1. Introduction

In this paper, we examine the determinants of variation in fertility timing using a new and diverse birth cohort study, the Fragile Families and Child Wellbeing Study (FFCW). The FFCW sample is drawn from 20 US cities selected to provide variation in labor markets, housing markets, and welfare regimes. The sample consists primarily of women who were not married at the time of the birth and is representative of non-marital births in medium and large cities, but also includes some women who were married and who gave birth in the same hospitals and cities. Sample members are followed longitudinally, with the latest wave of data available from approximately 3 years post-birth. Taking advantage of the longitudinal data and the variation across cities in labor markets, housing costs, and welfare policies, we analyze the timing to next birth and the influence of these external factors on that timing. We find considerable variation in the time to next birth across our 20 cities, some of which is explained by the variation in labor markets, housing costs, and welfare policies, particularly for unmarried women who already have two or more children. Our results indicate that this group's fertility is more sensitive to these external variables than is the fertility of married women, or unmarried women with just one child.

2. Background

Economists, sociologists, and demographers have long been interested in the influence of labor markets, housing costs, and welfare policies on fertility. A large literature has examined the influence of labor markets on women's fertility decisions (cites). There have also been numerous studies of the effects of welfare on family formation outcomes, including fertility (see Moffitt for a comprehensive review). The effects of housing costs have been less studied. And it is rare for studies of fertility to examine all three sets of factors concurrently. The omission of housing costs is particularly problematic as these are likely to have a strong influence on fertility, and related family formation outcomes (Curtis 2006, Hughes 2003, London 2000, Single-Rushton & McLanahan 2002, Winkler 1992). And, studies that control for only one or two sets of factors, rather than all three, may be biased if those factors are correlated with each other, as well as the outcome variable. For example, if cities with higher welfare benefits have higher benefits in part because earnings are higher, the interpretation of the welfare benefit variable is problematic if wages are not controlled.

Our study expands upon previous research by including detailed information on labor markets, housing costs, and welfare policies, unlike prior studies that have tended to focus on only one or two of these areas at a time. As noted above, housing costs in particular have been neglected as an influence on fertility. This omission is particularly concerning given that the few studies that have looked at housing costs have found them to have important effects on fertility and other family formation outcomes. Therefore, we include detailed controls for housing costs in all our models, along with detailed controls for labor markets and welfare policies.

3. Theoretical Framework

In order to estimate associations between labor markets, housing costs, and welfare policies and women's decisions about the timing of subsequent fertility, we begin with the theoretical framework presented by Walker (1995) (see also Bjorklund, 2006). In this framework, policies can influence fertility by altering the costs of having a child. Three specific types of costs enter into a woman's decision: 1) direct costs (of housing, food, clothing, etc.) associated with raising the child 2) foregone earnings associated with time out of the labor market 3) lower future earnings due to the loss of human capital associated with the loss of work experience and job tenure.

Given this framework, higher housing costs would, all else equal, be expected to decrease fertility by raising the direct costs of having a child (assuming that as children are added to a family, this increases the amount of housing the family requires). Conversely, higher welfare benefits, all else equal, should increase fertility by lowering the direct costs (since, with higher benefits, families receive a higher subsidy per child). The effects of labor market factors are less straightforward. Better labor markets, as evidenced by lower unemployment rates and higher wages, would be expected to lower the direct costs of having a child by raising family incomes, but also should increase the penalty to having a child, by raising the value of foregone earnings as well as the value of future foregone earnings (assuming that cities with strong labor markets today will have strong labor markets in future).[1] Thus, the influence of labor market factors on fertility is not clear *a priori*.

Another implication of this framework is that the costs of having a child, and the effects of external factors, may not be constant across women. The number of prior births is likely to be particularly consequential. Given that the modal family size in the U.S. consists of two children, women who already have two or more children may be more sensitive to costs, and policies that affect costs, than women who have fewer or no children. Therefore, in our sample, where all women have just given birth and thus have at least one child, there may be a distinction between women who have just one child (and may want another to complete their family) and women who already have two or more children (and for whom another child may be more discretionary). A second factor that may alter the costs of children, and the effects of external factors, is marital status. To the extent that unmarried women bear more of the costs of children than do married women, the fertility decisions of women who are not married may be more sensitive to external factors that affect the costs.

4. Data and Methods

We use data from the Fragile Families and Child Wellbeing Study, a national survey that provides longitudinal information about a birth cohort of children born to unmarried parents as well as a comparison group of children born to married parents, in 75 hospitals in twenty U.S. cities with populations of 200,000.[2] Mothers were interviewed in the hospital shortly after their child's birth and approximately one year and three years later. The next follow-up interview is planned when the child is about 5 years old. Baseline

interviews took place for 13 of the cities in 2000, 5 of the cities in 1999 and 2 of the cities in 1998.[3]

Our focus is on whether a woman has had a next birth and the timing to that birth, in our sample of women who have all just given birth at baseline. We track subsequent births using data from the household roster that interviewers complete in phone interviews conducted approximately 12 and 36 months post-birth. FFCW began with a sample of 4898 births (3713 non-marital and 1185 marital). Of these, 4231 women (3181 who had non-marital births and 1050 who had marital births) remained in the study at the 36-month follow-up. Thus, the attrition rate was 14% overall (14% for non-marital births and 11% for marital). Cases lost to attrition were significantly more likely to be non-marital, foreign born, not working, Hispanic and less educated while there were no differences in terms of age and number of children at baseline.

We begin by categorizing the women in the sample by whether they had any subsequent birth between the time of the baseline birth and the 3-year follow-up survey.[4] We then use Cox proportional hazards models to estimate the rate at which mothers had a subsequent birth. Cox proportional hazards models have been widely used in studies of fertility timing (see, for example, Acs, 1996; Finer and Zabin, 1998; Pong, 1994) and are appropriate for this analysis because no assumptions are made about the underlying distribution of the hazard. Because our period of observation ends at the 3-year follow-up, mothers who did not have a subsequent birth by that time are right censored. Mothers who had more than one subsequent birth between the baseline birth and the 3-year follow-up (this applies to 121 women, or .03% of our sample) are used only once (that is, we analyze the timing to their first subsequent birth and do not analyze the timing to a second subsequent birth, if present).

Because the timing to a next birth, and the determinants of that timing, may vary both by the birth order of the baseline birth, as well as the mother's marital status at the time of that birth, we estimate models separately by both baseline birth order and marital status. Thus, we estimate models for four distinct groups: 1) non-marital first birth at baseline; 2) marital first birth at baseline; 3) non-marital higher-order birth at baseline; and 4) marital higher order birth at baseline.

Each model includes controls for labor markets, housing costs, and welfare policies. We measure the strength of the labor market with two controls, the male unemployment rate and the natural log of the mean male wage derived from the March Current Population Survey in the baseline interview year. As discussed earlier, the effect of these measures is unclear a priori, as a higher unemployment rate and lower wages would be expected to increase fertility by lowering the costs associated with foregone earnings and lower human capital, but would also decrease fertility by raising the costs of children relative to families' incomes. We measure housing costs with a control for the log of the house price index using Malpezzi, Chun and Green's 1990 single owner occupied housing indexes adjusted to 2000 figures using the Office of Federal Housing Enterprise Oversight house price indexes[5] (Malpezzi et al. 1998). The subsidized housing control is constructed from HUD's "Picture of Subsidized Households 1998" and "The Low

Income Housing Tax Credit Database". Theory would predict that greater availability of subsidized housing and lower house prices would increase fertility by lowering the costs of having children. We measure welfare policies with a control for the log of the maximum combined welfare and Food Stamp grant available to a family of four from the Welfare Benefits Data Base (Moffitt 2005) the log of state child support expenditures per single-mother family in the state using data on child support enforcement expenditures from the Office of Child Support Enforcement and data on the number of single mother families from the Census. Higher welfare and Food Stamp benefits should raise fertility by lowering the direct costs of children. The effects of child support expenditures are harder to predict. On the one hand, tougher enforcement should raise women's incentive to have children by increasing the likelihood that they will get support even if the father is absent, but on the other hand, tougher enforcement should raise men's incentives to avoid having children, because it increases the costs of children for those who are not married or co-resident. The net effects will depend on the relative strength of these contrary effects for men and women and how they balance each other out.

We also include a full set of controls for demographic characteristics that theory and prior research have indicated affect fertility timing. These characteristics, all measured at the time of the baseline birth, include: the mother's age, mother's race/ethnicity, mother's nativity, mother's education, mother's employment, mother's religious observance, child gender and child low birth weight.

Endnotes

[1] There may be some asymmetry with regard to gender, if better labor market conditions promote fertility by raising men's ability to support children but also deter fertility by increasing the costs to women of having children. Although in principle one might test for this by including measures of labor market conditions for women as opposed to men, we are reluctant to pursue this approach because measures of women's unemployment or wages may be endogenous. We therefore use measures of men's unemployment and wages as measures of the overall strength of the labor market, recognizing that the interpretation of their effects will not be straightforward.

[2] Austin, TX; Baltimore, MD; Boston, MA; Chicago, IL; Corpus Christi, TX; Indianapolis, IN; Jacksonville, FL; Nashville, TN; New York, NY; Norfolk, VA; Philadelphia, PA; Pittsburgh, PA; Richmond, VA; San Antonio, TX; San Jose, CA; Toledo, OH, Detroit, MI; Milwaukee, WI; Newark, NJ and Oakland, CA.

3 Corpus Christi, Indianapolis, Milwaukee, New York, San Jose, Boston, Nashville, Chicago, Jacksonville, Toledo, San Antonio, Pittsburgh and Norfolk baseline interviews occurred in 2000; Baltimore, Detroit, Newark, Philadelphia and Richmond in 1999 and Oakland and Austin in 1998.

4 The FFCW data do not allow us to track pregnancies that did not result in a birth.

[5] The Office of Federal Housing Enterprise Oversight (OFHEO) house price index is a weighted repeat sales index designed to measure changes in single-family home values in the U.S. The indexes are adjusted by normalizing the OFHEO housing price index to 100 in the first quarter of 1990 and then multiplying the 1990 value by the 2000 index and dividing by 100.