Women's household income contributions and higher-order births in the United States

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I. Introduction

Women's labor force participation, career commitment, and rising contributions to household income shape the fertility behavior of an increasingly large proportion of U.S. couples. Our hypothesis is that the fertility patterns of equal-earner households and households where women contribute a majority of income will differ from those of traditional male breadwinner families. Our goal at present is to provide demographic evidence supporting and motivating further research on this subject.

We draw on the 1979 cohort of the National Longitudinal Survey of Youth (NLSY79) to conduct an investigation of the significance of relative earnings on fertility outcomes. We focus on the transition to second and third births among married, heterosexual couples who have already had a first child. We employ event history models to analyze the relationship between the transition to higher order births and wife's share of household income. The analyses compare households with a primary male earner (where women contribute less than 40%) to households with a relatively equal share of income contribution (where women contribute 40-60% of income) and to female breadwinner households (where women's income share is greater than 60%).

In the remainder of this paper we provide some brief background to the subject (section II); discuss the data and methods (sections III and IV); present and discuss the results (section V); and conclude with a review of further steps that we have planned (section VI).

II. Background

The increased labor force participation of women in the United States over the last hundred years is both well documented and, arguably, "the most significant change in labor markets in the past century" (Goldin 2006). A rebalancing of the shares of household earnings and income contributed by husbands and wives has been concomitant with the increased participation of women in the economy. In 1970, husbands were the sole source of income for 56% of couples and provided more than half (at least 60%) of income in an additional 31% of couples. By 2001 the equivalent figures were 25% sole-male income couples and 39% majority-male income couples (Raley et al. 2006). More recently, a number of studies have documented an emergence of the trend in female breadwinnership among married couples (Bloemen and Stancanelli 2007; Brennan et al. 2001; Raley et al. 2006; Winslow-Bowe 2009). The most recent data from the 2011 American Community Survey suggest that among married couples in the US, almost a quarter of wives out-earn their husbands (24.3%), an increase from 6.2% in 1960 (Wang et al. 2013).

The primary outcome of interest, continued childbearing among U.S. married couples, has not been empirically tested in studies that investigate the effects of relative household income on family functions and structures. Instead, much theoretical work on relative income and household decision-making comes from literature on household division of labor and marital dissolution. Both sociologists and economists have expressed an interest in such studies because they test theories of behavior and gender. For example, bargaining theories of behavioral economics posit that the primary earner can strike a better bargain in marriage such that the secondary earner performs more household work (Manser and Brown 1980). Exchange theories of sociology hypothesize that a spouses' degree of dependence on the other spouse determines his or her level of contribution to household work (England and Farkas1986).

While exchange and bargaining theories are perhaps over-simplified, they do offer a basic framework for investigating the effects of relative income on certain behaviors or choices. In short, the theories predict a negative linear relationship between relative earnings and a negative good/outcome like household work: as wives' income contributions increase, the amount of time she spends doing household work should decrease. It is not immediately clear what predictions this framework would yield in terms of fertility outcomes. It is possible that the majority-earner partner would be more likely to impose their preferences, but proving this is difficult. Not only do you need data from both partners, it also demands some discordance in preferences. If both partners want to proceed to the next parity, then a bargaining framework becomes less relevant.

Gender theory offers another explanatory framework. For example, Bittman et al. (2003), writing on relative income and household work, claim that gender "trumps" the potential gains from household exchange and bargaining. The authors find a non-linear relationship between wives' relative income and time spent on household work. The authors' interpretation of this pattern is that when wives earn more than their husbands, they are participating in a gender-deviant behavior that stigmatizes the man. In order to compensate for this violation of gender norms, wives must "do gender", and household work is considered as one such "deviance neutralization strategy" for the couple. It should be noted that the authors do not find this same pattern using U.S. data, but the finding and the theory around it are interesting nonetheless.

The evidence around marital dissolution and relative earnings is also mixed. Two longitudinal studies show that the more income a woman contributes to the household, the greater her risk of divorce (Heckert et al. 1998 and Treachman 2010). This evidence aligns well with the economic models of bargaining, which predict that wives who contribute more income to the household have greater bargaining power and a lower "threat point" for divorce. Interestingly, the study from Heckert and colleagues also finds a nonlinear relationship between wives' earnings and risk of divorce: households in which wives earn between 50 and 75% of household income are more likely to divorce than traditional male-breadwinner households, whereas female breadwinner households in which the wife earns 75-100% of total household income are less likely.

These studies suggest that effects of relative income contribution bear investigation, and we intend to extend this growing field into questions of fertility intentions, attainment, and timing of births. A test is warranted to see if bargaining, exchange, and gender theories are manifested in these set of outcomes.

Possible mechanisms:

Borrowing from the aforementioned theories and literature, we offer the following hypotheses to explain how relative female earnings may impact completed fertility. There are a variety of causal pathways through which associations may arise, and it is possible that these mechanisms do not operate in isolation. The present analysis *does not* test for these hypotheses; rather, we provide descriptive evidence of possible differential effects by couple's relative income.

> Mechanism 1: Economic theory would predict that the woman's value of time is related to the propensity of having a child. In traditional male breadwinner families, for example, the wife has more leisure time that she can dedicate to housework and childrearing. Therefore, childbearing is positively correlated with wife's leisure time; the more a woman works, the fewer children she will have.

Mechanism 2: Husband's leisure time may substitute for wife's leisure time. The husband can participate in childrearing activities (i.e. the "stay-at-home dad"), which weakens previous perceived barriers to childbearing. If this is the case, childbearing is positively associated with either parent contributing the majority of income and negatively associated with a relatively equitable split of income.

Mechanism 3: Wives who earn more have invested more in their human capital. These women may delay childbearing, which in turn reduces natural fecundity. These women, therefore, may have fewer children than wives in more traditional households.

Mechanism 4: Wives who earn more than their husbands have more children as a way of "doing gender."

Mechanism 5: Wives who earn more than their husbands are inherently different than those that ascribe to more traditional gender roles. They are selected into these types of households. These females, therefore, will have different outcomes.

Mechanism 6: Hours spent on household work and childcare may be more equitable in equal-earner and non-traditional male breadwinner households. Because of this, perceived barriers to childbearing might be mitigated, resulting in higher fertility.

Mechanism 7: Wives who earn more than their husbands are more committed to their careers and have more bargaining power to enact the fertility timing normatively encouraged in their career trajectory. This does not depend on differences between partners on quantum preferences but rather on tempo outcomes.

III. Research Design

The aim of this study is to compare the likelihood of second and third births among couples with different relative income compositions. The study population will be heterosexual married couples that have already had one birth and the events under study will be the transition to second and third birth. The study therefore focuses on childbearing within married unions. This is, we acknowledge, a select group, and we do not claim broad generalizability beyond this population. However, this remains a significant population in the U.S. case, especially given the time frame for fertility of the sample used in analysis, and can provide some initial suggestion of the patterns in play. We hope to carry out further work applicable to a population with a broader range of relationship types.

Relative income is a fairly easy metric to compute, but there is a substantial amount of clustering along the continuum. Male breadwinner families and equal-earner families make up the bulk of American households, whereas less traditional female breadwinner families make up a much smaller share. Previous studies have used a number of strategies to determine the optimal measurement of the relative income construct. Brines (1994) proposes using an index, while other studies have created relative income categories. Heckert et al. (1998), for example, classified relative income into four distinct groups: traditional (husband earns 75-100% income); new traditional (husband earns 50-75% income); non-traditional (wife earns 50-75%); and reverse traditional (wife earns 75-100%). The creation of these relative income categories might reflect an author's construct of family typologies, or might be purely arbitrary (i.e. quintiles or quartiles).

We have chosen to divide women's share of household income into three categories (we have also carried out tests with five categories). As discussed above, households are placed within three groups—female primary earner (more than 60% of household income), male primary earner (female earns <40% of household income), or similar contributors (40-60%). These categories make it easiest to clearly compare different households types, provide qualitatively distinct groups, and allow enough cases in each category to produce significant results. If a partner earns 60% of the household income, they earn 150% of the other partner's income. Smaller divisions of household income are informative but theoretically more ambiguous.

A further decision in the research design is to use a time-varying (yearly) measure of wives' income share and perform a sensitivity analysis using a time-invariant measure. A yearly measure of women's share of household income makes it possible to take into account yearly fluctuations, which can be significant around the time of childbearing. Women can take maternity leave, switch to part-time work, leave work temporarily, or leave work permanently. Thus women's income share after the time of the first birth is endogenous to continuing births. Using time-varying income makes it possible to distinguish between a woman who had been a primary earner before their first childbirth and then left the labor market, and a woman who continues to play a significant role in the household economy. This is appealing as it is likely the two women would have different fertility trajectories.

The fluctuation in women's income due to scaled-down work hours around the time of birth make it difficult to track what a woman's potential contribution to the household income might be. The couple likely considers this potential contribution in their decision-making processes regarding the woman's labor force involvement. Therefore, we complement a time-varying, yearly income measure with a time-invariant measure of women's income share, which is captured the year before the first child birth. This time-invariant or fixed measure serves as a proxy for a wife's potential income contribution over her life course and avoids potential endogeneity problems that arise with time-varying measures.

The transition to higher order births is modeled using discrete time logistic event history analysis. Women's income share is the primary income of interest, and further, possibly mediating, variables are added stepwise into the models. These variables include demographic information on the wife and husband (age for both, race only for the respondent), their education, work commitments (in terms of weeks worked yearly and hours worked per week), and their urban/rural status. This step-wise event history model approach using both time-varying and static measures of women's income share make it possible to compare how different economic configurations within households progress in family-size.

IV. Data and Methods

The data used for the analysis are from the National Longitudinal Survey of Youth 1979 (NLSY79), a panel survey of 12,686 males and females in the United States. Initial interviews were conducted in 1979, when participants were aged 14 to 22; subsequent interviews were conducted annually until 1994, and biennially thereafter.

Because the focus of our study is on couple income dynamics and higher-order births, we restricted our sample to male and female participants who are in their first marriage and have reported a first birth. Therefore, respondents who remain permanently childless, never marry, or have an unknown marital status are not included in the analysis (n=4,520). First births that occur before marriage are included in the sample, while pre-marital higher order births are excluded (n=600).

To take advantage of the longitudinal structure of the data, we employed discrete time event-history models with time-varying and time-invariant covariates to analyze incidence and spacing of births, while censoring divorces and cases of attrition. Thus, the unit of analysis is the couple-year. For our primary outcomes of interest—risk and timing of 2nd and 3rd births—two separate models were specified with time measured from the year of the previous birth. For each risk set, couples are observed until the event of interest (i.e. 2nd or 3rd birth) occurs or the end of the survey study period (2008). Couples who divorce or drop out of the survey are censored. After excluding couples for whom children's year of birth could not be ascertained (n=6), there were a total of 60,610 couple-years from 7,560 respondents available for analysis (27,685 couple-years at risk of 2nd birth and 32,925 couple-years at risk of third birth.)

Our main explanatory variable, husband-wife relative income, was generated from respondent- and spouse-specific measures of yearly incomes. However, due to both survey non-response and reports of unknown spousal incomes, a large share of cases in our sample (26.4%, n=16,001) had at least one missing year of information on spousal or respondent income. Income information was found to be not missing at random; hence, simple imputation of missing data, such as by substituting a mean, could potentially bias results. To address these biases, we used multiple imputation with chained equations via the *mi* package in Stata to impute non-random missing data.

The multiple imputation procedure for missing data was conducted as follows. Per recommendations from Van Buuren, Boshuizen and Knook (1999), we predicted each year's income with a separate predictor equation. The variables used to predict income included socio-demographic information included in our models, available reported income, hours and weeks reported worked, as well as variables on timing and spacing of births (which are strongly associated with yearly income). Smaller numbers of missing cases were also imputed for spouse's year of birth (n=2,172), information on respondent's and spouse's highest grade completed (n=4 and n=572, respectively) and respondent's religious attendance/affiliation in 1979 (n=62) and 2004 (n=10,573). Respondent's responses to questions gauging attitudes around female employment asked in certain years were also missing (1979, n=360; 1982, n=2,188; 1987, n=4,987; and 2004, n=13,267). The data were imputed using predictive mean matching, which models missing income as an outcome of a linear regression model based on the predictor variables, and matches the missing case to the closest matching complete case (Little 1988). The imputed data set was created using 5 imputations with 10 iterations. The data were imputed in wide format, reshaped in R to long format for event-history modeling, and then reformatted into list format for analysis using the R package Zelig. Discrete-time logistic event history models were run on the imputed data in R using the Zelig package (mirroring glm).

Relative income was measured as the proportion of total household income contributed by the wife in a given year. Primary analyses were conducted using relative income as a three-level categorical variable: wife contributes <40% (traditional), wife contributes 40-60% (equal-earner), and wife contributes ≥60% (female breadwinner). In addition, we used both time-invariant and time-varying measures of relative income to test the sensitivity of fluctuations of husbands' and wives' income over time.

Several demographic and socioeconomic factors of both respondent and spouse were considered in our models. When necessary and possible, we recoded respondent and spousal variables into husband- and wife-specific variables. Demographic variables include respondent race (spousal race was not available); wife's age at marriage and at each birth; and a time-varying variable for wife's and husband's age at the time of interview. Due to the paucity of data, a time-invariant categorical measure of education was based on the highest grade observed for the husband and wife. Education was coded as less than high school, high school or GED equivalent, some college, and college degree. Age and educational homogamy were also included in the models, as captured by husband-wife age difference and husband-wife educational difference. Other measures of income considered include total household income, husband's income, and wife's income, all in 2008 constant dollars (CPI source). Income variables were tested as both categorical and continuous variables (log income), and a quadratic term was tested in the continuous variable analysis.

The following variables that might reflect attitudes around childbearing or gender were also examined in preliminary analyses, though not in regression models: urban/rural status, respondent and spousal religious upbringing and affiliation, and respondent gender attitude scores at baseline (1979), 1982, 1987, and 2004.

Lastly, employment characteristics of both respondents and spouses, specifically number of weeks worked per year and number of hours worked per week, were also considered in analyses. Following the Bureau of Labor Statistics classification, part-time employment was defined as working between 1 and 35 hours per week and full-time employment was defined as working 35 hours or more per week (0 hours was coded as no work). The number of weeks worked per year might reflect periods of unemployment or other work arrangements. For husbands and wives, we developed the following classification scheme for number of weeks worked per year: <10 weeks, 10-45 weeks, and 45 weeks or more.

We conducted univariate and multivariate analyses to investigate the relationship between couple's relative income and continued childbearing, as well as the composition of relative income groups. In univariate analyses, simple descriptive statistics (e.g. mean among couple-years) were calculated for each covariate by relative income group (see Tables 1 and 2). Multivariate analyses were carried out using logistic regression for discrete-time event history data. Separate models were run analyzing the propensity of progression to a second or third birth and using either time-varying or time-invariant measures of wife's income share (only models with time-varying income share are presented here). All analyses were conducted in R and custom weights were not used.

V. Results

Table 1 presents descriptive statistics of the couple-year observations for the total sample and each parity-specific sub-sample from the imputed dataset. These can be read as, depending on the variable, either the mean or the distribution within that parity for the measure. For instance, among couples at risk for a second birth, there were a total of 27,685 couple-years, and of these, the mean age of the wife was 32.9 years. Reflecting the overall lower likelihood of progression to parity three, the number of couple-years was larger among couples at risk for a third birth (32,925 couple-years) and wife's mean age increased to 35.1.

Table 2 provides an alternative presentation of these descriptive statistics. Here we show the means and distributions of variables by wife's income share. So, for instance, we see that among couple-years where wives earn less than 40% of household income, 13.8% have less than a high school diploma; this figure drops to 8% for couple-years of equal earner or female breadwinner households. Note that this is a distribution of person-years and wives may therefore contribute to more than one column over the course of their marriage.

Table 3 presents logits (Betas) and odds (exponentiated Betas) for the risk of progression to the second child using time-varying wife's income share. All models include dummies (not included in the table) for years since last birth. Odds less than 1 indicate decreased risk of subsequent childbearing, while odds more than 1 indicate an increased risk. Reference categories always have logit=0, odds=1. Table 4 models the progression to the third birth, again using time-varying income share measures. Other analysis investigated the likelihood of second and third birth using a time-invariant measure of women's income share (data not shown).

Model 1 tests the crude relationship between wife's income share and continued childbearing. Model 2 includes demographic covariates for race, family income, wife's age, husband's age, and wife's age at previous birth Model 3 adds wife's education and a control for education homogamy.

Among couples at risk of a second birth, women who earn 40% or less of the household income consistently had significantly higher odds of transition than equal-earner couples in all models. Women earning more than 60% of family income also had slightly higher odds, although these results are not statistically significant. Results differ somewhat when investigating the transition to third births. The unadjusted model reveals a significant effect among female breadwinner households; these households were 44% more likely than equal-earner families to have a third child. However, these results are attenuated when controls for family income, race, and age, as well as subsequent controls for education, are included in the model. As with the transition to second birth analyses, male breadwinner households continued to have significantly higher odds of progression to a third child, with these households having a 38% increased likelihood compared to equal-earner families.

We found an interesting pattern with total family income and subsequent childbearing. Incomes above 75K were significantly more likely to transition to a second birth, but not a third birth. Families earning less than 25K had significantly higher odds of having a third birth compared to families with incomes ranging from 25-100K.

The step-wise models also reveal some interesting results regarding women's education. As can be seen in Tables 3 and 4, women with some college or a college degree were more likely to have a second or third birth compared to women with a high school diploma or GED equivalent. In fact, women with a college degree or more have the highest odds of transitioning to further births of any other educational group. However, couples with wives who are much more educated than their husbands have significantly reduced odds of parity progression as compared to when husbands and wives have the same educational status.

VI. Next Steps

As we see it there are two crucial steps that we need to take in developing this paper. First, we need to resolve a set of methodological issues with the currently existing work. Second, we need to develop and implement a set of hypotheses to explain and test the differences we have documented here. In this section we will briefly discuss both challenges.

A) Methodology

Our approach to the NLSY79 data and the analyses presented here was informed by current best practices in Sociology and Demography. Those practices do not, however, always conform from paper to paper. As such, we are particularly eager for feedback on or alternate approaches to:

- Multiple Imputation: Is it appropriate in this case? How many imputations are called for? Which variables should be excluded from or included in the imputation process? Should we maintain PMM for all imputations? What additional description of the data should we provide to motivate imputation in this case?
- Biennial surveys: After 1994, the NLSY79 has been conducted every other year (that is, 1996, 1998, etc.). Within the discrete-time event history framework, how do we best account for these two-year gaps? Standard imputation doesn't work in this case, but we

had considered using transition matrices for key variables to simulate possible intermediate values (for 1995, 1997, etc.). Alternately, some authors have chosen to carry over values from the prior survey year into the gap year (using 1994 values for 1995, basically). This seems statistically questionable, however. Or should we adjust our models to reflect two-year periods for the entire length of data collection (making it a 1980-2008 data set)? Or, alternatively, we can use a three-year moving average, including a dummy variable for year of birth effects.

B) Hypotheses

While this paper is primarily exploratory, we are also in the process of developing hypotheses to test using these data (see above in Section II under "Possible mechanisms"). We are still in the process of developing the measures needed to test these mechanisms. We are eager for feedback about how they might be implemented, adjusted, or built upon.

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