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Chapter Title: Comment on "Fertility Theories: Can They Explain the Negative Fertility-Income Relationship?"

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Comment

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The chapter begins with an empirical regularity: the negative association between household income and completed fertility, as measured by the number of children ever born to a woman. The authors provide compelling evidence of a robust relationship that is present in comparisons both within and between birth year cohorts. Figure 2.1 in the chapter (reproduced from Jones and Tertilt [2008]) shows the surprising consistency of the relationship over the past century-and-a-half in the United States, and table 2.1 shows that the measured elasticity has been remarkably stable over time.

Having established their main stylized fact, the authors proceed to carefully explore the types of theoretical models that can generate the negative relationship observed in the data. The approach in the chapter is to use a series of simple cases to exemplify the models, which they classify into two main types, based on their underlying primitive source of heterogeneity across agents. The major division is between models that start with income heterogeneity and produce fertility differences and those that start with fertility differences (or differences in preferences for children) and endogenously generate income differences. The models represent the two potential directions for an immediate causal relationship between income and fertility. Indirect sources for the relationship based on outside factors are not considered.

The main contribution of the chapter is that it lays out a broad yet coherent framework for exploring the fertility-income relationship. The second contribution is the identification of the fundamental modeling choices and assumptions, such as functional form or parameter requirements for utility or production functions, necessary for each model to produce the key relationship. These assumptions are not equally plausible, and may provide testable implications for future empirical work. The authors argue that the exercise is useful for macroeconomic theorists who want to incorporate fertility in their models in a reasonable way. In addition, the chapter can provide a useful framework for empirical researchers studying demographic and labor economics.

The first type of model, characterized by the price theory of time, starts with exogenous wealth or wage heterogeneity, and endogenously produces fertility differences. If children are inferior goods, clearly the relationship between income and fertility is negative. Without that assumption, this first type of model requires a high elasticity of substitution between children and consumption, a source of nonlabor income, or nonhomothetic preferences to reproduce the key stylized fact. The authors demonstrate the sensitivity

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of these models in generating even the cross-sectional relationship. They also provide a useful discussion of how the well-known "quantity-quality" trade-off is insufficient to produce a negative correlation between fertility and income. Models of the first type with quality require restrictive assumptions regarding preferences or the quality production function.

The second type of model treats wages as endogenous, and reverses the direction of causality in the key correlation from number of children to earned income. Agents exogenously differ in one of two ways: in their tastes for children or their realized fertility. The model is introduced in section 2.4 as the less conventional approach, and is considered in later sections in combination with quantity-quality and the theory of female time allocation. One channel through which children reduce household income is a reduction in market work hours. In a stronger form of the model, not only does income decline with fertility, but wage rates do as well. The channel for the latter effect is through lower human capital investment in formal education or on-the-job training and experience.

The chapter's emphasis on the second model type is appropriate. These models have been generally overlooked by macroeconomic theorists, despite their ability to generate the main stylized relationship under less restrictive assumptions than the first model type. A potential drawback of the approach is that the primitive source of variation is in preferences, and economic models have traditionally had less to say about preference formation than about income distribution.

Another advantage of the second approach is that its casual mechanism is consistent with empirical evidence from labor economics and economics of the family. Researchers have identified a gap in pay between mothers and similar nonmothers, termed the family gap (Waldfogel 1998), and motherhood remains a key source of income inequality between the sexes (Fuchs 1988).

In a recent paper (Miller 2006), I find that early childbearing harms women's career outcomes. Biological shocks to fertility timing from miscarriage, failed contraception, and extended time to conception are used as instrumental variables to estimate the effects of a year of motherhood delay: a 10 percent increase in income, 5 percent increase in total hours worked, and 3 percent increase in wage rates. The paper also estimates the effect of motherhood itself on wages using the same instrumental variables on panel data. There is evidence that mothers experience both a fixed penalty in the form of permanently lower wages as well as a flattening of the wage-age profile, reflecting lower returns to experience or a "mommy track." The underlying source of the family gap may be changes in labor supply or investment behavior of women after motherhood. It may be that employers offer mothers fewer opportunities for advancement and promotion. In fact, the two are likely interconnected. Although this evidence is consistent with the models

of the second type presented in the paper, it is important to note that the estimates constitute only a portion of the endogenous wage channel. The empirical results in Miller (2006) are conditioned on educational attainment, test scores, and in some cases, accumulated work experience. Without these conditioning factors, the total relationship is even larger.

An important feature of the second type of models is that they depend on the assumption that a mother's time is an essential input in child development. In section 2.7, the authors consider the theoretical implications of relaxing that assumption and allowing mothers to substitute their own time with purchased child care. The motherhood penalty in wages would be eliminated, but the authors are able to generate an example with the basic negative correlation between fertility and income when they include leisure in the model. The empirical evidence that women experience career penalties for childbearing suggests, however, that the time costs of children remain important and are borne in large part by mothers. The authors speculate as to the possible reasons that nannies have not completely replaced working mothers at home; the barriers are substantial. Among them are unequal tax treatment of family and hired inputs into child care (leisure and home production, including child care, are untaxed, but income spent on hired care is taxable), and asymmetric information about quality and effort (leading to potential adverse selection and moral hazard problem: hence demand for services from agencies and monitoring devices). Finally, if the utility from children flows from time spent with them, paid care will always be an imperfect substitute for parental time.

After exploring a range of static models that generate the cross-sectional relationship, the authors return to their empirical inspiration in figure 2.1 and put their models to a more ambitious test: can they be extended to explain the time-series variation as well? For the models with preference heterogeneity, one approach would be to have preferences for children change exogenously over time and themselves generate changes in gross domestic product (GDP) within the model. Rather than relying on changing fertility to explain economic growth, the authors instead develop a model in the appendix with additional exogenous variation from technological change in the productivity of the economy and in the costs of children. With the right choice of parameters, the authors can produce a figure that resembles the pattern in the data. A question that warrants future exploration is how the distribution of tastes would evolve endogenously in such a model. For example, if children inherit tastes (even imperfectly) from their parents, and those with greater desire for children choose higher fertility, do average preferences in society tend to increase, or are there mitigating forces?

An interesting area for future work is to consider models that produce the negative correlation between female wages and fertility, but depend on channels not explored in the chapter. One possibility is marital disagreement

over desired fertility. The models in the chapter are all unitary, in that either one adult creates one child or the partners agree on their desired number of children. What would happen if they did not agree? The direction of causality is open: children may reduce woman's power within a relationship and earned income, or women with more power from higher wages may bargain for fewer children. More effective birth control can also shift the "balance of power" toward women (Chiappori and Oreffice 2008).

The National Longitudinal Survey of Youth 1979 provides some anecdotal evidence that men and women disagree about desired fertility, or at least that women report such disagreements with their partners and spouses. Starting with the 1982 wave of the survey, women were asked, following each live birth: "Prior to becoming pregnant, did you want to become pregnant?" The 1982 responses for first child born (women aged seventeen to twenty-five reveal a high rate of undesired pregnancies, based on the self-reported preferences of the mother. The distribution of responses was: 192 women said "yes"; 69 said "didn't matter"; 1,058 said "no, not at that time"; and 340 said "no, none at all." Only 11.6 percent report having wanted to conceive. If we include first births to older women, using data through 2004, the rate increases, but only to 13.5 percent. The same women were also asked if their husband or partner wanted the pregnancy. The 1982 responses were as follows: 1,103 said "yes"; 130 said "didn't matter"; 718 said "no, not at that time"; and 420 said "no, none at all." Although fewer than one in eight women reported wanting her own pregnancy, nearly half of the women reported the belief that their husband or partner wanted it.

Another way to fruitfully extend the models would be to incorporate imperfect control over fertility. The survey responses just mentioned suggest that random shocks play an important role in human reproduction. Limiting fertility has a cost, either practicing abstinence or using contraception. The supply of contraceptives and knowledge about fertility control varies over time and in the cross-section. Expanding the models to include contraceptive choices would also provide a natural way to introduce other "extra-economic" factors such as culture and religion, which are clearly related to fertility.

To summarize, through a series of simple examples and cases, the chapter provides an overview of the modeling options available to researchers who want to generate a negative cross-sectional correlation between fertility and income, consistent with the documented demographic pattern. The authors demonstrate that a wide range of economic models produce predictions consistent with the facts, but that the necessary assumptions are less restrictive if one begins with preference heterogeneity rather than income heterogeneity. The chapter contains useful insights that will inform economists and demographers in their thinking about variation in completed fertility, its sources, and its consequences.

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