Economic Uncertainty and Fertility: Insights from Japan

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September 26, 2013

Research was conducted at the Center for Demography and Ecology and the Center for the Demography of Health and Aging at the University of Wisconsin-Madison, which are supported by Center Grants from the National Institute of Child Health and Human Development (R24 HD047873) and National Institute on Aging (P30 AG17266), respectively. Please direct correspondence to James Raymo at: Department of Sociology, University of Wisconsin, 1180 Observatory Dr., Madison, WI 537056. email: jraymo@ssc.wisc.edu, tel: 608-262-2783

Abstract

In this paper, we develop a model of fertility that incorporates economic uncertainty faced by both men and women. We evaluate this model using data from Japan, a country characterized by a prolonged recession and substantial differences in the economic opportunities and economic roles of men and women. Results of aggregate level analyses for the period 1985-2010 indicate that men's economic uncertainty (but not women's) is associated with fertility and that the observed decline in TFR would have been less pronounced if indicators of economic uncertainty had remained at their 1985 (pre-recession) levels. Results of individual-level analyses between 2004-2010 are different, with no evidence that husbands' economic uncertainty is associated with the likelihood having a child in a given year and some evidence that higher economic uncertainty for wives is associated with a lower risk of childbearing. Subsequent analyses will incorporate marriage and seek to understand these inconsistent findings.

Fertility research has long emphasized the importance of economic uncertainty. Theoretical models of fertility behavior provide a framework for understanding how increased economic uncertainty is expected to result in lower fertility (e.g., Ranjan 1999). Empirically, it is clear that aggregate fertility rates have declined in periods of high economic uncertainty, including the Great Recession in Europe and the U.S. (Goldstein et al. 2013; Morgan, Cumberworth, and Wimer 2011). Increased interest in understanding how, and under what circumstances, fertility is impacted by economic uncertainty reflects both growing macroeconomic volatility and concern about the social, economic, and demographic implications of very low fertility rates.

While there is a general consensus regarding theoretical expectations and broad empirical patterns, it is clear that there are reasons to believe that fertility may be positively related to economic uncertainty (e.g., Butz and Ward 1979), that the magnitude of fertility decline during the recent recession varied across countries, and that estimated relationships between economic uncertainty and fertility depend on whether analyses are conducted at the aggregate or individual level (Kohler and Kohler 2002). Our goal in this paper is to shed light on these theoretical and empirical inconsistencies by focusing on fertility behavior in Japan during its long recession in the 1990s and early 2000s.

To this end, we develop a formal model that extends existing frameworks by allowing economic uncertainty to affect men and women in different, perhaps offsetting, ways. This insight is not novel, but models of fertility behavior and analyses of relationships between economic uncertainty and fertility tend to focus on either men or women in isolation. Our effort to incorporate sex-specific influences of economic uncertainty in a two-period model of couples' childbearing is thus an important innovation that may be particularly relevant in societies like Japan where (a) women face very different career opportunities than men and (b) marriage and

childbearing remain closely linked. We expect men's economic uncertainty to have an unambiguously negative impact on fertility but expectations regarding women's economic uncertainty are less clear and depend on the relative magnitude of income and substitution effects. On one hand, if husbands and wives earnings are of similar importance to the household budget, economic uncertainty for women should contribute to reduced risk of childbearing as it does for men. On the other hand, if wives earnings are primarily supplemental and the opportunity costs of temporary labor force exit are low, higher economic uncertainty for women may contribute to higher fertility (we omit the formal, mathematical presentation of the model here for the sake of brevity).

Data

We conduct two sets of analyses – one using aggregate data from Vital Statistics, the Census, and wage and labor force surveys, and another using eight waves of data from the Keio Household Panel Survey (KHPS). The aggregate age-specific data, measured at the prefecture level, cover the period 1985-2010 and are available at five-year intervals. In analyses using these data, we measure economic uncertainty using prefecture-level measures of annual wage growth and unemployment, by age and sex. There are a total of 2,303 observations (7 years x 7 age groups x 47 prefectures) in these analyses. The individual data cover the period 2004-2010 and include detailed employment and earnings information for both the respondent and his/her spouse. In analyses using these data, we measure economic uncertainty using annual changes in personal income and occupation-specific measures of the likelihood of job turnover (constructed from labor force survey data) for those who are employed in the private sector at wave t. Models are based on the 8,654 person-year observations with no missing data.

Method

Using the aggregate data, we estimate models of age-specific fertility rates at the prefecture level and aggregate predicted values from these models to produce a national figure. We then conduct a counterfactual regression standardization exercise in which we ask what the TFR would have been at each year if the two measures of economic uncertainty had remained constant at their 1985 values (for both men and women). Comparison of these counterfactual TFRs with observed TFRs provides a descriptive basis for evaluating the impact of increasing economic uncertainty during the long recessionary period of the 1990s and early 2000s. We will employ similar techniques in the couple-level analyses but have not yet progressed beyond the estimation of basic models of childbearing between waves t and t+1 of the survey as a function of indicators of husbands' and wives' economic uncertainty.

Results

Figure 1 presents trends in the observed TFR (green line) and the predicted TFR (blue line) from a model that includes indicators of both men's and women's economic uncertainty (unemployment and wage growth). The model fits well except for 2010 when it doesn't capture the slight uptick in fertility. The red line is the counterfactual TFR calculating by holding measures of economic uncertainty constant at their 1985 values. This counterfactual trend shows that fertility would have been higher in the absence of economic change, although the difference is not especially large except in 2005. Estimated coefficients indicate that men's economic uncertainty is of primary importance and provide no evidence of offsetting influences for men and for women.

Results are very different for the individual-level analyses. As shown in Table 1, there is little evidence that indicators of economic uncertainty at the individual level are related to the

risk of childbirth. This is particularly true for men. The two measures of uncertainty (annual turnover rates in husband's occupation and husband's wage growth between waves t and t+1) are unrelated to the risk of birth between survey waves. In contrast, we find that wives who are employed in high turnover jobs are significantly less likely than their counterparts in jobs with average turnover rates to give birth between waves. This is consistent with a scenario in which women's employment is important to the household budget and not consistent with a scenario in which low opportunity costs contribute to a positive relationship between women's economic uncertainty and childbirth. It is important to note that 71% of men and 45% of women are employed in private sector jobs and thus are included in one of the employment categories for which we have turnover rates to proxy economic uncertainty.

Next steps

Our formal model is well developed and provides a clear framework for evaluating and interpreting associations between economic uncertainty and childbearing, but the individual-level analyses summarized in Table 1 are preliminary and require substantially improvement. In subsequent revisions, we will add two more years of data (2011 and 2012), employ procedures for imputing missing data, consider alternative measures of economic uncertainty, attempt to evaluate indirect relationships between economic uncertainty and fertility via marriage, conduct counterfactual analyses in an effort to quantify the impact of change in economic uncertainty and fertility, and focus on understanding differences between the results of these models and the aggregate-level analyses.

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Table 1: Estimated coefficients (log-odds ratios) from logistic regression models of childbirth between wave t and wave t+1

	log-odds-ratio	P>|z|
Wife's age	0.45	0.00
Wife's age squared	-0.01	0.00
Parity		
0 (omitted)	0.00	-
1	0.20	0.21
2	-0.30	0.11
3	-0.16	0.49
Parity interval (years)	-0.17	0.00
Marriage dissolved between waves t and t+1	-0.46	0.46
Husband's employment		
Unemployed/not in labor force	-0.23	0.73
Self-employed and farming/fishing	0.08	0.66
Employed - low turnover job	0.01	0.96
Employed - moderate turnover job (omitted)	0.00	-
Employed - high turnover job	0.13	0.42
Public sector employee	0.10	0.69
Wife's employment		
Not in LF	0.71	0.00
Unemployed	-0.47	0.45
Self-employed and farming/fishing	0.05	0.84
Employed - low turnover job	-0.07	0.76
Employed - moderate turnover job (omitted)	0.00	-
Employed - high turnover job	-0.74	0.02
Public sector employee	-0.60	0.30
Husband's income change		
Decline of 20% or more	-0.32	0.23
Decline/Growth of less than 20% (omitted)	0.00	-
Growth of 20% or more	-0.19	0.31
Missing	0.01	0.95
Husband's earnings (standardized)	-0.07	0.55
Husband's earnings missing	0.14	0.63
Wife's earnings (standardized)	0.36	0.00
Wife's earnings missing	0.34	0.36

N=8,654
log-likelihood= -1135

Figure 1: Observed, predicted, and counterfactual trends in TFR from models including men's and women's economic uncertainty