.e., stepfamily).

These regular unimodal qualitative fertility schedules in Figures 3 through 5 may be interpreted behaviorally. The one-year peaks for first marital births, shown in Figure 3, indicate that newly-weds seemed to desire a baby soon after marriage. Children born within nine months of the wedding date were likely to be conceived prior to marriage, and indicate so-called “shotgun” marriages. Such a pattern is consistent with the argument that marriage is “endogenous” to childbearing, by which economists mean that people marry in order to have children. However, our results add a qualification regarding temporality—marriage is only endogenous to fertility in the early stage of a marriage. Hence, if the substantive interest is to find out whether second births occur on different fertility schedules in cohabitation versus marriage, or whether first births occur on different fertility schedules after three years in the union, the endogeneity issue should not be involved. It is also consistent with the social

psychological argument that suggests a family is incomplete without children, but it again adds an important qualification that it happens only in the early stage of family formation. The peaks for the second and higher order births in a marriage may reflect the efforts of optimal child spacing—that two adjacent births tend to be born around two or three years apart. According to the empirical regularities documented in Figures 3 through 5, women appear to have a normative ideal about when to have a next child.

Conditional on marital parity, intact families have higher fertility rates than stepfamilies. This finding is consistent with the literature reviewed earlier that suggests stepchildren reduce fertility rates. What the literature has not stressed is the strong empirical regularity of fertility differentials by women's lifetime parity. Our results provide evidence, in the stepfamily context, for the normative belief that an ideal family size is two children (Bongaarts 2002; David and Sanderson 1987). More importantly, this regularity suggests that a woman's lifetime parity is the primary driver of fertility differentials. The results in the next section will provide clearer support for this point.

Lifetime Parity Held Constant

Figures 6 through 8 present fertility schedules by a woman's marital parity, holding constant lifetime parity. Again, the time axes are marriage duration for first marital births (either in intact or stepfamilies) and birth interval for subsequent births in a marriage. Because having a first marital *and* first lifetime birth only happens within intact families, comparisons among different marital parities (and intact families vs. stepfamilies) begin with a second lifetime birth. In brief, we shall observe two empirical regularities in these results: (1) a consistent crossover between first marital births (in stepfamilies) and second- and higher-order births, and (2) a close clustering of all the second- and higher-order births for each and every lifetime parity.

Figure 6 compares fertility schedules for second lifetime births in intact families (the solid curve for second marital births) and in stepfamilies (the dashed curve for first marital births). Although it seems inappropriate to compare these two fertility schedules because they are calculated on different time dimensions, they are based on actual exposures to the risk of childbearing. Prior to the crossing of the two curves, fertility rates for women having second lifetime births in stepfamilies are higher than that in intact families during the first 18 months. After the crossing of the two curves, this relationship reverses—at longer durations, the first marital birth in stepfamilies occurs at a lower rate than the second marital birth in intact families, for second lifetime births. Similar crossover patterns are revealed in Figures 7 and 8. For lifetime parities 2, 3, and 4, first births in a marriage occurred at higher rates than subsequent births in the first few months but at lower rates for longer durations. The crossover pattern is consistent with what Wu (2003) has argued as “pace” (see Figure 2) and I will demonstrate the results with horizontal shifts in Figures 9 through 11. In contrast to what previous research has vaguely specified in models and assumed in theory, crossovers that happen only between first marital births and subsequent births at given lifetime parities imply a behavioral mechanism specific to marital parity (conditional on lifetime parity) and *not* a behavioral mechanism related to age of the youngest child.

[Figures 6, 7, and 8 about here]

What is noteworthy in Figures 7 and 8 is the close clustering of fertility schedules for second and higher-order births in a marriage conditional on a woman’s lifetime parity. Births at the same lifetime parity of a woman follow almost identical fertility schedules, regardless of marital parity. Not only are the qualitative shapes of fertility schedules the same, the levels and differentials of fertility are also very similar. This finding suggests that a woman’s lifetime

parity is the primary determinant of fertility schedules especially for a second- and higher-order marital birth in both stepfamilies and intact families. Neither marital parity nor stepfamily status has any effect on lifetime-parity specific fertility schedules once the first child is born (i.e., for second and higher order marital births). Childbearing behaviors are almost identical for second and higher-order births in a marriage. Beyond the early stage for stepfamilies, interpreted as the period after the birth of the first mutual child, the stepfamily and the intact family follow similar institutionalizing processes, as indicated by fertility patterns.

The “Pace” Regarding the First Marital Births in Stepfamilies

The crossovers between first marital births in stepfamilies and all subsequent marital births clustered together, regardless of stepfamily status, deserve careful further examination. Conditional on lifetime parity, fertility schedules for first marital births in stepfamilies have roughly equal slopes on the tails (or right-shoulders) as the clustered group of fertility schedules for second and higher-order marital births. Since they have equal slopes on the tails, horizontally shifting the fertility schedule for the first marital birth by a certain amount of time will make its tail coincide with the tails of the other clustered fertility schedules for second and higher-order marital births. The question is what are the distances of shifts for each of the lifetime parities. I empirically determine the distances by gradually sliding the fertility schedules for first marital births towards subsequent marital births. Results in Figures 9 through 11 show that distances are shifted *exactly 36 months for all lifetime parities*.

[Figures 9, 10, and 11 about here]

The heads (or left-shoulders) of these fertility schedules, nonetheless, do not coincide after the 36-month horizontal shifts. The instantaneous fertility rates at the heads for the first marital births in stepfamilies are lower than those for second and higher-order marital births

clustered together. The implication for parity progression probabilities in the long run is that, conditional on lifetime parity, a smaller proportion of women in stepfamilies will eventually have a first marital birth at any given lifetime parity than those women (in either stepfamily or intact family) who will eventually have a second or higher-order marital births. This implication may be called the “penalty” of marital disruption.¹¹

Our results provide an important qualification of a well-documented finding that average fertility is lower for divorced women than continuously married women (see the literature review in Appendix A) and suggest that this “penalty” only exists for first marital births in a stepfamily. For women in stepfamilies who have had first births, long-term parity progression probabilities for subsequent births should be very similar to those in intact families. In other words, lower fertility occurs in the early stages before a stepfamily is fully institutionalized. Once having survived the early stages of a marriage, women in stepfamilies have similar fertility behaviors as intact families, as would be expected from stepfamily process research.

Decipher the 36-Month Shift in Fertility Schedules

How can we understand the 36-month shift between first marital births in a stepfamily and second and higher-order births in intact families and stepfamilies? One way to think about it is that fertility schedules for women in stepfamilies are partial observations of the underlying model fertility schedules assuming no marital disruptions, whereas fertility schedules for women in intact families do not suffer from such a missing data problem. Marital disruption, as suggested in our results, incurs costs, which lead to lower fertility rates in the heads (left shoulders) of the stepfamily schedules, and the aforementioned “penalty.” From the child’s perspective, our finding suggests that a typical child in a stepfamily obtaining a younger (half-)

¹¹ Larry Bumpass kindly offered his insight and helped coin this term.

sibling will be 36 months older than his or her counterpart in an intact family if the stepfamily survives through the early years of marriage (which is also where the penalty happens). Figure 12 illustrates a third explanation from the perspective of stepfamily processes. If there is no marriage breakdown that interrupts the reproductive years, childbearing behaviors are all alike and follow the schedules we have observed for those births in intact families (top panel). Time axes for the fertility schedules are the actual exposure to the risk of birth, i.e., marital duration for first marital birth and birth interval for second and higher-order marital births, as I have used in this analysis. The complication caused by marital disruption and reconstitution may be seen as a variant process of “interruption and resumption” of the same fertility schedules (bottom panel). Compare the two panels of Figure 12, we may hypothesize that the 36-month shift indicates the typical difference between (a) the average waiting time of the single process of having an additional birth in the top panel and (b) the average waiting time for the convolution of several demographic processes in the bottom panel, which involve separation/divorce, remarriage, and the resumption of childbearing. Behaviorally, a woman is removed from the “legitimate” reproductive institution of marriage by separation and divorce and subsequently resumes her fertility upon remarriage. To “catch up,” she bears children at a higher “pace” that compensates for her lost reproductive time outside of marriage. The convolution model in Figure 12 and our empirical results that shift parity-specific fertility schedules suggests that lost fertility time is approximately 36 months.

[Figure 12 about here]

Both the child’s perspective and the stepfamily processes perspective are consistent with our prior knowledge documented in the literature under other contexts. Bumpass (1984b) and Bumpass and Rindfuss (1979) estimated that the average (median) duration between parental

separation and mother's remarriage is approximately 4 years, with 15% of children entering a remarriage within a year of the parents' separation and over 25% of children entering a remarriage after 5 years (Bumpass 1984a). Bumpass (1984a) further noted that many of these remarried women lived with their prospective spouses before the remarriage and for 11% of those children whose mothers remarried, the mothers were already pregnant at remarriage (p. 614)—which is consistent with the “shotgun” marriage and fertility “catch-up” findings documented here. Hetherington and Kelly (2002) reported that the respondents in their Virginia sample experienced roughly two years of psychological distress and economic difficulty after marital disruption before they were ready to engage in an intimate relationship or to consider a new marriage, which also corroborates our finding of the 36-month lag in fertility “catch-up.”

SUMMARY AND CONCLUSION

Stepfamilies have increasingly become a prevalent childbearing institution due to recent family changes, although the model schedules of fertility continue to build on assumptions that are only plausible for intact families. In this paper, I document qualitatively the characteristic patterns of marital fertility for American women in stepfamilies using retrospective survey data collected in the late twentieth century. I develop a demographic framework that addresses complications due to multiple time dimensions and multiple parity progressions, and distinguish a horizontal-shift conceptualization of “pace” in the analysis. Combined with a nonparametric statistical procedure, these efforts overcome important conceptual and analytic difficulties in stepfamily fertility research and help identify qualitative model schedules of marital fertility in both stepfamilies and intact families. These qualitative fertility schedules reveal intriguing

empirical regularities that yield intuitively appealing behavioral interpretations and have never been reported in the literature.

Specifically, the results show that there are substantial similarities in marital fertility schedules in both intact families and stepfamilies. For first births in a marriage, the qualitative pattern of fertility rates rise, peak at one year, and decline by marriage duration. For second and higher-order births in a marriage, similar patterns arise but with a peak at around 2.5 years on the time axis of birth interval. A woman's lifetime parity is a key determinant of both levels and shapes of fertility schedules: Regardless of marital parity (and stepfamily status), fertility schedules at the same lifetime parity are nearly identical. The only exception is first marital births in stepfamilies, which consistently yield a crossover with second and higher-order marital births at the same lifetime parity. I then apply the horizontal-shift conceptualization of "pace" to analyzing these crossovers and find that the tails (or right shoulders) of all fertility schedules fall closely together after shifting the fertility schedules by 36 months. The heads (or left shoulders) of the fertility schedules do not match, with fertility rates lower in stepfamilies than in intact families at the same lifetime parity, suggesting a possible marital disruption "penalty" in completed fertility.

The similarities in qualitative shapes of fertility schedules are indicative of underlying behavioral mechanisms of childbearing in relation to marriage and child spacing. That the rates for a first marital birth consistently peak at one year since marriage formation suggests, in both intact families and stepfamilies, that childbearing provides the motivation for marriage and the value of commitment that a mutual child may bring to a marriage is particularly strong in the early stage of a marriage. That rates for second and higher-order marital births follow a similar unimodal shape but peak at a later time on the time axis of birth interval implies the normative

child spacing, regardless of stepfamily status. These behavioral interpretations are masked in a quantitative description of model fertility schedules but uncovered by inspecting qualitative fertility schedules. The qualitatively and quantitatively identical marital fertility schedules observed at all lifetime parities, irrespective of marital parity, illustrate the key role of lifetime parity on childbearing behaviors, despite complications due to stepfamily status. This result not only highlights the importance of the parity progression approach in fertility analysis but also provides a possible solution to reducing unnecessary complexities (while maintaining the key theoretically significant variations) in future research. Overall, similarities in fertility between intact families and stepfamilies documented in this present study offer a demographic aspect to the literature on stepfamily processes that emphasizes similarities, especially at longer durations, between intact families and stepfamilies in various social and psychological aspects (Coleman et al. 2000).

The only difference in fertility between intact families and stepfamilies is the 36-month horizontal shift, which I conceptualize as a difference in “pace.” Although I have speculated why women in stepfamilies may attempt to “catch up” on their fertility and why this period to be caught up should be 36 months, there remains much room for further research. In any case, this empirical regularity of the 36-month lag that holds across all lifetime parities is intriguing. Associated findings on the fertility “penalty” have important implications for population dynamics—most notably, whether the increasing prevalence of stepfamily may lead to changes in population sizes via fertility. Our results suggest that the answer to this question should be conditional on several key factors. For those women in stepfamilies that survive and move on to have second and third births in the same new marriage (the “successfully institutionalized” remarried population), their completed fertility will be lower than if they were to remain in an

intact family. Therefore, marital disruption is expected to depress population size under this first scenario. However, there are consistent crossovers between the fertility schedules of first marital births in stepfamilies and fertility schedules of the same lifetime parity in intact families. These crossovers suggest that fertility rates are *initially* higher for women in stepfamilies than in intact families conditional on lifetime parity. It is worth noting that a nontrivial proportion of these women having a first marital birth in a stepfamily will not continue to have their second or third marital births in the same marriage because of another marital disruption. Under this scenario, women who have experienced multiple marital disruptions and multiple marriages might end up with higher completed fertility and potentially drive up population sizes (Cohen and Sweet 1974; Thornton 1978; also see Appendix A).

Overall, these behavioral interpretations point to a further contribution of documenting qualitative fertility schedules that are sensitive to the childbearing context of stepfamilies. To echo Cox and Oakes's (1984) insight quoted earlier, these qualitative fertility schedules make potentially incisive group comparisons. Extracting behavioral interpretations, either by looking at quantitative deviations from a standard fertility regime or by examining simplistic coefficient estimates from conventional event history models, is not an obvious task. In particular, this is the case because childbearing behaviors as indicated by fertility rates differ not only by their levels (i.e., vertical differences): issues of "pace" and timing, especially timing with respect to the specific time axis (e.g., marriage duration, or birth interval), are also extremely important. Although behavioral interpretations are more suggestive than conclusive, results reported in this paper potentially open a new door to future research on the intersection between fertility, stepfamily processes, and population dynamics.

APPENDIX A: FURTHER LITERATURE REVIEW AND DISCUSSION

Proximate Determinants Approach to Stepfamily Fertility Research

Early research on stepfamily fertility has been inspired by the “proximate determinants” approach (Bongaarts 1978; Davis and Blake 1956). Emphasizing the theoretical connection between marital status and fertility, empirical studies in this tradition assume a gradient of fertility by marital status. Marital disruption is hypothesized to reduce fertility by depriving a woman’s exposure to the high risk of fertility in socially sanctioned sexual unions (usually marriages). Remarriage, on the other hand, is hypothesized to make up for the reduced fertility by restoring her lost exposure time to the married status of high fertility risks (Downing and Yaukey 1979; Thornton 1978).

The empirical results by and large support this reasoning. Fertility is lower for women who have experienced marital disruption (Cohen and Sweet 1974; Downing and Yaukey 1979; Lauriat 1969; Thornton 1978). Remarriage is found to have positive, though sometimes small, effects in recuperating lost fertility, while women who had multiple marriages usually ended up with higher completed fertility (Chen et al. 1974; Clarke et al. 1993; Cohen and Sweet 1974; Downing and Yaukey 1979; Ebanks et al. 1974; Thornton 1978).

Stepfamily fertility research following the “proximate determinants” approach addresses an important and enduring question in demography: How does a woman’s exposure to different marital status affect her completed fertility, a quantity that is closely related to population size? Few studies in this tradition have explored the behavioral mechanisms of stepfamily fertility,¹² which I attempt to accomplish in this paper.

¹² An important exception is Thornton (1978). In this paper, Thornton criticized previous research that focused exclusively on post-dissolution fertility and examined the marital dissolution processes affecting fertility. He found

Social Psychological Approach to Stepfamily Fertility Research

The subjective values of children set the foundation of social psychological theory that has influenced most recent research into stepfamily fertility. This theory implicitly assumes a permanent marriage in which lifetime childbearing takes place and does not consider the complications caused by divorce and remarriage (Bulatao 1981; Fawcett 1983). A widely received variant of this theory posits that two children is the desired minimal family size because of the normative belief that (1) a family is incomplete without children, and (2) a lone child without siblings should be avoided (Blake 1974, 1979, 1981; Calhoun and Selby 1980; Griffith 1973). Therefore, particular values must motivate a couple to have their first two births.

Griffith, Koo, and Suchindran (1985) originally extended this theory to studying fertility in remarriages, and subsequent empirical research since Thomson (1997) has cumulated rapidly and internationally (in the United States and a number of European countries). Griffith et al., Thomson, and their followers argue that (1) the first mutual child in a marriage or cohabiting partnership may symbolize the commitment of a couple, and therefore is perceived as more desirable and also occurs at a higher rate, (2) if a spouse (or cohabiting partner) has never had children before, she/he tends to desire more strongly for a child that grants him/her parental status; moreover, the values associated with parental status may differ for men and women (Thomson et al. 2002; Thomson and Li 2002; Vikat, Thomson, and Prskawetz 2004), and (3) the second child in a married or cohabiting union is hypothesized to possess the value of a sibling to the first child.

fertility was reduced even in the two years before separation, which he interpreted as the suppressing effects of marital discord on childbearing. Although, in an earlier paper, Cohen and Sweet (1974) had speculated on the negative effects of marital discord on fertility, Thornton's study presented a rigorous empirical test of this hypothetical processual relationship between marital discord and fertility.

Empirical evidence for these hypotheses is mixed. The hypothesis of the value of union commitment has received the most consistent support (Buber and Prskawetz 2000; Griffith et al. 1985; Thomson 1997; Thomson et al. 2002; Thomson and Li 2002; Vikat et al. 1999; but Henz 2002 found only partial support for this hypothesis). Most studies reported no support or only partial support for the hypothesis that fertility rates increased in order to become a parent (Buber and Prskawetz 2000; Griffith et al. 1985; Henz 2002; Thomson et al. 2002; Thomson and Li 2002; Vikat et al. 1999; but Thomson 1997 reported evidence in support of this hypothesis). The evidence for the third hypothesis on sibling value is particularly contradictory (Griffith et al. 1985; Thomson 1997; Thomson et al. 2002; Thomson and Li 2002; Vikat et al. 1999).

To reconcile the conflicting empirical support for the three hypotheses, previous researchers have speculated that the practical difficulties with cross-national comparisons (e.g., the incompatibility of data, and the differences in policy and cultural regimes) are responsible for the lack of empirical consensus. However, such speculations have only a weak theoretical basis. Since the theory on the values of children is essentially built on the assumption that all children are born into the same permanent marriage throughout a woman's lifetime, the seemingly straightforward empirical predictions may actually become ambiguous when extended to the research of childbearing in stepfamilies. Such ambiguities may then affect the interpretation of empirical results. For example, those studies that support the union commitment hypothesis refer to the fact that either (1) the number of pre-union children has no effect on the fertility rate of a mutual child (Griffith et al. 1985) or, (2) holding constant the number of pre-union children for both partners, the fertility rate of a first mutual child is higher than the fertility rate of a subsequent birth in the union (Thomson et al. 2002; Thomson and Li 2002). Similarly, neither theory nor empirical research is clear on the "gendered" parenthood hypothesis: It is difficult to

sort out, in the published works, whether this hypothesis postulates that (1) the value of being a mother differs from being a father, (2) the costs of rearing pre-union children are different for men and women, or (3) both (c.f., Thomson et al. 2002 and Vikat et al. 2004). Another ambiguity unique to the stepfamily setting is “under what circumstances a *half* sibling may (or may not) substitute for the value of a *full* sibling,” which has never been attended to. Henz (2002) considered another theoretical ambiguity of this approach, namely, the implications of whether the differences in fertility predicted by the theory on the values of children refer to birth rates or the cumulative *probabilities* of having another child.

Several scholars in this tradition have insisted that it is imperative to consider both man’s and woman’s pre-union children in studying stepfamily fertility. This may lead to a potential challenge to our analysis, which builds exclusively on the woman’s marital and fertility history, that the similarities between intact families and stepfamilies may be interpreted as the offsetting result of the positive effects due to the values of the first- and second-borns in stepfamilies and the negative effects of omitted man’s children born into a previous relationship. This challenge cannot be sustained for both theoretical and empirical reasons: Although prior research including a man’s parity often specified a simplistic *additive* parity progression by summing the numbers of pre-union children from both male and female partners/spouses, there is little consensus over why, whether, and by how much, the man’s marital and fertility history relative to the woman’s affects childbearing (Buber and Prskawetz 2000; Bumpass 1984a; Furstenberg 1980; Griffith et al. 1985; Vikat et al. 1999; Vikat et al. 2004). Moreover, my results show that the *third marital births* follow the same fertility schedules as their counterparts at the same lifetime parity of the woman (Figure 7 and Figure 8). Because all hypothetical values of children pertain to the first

two births in a union and no values of children are postulated for the third birth, the offsetting argument cannot explain this result.

Nonetheless, my results cannot reject other alternative explanations related to man's marital and fertility history: For example, the fertility "penalty" may be due to the obligation of many previously married men to support their own children born prior to the current marriage (Bumpass 1984a) or due to that divorced men may bring with them a preference against repeated fatherhood (Furstenberg 1980). In fact, my results are consistent with Bumpass's contention that stepfamilies with previously married husbands are less likely to have a mutual child than those who had not previously married *within four years of the marriage*. However, our results add an important qualification regarding temporality that this difference may no longer exist after the initial stage of stepfamily.

APPENDIX B: FURTHER RESULTS

In Figures A1 through A10, I present the fertility schedules on all three time axes—age, marriage duration, and birth interval—for all marital-parity-lifetime-parity combinations. The panel for birth interval in Figure A1 is empty because it is logically impossible: namely, fertility rates cannot be gauged on birth interval if there was no previous birth in a woman’s lifetime. These figures should help exclude at least several other seemingly sensible ways of organizing the fertility schedules for the purpose of revealing empirical regularities. For example, the third panel in Figure A4 shows an apparent highly irregular fertility schedule for the first marital births and fourth lifetime births, implying that there might be a lack of interpretable underlying behavioral mechanisms. This also suggests that although the crossovers of first marital births and second and higher-order marital births in Figures 6 through 8 may be the result of different time axes (marriage duration for first marital births and birth interval for subsequent births), the condition will exacerbate, rather than improve, if fertility schedules based on birth interval are used throughout all comparisons. Besides, there are no straightforward age patterns in fertility schedules. Although all of them follow a more or less unimodal shape, the slopes and curvatures are by no means similar. Likewise, the fertility schedules on marriage duration follow irregular, despite consistently unimodal-shaped, patterns. I have experimented with a number of different comparisons and cannot discover detectable empirical regularities.

[Figures A1 through A10 about here]

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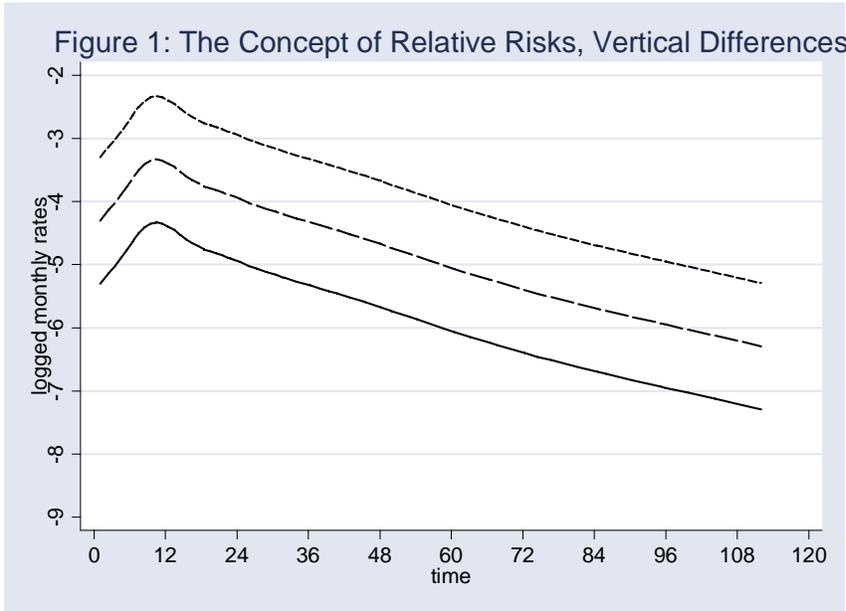
TABLES

Table 1: Distributions of (1) number of observed spells by lifetime parity and marital parity and (2) proportion of births (events) at each specific parity configuration before marital separation, divorce, spousal death, or survey interview (censoring).

Marital Parity	Lifetime Parity							
	0 → 1		1 → 2		2 → 3		3 → 4	
0 → 1	27,672	77%	4,377	56%	2,665	31%	1,209	23%
1 → 2			21,005	75%	2,423	44%	804	36%
2 → 3					15,669	46%	1,066	36%
3 → 4							7,305	42%

Note: Intact families (i.e., if marital parity = lifetime parity) are in bold face.

FIGURES



Note: The *vertical* differences between the groups are consistently 1 on the logged scale. Formally, it can be written as, $\log r_1(t) = \log r_2(t) + 1 = \log r_3(t) + 2$, where group 1 is indicated by the dotted line on the top, group 2 by the dashed line in the middle, and group 3 by the solid line at the bottom.



Note: The *horizontal* differences between groups are consistently 12 months. Formally, it can be written as $\log r_1(t) = \log r_2(t - 12) = \log r_3(t - 24)$, where group 1 is indicated by the solid line on the left, group 2 by the dashed line in the middle, and group 3 by the dotted line on the right.

Figure 3: First Births in a Marriage by Lifetime Parity

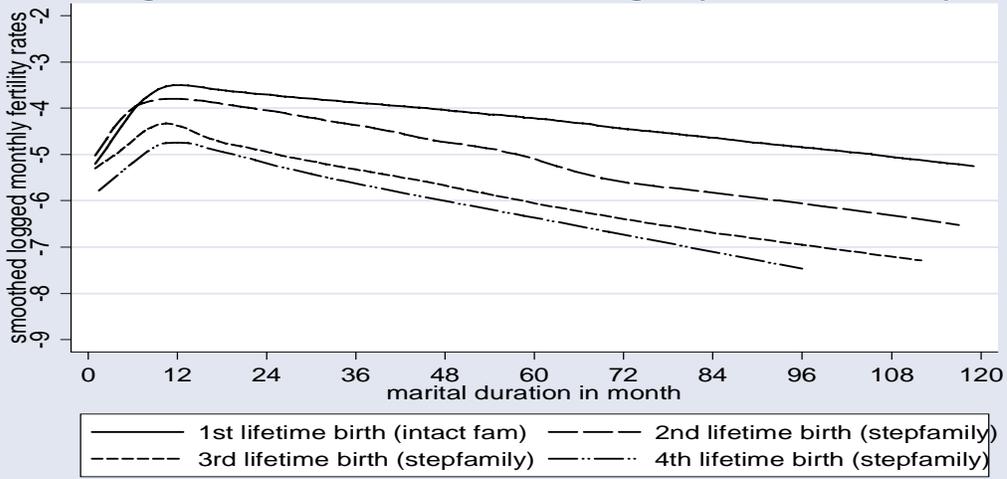


Figure 4: Second Births in a Marriage by Lifetime Parity

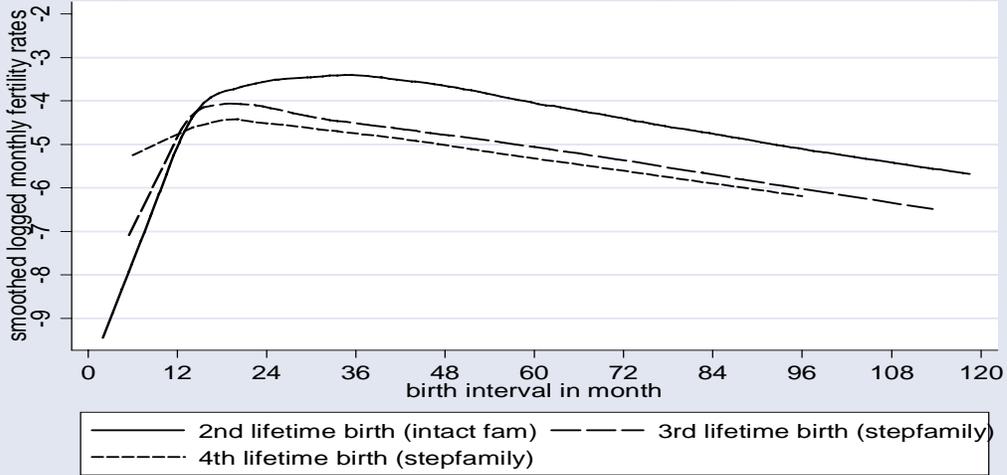


Figure 5: Third Births in a Marriage by Lifetime Parity

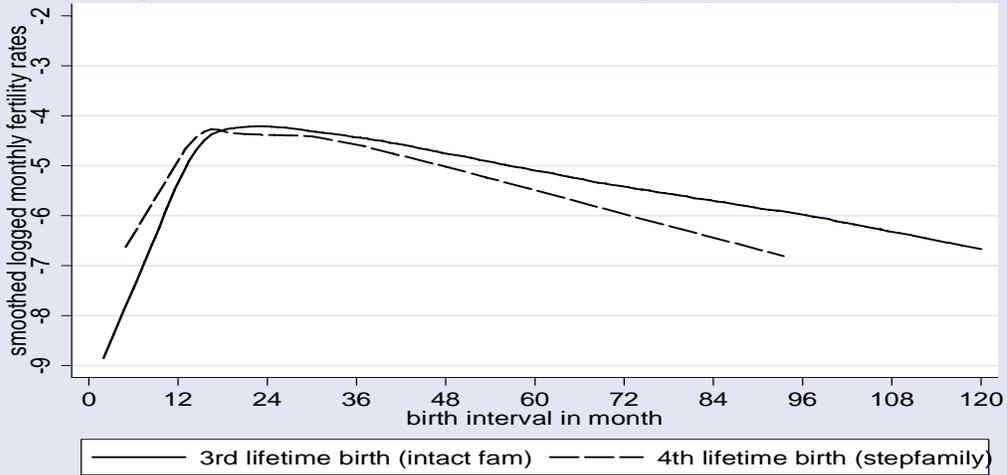


Figure 6: Second Lifetime Births by Marital Parity

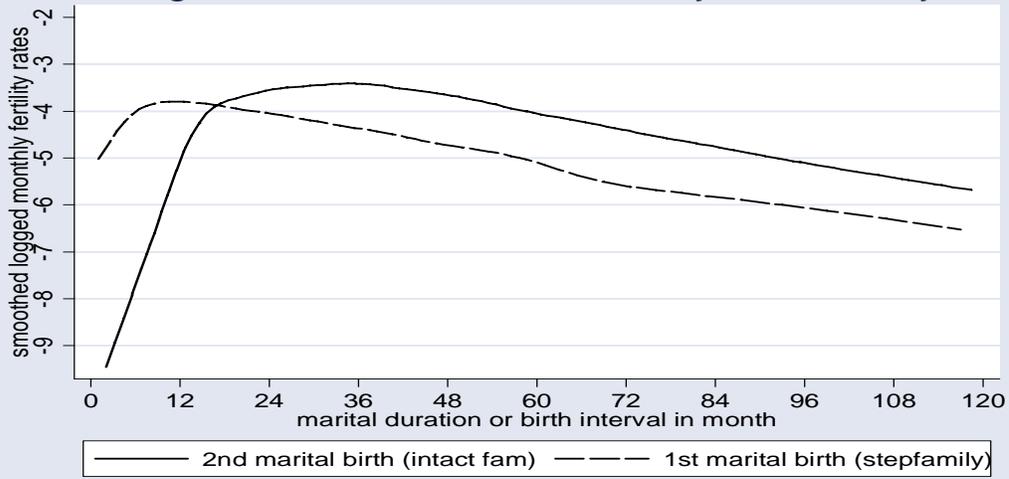


Figure 7: Third Lifetime Births by Marital Parity

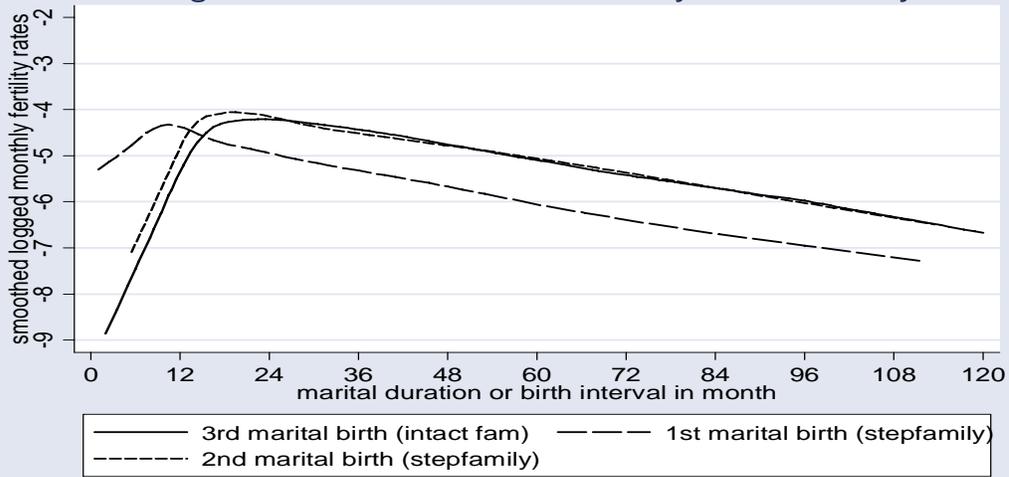


Figure 8: Fourth Lifetime Births by Marital Parity

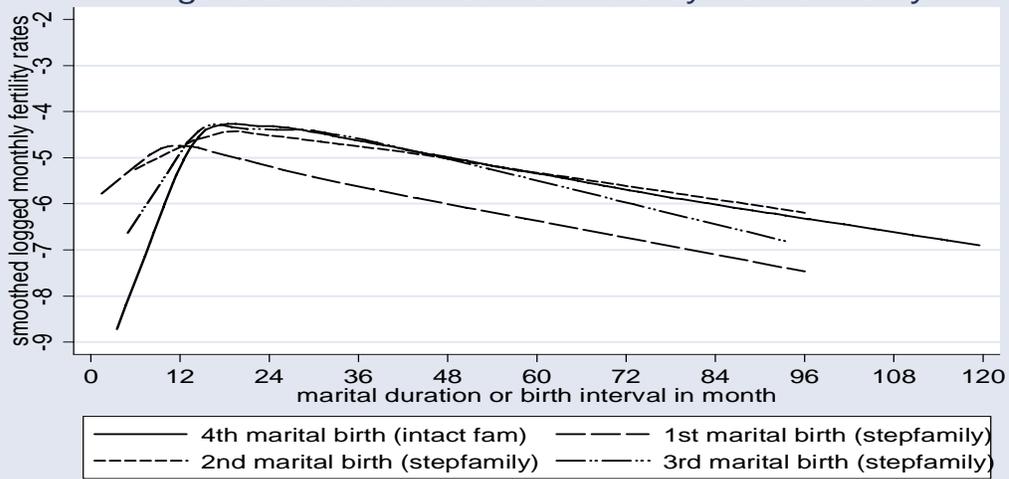


Figure 9: Shift 1st Marital Birth by 36 Months
Second Lifetime Births by Marital Parity

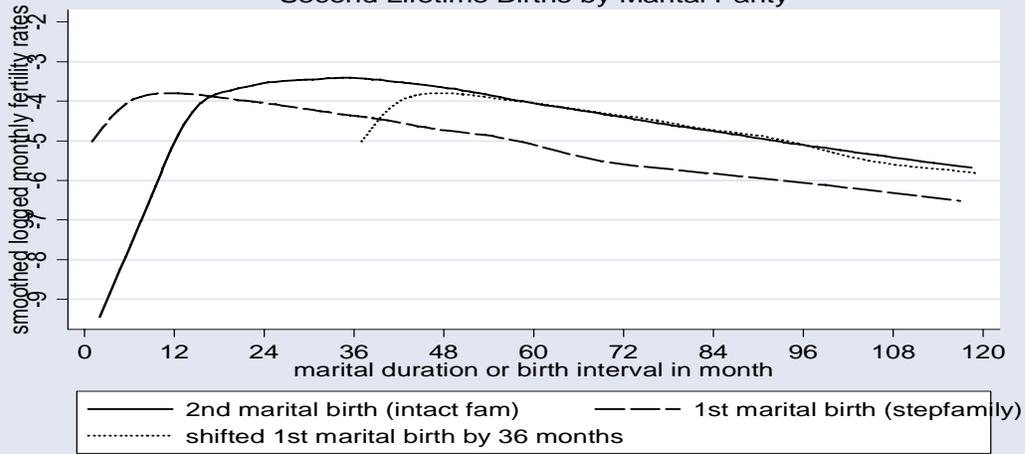


Figure 10: Shift 1st Marital Birth by 36 Months
Third Lifetime Births by Marital Parity

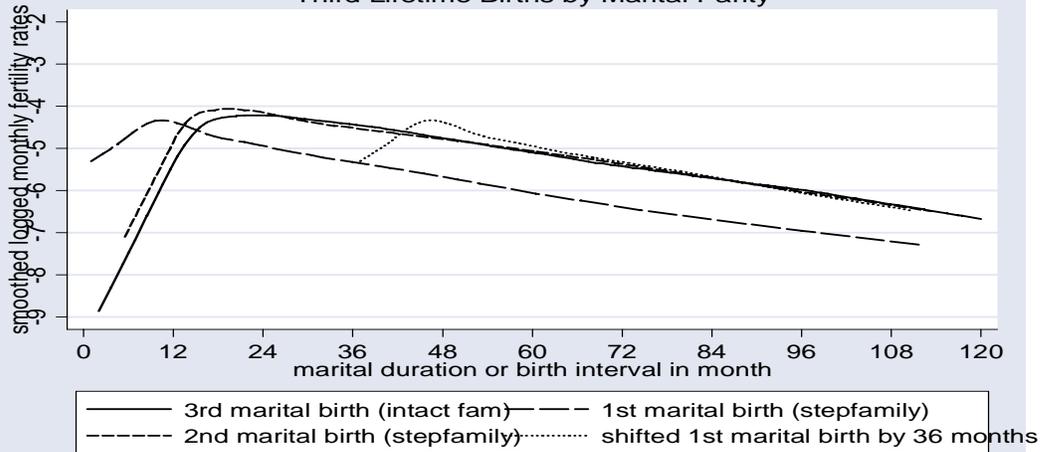


Figure 11: Shift 1st Marital Birth by 36 Months
Fourth Lifetime Births by Marital Parity

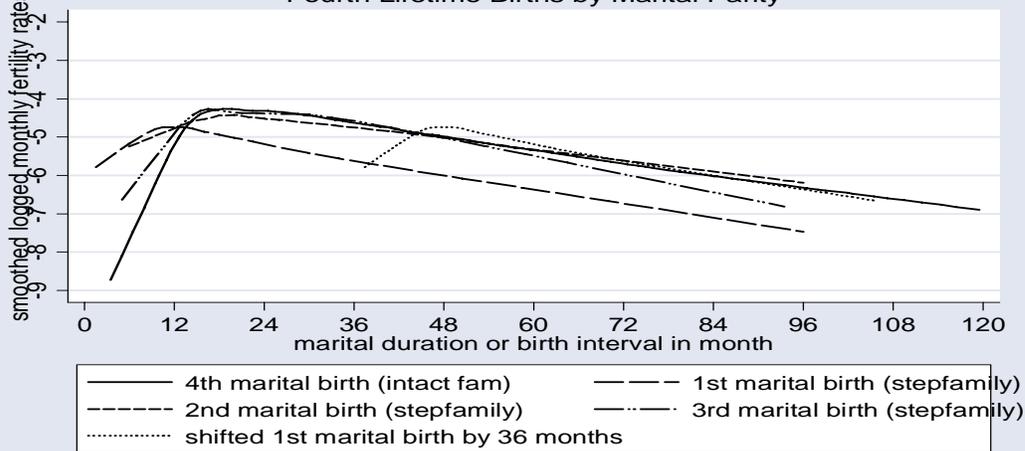


Figure 12: Decomposition of the convolution of two parity progressions, by in intact family, and the other in stepfamily.

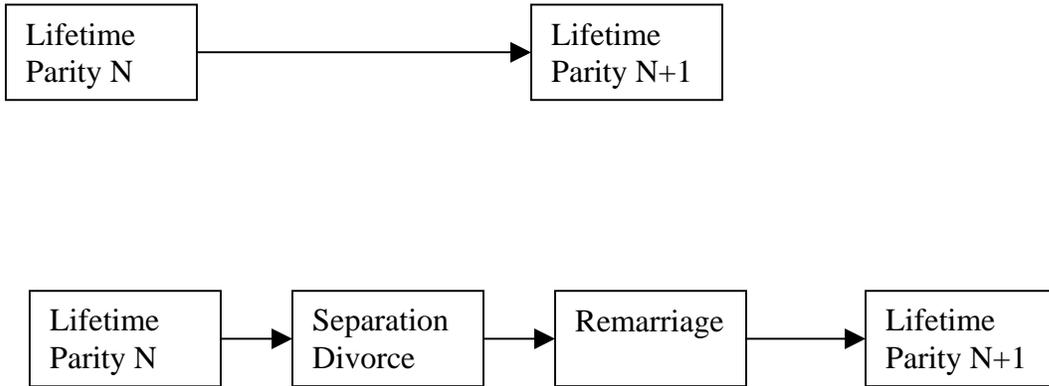


Figure A1: 1st marital births, 1st lifetime births

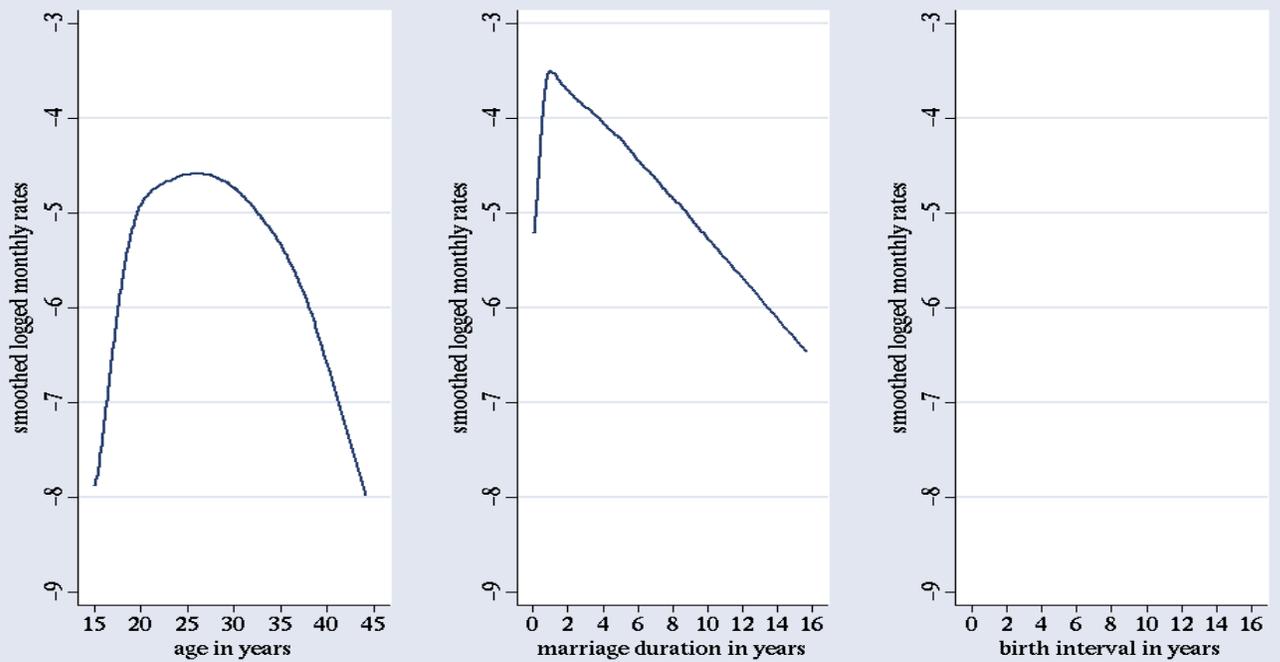


Figure A2: 1st marital births, 2nd lifetime births

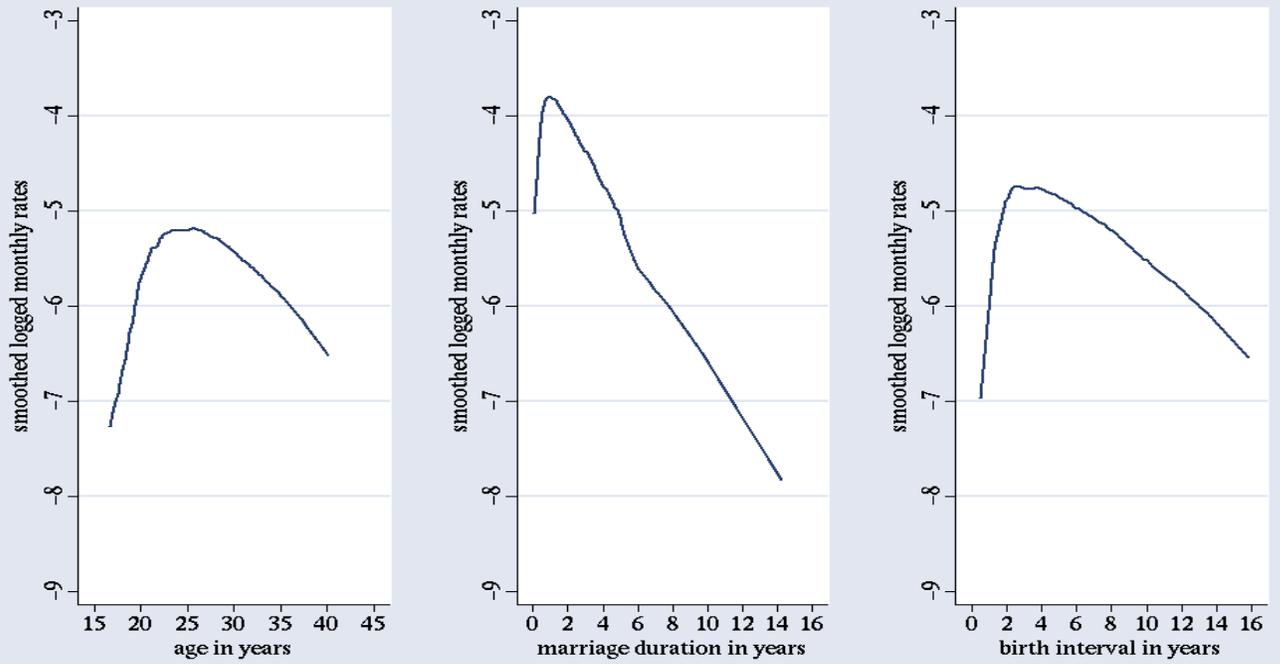


Figure A3: 1st marital births, 3rd lifetime births

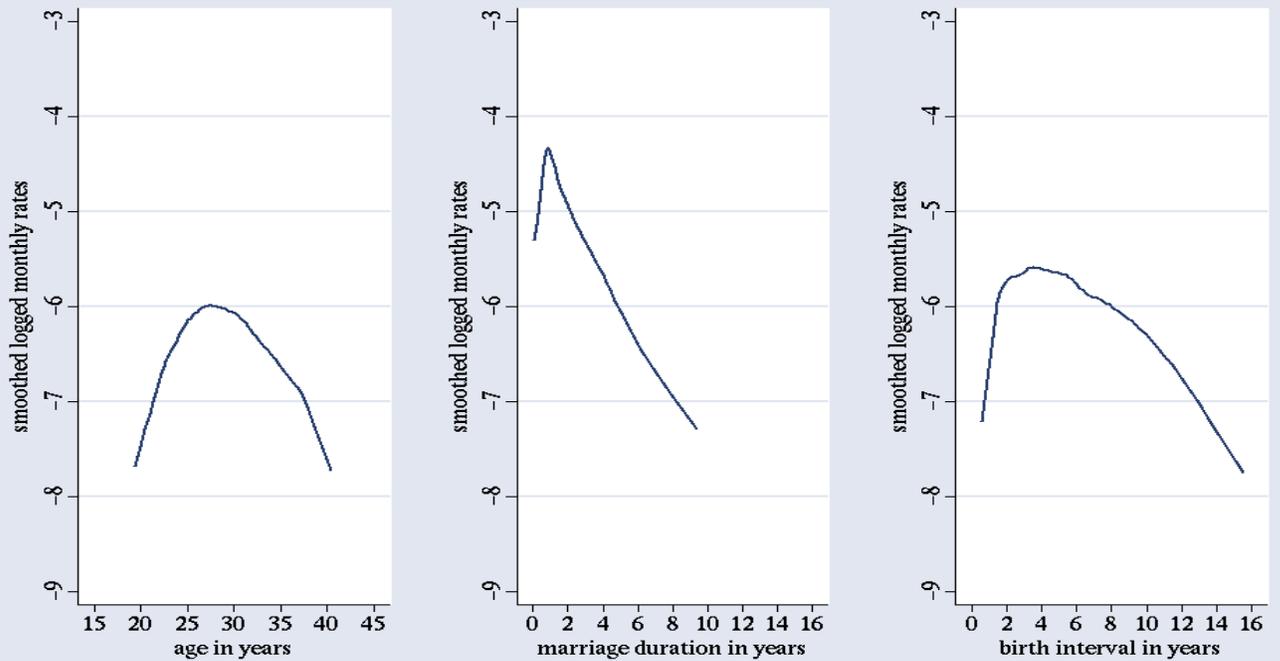


Figure A4: 1st marital births, 4th lifetime births

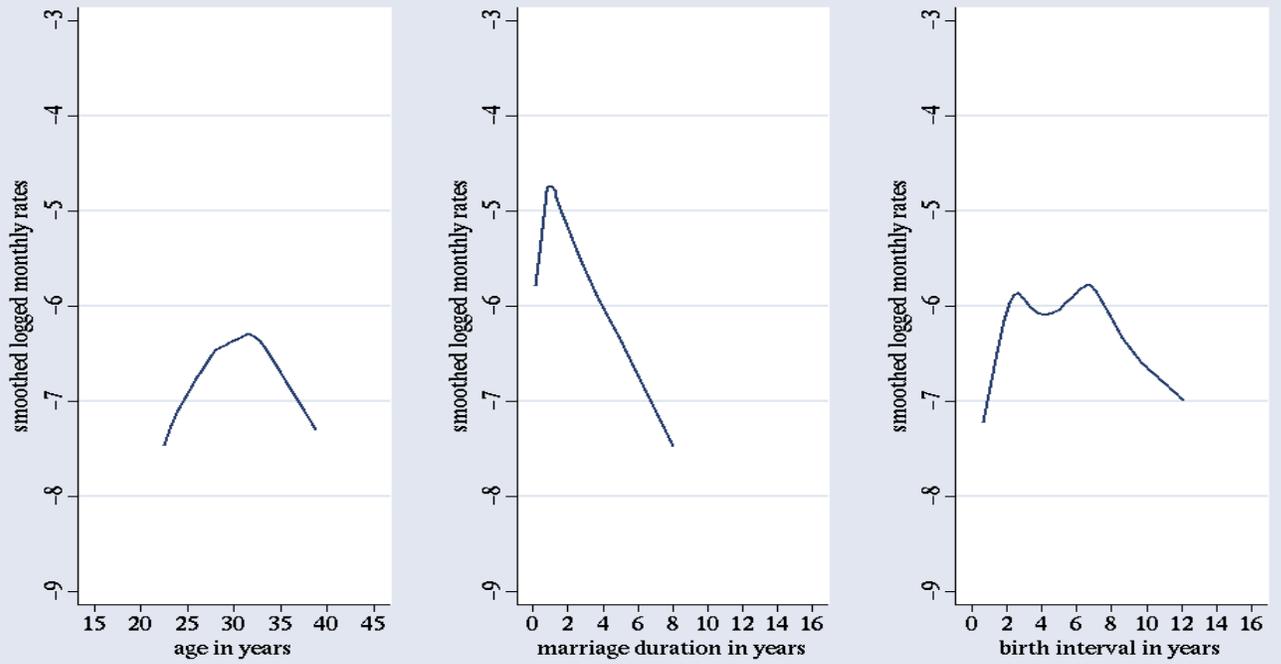


Figure A5: 2nd marital births, 2nd lifetime births

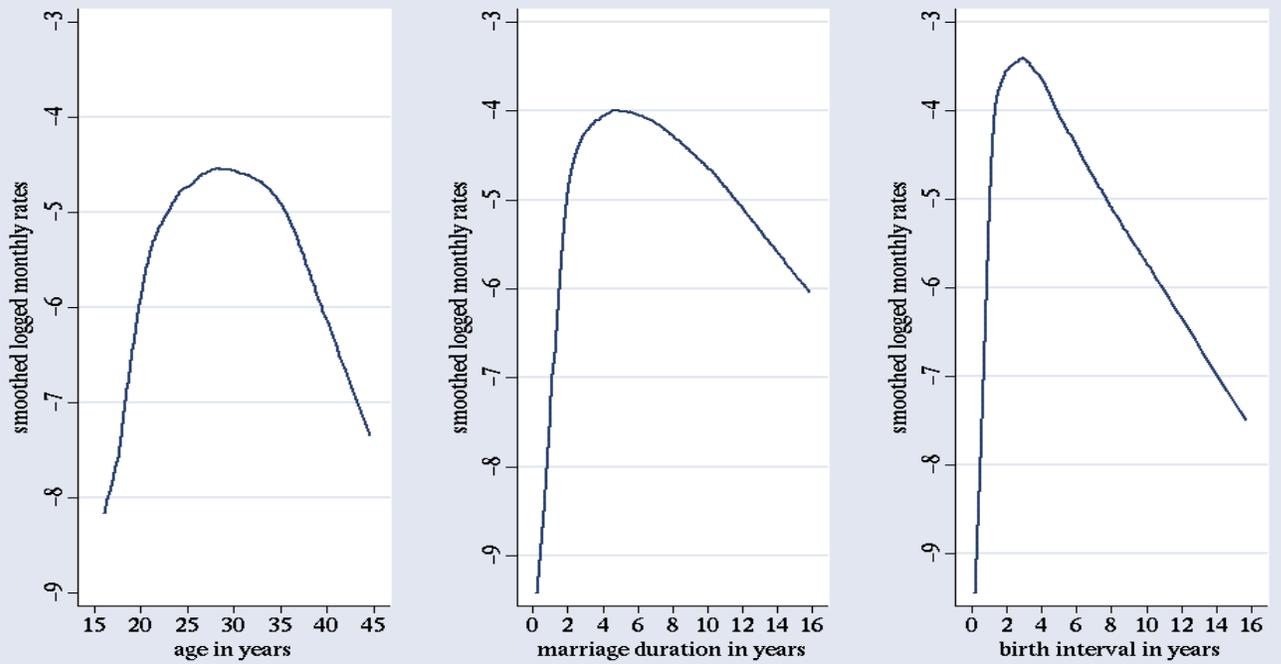


Figure A6: 2nd marital births, 3rd lifetime births

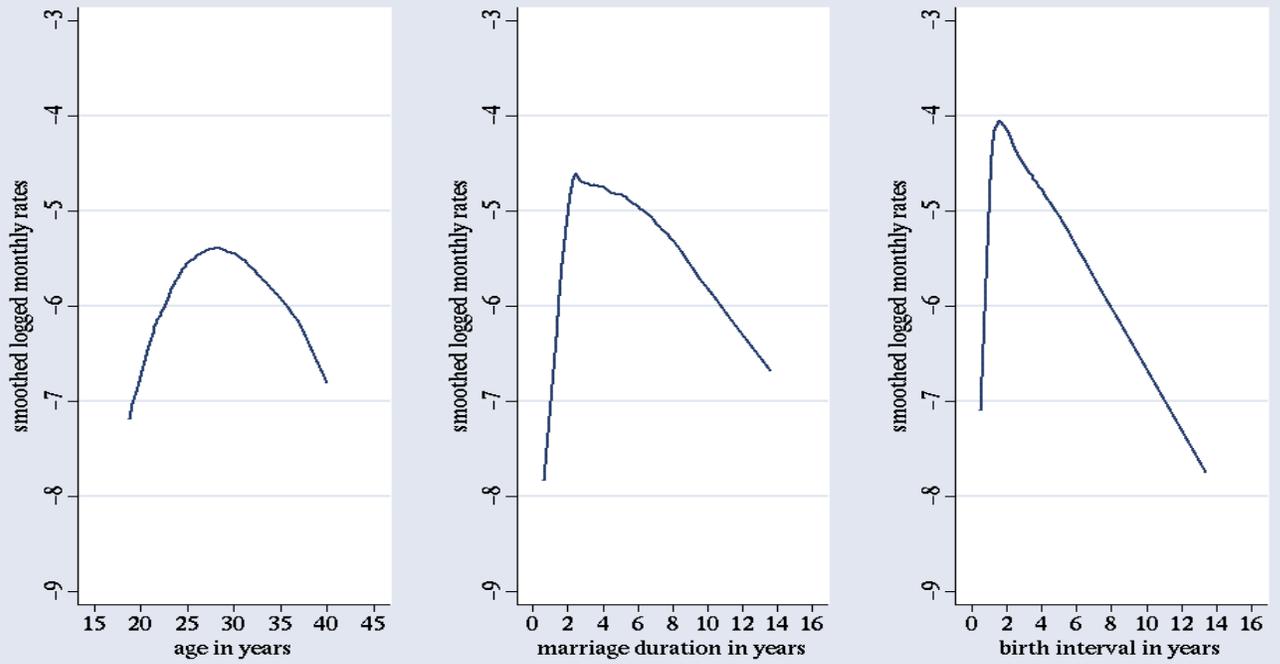


Figure A7: 2nd marital births, 4th lifetime births

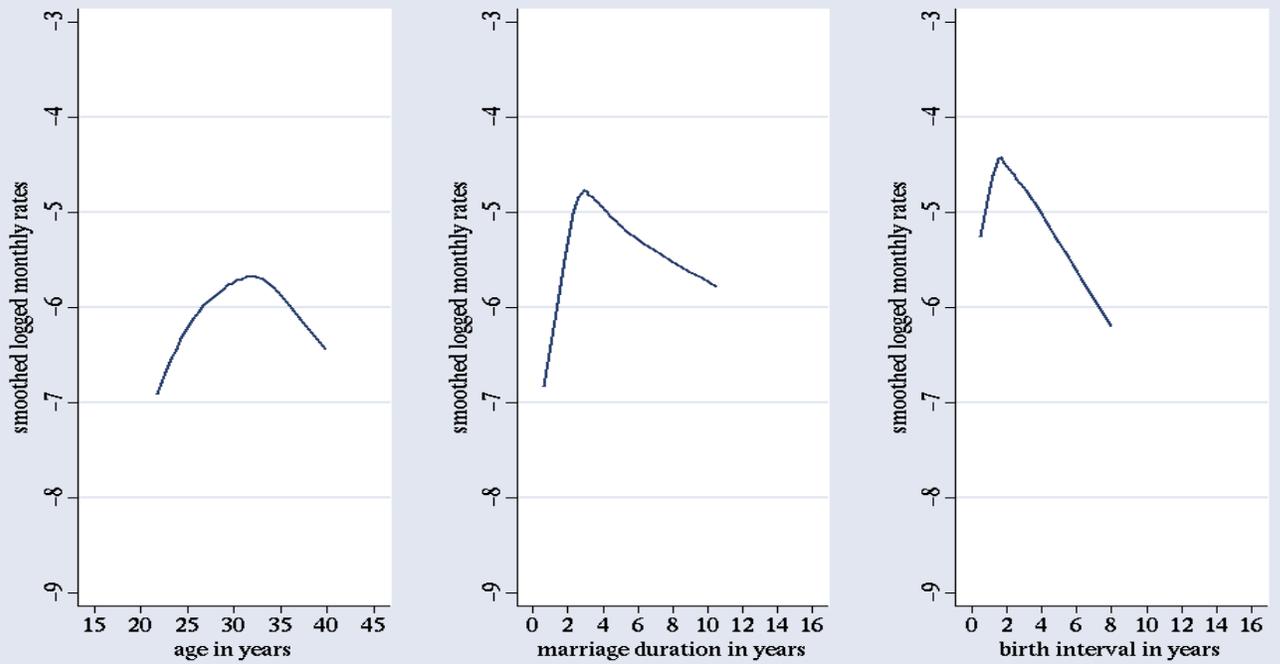


Figure A8: 3rd marital births, 3rd lifetime births

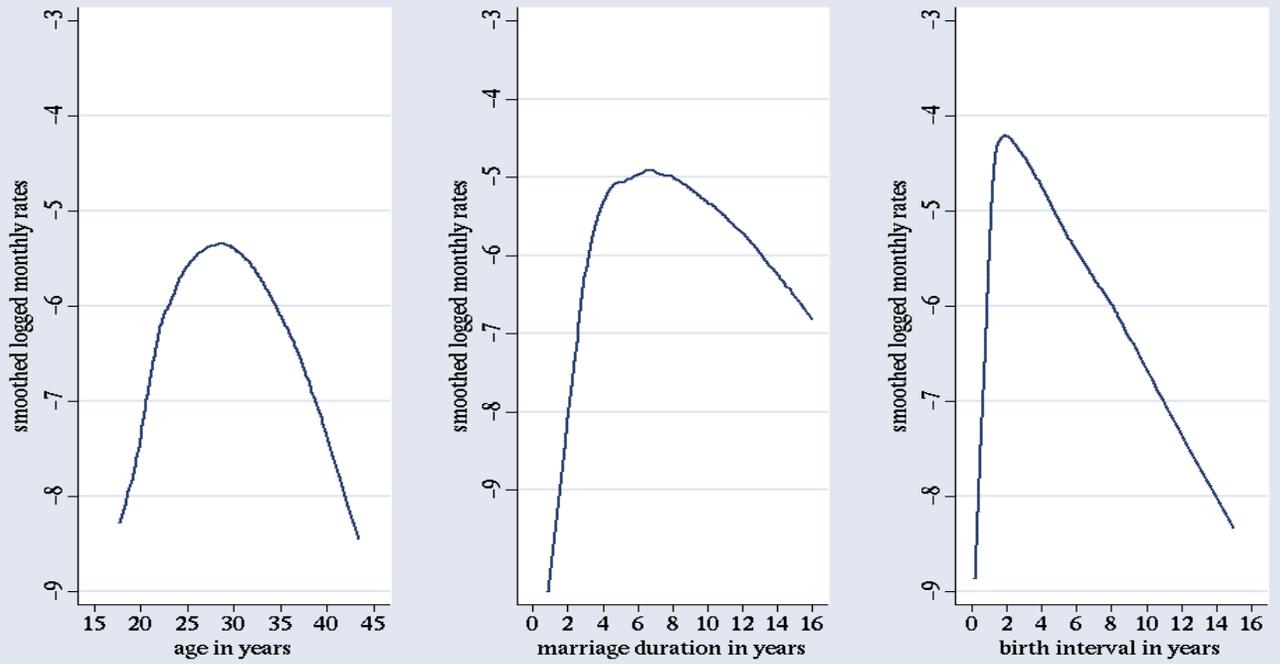


Figure A9: 3rd marital births, 4th lifetime births

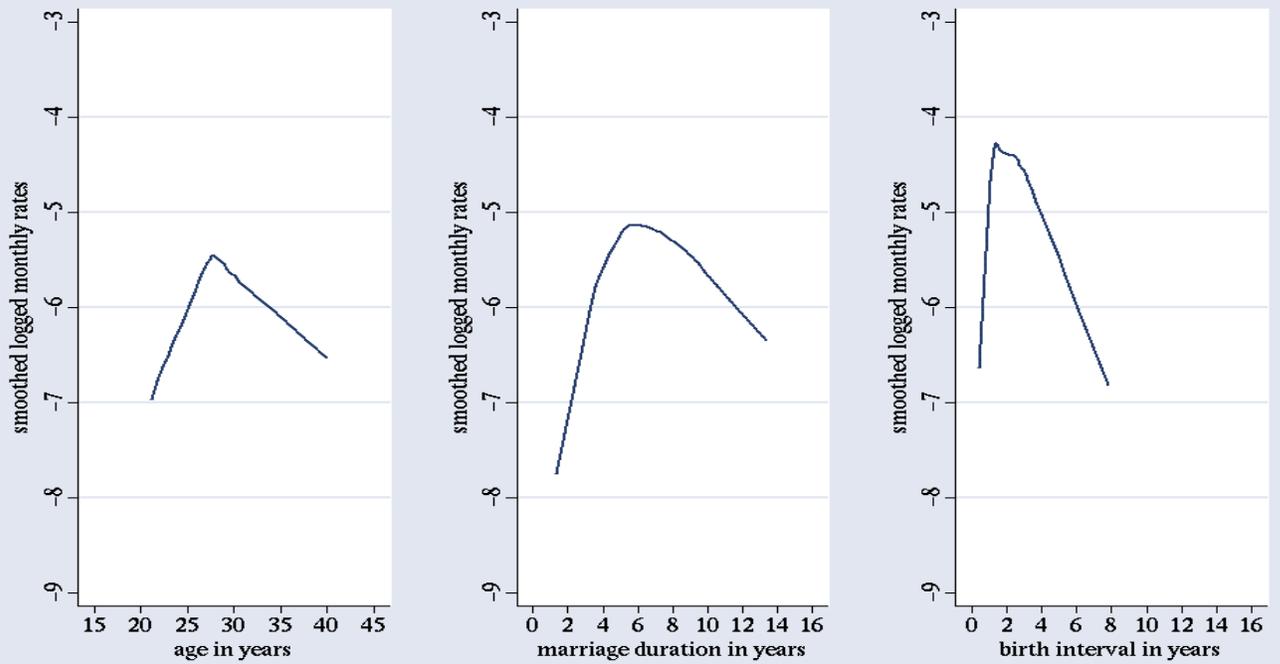
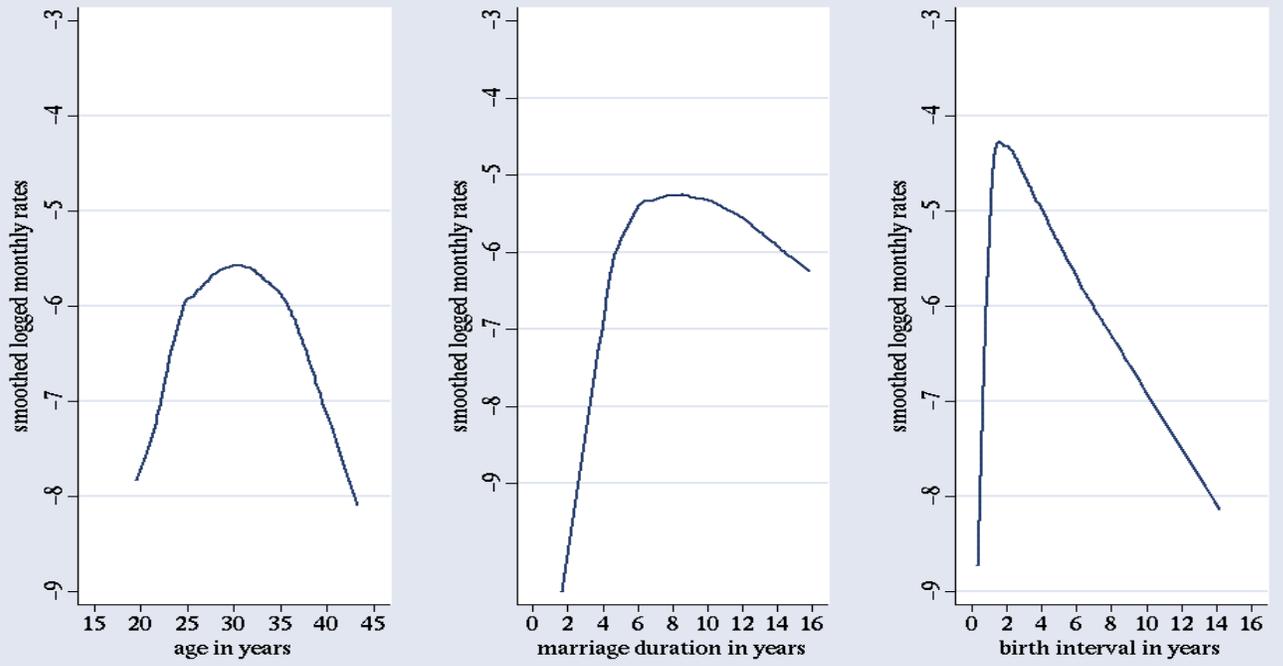


Figure A10: 4th marital births, 4th lifetime births



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