Does Education Delay the Timing of First Birth?

by Dean R. Lillard[1] and Ning Zhang[2]

[1] Cornell University and DIW Berlin

[2] Cornell University

Fertility has been declining almost continuously in both developing and developed economies over the past thirty years. A component of that change has been not only a reduction in the number of children a given woman bears but also the timing of her first birth. The average age of first birth in the United States has increased from 21.4 in 1970 to 25.1 in 2002 (Centers for Disease Control 2004). It is often asserted that these trends are largely explained by the rising education levels of women. However, it remains an open question whether the acquisition of education causes women to alter their fertility decisions, whether the timing of motherhood affects the education attainment, or whether the acquisition of education is a simultaneous outcome determined by some other factor that accompanies the change in fertility.

This paper will attempt to isolate these effects. We use human capital theory to frame an empirical investigation into this question. In that framework educational investment is taken with an eye to the marginal rate of return on each additional year of education (measured by the difference between the net discounted present value of additional earnings and additional costs associated with each year of education). To use this theoretical framework to model decisions about the timing of births we consider not only the extra earnings a woman gets from another year of education but also the path of those earnings. The time path of earnings is important when combined with the fact that pregnancy and child birth disrupt a woman's ability to conduct her work – for at least *some* time. Together these facts imply that a woman will time the birth of her child to coincide with a *relatively* flat portion of her life-cycle earnings trajectory. By so doing she minimized the opportunity cost of time away from work associated with being pregnant and giving birth. An alternative explanation, offered by Mincer and Polachek (1974) is that women anticipate their fertility and then acquire human capital that minimizes earnings losses from time taken away from the labor market.

The empirical analysis of the relationship between the timing of births and a woman's educational choices is complicated by selection issues. That is, are factors – low career expectations, low motivation and lack of success in school generally – associated with younger first birth and less schooling? Or are the women who get more education different in unobserved ways so that, even had they not gotten more education, they still would have delayed the birth of their first child?

To grapple with this statistical question and to try to explain the secular trends in the timing of births we will use a new and promising source of exogenous variation that will explain differences in levels of women's education. In particular, we will merge data on college tuition from the Integrated Postsecondary Education Data System (IPEDS) to data from both the National Longitudinal Survey of Youth 1979 cohort (NLSY79) and the Panel Study of Income Dynamics (PSID). Both of these longitudinal data sets contain information we need to implement our empirical analysis. Both track educational choices of women over long periods of time. Together the NLSY79 and PSID samples include women who were taking college and fertility decisions from 1973 to present (the period for which we have IPEDS tuition and institutional data).

We use this exogenous variation in college tuition to identify a woman's decision about whether or not to attend college. That is, for observationally equivalent women, we rely on the assumption that, everything else equal, a woman who faces higher tuition costs will be less likely to attend college. Under the assumption that variation in college tuition is unrelated to the factors that determine the timing of a birth, we can then identify how college education affects the timing of the birth. One challenge to this identification strategy is that college tuition may (somehow) be determined by factors that also enter a woman's fertility decision. For example, if state unemployment rates are high legislatures may be less inclined to raise tuition at state universities and women may be less inclined to bear children (if they or their husbands are unemployed). To confront this possibility, we adopt a second identification strategy. In particular, we make use of information in both the PSID and NLSY79 that identifies the county in which respondents live. We use county of residence information to calculate, for each woman, the distance to every college or university in the US. We then use the distance information to calculate several measures of tuition that incorporate both money and time

costs (in terms of travel). For example we calculate a simple average of tuition at all public colleges and universities in the woman's state of residence, a distance weighted average of tuition at public universities in the state, and the cost of attending the college or university that is physically closest to her county of residence at age 17. We compute similar measures for private universities. The use of distance assumes that parents did not choose a place to live to minimize the distance their daughter would have to travel to attend a university. We thus use both temporal and geographic variation in factors that are plausibly exogenous to the fertility decision to help statistically identify a causal effect of education on the timing of her first birth.

This study considers education and fertility decisions taken between 1973 and 2004. It is especially promising to study education and fertility decisions taken by women over this time period because many exogenous determinants of both fertility and education have changed dramatically over these years. For example, the real cost of the average 4 year public university increased 110 percent between 1973 and 2004. Over this same time period the cross-state variation in tuition also increased. Over the same period returns to education for women increased dramatically (Blau and Kahn, 2006) – a change many attribute to reductions in labor market discrimination against women and to increase federal subsidies aimed at attracting women to high paying college majors such as engineering and mathematics. Finally, Title IX of the Educational Amendments Act was implemented in 1975 which made pregnancy as a legitimate reason for school expulsion. These factors all feed back to either educational or fertility decisions.

Our findings contribute in four ways. First we provide new evidence on how education affects the timing of the first birth. Although research has documented that the post-secondary school attendance is correlated with widening gap between early and later childbearing observed from 1960 to the 1990s (Hofferth and Mott, 2001), no study has been able to establish a causal link. Second our study shows how temporary changes in college tuition affect women's educational and fertility choices – decisions that feed into subsequent labor market decisions. Third our paper also contributes to the large literature on fertility. In particular, we will contribute to the understanding of how fertility decisions change with temporary changes in the cost of higher education and how those effects vary across women from different socioeconomic backgrounds. The findings are

also related to life-cycle fertility models in which credit constraints are important in the timing of fertility decisions. Finally our paper contributes by providing another measure of returns to education.

From a policy perspective our findings will speak to questions of the socially optimal subsidy to higher education. The findings will also be relevant to efforts to educate women in developing economies – providing evidence on whether one can expect a reduction in fertility (or delay in first births) when education of women is more heavily subsidized. Motherhood may be one of the left obstacle to women's achievement of economic equality with men (Fuchs, 1988), and deferred motherhood may be a method of reducing that inequality.

References

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