Risk Preferences and the Timing of Marriage and Childbearing [⊗]

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Abstract

The existing literature on marriage and fertility decisions pays little attention to the role played by risk preferences and uncertainty. However, given uncertainty regarding the arrival of suitable marriage partners, the ability to contracept, and the ability to conceive, women's risk preferences might be expected to play an important role in marriage and fertility timing decisions. Using data from the Panel Study of Income Dynamics, I find that measured risk preferences have a significant effect on both marriage and fertility timing. Highly risk tolerant women are more likely to delay marriage, consistent with either a search model of marriage or a risk-pooling explanation. In addition, risk preferences affect fertility timing in a way that differs by marital status and education, and that varies significantly over the lifecycle. Greater tolerance for risk leads to earlier births at young ages, consistent with these women being less likely to contracept effectively. As women near the end of their fertile period, highly risk tolerant women are likely to delay childbearing relative to their more risk averse counterparts, and are therefore less likely to become mothers. These findings may have broader implications for both individual and societal well-being.

I. Introduction

Though extensive, the literature on marriage and fertility decisions has paid little attention to the effect of risk preferences and uncertainty on the timing of these decisions. Models generally assume that women are risk neutral, and that fertility can be perfectly controlled.[1] However, in a world where considerable uncertainty exists regarding the arrival of suitable marriage partners, the ability to contracept, and the ability to conceive, women's risk preferences might be expected to play an important role in marriage and fertility timing decisions.

Social scientists have long been interested in individuals' attitudes towards risk, and the effect that these attitudes have on decision-making and behavior. This interest has led to the inclusion of experimental questions in surveys that are designed to provide information about individuals' risk preferences. These questions generally measure risk preferences by eliciting willingness to take a series of gambles over lifetime income, and have been used extensively in the literature on savings and wealth.[2,3]

More controversial is the idea that these measures of risk preferences may capture a more general risk-taking propensity that could apply to non-financial behavior. Psychologists have long debated whether risk taking is an innate and stable personality trait, or whether it is context-

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[1] See Heckman and Willis (1976) and Michael and Willis (1976) for early exceptions.

[2] Barsky et al. (1997) describe these measures in the Health and Retirement Study (HRS), and the same questions have been asked in the Panel Study of Income Dynamics (PSID).

[3] For example, see Lusardi (1998) (wealth accumulation); Brown (2001) (decisions to annuitize); Shroder (2001) (decisions to become a landlord); and Charles and Hurst (2003) (intergenerational wealth correlations).

specific. Earlier psychology literature has argued that behavior is completely situationally determined (Mischel, 1968). More recent work by Hudson et al. (2005) argues that "risk is multidimensional, and that no single measure is likely to effectively capture risk preferences in a manner that lends itself to applied research (page 48)."

However, if such a general risk taking propensity exists, it would be expected to affect behavior in many different contexts, including marriage and fertility timing decisions. In this paper, I test whether heterogeneity of risk preferences, as measured by differences in the willingness to gamble over lifetime income, can help to explain differences in marriage and fertility timing across women.[4]

Using data from the Panel Study of Income Dynamics (PSID), I find that measured risk preferences have a significant effect on both marriage and fertility timing. Highly risk tolerant women are more likely to delay marriage, consistent with either a search model of marriage or a risk-pooling explanation. In addition, risk preferences play a role in fertility timing that differs by marital status and education, and that varies significantly over the lifecycle. Among both unmarried and married women, greater tolerance for risk leads to earlier births at young ages, consistent with these women being less likely to contracept effectively. As women near the end of their fertile period, those women who have a high tolerance for risk are likely to delay

[4] The correlation between these measured risk preferences and demographic behavior may not be as tenuous as it first seems. In an evolutionary framework, systematic differences in risk preferences by sex have been attributed to differences in returns to investments in reproductive success. "For females, the low-risk steady-return investment in parenting effort often yields the highest returns, whereas for males, the higher-risk investment in mating effort produces a higher expected payoff" (Eckel and Grossman, 2002, page 282).

childbearing relative to their more risk averse counterparts, and are therefore less likely to become mothers. This is particularly true for college-educated, unmarried women. This significant link between experimental measures of preference parameters and demographic decisions provides external validity of these survey risk preference measures, and suggests that they may be more broadly applicable beyond the realm of financial decision-making.

In addition, these findings on the timing of marriage and fertility decisions may have broader implications for both individuals and societies. Early first marriages are more likely to lead to divorce. Early first births are often associated with negative child outcomes, while excessive delay of first births could lead to permanent infertility. Risk preferences may therefore have very real effects on well-being.

The remainder of this paper is organized as follows: Section IIA explores the potential effects of risk preferences on marriage timing. Section IIB examines the ways in which risk preferences may (independently of marriage timing) affect fertility timing. Section III describes the data and Section IV describes the methodology used in the analysis. Section V presents empirical results, and Section VI explores the potential endogeneity of the risk measure. Section VII concludes.

II. How might risk preferences affect marriage and fertility timing?

A. Marriage timing

Different theories would have different predictions regarding the effects of risk tolerance on marriage timing. First, economists have often looked at the marriage timing decision within a search-theoretic framework (e.g. Becker, 1974; Becker, Landes, and Michael, 1977; Loughran, 2002; Schmidt, 2003). In one-sided search models of marriage, individuals search over a distribution of potential mates for marriage partners. These search models explicitly incorporate uncertainty. While the distribution of potential mates is known with certainty, the offer drawn from the distribution in any given time period is not. Searchers are generally assumed to be risk neutral, and marriage, once entered into, is often assumed to be permanent. When heterogeneity of risk preferences is introduced into these models, individuals who are more risk tolerant will have a higher reservation value of an acceptable marriage partner. They will therefore be less likely to find an acceptable mate, and will have, *ceteris paribus*, a higher age at first marriage.[5] An alternate explanation that provides the same predictions is risk pooling. If individuals view marriage as a way by which they can self-insure against income risks, then individuals who are more risk tolerant would marry later.[6]

However, there are also theories of marriage that would predict the opposite effect of risk tolerance. For example, in a world with high divorce probabilities, those individuals who are the least risk tolerant may *delay* marriage with the hope of finding a better match – one that will decrease the probability of divorce. In this case, risk tolerance would hasten marriage. In addition, the "economic provider" hypothesis suggests that, since men have historically been the

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[5] Heterogeneity of risk preferences has been introduced into job search models that are analogous to the marriage search models. In a job search model, individuals who are more risk tolerant will have a higher reservation wage, and therefore a longer expected duration of unemployment (e.g. Pissarides, 1974; Feinberg, 1977).

[6] See literature on the added worker effect in the U.S. (e.g. Cullen and Gruber, 2000; Stephens, 2002), and an extensive literature showing that family-based income transfers contribute to consumption smoothing in developing countries (e.g. Rosenzweig, 1988; Rosenzweig and Stark, 1989; Foster and Rosenzweig, 2001).

chief financial providers within marriage, decreases in real wages may lead to delays in marriage timing (Cooney and Hogan, 1991; Oppenheimer et al., 1997). If those who are the least tolerant of risk prefer to have a larger cushion of savings before marrying, then we would expect to see a negative relationship between risk tolerance and age at first marriage – people who were highly risk tolerant would marry sooner.[7]

Finally, risk preferences could also affect marriage timing through a "marriage attraction" effect. Assortative mating might occur on risk preferences and other personality traits. Risk tolerance could then either delay or hasten first marriage timing, depending upon the distribution of risk preferences in the population.

In sum, the direction of the predicted effect of risk tolerance on marriage timing is ambiguous. Standard search models and risk-pooling explanations predict that risk tolerance would delay marriage. Explanations associated with match quality and divorce, or the economic provider hypothesis would work in the opposite direction, and predict that risk tolerance would hasten marriage. The marriage attraction effect caused by sorting on risk preferences could go in either direction. Since the theoretical effects are ambiguous, it is ultimately an empirical question. In Section V, I test for the effects of risk preferences on marriage timing.

[7] The economic provider mechanism is usually associated with male marriage timing decisions. The focus of this paper is female marriage timing, but the two are closely linked.

B. Fertility timing

In a world with imperfect fertility control, a woman deciding on fertility timing must consider three costs.[8] First, as in models with perfect fertility control, she incurs the cost of lost lifetime earnings from bearing a child, which is a function of the woman's wage, human capital investment, and age.[9] Women who face an increasing earnings profile or whose careers require up-front investment in human capital will minimize these costs by choosing to bear children later in life. Women with a relatively flat earnings profile will choose to bear children earlier in life. Furthermore, these costs fall as the woman ages.

However, since fertility is a stochastic process, the timing of the first birth cannot be chosen with certainty. Uncertainty exists regarding the ability to prevent unwanted pregnancies, as well as the ability to conceive when desired. The relevant decision is not really "when to bear a child," but instead "when to stop trying to prevent pregnancy and begin trying to conceive."[10]

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[8] The existing literature on fertility decisions usually assumes perfect fertility control and risk neutrality. In addition, it has often focused on completed family size rather than fertility timing (see Hotz, Klerman, and Willis (1997) for a recent review).

[9] Both an emerging theoretical literature (e.g. Conesa, 1999; Mullin and Wang, 2002; Caucutt et al. 2002) and empirical evidence (e.g. Blackburn et al., 1993; Amuedo-Dorantes and Kimmel, 2005; Miller, 2005) suggest that women can minimize career-related costs associated with motherhood by delaying fertility timing.

[10] The ability to delay childbearing to focus on human capital investment requires the ability to prevent unwanted pregnancies. Goldin and Katz (2002) find evidence that the availability of contraception and abortion to unmarried women had a significant effect on women's investment in human capital.

The second cost the woman incurs is associated with the necessity of preventing early, unplanned pregnancies. Fertility can be controlled through the choice of a particular contraceptive technique. There are monetary costs that depend upon the technique chosen. In addition, there are nonmonetary costs incurred as well, including foregone time, sexual pleasure, religious principles, and health (see Michael and Willis, 1976). These costs are assumed to be constant over the woman's lifecycle.

Finally, assuming that motherhood provides utility to women, a third cost results from the possibility that a woman will be unable to give birth before her fertile period ends, and thereby forego the benefits of motherhood.[11] Since effective fecundability declines with age (see Weinstein et al., 1990), longer delay of childbearing increases the probability of fertility problems, and therefore reduces the probability of an eventual conception. The expected value of this cost increases with age.

Figure 1 shows how these costs might look over the lifecycle. The loss of lifetime earnings from having a child at a given age decreases as the woman delays childbearing and ages. The expected value of the loss of motherhood increases as a woman delays childbearing and ages. If the cost of contraception is constant over time, the result is a U-shaped pattern of costs over the childbearing years.

For less educated women, the costs of early childbearing in terms of foregone wages are low, so as predicted by the models under perfect fertility control, childbearing should take place early in life. This means the remaining two costs should also be less important. The need to contracept effectively is lower. In addition, since births occur early in life, the constraint

[11] The benefits of motherhood are assumed to be positive, and to be sufficiently high that most women want to bear a child before the end of their fertile period.

imposed by the biological clock is less likely to be binding. However, for more educated women the costs of an early, unplanned pregnancy are high in terms of lost lifetime income. They would therefore choose to delay childbearing in a world of perfect fertility control. By definition, delay requires effective contraception (or abstinence) in early years. In later years, as the likelihood of fertility problems increase, the potential costs of permanent childlessness become increasingly important.

These costs imply that women's risk preferences will affect fertility timing through two mechanisms, and that the relative importance of these two mechanisms will vary over the lifecycle. First, women who are highly risk tolerant may be more willing to sustain high risks of an unplanned pregnancy, and therefore contracept less effectively. If this is the case, higher levels of risk tolerance would be associated with earlier childbearing. Since the costs of an unplanned pregnancy are highest early in life, during that period, those with the least tolerance for risk should be most likely to use effective contraception and therefore see delayed births.

Second, those individuals who are more tolerant of risk might be less worried about the risk of infertility, and therefore delay childbearing longer. This would imply that risk tolerance would be associated with delayed births. Since the the risks of unintended childlessness increase as women age, this mechanism should be more important closer to the constraint imposed by the biological clock.

III. Data

The data used in this paper come from the Panel Study of Income Dynamics (PSID). The PSID began with a national sample of approximately 5,000 U.S. households in 1968. Since then, the PSID has attempted to follow all individuals from those households, including children of the original respondents as they begin their own families. Questions on demographics and employment information are asked of all respondents in each year of the survey.[12] In addition, family history files are available that can be merged to the main data files. These files contain detailed retrospective marriage and fertility histories of all individuals living in a PSID family in any wave beginning with 1985. These histories provide information such as age at first marriage, age at first birth, and whether the first birth to an individual occurred within or outside of marriage.

In 1996, a series of questions regarding hypothetical gambles over lifetime income were added to the PSID interview. These questions are similar to questions asked of respondents in the Health and Retirement Study (HRS) described by Barsky et al. (1997). Employed respondents were first asked the following:

> "Now, imagine that you have a job that guaranteed you income for life equal to your current, total income. And that job was your family's only source of income. Then, you are given the opportunity to take a new, and equally good, job, with a 50-50 chance that it will double your income and spending power. But there is a 50-50 chance that it will cut your income and spending power by a third. Would you take the new job?"

Depending on the response to this question, PSID respondents are asked a series of similar questions with different percentage income losses. Based on the responses to these questions, individuals can be arranged into ranges based on risk tolerance (the reciprocal of risk aversion). Those ranges are then converted into a risk tolerance index that corrects for measurement error using the methodology of Barsky et al. (1997). Estimates of relative risk tolerance range from 0.15 to 0.57 (corresponding to levels of risk aversion of 6.67 to 1.75), and 51 percent of the

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[12] For a detailed description of the PSID, see Brown, Duncan and Stafford (1996).

women in the sample fall into the least risk tolerant category.[13] These measures are merged with individual and family data from 1968 through 2003, and with detailed retrospective marriage and fertility histories. Table 1 presents summary statistics for the data set.

Table 2 presents summary statistics separately for women with the lowest level of risk tolerance versus women with higher levels of risk tolerance. The first two columns show that these two groups of women differ along a number of demographic characteristics. Women with the lowest levels of risk tolerance are significantly more likely to ever have given birth, more likely to be Black or Protestant, and less likely to be Catholic, Jewish, or live in an urban area. However, these two groups of women also significantly differ by education category. The least risk tolerant women are more likely to be high school dropouts and high school graduates, and significantly less likely to be college graduates. The remaining columns in Table 2 break out these statistics by educational category. While differences by race and religious affiliation across the two risk groups continue to exist, the other demographic differences are largely explained by differing levels of educational attainment.

One concern is that the risk questions in the PSID are only asked of the respondent – they are not asked of all household members. Table 3 shows the percentage of observations that were respondents, by educational attainment and marital status. More than 90 percent of the

[13] Individuals in the most risk tolerant of the four categories would accept a gamble with a 50 percent chance of doubling lifetime income and a 50 percent chance of losing half of lifetime income. Individuals in the least risk tolerant of the four categories would refuse a gamble with a 50 percent chance of doubling lifetime income and a 50 percent chance of losing one-fifth of lifetime income. For more discussion of the risk measures in the PSID, see Luoh and Stafford (1997).

unmarried women at each educational level responded to the survey. For married women, however, a significant fraction of the women in each educational category did not answer the risk questions themselves. If risk preferences are highly correlated across spouses, then using the respondent's risk tolerance as a family measure should not dramatically alter the results.[14,15] In Section V, I first present results using these responses as if they applied to all individuals in the household. I then break out the results for married women by respondent status to test the sensitivity of the results.

An additional concern with this measure of risk tolerance is that the questions were asked in 1996, after most of the women in my sample had made their marital and fertility decisions. As long as risk preferences are stable and remain fairly constant over the lifecycle, this will not create a problem. However, it is possible that risk preferences change as individuals age, and more importantly that these changes are endogenous to marriage or motherhood. I address this possibility in Section VI.

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[14] In Wave 1 of the HRS (1992), of those primary respondents in the least risk tolerant category, 70 percent had secondary respondents (usually their spouse or domestic partner) who were also in the least risk tolerant category. This suggests that risk tolerance is correlated to some extent across spouses. However, married couples in the HRS are likely to have been married for many years, and therefore may not be representative of married couples in the PSID.

[15] Research in psychology suggests that there are moderate positive and statistically significant correlations between spouses on sensation-seeking in the range of 0.30 – 0.40, which are similar in size to correlations found on attractiveness (see Bratko and Butković (2002) and Glicksohn and Golan (2001)).

IV. Methodology

I estimate two sets of discrete time hazard models to separately examine the effect of risk preferences on marriage and fertility timing. The marriage (childbirth) hazard function $\lambda(j|X_{it})$ is the probability that woman *i* in year *t* will marry (bear a child) at age *j*, conditional on being unmarried (childless) up until age *j*. More precisely:

$$\lambda(j|X_{it}) = \frac{1}{1+\exp(-(\beta X_{it} + \delta RT_i + \gamma_j))} \tag{1}$$

The *X* vector includes individual-level characteristics, such as educational attainment, race, religion, region of residence, urban residence, and year of birth dummies to control for any cohort effects.[16,17] Duration dependence takes the form of a fourth-order polynomial in *t*.[18]

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[16] It is possible that risky behaviors are correlated with both measured risk preferences and marriage and fertility timing. Since these behaviors are endogenous, I do not include them in my main specification. However, all results are robust to inclusion of controls for financial problems, smoking, and heavy drinking.

[17] In regression results not reported here, I have included measures of family background – in particular, variables for whether the woman's mother and father were high school or college graduates. This does not qualitatively affect the results. In addition, in the regressions for married women I have also included spousal characteristics, including spouse's age and educational attainment. The inclusion of these variables does not affect the results.

[18] Results that allow duration dependence to be fully non-parametric, where each year at risk has it its own interval-specific dummy variable, do not differ qualitatively from the results presented here.

RT measures risk tolerance.[19] As discussed in Section IIA, the predicted effect of risk tolerance on marriage timing is ambiguous. *RT* will delay marriage if search or risk-pooling effects dominate. It will hasten marriage if match quality or economic provider effects dominate. For the childbirth regressions, the expected sign of δ is unclear *a priori*. If risk tolerant women are less likely to contracept and therefore have earlier first births, δ would be expected to be positive. If instead risk tolerant women are more likely to postpone childbearing since they are more willing to gamble over the risk of infertility, then the estimate of δ would be expected to be negative.

In addition, the effects of risk tolerance on fertility timing are expected to differ depending on whether the woman is early or late in her fertile period. Because of this, I also estimate a version of the childbirth hazard where the risk tolerance variable is interacted with a spline for age – allowing different effects of risk for women under 20, between 20 and 29, and 30 and older. The estimated coefficient on *RT* is predicted to be positive for the youngest women, and negative as women near the end of their fertile period.

To the extent that marriage signals the beginning of a socially sanctioned period for childbearing, marriage timing should indirectly affect fertility timing as well. If risk tolerance leads to later marriages, it should correspond to later first births as well. Because of this, in the

[19] Due to the curvature of the utility function, wealth effects could theoretically play an important role. However, Sahm (2006), using the same measures in the HRS, finds no evidence of a relationship between an individual's measured risk tolerance and total household wealth or income, and finds that changes in wealth and income do not significantly alter an individual's willingness to take risk.

empirical analysis of fertility timing, all models are run separately for married and unmarried women, and the models estimated for married women control for age at first marriage.

V. Results

A. Marriage Timing

Estimates of the effect of risk tolerance on the timing of women's first marriages are presented in Column 1 of Table 4. The demographic variables are, for the most part, statistically significant and in the expected direction. Women who pursue higher levels of education marry later, as do Black women. Women living in urban areas also marry later. Women who report their religious affiliation to be either Jewish or Protestant marry significantly earlier than those who report a non-Western religion, Catholicism, or no religion at all. Even after controlling for a wide array of demographic variables, the estimated coefficient on risk tolerance is –0.61, and is statistically significant at the one-percent level. The negative coefficient implies that those who have a greater tolerance for risk marry later in life. This is consistent with dominant search model or risk-pooling effects on marriage timing. Figure 2 graphs the predicted survivor functions representing the probability that a woman is unmarried for at least *t* years. Predictions shown are for a white, college-educated woman born in 1970. The solid line in each graph indicates predictions for the highest level of risk tolerance in the sample, while the dashed line represents predictions for the lowest level of risk tolerance. The survivor functions presented in Figure 2 show graphically that risk tolerance delays marriage, and that those who are more risk tolerant have a reduced probability of ever marrying.

Columns 2 through 4 of Table 4 break these results out separately by educational attainment. For all three educational categories, the estimated coefficient is large and negative, although it is less precisely determined for college graduates than for the other groups. For high school dropouts, the coefficient is –1.24 and is significant at the ten-percent level. The magnitude of the coefficient implies that moving from the lowest level of risk tolerance reported in the survey to the highest level would delay the median age at marriage for a white, female high school dropout born in 1970 by approximately 5 months, from 20 years, 10 months to 21 years, 3 months of age, and delay the 75th percentile age at marriage by a year, from 23 years, 6 months to 24 years, 6 months of age. For high school graduates, the coefficient is smaller in magnitude but statistically stronger, with an estimated coefficient of –0.54 that is statistically significant at the five-percent level. For a white high school-educated woman born in 1970, moving from the lowest level of risk tolerance in the survey to the highest level would delay the median age at marriage by 11 months, from 21 years, 5 months to 22 years, 4 months, and delay the 75th percentile age at marriage by 2 years and 4 months, from 24 years, 10 months to 27 years, 2 months of age.

B. Fertility timing

Table 5 presents results from duration analyses on age at first birth. I conduct these analyses separately for women who were married at the time of the first birth, and for women who were not married at the time of the first birth. Results for married women are presented in Columns 1 and 2, where Column 1 presents results that do not control for age at first marriage. As the previous section makes clear, risk preferences have an independent effect on marriage timing, and might be expected to affect fertility timing through this mechanism. Thus, it is necessary to control for age at first marriage.

The results in Column 1 show that, for married women, before controlling for age at first marriage, education significantly affects fertility timing. Women with higher levels of education are more likely to delay their first birth. However as Column 2 shows, this effect works entirely through the timing of marriage. Once age at first marriage is controlled for, educational attainment has no independent effect on fertility timing.[20]

The effects of risk preferences tell a similar story. Before controlling for age at first marriage, risk tolerance has a negative effect on fertility timing. The coefficient of –0.24, although not statistically different from zero, suggests that women who are more risk tolerant have their first births later than those women who are relatively more risk averse. Column 2 shows that for married women, earlier age at first marriage, as expected, has a significant effect on hastening age at first birth. However, after controlling for this factor, risk tolerance has no independent effect on fertility timing -- the estimate of δ is reduced to one quarter of its original magnitude.

Results presented in Column 3 for unmarried women show the expected pattern for the demographic control variables. Unmarried women with higher levels of educational attainment delay their first births, while Black and Hispanic unmarried women have their first births earlier. However, risk tolerance has no significant effect on fertility timing for this group of women.

Regressions were run that stratify the sample by both marital status and educational category. The pattern of coefficients on the control variables are similar in magnitude and sign to those in Table 5, so Table 6 presents only the coefficients on the risk tolerance measure (each

[20] In subsequent tables, I only report results from the specification where I control for age at first marriage.

coefficient is estimated in a separate regression). No significant effects of risk preferences are found on the fertility timing of the women in any of these six groups.

However, there are two competing theoretical effects of risk tolerance on fertility timing that should vary in relative importance by age. Early in the fertile period, risk tolerance is expected to *hasten* first birth timing, since risk tolerant women will be less likely to contracept effectively. This should lead to an estimated coefficient that is positive. Late in the fertile period, risk tolerance is expected to *delay* first birth timing, since risk tolerant women will be less concerned about the possible risk of childlessness. This should lead to an estimated coefficient that is negative. To test whether these differential effects of risk tolerance by age exist, I interact the risk tolerance variable with a spline for age, so that risk tolerance can have different effects on women under 20, between 20 and 29, and 30 and older. These results can be found in Table 7.

For both married and unmarried women, the results suggest that risk tolerance has a significant effect on fertility timing, and that this effect differs by age. For both married and unmarried women, the hypotheses that the risk variables are jointly equal to zero and jointly equal to each other are each rejected by a chi-square test at at least the five-percent level. The estimated coefficient on risk tolerance for married women under the age of 20 is positive, but not precisely estimated. This is consistent with the story that younger women with higher levels of risk tolerance are less likely to contracept effectively. However, the interaction with over 30 is also positive, the opposite sign from what would be expected if the biological clock is playing a role.

For unmarried women, the effect of risk tolerance on women under 20 is positive and significant at the five percent level. In addition, it is significantly larger than the coefficients for the two older age groups. Again, this is consistent with the idea that those women who are more risk tolerant engage in riskier sexual behavior and are more likely to bear children at earlier ages.

As explained previously, the differential results of risk tolerance by age should be most pronounced for women with steep earnings profiles. Highly educated women will be most likely to delay childbearing, and therefore more likely to be influenced by the biological clock. Because of this, Table 8 presents regressions with age interactions for women by educational level. For married women at all three levels of education, the risk variables are not jointly statistically different from zero. For high school dropouts and college graduates, the coefficients for young women are large and positive, as would be expected – those women who are more risk tolerant have earlier first births. For high school dropouts, the interaction between RT and age less than 20 approaches statistical significance at the ten-percent level (p-value=0.109), and for college graduates it is statistically significant at the ten-percent level.

For unmarried women, this positive effect on women under 20 is present for all educational categories, since in each category the coefficient is significantly larger than that for women in the next age group. For high school graduates, it approaches statistical significance at the ten-percent level (p-value=0.102). For women who are high school dropouts, we can reject the hypotheses that the risk coefficients are jointly equal to zero and that they are jointly equal to each other. Finally, at the other end of the fertility horizon, over the age of 30 risk tolerance plays a large role in delaying childbearing for unmarried college educated women. The coefficient on the risk variable for women over 30 is -6.13 and is statistically significant at the ten-percent level.

Figures 3 and 4 graph the predicted survivor functions, which represent the probability that a woman is childless for at least *t* years. Predictions shown are for a white, college-educated woman born in 1970. The solid line in each graph indicates predictions for the highest level of risk tolerance in the sample, while the dashed line represents predictions for the lowest level of risk tolerance. The survivor functions shown in Figure 3 show that, although the effect of risk tolerance hastens births at young ages, the magnitude of this effect is very small. Once age at marriage is controlled for, risk preferences have very little effect on the fertility timing of married women.

For unmarried women, the effects illustrated in Figure 4 are larger (albeit on a much smaller base). Moving from the highest level of risk tolerance to the lowest level has three major effects. First, it delays childbearing at early ages. Secondly, it hastens the timing of the first birth from the age of 30 on. Finally, it reduces the probability that the woman will remain permanently childless.

Among college-educated women, the stronger effects of risk preferences on the fertility timing of unmarried women relative to married women may seem surprising. However, these differences are consistent with theoretical predictions found in Caucutt et al. (2002) and Schmidt (2003). The models in each of these papers predict that high productivity single mothers should exhibit the longest delays in fertility timing. In this type of world, the fertility timing of married women is affected by both marriage and the finite nature of the biological clock. However, the fertility timing of unmarried women is primarily driven by the biological clock. Given the greater importance that the biological clock plays for unmarried college educated women, it is not surprising that risk tolerance has a stronger effect on their decisions later in life.

As mentioned in Section III, the PSID risk questions are only asked of the respondent. Most unmarried women were the respondent in their households, so the results presented above are unaffected. For married women, however, a significant fraction of the women in each educational category did not answer the risk questions themselves. Table 9 presents results in which the married sample is further stratified into respondents and nonrespondents.

Column 1 reprints the results for all married women from Table 8 for reference. Column 2 presents results in the case were the women were the respondents (i.e. they answered the risk questions themselves), and Column 3 presents results for those women who were not the respondents (i.e. someone else in the household – usually the spouse – answered the risk questions for them). When regressions are run only for those married women who answered the risk questions themselves, the hastening effect of risk tolerance on fertility timing of women under the age of 20 becomes stronger for all education categories. The results in Column 3 for nonrespondents show no effects of risk preferences on fertility timing at any level.

Ideally in duration analysis, the right hand side variables would be fully time-varying. However, since the marriage and fertility histories in the PSID are retrospective, I do not have a true panel data set. This problem affects the educational status variables, which are important for stratifying the sample.[21] To test the sensitivity of the results to the time at which educational attainment is measured, I have limited the sample to those individuals for whom I have data on educational attainment at the time of their marriage and fertility decisions. In practice this means

[21] This problem also affects region of residence and the measure of risk tolerance. Due to the importance of the risk tolerance measure as my independent variable of interest, I address this separately in the next section. Large regional differences exist in marriage and fertility timing that might capture the effects of other omitted variables. To proxy for these regional differences, I have run regressions using the 1993 value for region of residence, as well as regressions that control for the region of residence of the original PSID household in 1968. The results are not substantively affected by the choice of regional variable.

removing women born before 1955 (women born in 1955 were 13 when the PSID began in 1968) and women who had children prior to marrying into the sample. This reduces the sample size from 8,586 to 6,600 observations. Table 10 presents regressions stratified by educational attainment at the time of the first birth. These results are similar to those found in Tables 8 and 9, with one exception. When I stratify by educational attainment at the time of the birth, I no longer have high school graduates who had their first birth at an age younger than 17. Likewise, I no longer have college graduates who had their first birth at an age younger than 21. By stratifying the sample in this way, each educational category only contains those women who were successful at preventing unwanted pregnancies until they completed the educational level in question. As a result, the positive effect of risk tolerance at early ages is present for high school dropouts, but becomes attenuated for women with higher levels of education. Figure 5 illustrates how the survivor function presented in Figure 4 for unmarried college-educated women changes with this alternate definition of educational attainment.

The kinks in the survivor functions are a result of constraining the effect of risk tolerance to be the same for women in each of the three segments of the spline (less than 20, 20-29, and 30 and older). However, these cut points for the age interactions are somewhat arbitrary. One might wonder whether different cut points affect the results. To look at whether the cut points matter, I have run regressions where instead of defining the cut points at 20 and 30, I allow for year-specific interactions with risk tolerance (essentially allowing risk to have a different effect in each year). These regressions have less power due to the reduction in degrees of freedom, but provide a useful picture of the pattern of risk and fertility timing. The predicted survivor function for unmarried college graduates implied by these regressions is found in Figure 6. It shows that the predicted patterns are not dependent upon the choice of cut points.

VI. Is Measured Risk Tolerance Endogenous?

Ideally, questions aimed at quantifying risk tolerance would be asked in the PSID before the marriage and or fertility decisions were made. If measured risk tolerance reflects a stable personality trait, then this will not bias my results. However, it is possible that risk preferences change endogenously with major life events, like marriage or motherhood. If women become less tolerant of risk after marrying or having children, this reverse causality could bias my results – women who were more risk tolerant would show up as having later marriages and births, when in fact the lower levels of risk tolerance were caused by the transitions to marriage and motherhood and not vice-versa.

Three main findings emerge from the results presented in the previous section – first, those women who are more risk tolerant marry later; second, that risk tolerance hastens first births early in the lifecycle; and third, that risk tolerance delays first births as women approach the end of their fertile period. The reverse causality argument in the last paragraph could potentially explain the marriage timing results, and the "biological clock" fertility effect at the end of the fertile period. However, it would not explain the strongest fertility effect – that risk tolerance hastens fertility timing for young women under the age of 20. This suggests that reverse causality is not the only explanation for my results.

The risk questions were only asked once in the PSID, so it is impossible to examine whether a given individual changes their response to the risk questions over time and to rule out such endogeneity. However, the equivalent questions were asked on several occasions in the

Health and Retirement Study.[22] Detailed analysis of the HRS risk questions by Sahm (2006) suggests that the questions do measure stable and well-defined preferences. For example, she finds that personal events that would reduce an individual's expected lifetime income (such as job displacement or diagnosis of a serious health condition) seem to have little impact on risk tolerance. However, she does find a link between marriage and measured risk tolerance, but in the opposite direction of that suggested above -- individuals entering a marriage show an increase in risk tolerance.[23]

As an additional test for the exogeneity of risk preferences to the childbearing decision, I examine the subsample of women who are likely to have completed their childbearing (women older than 45) in the PSID, to see if there is a relationship between ever having had a child and risk preferences. If risk preferences endogenously change with motherhood such that mothers are less tolerant of risk, we would expect that motherhood would be negatively and significantly correlated with risk tolerance. Table 11 shows results from estimation of a linear probability model, where an indicator for whether the woman ever had a child is regressed on the *RT* measure, as well as on individual characteristics. This regression shows that there is no statistically significant relationship between measured risk tolerance and the likelihood of motherhood.

VII. Conclusion

[22] However, the HRS sample is made up of older individuals, and may not be the best sample for comparison.

[23] Sahm does find that less risk tolerant types are more likely to be consistently married in the panel, but this relates more directly to divorce than to marriage timing.

A large and growing literature examines the role risk preferences play in influencing individual decision-making, and experimental questions designed to measure such risk preferences have become popular additions to surveys. Despite skepticism over the existence of a general risk-taking propensity, this paper shows that the PSID's measure of risk preferences, determined by asking a series of questions about willingness to gamble over lifetime income, has predictive power in the non-financial context of demographic decisions.

Risk preferences are found to have a significant effect on marriage timing, with highly risk tolerant women likely to delay marriage. In addition, risk preferences play a role in fertility timing that varies by age, marital status, and education. Among both unmarried and married women, greater tolerance for risk leads to earlier births at young ages, consistent with these women being less likely to contracept effectively. As women near the end of their fertile period, those women who have a high tolerance for risk are likely to delay childbearing relative to their more risk averse counterparts. This is particularly true for college-educated unmarried women.

These findings further validate the PSID risk measures, and could have broader implications for both individual and societal well-being. Early marriages are more likely to end in divorce, and early first births are often associated with negative child outcomes. In addition, by affecting fertility timing, differences in risk preferences may lead to differences in the incidence of infertility problems and potential childlessness. Due to these effects, it is even more critical to understand the role that risk preferences play in these demographic decisions.

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Table 1: Summary Statistics

	All Women	High School Dropouts	High School Graduates	College Graduates
Risk Tolerance	0.276	0.255	0.274	0.296
	(0.157)	(0.155)	(0.155)	(0.162)
Marital Status	0.681	0.519	0.684	0.778
Birth	0.432	0.473	0.439	0.384
Black	0.311	0.445	0.329	0.168
Hispanic	0.038	0.051	0.038	0.032
Jewish	0.022	0.005	0.011	0.066
Protestant	0.690	0.785	0.700	0.594
Catholic	0.209	0.136	0.211	0.249
Urban	0.680	0.596	0.677	0.734
Number of Observations	8586	1187	5577	1822

Source: Panel Study of Income Dynamics. The statistics presented are mean values for the variables. Standard deviations are in parentheses.

Table 2: Summary Statistics by Risk Tolerance and Educational Category

	Full Sample		HS Dropouts		HS Graduates		College Grads	
	Lowest RT	Other RT levels	Lowest RT	Other RT levels	Lowest RT	Other RT levels	Lowest RT	Other RT levels
Marital Status	0.673	0.684	0.549***	0.444	0.681	0.694	0.760	0.766
Birth	0.432*	0.407	0.465	0.459	0.438	0.419	0.384	0.354
Black	0.337***	0.262	0.434*	0.505	0.345***	0.278	0.239***	0.119
Hispanic	0.034	0.041	0.046	0.061	0.032**	0.046	0.033	0.023
Jewish	0.019***	0.032	0.008	0.000	0.014	0.012	0.045***	0.101
Protestant	0.713***	0.633	0.818**	0.747	0.719*	0.687	0.656***	0.506
Catholic	0.183***	0.227	0.113**	0.172	0.191**	0.223	0.220**	0.284
Urban	0.668**	0.695	0.597	0.591	0.676	0.685	0.706***	0.783
High School Dropout	0.159***	0.119	--	--	--	--	--	--
High School Graduate	0.622**	0.589	--	--	--	--	--	--
College Graduate	0.181***	0.237	--	--	--	--	--	--

Source: Panel Study of Income Dynamics

Table 3: Percent of Observations that were Respondent for Family, By Marital Status and Educational Attainment

	Married			Unmarried		
	Respondent	Total	% Resp	Respondent	Total	% Resp
High School Dropouts	352	616	57.1	518	571	90.7
High School Graduates	2010	3813	52.7	1615	1764	91.6
College Graduates	654	1417	46.2	382	405	94.3

Source: Panel Study of Income Dynamics.

Table 4: Effects of Risk Tolerance on Hazard of First Marriage

	All Women		High School Dropouts		High School Graduates		College Graduates	
Risk Tolerance	-0.6072	***	-1.2406	*	-0.5414	**	-0.5339	
	(0.1774)		(0.7224)		(0.2388)		(0.3692)	
High School Graduate	-0.6164	***	--		--		--	
	(0.0955)							
College Graduate	-1.2649	***	--		--		--	
	(0.1069)							
Black	-1.0881	***	-1.4264	***	-1.0937	***	-0.4392	**
	(0.0936)		(0.2539)		(0.1172)		(0.2178)	
Hispanic	0.0848		-0.2790		0.2959		-0.1972	
	(0.1482)		(0.4958)		(0.1992)		(0.3200)	
Jewish	0.4650	***	0.4644		0.3276		0.5536	**
	(0.1752)		(0.8605)		(0.2871)		(0.2600)	
Protestant	0.2843	***	0.2294		0.4047	***	0.2950	
	(0.0954)		(0.3696)		(0.1331)		(0.1850)	
Catholic	0.0772		0.0447		0.1390		0.0181	
	(0.1028)		(0.3983)		(0.1418)		(0.2003)	
Urban	-0.2606	***	-0.3778		-0.1751	**	-0.4635	***
	(0.0643)		(0.2202)		(0.0845)		(0.1427)	

Notes: Standard errors in parentheses. Regressions also control for region of residence and year of birth dummy variables. Duration dependence takes the form of a fourth-order polynomial in t. PSID core weights are used. Levels of statistical significance: *** denotes significance at the one-percent level; ** at the five-percent level; and * at the ten-percent level.

Table 5: Effects of Risk Tolerance on Hazard of First Birth

	Married Women				Unmarried Women	
Risk Tolerance	-0.2420		-0.0644		0.0378	
	(0.2014)		(0.2028)		(0.3879)	
Age at Marriage	--		-0.0834	***	--	
			(0.0093)			
High School Graduate	-0.1526		-0.0600		-0.5374	***
	(0.0942)		(0.0958)		(0.1271)	
College Graduate	-0.3120	***	0.0136		-1.8747	***
	(0.1068)		(0.1135)		(0.2507)	
Black	-0.0809		0.0435		0.5694	***
	(0.1202)		(0.1216)		(0.1413)	
Hispanic	0.0756		0.0434		0.5149	**
	(0.1636)		(0.1654)		(0.2584)	
Jewish	0.2063		0.0604		-0.8247	
	(0.1933)		(0.1975)		(0.9886)	
Protestant	0.2552	**	0.1267		0.1292	
	(0.1239)		(0.1242)		(0.1661)	
Catholic	0.1789		0.1423		-0.0925	
	(0.1324)		(0.1320)		(0.1938)	
Urban	-0.0216		0.0378		-0.1175	
	(0.0680)		(0.0680)		(0.1328)	

Notes: Standard errors in parentheses. Regressions also control for region of residence and year of birth dummy variables. Duration dependence takes the form of a fourth-order polynomial in t. Educational attainment is measured as of 1996. PSID core weights are used. Levels of statistical significance: *** denotes significance at the one-percent level; ** at the five-percent level; and * at the ten-percent level.

Table 6: Effects of Risk Tolerance on Hazard of First Birth
By Educational Attainment

	Married	Unmarried
High School Dropouts	0.8346	-0.7589
	(0.9946)	(0.7884)
High School Graduates	-0.3126	0.4563
	(0.2651)	(0.5244)
College Graduates	0.2585	-0.8785
	(0.4179)	(1.7998)

Notes: Standard errors in parentheses. Each coefficient is the estimate of δ from a separate regression, stratified by marital status and educational attainment. Regressions for married women control for age at first marriage. Regressions also control for region of residence and year of birth dummy variables. Duration dependence takes the form of a fourth-order polynomial in t. Educational attainment is measured as of 1996. PSID core weights are used. Levels of statistical significance: *** denotes significance at the one-percent level; ** at the five-percent level; and * at the ten-percent level.

Table 7: Effects of Risk Tolerance on Hazard of First Birth
With Age Interactions

	Married		Unmarried	
RT * (under 20)	0.5078		0.9240	**
	(0.3722)		(0.4561)	
RT * (20-30)	-0.3449		-0.8205	
	(0.2257)		(0.5151)	
RT* (over 30)	0.5332		-0.6061	
	(0.3953)		(1.1929)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid χ^2 (1)	5.20	**	10.54	***
Rtmid=RT30 χ^2 (1)	4.45	**	0.02	
Vars jointly 0 χ^2 (3)	8.45	**	11.11	**
Vars all equal χ^2 (2)	8.37	**	10.94	***

Notes: Standard errors in parentheses. Regressions for married women control for age at first marriage. Regressions also control for region of residence and year of birth dummy variables. Duration dependence takes the form of a fourth-order polynomial in t. Educational attainment is measured as of 1996. PSID core weights are used. Levels of statistical significance: *** denotes significance at the one-percent level; ** at the five-percent level; and * at the ten-percent level.

Table 8: Effects of Risk Tolerance on Hazard of First Birth
With Age Interactions, by Educational Attainment

	Married		Unmarried	
A. High School Dropouts				
RT * (Under 20)	1.6499		0.0703	
	(1.0300)		(0.8385)	
RT * (Between 20 and 30)	-0.4114		-4.2544	***
	(1.1873)		(1.5635)	
RT* (Over 30)	1.2138		-1.7882	
	(2.9978)		(3.5564)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid $\chi^2(1)$	3.91	**	9.72	***
Rtmid=RT30 $\chi^2(1)$	0.31		0.44	
Risk vars jointly 0 $\chi^2(3)$	4.92		9.92	**
Risk vars all equal $\chi^2(2)$	3.94		9.89	***
B. High School Graduates				
RT * (Under 20)	0.0512		1.0612	
	(0.4909)		(0.6482)	
RT * (Between 20 and 30)	-0.4323		-0.1505	
	(0.2853)		(0.6249)	
RT* (Over 30)	0.0466		1.1651	
	(0.6535)		(1.2651)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid $\chi^2(1)$	0.96		3.25	*
Rtmid=RT30 $\chi^2(1)$	0.54		1.03	
Risk vars jointly 0 $\chi^2(3)$	2.70		4.95	
Risk vars all equal $\chi^2(2)$	1.32		3.90	
C: College Graduates				
RT * (Under 20)	2.1650	*	0.5563	
	(1.3067)		(1.9262)	
RT * (Between 20 and 30)	0.2350		0.4212	
	(0.4532)		(1.6960)	
RT* (Over 30)	0.0555		-6.1319	*
	(0.6016)		(3.7181)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid $\chi^2(1)$	2.19		0.01	
Rtmid=RT30 $\chi^2(1)$	0.09		3.61	*
Risk vars jointly 0 $\chi^2(3)$	2.84		4.21	
Risk vars all equal $\chi^2(2)$	2.44		4.15	

Notes: See notes for Table 7.

Table 9: Effects of Risk Tolerance on Hazard of First Birth
Respondents versus Nonrespondents

	All Married Women		Respondents		Nonrespondents
A. High School Dropouts					
RT * (Under 20)	1.6499		2.3121		-0.1622
	(1.0300)		(1.4600)		(2.4248)
RT * (Between 20 and 30)	-0.4114		-0.4764		-0.1964
	(1.1873)		(1.8841)		(2.4269)
RT* (Over 30)	1.2138		-6.1544		3.6914
	(2.9978)		(3.8507)		(3.1904)
χ^2 for parameter tests on risk variables					
RT20=Rtmid $\chi^2(1)$	3.91	**	3.64	*	0.00
Rtmid=RT30 $\chi^2(1)$	0.31		2.66		2.15
Risk vars jointly 0 $\chi^2(3)$	4.92		8.79	**	2.35
Risk vars all equal $\chi^2(2)$	3.94		7.09	**	2.33
B. High School Graduates					
RT * (Under 20)	0.0512		0.4359		-0.4274
	(0.4909)		(0.5924)		(1.0135)
RT * (Between 20 and 30)	-0.4323		-0.7097	*	0.1118
	(0.2853)		(0.3792)		(0.4872)
RT* (Over 30)	0.0466		-0.9901		1.4441
	(0.6535)		(0.9665)		(0.8941)
χ^2 for parameter tests on risk variables					
RT20=Rtmid $\chi^2(1)$	0.96		3.87	**	0.30
Rtmid=RT30 $\chi^2(1)$	0.54		0.09		2.14
Risk vars jointly 0 $\chi^2(3)$	2.70		6.23		3.01

Risk vars all equal χ^2 (2)	1.32		4.16		2.59
C. College Graduates					
RT * (Under 20)	2.1650	*	3.2031	**	-2.3419
	(1.3067)		(1.5038)		(2.7136)
RT * (Between 20 and 30)	0.2350		0.3189		-0.3152
	(0.4532)		(0.6086)		(0.8572)
RT* (Over 30)	0.0555		0.8025		-1.2613
	(0.6016)		(0.7644)		(1.2958)
χ^2 for parameter tests on risk variables					
RT20=Rtmid χ^2 (1)	2.19		3.49	*	0.64
Rtmid=RT30 χ^2 (1)	0.09		0.40		0.71
Risk vars jointly 0 χ^2 (3)	2.84		5.23		1.60
Risk vars all equal χ^2 (2)	2.44		3.62		1.38

Notes: See notes for Table 7.

Table 10: Effects of Risk Tolerance on Hazard of First Birth With Age Interactions, by Educational Attainment at Time of Birth

	Married		Unmarried	
A. High School Dropouts				
RT * (Under 20)	1.9041	*	0.6782	
	(0.9706)		(0.8485)	
RT * (Between 20 and 30)	1.5328		-3.1548	**
	(1.0718)		(1.2424)	
RT* (Over 30)	2.7386		1.7210	
	(2.8573)		(2.6340)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid χ^2 (1)	0.09		9.40	***
Rtmid=RT30 χ^2 (1)	0.18		3.34	*
Risk vars jointly 0 χ^2 (3)	4.98		11.19	**
Risk vars all equal χ^2 (2)	0.23		11.19	***
B. High School Graduates				
RT * (Under 20)	0.6629		1.0178	
	(0.9027)		(1.1017)	
RT * (Between 20 and 30)	-0.4490		-0.5575	
	(0.3544)		(0.6890)	
RT* (Over 30)	-0.1543		0.6863	
	(0.7450)		(1.2852)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid χ^2 (1)	1.49		1.94	
Rtmid=RT30 χ^2 (1)	0.15		0.77	
Risk vars jointly 0 χ^2 (3)	2.55		2.35	
Risk vars all equal χ^2 (2)	1.54		2.34	
C: College Graduates				
RT * (Under 20)	--		--	
RT * (Between 20 and 30)	-0.3668		0.7674	
	(0.5994)		(2.1967)	
RT* (Over 30)	-0.1084		-6.1083	*
	(0.6513)		(3.3889)	
χ^2 for parameter tests on risk variables				
RT20=Rtmid χ^2 (1)	--		--	
Rtmid=RT30 χ^2 (1)	0.12		4.23	**
Risk vars jointly 0 χ^2 (3)	0.37		4.32	*
Risk vars all equal χ^2 (2)	0.12		4.23	**

Notes: See notes for Table 7, except that educational attainment is measured at the time of the first birth.

Table 11: Effect of Risk Tolerance on the Likelihood that a Woman Older than 45 Ever Had a Birth

RT	-0.0310	
	(0.0703)	
Marital status	0.1995	***
	(0.0246)	
High school graduate	-0.0095	
	(0.0274)	
College graduate	-0.0732	**
	(0.0333)	
Black	0.0670	**
	(0.0266)	

Notes: Dependent variable is an indicator for whether the woman ever had a birth. Coefficients are from linear probability model on a sample of those women over the age of 45. Regression also controls for Hispanic ethnicity, religious affiliation, and urban status. Levels of statistical significance: *** denotes significance at the one-percent level; ** at the five-percent level; and * at the ten-percent level.

Figure 1

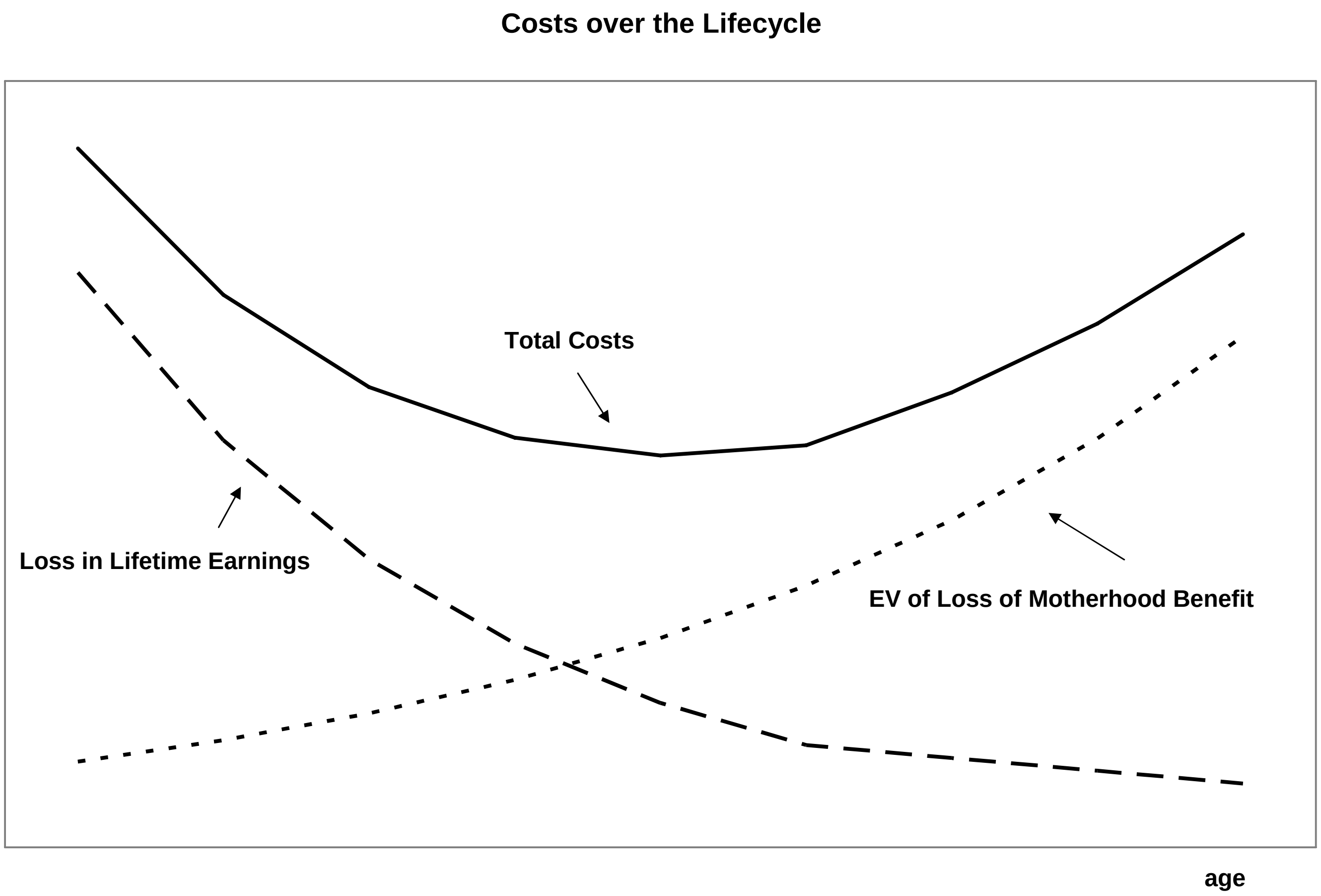

Costs over the Lifecycle
Total Costs
Loss in Lifetime Earnings
EV of Loss of Motherhood Benefit
age

Figure 2

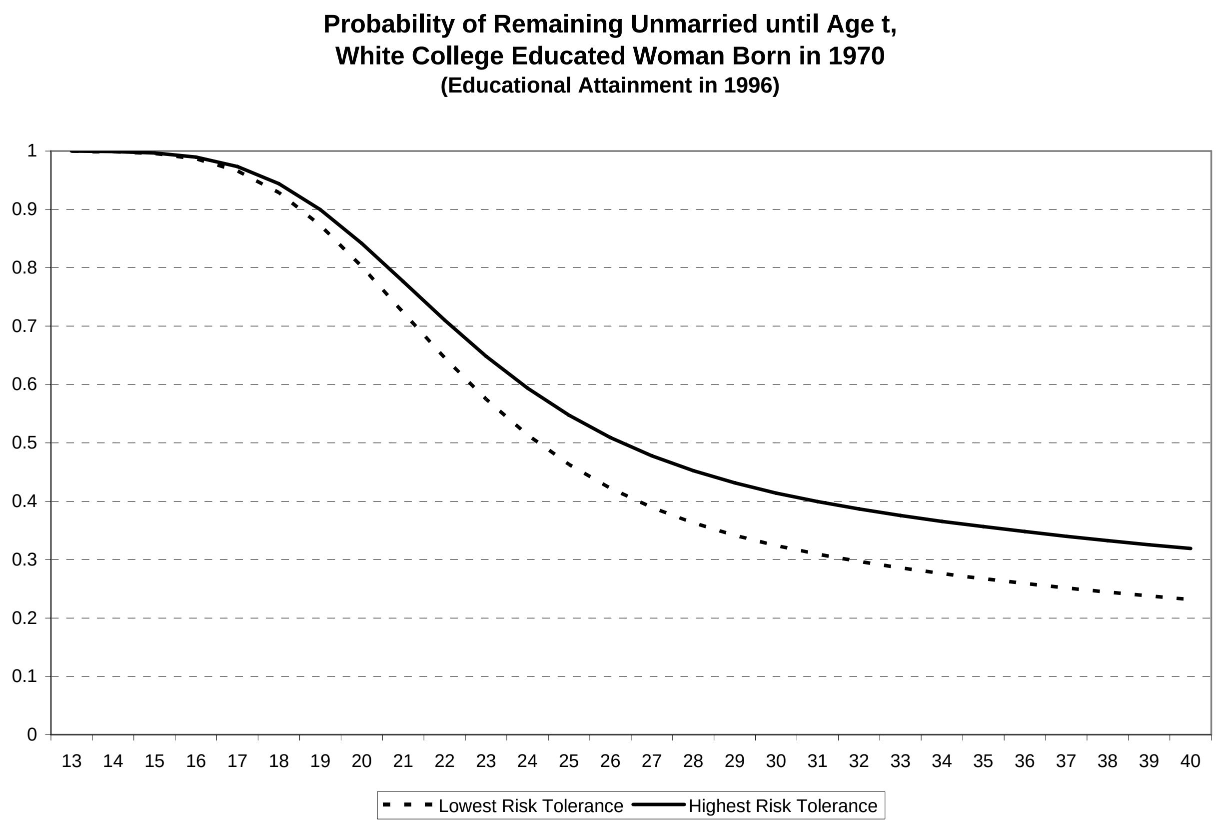

Probability of Remaining Unmarried until Age t,
White College Educated Woman Born in 1970
(Educational Attainment in 1996)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Lowest Risk Tolerance
Highest Risk Tolerance

Figure 3

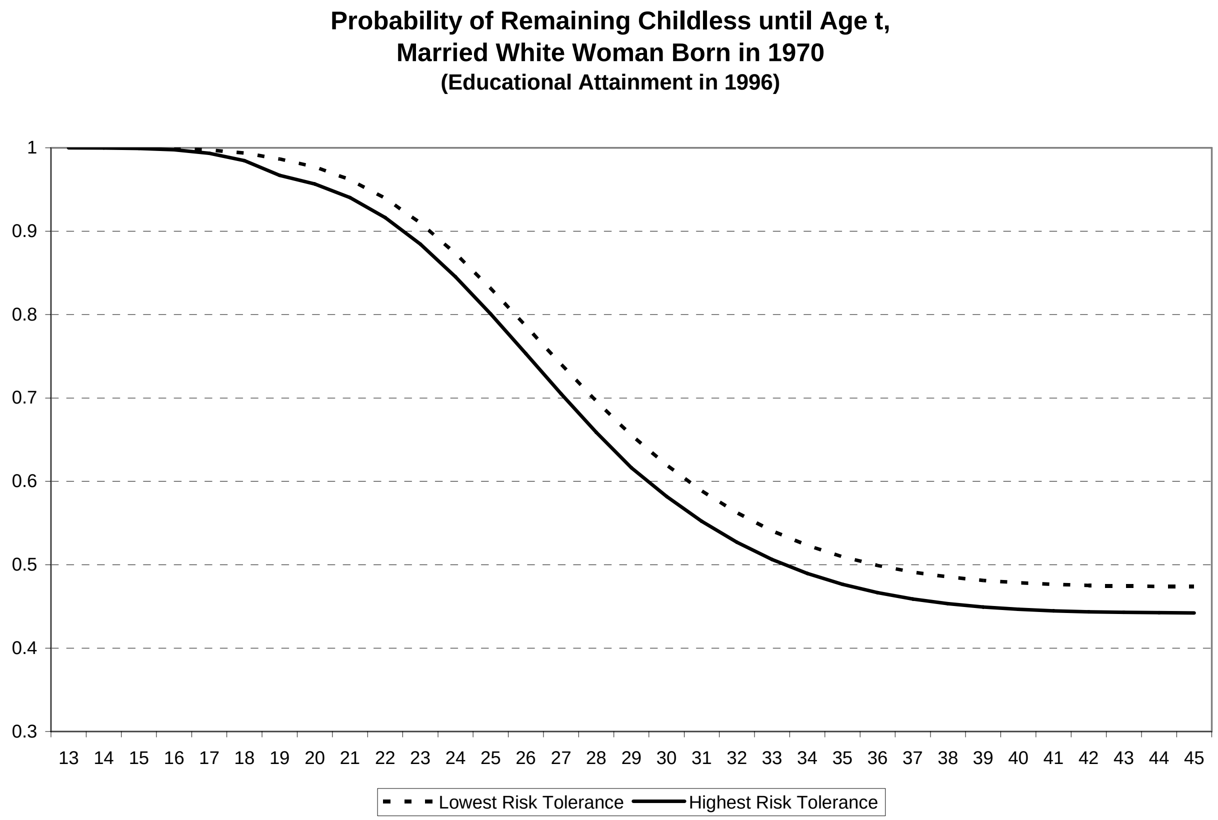

Probability of Remaining Childless until Age t,
Married White Woman Born in 1970
(Educational Attainment in 1996)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
Lowest Risk Tolerance
Highest Risk Tolerance

Figure 4

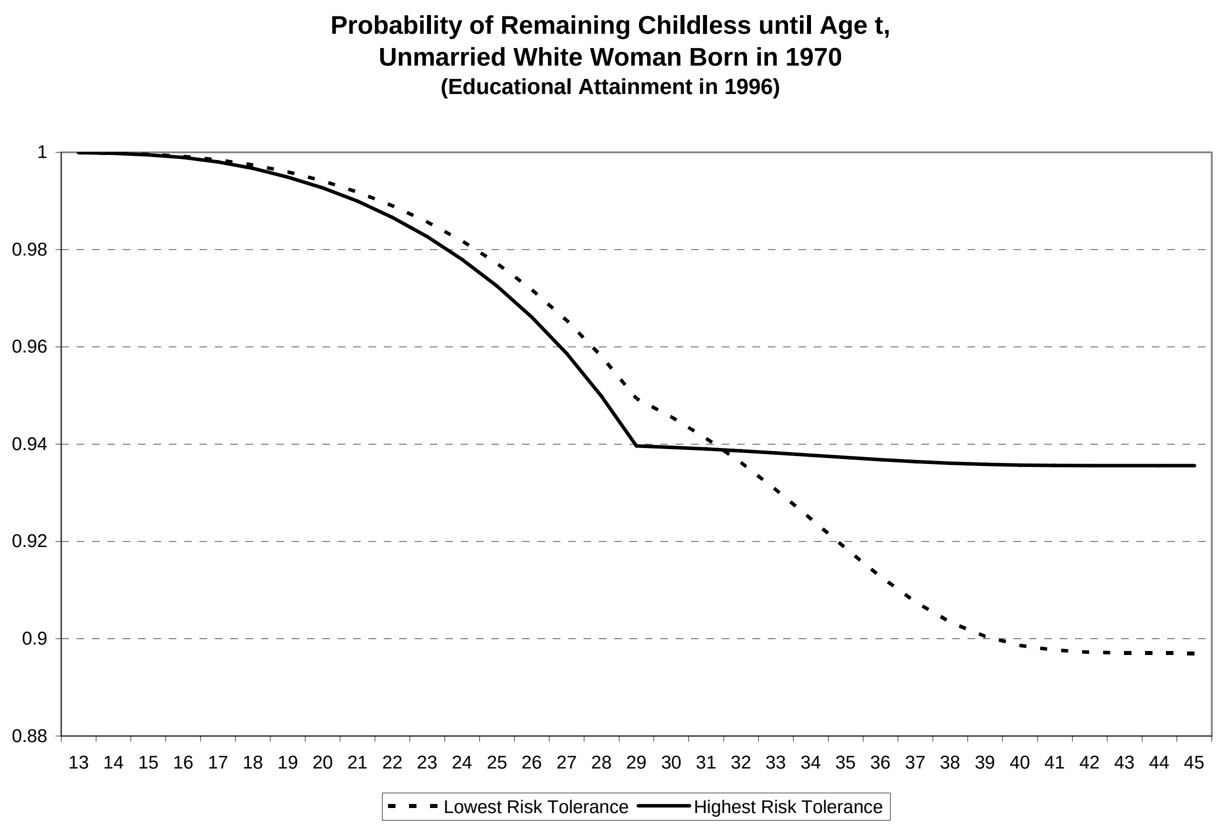

Probability of Remaining Childless until Age t,
Unmarried White Woman Born in 1970
(Educational Attainment in 1996)
1
0.98
0.96
0.94
0.92
0.9
0.88
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
Lowest Risk Tolerance
Highest Risk Tolerance

Figure 5

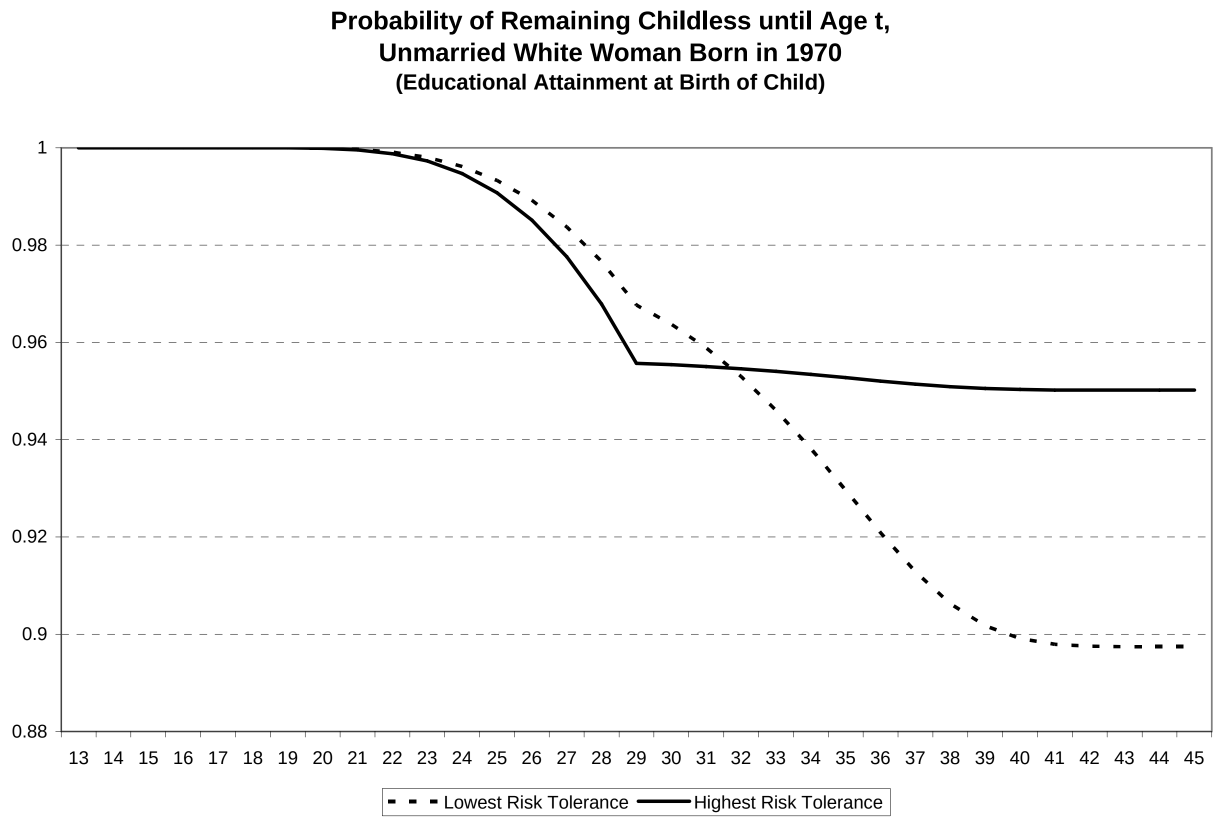
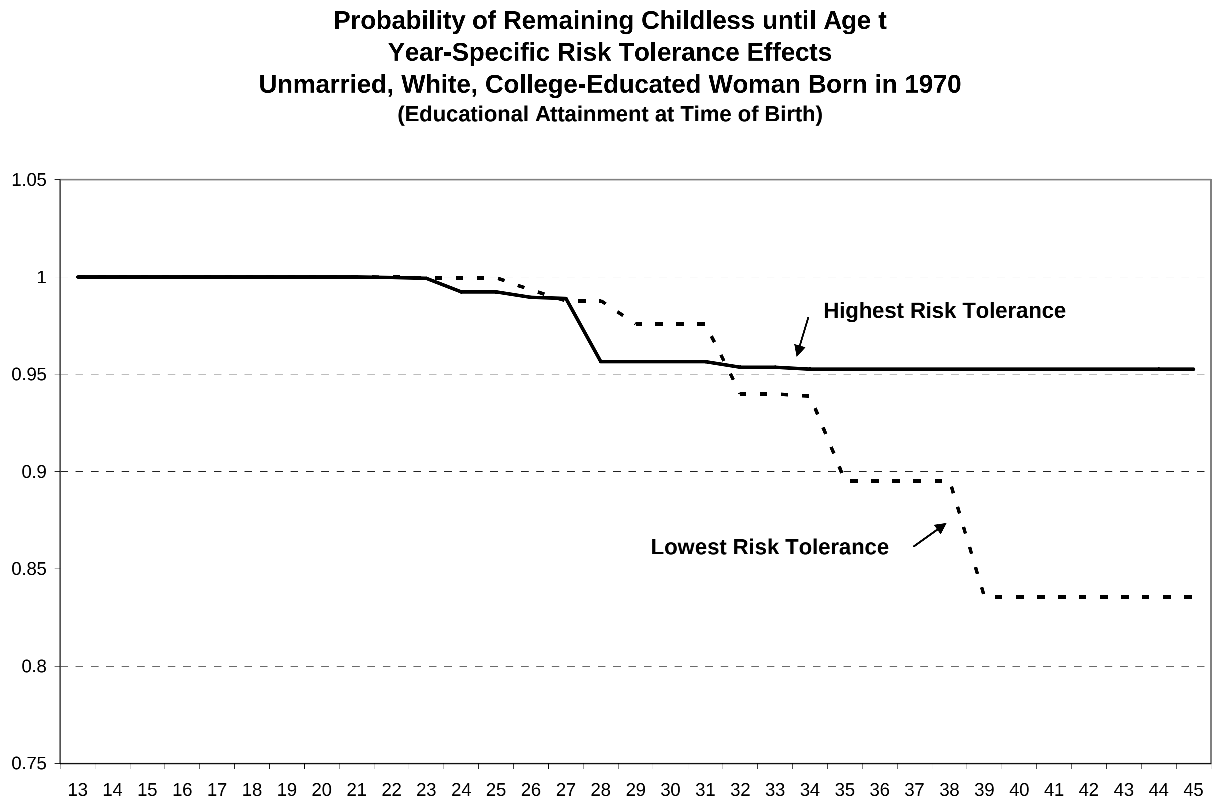

Probability of Remaining Childless until Age t,
Unmarried White Woman Born in 1970
(Educational Attainment at Birth of Child)
1
0.98
0.96
0.94
0.92
0.9
0.88
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
Lowest Risk Tolerance
Highest Risk Tolerance

Figure 6


Probability of Remaining Childless until Age t
Year-Specific Risk Tolerance Effects
Unmarried, White, College-Educated Woman Born in 1970
(Educational Attainment at Time of Birth)
1.05
1
0.95
0.9
0.85
0.8
0.75
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
Highest Risk Tolerance
Lowest Risk Tolerance