The Effect of Husband's Earnings Shocks on the Timing of Fertility

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Preliminary and incomplete, please do not cite

Abstract

In this paper I explore the timing of the fertility response of households to husband's job loss. First, I present a simple life-cycle model of fertility and childbearing which allows the information about income shocks to have an effect not only in the period of displacement, but also before and after the displacement. I then derive testable implications of the model for the effect of exogenous long-term shocks to household income on household fertility. I use Panel Study of Income Dynamics data to test the implications of the model using husband's layoffs and plant closures as sources of income shocks. The effect of husband's job loss on the hazard of having a child is modeled using log-logistic hazard model on longitudinal data for households from 1968 to 1993. The impact of husband's job loss on fertility differs in magnitude by type of husband's job loss (plant closings vs. layoffs) and by the order of birth. I find that there is postponement of having the first and the second child. I also find that households adjust their fertility before mostly in the long run. My findings are consistent with the hypothesis of income effect of husband's earnings on fertility.

1. Introduction.

Over the past three decades fertility has declined sharply in many European countries. A number of papers have explored the possibility that the decline in fertility resulted from persistent high unemployment rates in Europe, particularly among young workers (Adsera, 2004, 2005; Gustafsson, 2001). In the U.S. totally fertility declined sharply during the 1960s and the early 1970s but have leveled off since mid-1970s and stayed approximately equal to the replacement level (See Figure 1). However, fertility rates have declined substantially among white non-Hispanic population within the past two decades. Also, there is a continuing trend of delayed childbearing starting in the 1980s, with the age at first birth sharply rising for the older cohorts of women (See Figure 2). While the rise in women's education and market wages are among the likely candidate explanations, the stagnation of husbands' earnings during the 1970s and the 1980s may have further contributed to the postponement of fertility.

The connection between household income and fertility has been first explored in the classical models of fertility by Becker (1960) and Mincer (1963). In these models, children are durable goods in the utility function of parents. A decrease in household income holding the price of children constant will lower the demand for children. An increase in the woman's wage will raise both household income and the price of children, and thereby have offsetting income and substitution effects on the demand for children. An increase in husband's wage will increase the demand for children through the income effect, and this effect will be reinforced if husband's and wife's time are substitutes in household production.

However, even economic growth and rising household incomes may not always lead to a higher number of children. Becker (1960) introduced a theory to explain the observed negative correlation between family income and family size. A key element of his quantity-quality model is an interaction between quantity and quality in the budget constraint that leads to rising marginal costs of quality with respect to family size; this generates a tradeoff between quality and quantity. Becker et al. (1990) examine a model in which a high societal level of human capital raises the return to individual investment in human capital. Their model implies that higher stocks of capital reduce the demand for children because that raises the cost of the time spent on childcare. The resulting notion of a quantity-quality trade-off implies that as parents get richer they demand children of higher “quality,” (i.e., children who are more productive), without necessarily demanding more of them. Because increases in the quality can be interpreted as making children more expensive, the quantity-quality trade-off explains why families might get smaller as parents get richer. Hence, given that the fertility rate is already at a low level in the U.S., declining husband’s earnings might reduce investments in the child “quality” without having a significant effect on the number of children. However, the empirical evidence on the existence of this quantity-quality trade-off is inconclusive. Recent papers by Angrist et al. (2005) using Israeli data and Black et al. (2005) using Norwegian data did not find support for this quantity-quality trade-off.

Empirical studies on the effect of male income on fertility have mostly used aggregate level data to explain macro trends in fertility. Butz and Ward (1979) used current weighted average of median income of males to model age-specific fertility rates. Macunovich (1996) used lagged average annual earnings of all males in their first 1-5 years of potential work experience to measure the effect on the age-specific fertility rate for all women aged 20-24. Heckman and Walker (1990) used age-specific average annual male income based on Swedish Personal Income Tax Returns data to simulate the effect on age-specific fertility rates within a semiparametric multi-state duration model. Merrigan and St.Pierre (1998) replicated the Heckman and Walker model on Canadian data and also tested for non-parametric individual heterogeneity. Overall, increases in male wages were usually found to have a positive effect on fertility. By contrast, Tasiran (1995) estimated hazard models on the PSID 1985-1988 ‘Birth History File’ and found a positive and statistically significant effect of the female wage rate and negative but not always statistically significant effect of male income. He concluded that the common belief in a negative female wage rate effect and a positive male wage income effect might not hold generally. Several recent studies were exploiting exogenous variation in the economic conditions induced by cross-country labor market differences (Adsera, 2005), Germany reunification (Bhaumik and Nugent, 2002; Kreyenfeld, 2005) and Russian transition (Kohler and Kohler, 2002) in order to identify their effect on fertility.

Most of the earlier studies have not adequately addressed the problem of endogeneity of earnings in studying the relationship between earnings and fertility[1]. Since earnings and fertility are jointly determined, estimation techniques not accounting for simultaneity will lead to a biased estimate of the effect of income on fertility. Bias will also arise if earnings and fertility are both driven by some unmeasured or unobserved factor, such as health or ability. In this paper I address the problem of potential endogeneity in two ways. First, I use husbands' displacement (layoffs and plant-closings) to proxy for unanticipated shocks to permanent income of the household. Second, I restrict my analysis to ever displaced couples and to a manufacturing subsample, which should reduce the effect of unobserved factors that may influence both fertility and the incidence of displacements. Timing of fertility has been argued to affect completed fertility and delayed births are usually thought to be the key reason for lower completed fertility as those who start having children later tend to have fewer children (Macunovich, 1996; Adsera, 2005). My focus on the timing of fertility complements other recent research that examines the effect of husband's displacement and thus exogenous shocks to household income on children's educational outcomes (Oreopolous et. al, 2005). My paper also accounts for the fact that husband's displacement impacts fertility indirectly through marriage dissolutions. Olsen (1994) noted that marital status is closely linked to fertility, and that changes in fertility may be induced in part by changes in marital status.

Following Stephens (2001), I argue that husband's displacement from job in PSID data is a permanent shock to household income that has a prolonged effect on couple's fertility. Butz and Ward (1980) argued that the effects of current economic activity on current fertility appeared to operate not only directly on current decisions but, more important, indirectly through alterations in forecasts of future income and opportunity costs. Gustafsson (2001) argued that the 'timing and spacing' econometric literature, using current female wage and male income as the main explanatory variables, had not

[1] One exception is Schultz (1985) which analyzed the first fertility transition in Sweden 1860-1910 and used the change in the ratio of butter to rye price as an exogenous variation in the female price of time, since women were dominant in the pre-industrialist dairy production. The reason these price changes were truly exogenous was that Sweden lost its competitive position as a grain exporting country during that period and the ratio of butter to rye prices increased by 43 percent.

given the ultimate explanation for the aging of fertility in Europe because fertility involves lifelong decisions, which require lifetime perspective in the economic variables that have an influence. Hence it seems relevant to analyze the adjustment of fertility in response to income shocks in the life-cycle prospective.

The paper is organized as follows. Section 2 presents a simple dynamic model of fertility which allows the earnings shocks to have a prolonged effect on household fertility decisions and derives testable implications from this model. Section 3 uses PSID data for 1968-1993 to estimate a reduced form regression using hazard of birth in a given period and husbands' displacements as proxies for the exogenous permanent shocks to household income. Section 4 explores alternative specifications. I also discuss certain estimations issues. Finally, I summarize the main results in Section 5.

2. A family life-cycle fertility model.

The family life-cycle fertility model with uncertainty presented here is an extension of a static model of household behavior in which the family is viewed as jointly maximizing utility defined over market goods, leisure of husband and wife, and child services. Consumption goods are aggregated into one good, which is set to be a numeraire for all periods and wages of husband (W_{mt}) and wife (W_{ft}) are determined exogenously by the market. The household utility is assumed to be concave and intertemporally separable. Consumption (C_t), leisure time of husband (M_t) and wife (F_t) are assumed to be normal goods, and capital markets are assumed to be perfect. Following Willis (1974) model, it is assumed that the vector of utility-generating characteristics of a given child may be aggregated into the commodity Q_t, which is called child "quality". Child quality $Q_t(B_t)$ is produced according to a household production function, which is increasing in its arguments and concave. B_t is the amount of home time spent on a child in period *t*. It is assumed that a child is born in period *t* if $Q_t > 0$ and is averted if $Q_t = 0$. The production function for child quality implies that parents may increase satisfaction they derive from a given child by increasing time spent on child. It is usual to assume in the fertility literature that child quality is produced using both time and market goods as inputs. Following this tradition, it is assumed in the model that the amount of market goods devoted to a child must increase proportionally with child quality. There is a fixed cost of market goods, ρ , per unit of child quality produced. A discussion on how goods cost of children can enter household budget constraint can be found in Francesconi (2002). However, no substitutability between the time and goods inputs in the production of child quality is allowed here, as consumption goods do not enter the child quality production function. Additionally, it is assumed that only one child may be born in any given period, and, following Willis (1971), there is no joint production of child quality. Further, it is assumed that women's time is the only time input in the production of child quality. Also, parents may extract utility from child quality in period *t* only in this period. No bequests or debt is allowed in the last period, T+1. Under the conditions of uncertainty, a household updates its expectations as of period *t* with any new information it has received since the previous period and maximizes expected utility over the remainder of its lifetime. Hence, a household's problem in period *t* becomes

$$\max_{C_k, M_k, F_k, B_k} U_t = E_t \left\{ \sum_{k=t}^{T} \left(\frac{1}{1+\alpha} \right)^{k-t} U(C_k, M_k, F_k, Q_k) \right\}$$

$$\text{s.t. } A_{t+1} = (1+r)\left[A_t + W_{mt}(\bar{L} - M_t) + W_{ft}(\bar{L} - F_t - B_t) - C_t - \rho Q_t\right],$$

$$\text{and } A_{T+1} = 0 .$$

Where A_t is the household's stock of assets in period *t*, α is the household's constant subjective discount rate, r is a constant real interest rate, and $\bar{L}$ is the constraint on the total time each household member can divide between work, leisure and home production of child quality.

After substituting for the child quality production function, the maximization problem can be solved for the optimality conditions, which, allowing for corner solutions, are

$$U_C(C_t, M_t, F_t, Q_t) - \lambda_t \leq 0, \quad (1)$$

$$U_M(C_t, M_t, F_t, Q_t) - \lambda_t W_{mt} \leq 0, \quad (2)$$

$$U_F(C_t, M_t, F_t, Q_t) - \lambda_t W_{ft} \leq 0, \quad (3)$$

$$U_Q(C_t, M_t, F_t, Q_t) \cdot \frac{dQ_t}{dB_t} - \lambda_t \left(W_{ft} + \rho \frac{dQ_t}{dB_t} \right) \leq 0, \qquad (4)$$

and ruling out zero solutions for consumption, the Euler equation of evolution of λ_t over time is

$$\lambda_t = \frac{(1+\alpha)}{(1+r)} E_t \lambda_{t+1}$$

λ_t can be interpreted as the marginal utility of wealth (MaCurdy (1985)). This last expression dictates how the family allocates its resources to account for any unanticipated shocks. It sets its savings policy so that the expectation of next period's marginal utility of wealth is revised by the full amount of the unanticipated element; in other words, the family revises the means of all future values of λ to account for all forecasting errors when they are realized. This martingale property of λ implies that certain transformations of the family decision variables also follow a martingale as the result of rational economic behavior.

Kuhn-Tucker complimentarity conditions imply that the demand for child quality Q_t in period *t* directly follows from the demand for time devoted to child production[2]

$$B_t = \begin{cases} 0,..if..U_Q(C_t, M_t, F_t, Q_t) \cdot \frac{dQ_t}{dB_t} < \lambda_t \left(W_{ft} + \rho \frac{dQ_t}{dB_t} \right) \\ B_t(\lambda_t, W_{mt}, W_{ft}) \in (0, \overline{L} - F_t],..if..U_Q(C_t, M_t, F_t, Q_t) \cdot \frac{dQ_t}{dB_t} = \lambda_t \left(W_{ft} + \rho \frac{dQ_t}{dB_t} \right) \end{cases}$$

as the demand for B_t is a derived demand from the demand for child quality Q_t. Woman's time at market work in period *t* is equal to $\overline{L} - F_t - B_t$. With uncertainty, family forms expectations about the distribution of future earnings that husband and wife may receive. The decisions household makes at each point of life will take into account both the expectations and uncertainty associated with the future realizations of these variables.

[2] Such a presentation of the demand for child producing time follows MaCurdy (1985) presentation of the first-order conditions for the variables of choice in the life-cycle model in terms of the marginal utility of wealth constant (MUWC) functions. These functions decompose the decisions about the variables of choice at a point in time into a "life-cycle" component λ_t that summarizes all the historic and future information relevant to the consumer's current choices and a second set of components that represent variables actually observed in the decision period, such as wages and "taste shifters".

As family moves into the next period, it may update its beliefs about the moments of these distributions given past realizations of the variables. Both the realizations of past variables, e.g., a job loss, and the changes in beliefs about future distributions, e.g. the probability of a job loss, will enter a family's decisions as shocks to the marginal utility of wealth, λ_t.

Husband's displacement can affect the quality of child through two channels: the cross-wage effect of husband's low wage realization on the labor supply of wife in the period of displacement and the effect of this shock on the marginal utility of wealth λ_t, both in the period of displacement and in the periods before and after the displacement.

In general, changes in husband's wage affect labor supply of wife and may also change the price of childbearing, holding λ_t constant. As Butz and Ward (1979) argue, if the wife is employed, then increases in the husband's wage lead to a reduction in her hours of labor market work, but do not alter the price of her time. If the wife is not employed, increases in the husband's wage should increase fertility but by a smaller magnitude. This follows if husband's and wife's household time inputs are gross substitutes; then increases in the wage of one induce the other to substitute away from market work. Since a non-employed wife cannot withdraw further from the market, the shadow price of her time and hence the shadow price of children rise when her husband's wage increases. This tends to mitigate the positive effect of an increase in the husband's wage on fertility.

Most of the effect of a displacement on the demand for child quality comes from the decline in the mean of future husband's earnings distributions which reduces expected lifetime income. In the model, the loss in lifetime income increases λ_t in all future periods after the family learns of the job loss and causes the family to spend less time on leisure and on child quality production in each period. Therefore, holding constant the husband's wage, an increase in λ_t will lead to a decrease in the demand for child quality. Since the cross-wage effect only changes time allocated to different activities in the period of displacement, the theoretical predictions for the impact of displacement on the demand for child quality can be fully understood by looking at the time path of the change in λ_t.

The fertility response will depend upon both how far in advance that the family learns of a future job loss and the magnitude of the resulting income loss. If the news about displacement comes in only in the period of displacement, λ_t will increase only in the periods following the period of displacement. The permanent earnings loss due to a displacement will permanently decrease the family's desired level of investment into child quality. However, if the family learns of the displacement before it occurs, it will decrease fertility not only once the displacement occurs, but even before the husband's job loss. In addition, the fertility response will depend upon the magnitude of the impact on λ_t.

To summarize the theoretical implications, the family's fertility response depends on the timing of the information arrival and the magnitude of the resulting income loss. An average of these responses across heterogeneous households will be estimated within the regression analysis. If displacements are not perfectly forecast by households, there should be a permanent decrease in the fertility following the arrival of the news about husband's displacement. Fertility adjustment in response to the job loss will continue until all of the information about the shock is incorporated into their decisions.

3. Empirical methodology.

It is necessary to impose additional assumptions on the general theoretical model presented in the previous section in order to derive an estimable fertility demand function. The empirical model in this section imposes the usual assumption from the life-cycle labor supply literature of intratemporal separability between consumption, leisure goods and child quality. The model also assumes intratemporal separability between the husband's and wife's leisure times. The latter assumption does not allow separating a wealth effect from the cross-wage effect. After imposing these assumptions, the objective function becomes

$$\max_{C_k, M_k, F_k, B_k} U_t = E_t \left\{ \sum_{k=t}^{T} \left(\frac{1}{1+\alpha} \right)^{k-t} \left(T_{ck}(C_k)^{\sigma} + T_{mk}(M_k)^{\varphi} + T_{fk}(F_k)^{\omega} + T_{qk}(Q_k)^{\gamma} \right) \right\}$$

where T_{jt} for j = C, M, F, Q are taste modifiers of the respective goods, which typically depend on the observable individual characteristics.

Child quality is produced according to a household production function of the form $Q_t = B_t^{\beta}$, $\beta \in (0,1)$, and B_t is the amount of home time spent on a child in period *t*. First-order condition for child quality is

$$\gamma\beta T_{qt} B_t^{\beta\gamma-1} = \lambda_t \left(W_{ft} + \rho\beta B_t^{\beta-1}\right), \text{ if } Q_t > 0 \text{ and}$$

$$\gamma\beta T_{qt} B_t^{\beta\gamma-1} < \lambda_t \left(W_{ft} + \rho\beta B_t^{\beta-1}\right), \text{ if } Q_t = 0.$$

Without loss of generality, the cost of market goods per unit of child quality ρ can be set equal to 0, which results in the optimality condition for positive Q_t being

$$\gamma\beta T_{qt} B_t^{\beta\gamma-1} = \lambda_t W_{ft}$$

Taking logs of this first-order condition for positive child quality and rearranging terms yields an easily interpretable formulation

$$\ln B_t = \Psi_{qt} - \theta_q \ln W_{ft} + \theta_q \ln T_{qt}$$

where $\theta_q = 1/(1-\gamma\beta)$, $\Psi_{qt} = \theta_q (\ln \beta\gamma - \ln \lambda_t)$. In this formulation, the time spent on children should increase with increase in the wealth and the “taste” for children and decrease in wife’s wage. After substituting the first order condition for child quality into the utility derived from child quality, U_{qt}, and taking a log monotonic transformation,

$$\ln U_{qt} = \frac{\beta}{(1-\gamma\beta)} \ln T_{qt} + \frac{\beta\gamma}{(1-\gamma\beta)} (\ln \beta\gamma - \ln \lambda_t) - \frac{\beta\gamma}{(1-\gamma\beta)} \ln W_{ft} \quad (5)$$

Next, suppose that for a given vector of explanatory variables $x = (\beta, \gamma, T_{qt}, \lambda_t, W_{ft})$, the latent variable U_{qt} has a continuous cumulative distribution function $F(U_{qt}; x)$ and that the binary response of having a child Y = 1 is recorded if and only if $U_{qt} > 0$:

$$\Pr(Y = 1 | x) = \Pr(U_{qt} > 0 | x) = 1 - F(0; x) = 1 - \Pr(U_{qt} = 0 | x)$$

with the term $\Pr(U_{qt} = 0 | x)$ representing the case of a corner solution where $B_t = 0$. Since the utility of child quality $U_{qt} > 0$ whenever $Q_t > 0$ and is not directly observed (unlike having a child), there is no loss of generality in taking a critical (i.e.

cutoff) point of having a child vs. not having a child to be 0. In addition, standard deviation of U_{qt} can be taken to be 1 without loss of generality. Then it follows that

$$\Pr(Y=1|x)=\Phi(x'\eta)$$

where $\Phi(\cdot)$ is a cumulative density function. Once this latent variable model is specified, it can be estimated either by probit/logit or by a hazard regression. In the case of hazard the probability of an event happening at a given point in time conditional on not happening before and a set of control variables can be modeled. Hazard is a natural choice for modeling the probability of having a birth. Hazard model also allows independent variables to change over time and deals with censored observations.

In order to be able to estimate equation (5) one must make certain substitutions to get an empirical specification. The log of the marginal utility of wealth, $\ln\lambda_t$, varies across time due to the continual updating a family makes as new information arrives. Using an approach from MaCurdy (1985) and Stephens (2001) to characterize the stochastic process generating the marginal utility of wealth, $\ln\lambda_t$ can be written as the process, which requires the consumer to revise the value of his marginal utility of wealth fully in each period to account for new information contained in the realization of unanticipated elements:

$$\ln\lambda_{it}=\ln\lambda_{i0}+\sum_{k=0}^{t}\tau_{ik}+\sum_{k=1}^{t}\varepsilon_{ik}$$

where

$$\tau_{it}=\sum_{k=0}^{t}\left[(\alpha-r)-\ln\left[E_{t-1}\left\{\exp(\varepsilon_{it})\right\}\right]\right]$$

and ε_{it} represents the shock to the log of marginal utility, or, alternatively, a one-period forecast error, which arises from unanticipated realizations of wages or income in this model, with E(ε_{it}) = 0. Thus, λ_{it} is a function of the initial marginal utility of wealth λ_{i0} as well as the subsequent forecast errors. As the number of periods increases, the average of these errors will approach zero.

The husband's displacement can change $\ln\lambda_{it}$ not only in the period of displacement, but also in periods before and after the displacement occurs. Changes in

$\ln \lambda_t$ incorporate all of the historic information as well as the changes in expectations of future variables. Following Stephens (2001), a set of dummy variables D_{it}^k, are included in the regressions in order to capture the portion of these changes which is correlated with displacement. D_{it}^k receives a value of 1 if the worker is displaced k periods before the current period *t*. *k* can also assume negative values in order to capture the effects in the pre-displacement years.

In the empirical specifications, these dummy variables will capture the average change in the fertility due to the shocks to $\ln \lambda_t$ caused by husbands' displacements. Coefficients on these dummies represent the cumulative effect of the displacement and not the incremental effect. E.g., five years after a displacement, it is possible that no new information related to the displacement is gained by families. However, the coefficient on D_{it}^5 may be non-zero because past shocks related to the displacement will have an effect on the wife's current fertility.

The above empirical specification transforms equation (5) to yield

$$\Phi^{-1}(\ln U_{qit} > 0 \mid x) = \mu_i + a_t^* + \sum_{k=\underline{k}}^{\bar{k}} \kappa_k D_{it}^k + b \ln T_{qit} - c \ln W_{fit} + v_{it}$$

where μ_i is a household specific effect, a_t^* is a year specific effect, and v_{it} is an idiosyncratic error term. The remaining components of this fertility demand equation are given empirical counterparts. The wife's wage is assumed to be a function of her age and education, while the quality modifiers T_{qit} are a function of other household characteristics. As long as the wealth losses of displacements may vary across families, husband wage loss may be correlated with the wealth shocks across families. Therefore, husbands’ characteristics are not included in the above equation, as controlling for husband’s wage may pick up the heterogeneity in the wealth losses and lead to biased estimates of the cross-wage effect. Also, husband’s characteristics should be close to wife’s according to the assortative mating argument. The estimates of this equation represent structural parameters under the very strong assumptions introduced above. The results should be regarded as reduced form estimates of the model with the measured effect of a displacement on fertility incorporating both the wealth and the cross-wage effects.

4. Results.

Construction of the sample

I used Panel Study of Income Dynamics data for the period 1968-1992 to construct the sample of households used in estimations. The sample is restricted to families where the wives are in their fertile period between the ages of 18 and 45. The sample is created by following each couple from their first usable observation until they either leave the sample or get separated. Split-offs of original sample households, where a child from an original household moves out and forms their own household are also used in the analysis. The resulting unbalanced sample of couples with at least three usable observations contains 46,940 observations on 4746 couples, with 1796 of these couples experiencing job loss due to either a plant closing or a layoff. Since marital break-up and sample attrition are possible results of a displacement, restricting the sample to families with long data histories may fail to capture possible effects of displacement on marriage duration. Displacements are identified from the question asking “What happened to the previous job/employer?" The two categories of responses used to identify displacements are plant closed/employer moved and laid off/fired. The latter category includes workers who are not generally considered displaced, the workers who report that they have been fired. According to Stephens (2001), only 16% of the PSID workers in the laid off/fired category have indeed been fired. To the extent that a firing is also a shock to family income that would require adjustments in fertility, including this small set of fired workers is likely not a problem.

The year of displacement is measured with some error as discussed in Stephens (2001). The earnings and other questions retrieve information about the previous calendar year. However, questions about job loss are not specific to calendar years. For the first sixteen waves of the PSID, the survey asks what happened to the last job for those reporting job tenure which is less than one year. Subsequent surveys ask what happened to the previous job if the current job started since January 1 of the previous calendar year.

Since the PSID surveys nearly all of its respondents between March and May, job displacements may have occurred either during the previous calendar year or during the first few months of the current calendar year. Thus, a recorded displacement is assumed to have happened during the previous calendar year to match the earnings and other household data given in the same survey. PSID survey design will result in reported displacements which on average occur in the latter part of the previous calendar year.

The empirical analysis focuses on the wife's fertility response to the first husband's displacements since the couple has been together. The couples with displacements recorded in the 1968 are not used in the analysis because these displacements may have occurred during the previous ten years.

There may be a correlation between displacements happening to the same couple over time. As shown in Charles and Stephens (2001), displaced couples tend to experience subsequent job losses more often. I focus on the very first displacement, as the bout of displacements which follow the first one are, to a considerable degree, not “shocks” at all; couples can better forecast the future events once such an event happens once. Stevens (1997) finds that ever-displaced workers face an increased risk of future job loss relative to never displaced persons. Another and perhaps less important reason for emphasizing the first as opposed to subsequent shocks is that previous research had shown that the first job loss is by far the most severe in terms of lost earnings and wages.

The dichotomous variable measuring the occurrence of birth takes a value of 1 if the couple has a child in the year next to the current year. Such a formulation of the dependent variable accounts for the fact that fertility decisions are made at the time of conception, which happens 9 months prior to the birth. In the absence of data on exact dates of birth, lagging all the variables by one year is taken as a relevant alternative.

Finally, observations with all zero or missing values for husband’s earnings were excluded from the analysis in order to minimize the chances of husband switching from market activities to household production.

Descriptive statistics

Table 1 compares pre-displacement characteristics of the couples with ever displaced husband to those where husband never experienced a displacement. Displaced couples on average have more children. Wives' and husbands' average age and education is slightly greater in never displaced couples. The percentage of whites is significantly greater in never displaced couples. Men's average wages, annual labor earnings and total family income before displacement are significantly higher in never displaced couples. In addition, displaced men are more likely to work in the manufacturing industry. There are no significant differences in terms of regional location or being of catholic religion between never displaced and ever displaced couples.

Figures 3-5 present the effect of general displacements[3] on the husband's hourly wages, husband's annual labor earnings and annual family income[4]. The results are derived from random-effects regressions on a quadratic in the husband's age, region and year fixed effects and their interactions and a series of dummy variables representing 4 years before and all periods after the husband's displacement. This allows abstracting from life-cycle trends and possible region-specific business cycles. Figures 3-5 plot the demeaned effects of displacements using the estimated coefficients on the displacement dummies. The husband's hourly wages start to decline in two periods prior to the displacement (period 0) and experience a sharp drop in the first year following the displacement, while annual labor earnings and family income exhibit similar trends around the period of displacement. Husband's hourly wages, annual labor earnings and family income continue to decline until the first period after the displacement and then stay at a permanently lower level compared to the pre-displacement years. These results demonstrate that displacements impose a long-term economic loss on the displaced couple's economic resources. Stephens (2001) finds that increased wives' earnings following husbands' displacements compensate for only up to 30% of lost husbands' earnings in the 5 years after the displacement, which is not enough to fully offset a long-term economic loss from displacement. Also, taxes and transfers may be an important mechanism of earnings smoothing only in the short run, and the limited in duration unemployment insurance benefits and other welfare programs are not capable of smoothing long-run earnings losses.

[3] A displacement for any reason (layoff or plant closing) is referred to as a "general displacement" throughout the text.
[4] Family income here is the PSID husband's and wife's total yearly taxable income.

Estimation and Discussion

The model presented above was estimated using a parametric accelerated failure time (AFT) regression with discrete log-logistic hazard model approximating a continuous-time hazard model. A widely used alternative is a semi-parametric Cox proportional hazards model, which imposes a restriction of having the same ratio of hazards for two different individuals for all levels of time at risk. By definition, hazard is a probability of failure in a given period provided that a unit under observation had survived until that point of time. The choice of log-logistic hazard is a suitable choice in the fertility analysis. In addition, log-logistic hazard allows parametrizing positive, as well as negative duration dependence for the hazard, which is the case with fertility. Non-parametric hazard estimates[5] suggest that the hazard of the first, the second and the third child follows an inverted U-shape. Age of woman starting at 18 is taken to be the analysis time and the observations are followed until age 45.

The estimates from the hazard model are reported as time-ratios calculated by exponentiating the regression coefficients. If the time-ratio exceeds one, then time is "accelerated;" the opposite holds for time-ratios less than one. In the present application, a time-ratio greater than one indicates an increase in the expected survival time until birth. The extent to which the estimate exceeds one indicates the percentage by which the expected survival time until birth increases. Similarly, a time-ratio less than one implies a decrease in the expected survival time until birth by a percentage equal to the deviation from one.

The results from estimating log-logistic hazard model[6] for the first, the second and the third child are presented in Tables 2-4. Separate specifications for every birth order were estimated for each type of displacement and for general displacements. All specifications include binary indicator variables for 2-1 years before the husband's displacement from job and for 0-1, 2-3, 4-5, 6-7 and more than 8 years after the

[5] Available upon request.

[6] Analysis time is woman's age. All hazard models were also estimated with Gamma-distributed unobserved heterogeneity in order to control for the couple-level heterogeneity. The likelihood-ratio test failed to reject the hypothesis that the variance of heterogeneity parameters is 0, so only models without such heterogeneity are reported.

displacement; dummy variables for wife's highest completed educational level; a dummy for catholic religion of a household; a dummy for White race; region and year fixed effects. Estimated coefficients for the educational dummies indicate that higher educated women postpone having first child, but tend to have their second and third child sooner, although the coefficients for the second and the third births are mostly statistically insignificant. Catholics tend to have their children sooner compared to all other religions, but all the coefficients are statistically insignificant. White families are estimated to have their first and third child later and their second child earlier than the families of other races, but the results are statistically insignificant. The couples with displaced husbands are found to delay their first child starting at 6-7 years after the displacement. Expected time to first birth increases by 21 percent in 6-7 years and on average by 37 percent in 8 and more years after a general displacement compared to pre-displacement years up to 2 years before the displacement and to all similar families without displaced husbands, while there is no effect for 2 years before and up to 6 years after the displacement. This is consistent with the hypothesis that the families stick to their previous plans about the timing of their first child immediately after displacement, and the economic burden of displacement starts affecting first birth decisions only in the long-term. Almost all of the adjustment in the timing of the first births is due to layoffs with all of the estimated coefficients on plant closing dummies being insignificant. Wald test rejects the hypothesis that all of the after-displacement dummies for plant closings are jointly statistically insignificant. Second births are affected by general displacements in 4-5 years after the displacement and in all of the subsequent years. Plant closings have a greater effect on postponing second child in 4-5 and 8 and more years after the displacement compared to layoffs. All of the coefficients on the after-layoff dummies are insignificant, but Wald test suggests that they are jointly statistically significant at 3% level, while the after-plant closing dummies are jointly statistically significant only at a 10% level. There is some evidence of postponing third birth in Table 4 following a general displacement, but all of the after-displacement coefficients are jointly insignificant either for the layoffs or plant closings. This suggests that families tend to adjust timing of their fertility more on the extensive margin (i.e. for the initial births) following a displacement.

The results from estimating hazard models in this paper should be treated as simulations as long as one believes that different households in the sample have different hazard functions. This paper constrains the period of being married for couples to be at least 3 years, placing a restriction that the couples should remain married for at least 3 years following a displacement if the displacement occurs at the beginning of their marriage. The period of at least 3 years allows measuring the effect of displacement on fertility for at least the following 2 years. While sample selection bias due to marriage stability is less of an issue here than when constraining marriage histories to be very long, there remains a problem of a marital dissolution after displacement being correlated with fertility pattern, which may bias the fertility responses following the displacements. If displacements negatively affect fertility and also raise the probability of marital dissolution, then the number of censored observations as a result of marriage dissolution will increase. One would expect couples who remain together in the face of a bad outcome to be those for whom fertility and labor supply adjustments are smaller than for people whose marriages break up. If this is the case, then the fertility response shortly after the displacement would come from both types of couples, while the long-term effect will be driven solely by the by couples who tend to be less affected by displacements. To the extent that sturdier marriage-couples will have less adjustment on the fertility side, my estimates of the effect of displacements in the long run will be downward biased. Charles and Stephens (2001) show using PSID data that layoffs increase the probability of marriage dissolution. Considering only the results for plant closings could partly eliminate the problem of possible correlation between divorces and fertility. Figure 6 shows the attrition patterns for general displacements and for layoffs and plant closings separately. While attrition may happen for any reason as the time progresses, the rate of attrition is much higher for the layoffs than for plant closings, suggesting that marriages could dissolve faster following the layoffs. In order to reduce the possible bias due to the sample composition and non-random attrition, the displaced couples were restricted to stay in the sample for at least 1 period before and two periods after the displacement. The results of estimating hazard model for this sample for all three birth orders are in Table 9. As a result of controlling for sample composition in this way, estimates on the displacement dummies for the second and third births increased suggesting a stronger postponement effect compared to the results in Table 3 and 4, while the effect for the first birth 8 and more periods after the displacement decreased compared to Table 2.

The differences in mean characteristics between the displaced and never displaced couples in Table 1 suggest that never displaced couples could be heterogeneously different in the unobserved characteristics as well. If unobservables are correlated with fertility patterns, then the never displaced couples are not an appropriate control group for the ever-displaced couples. If this is the case, the estimated effects of displacements will be biased. In order to reduce the bias arising from the sample heterogeneity, I estimated hazard models separately for the couples with husbands ever working in the manufacturing and for the ever displaced couples only. Focusing on the manufacturing subsample could potentially provide me with a group of people that is more homogeneous in its geographical and industrial composition. Manufacturing workers are more frequently displaced in my sample, and they faced similar patterns of displacements that were induced mainly by changes in the exchange rate in the early 1980's in the US. As Table 5 shows, ever and never displaced couples with husbands ever working in the manufacturing have mean characteristics that are more similar than mean characteristics for the full sample in Table 1. Estimates of the hazard model for the manufacturing subsample in Table 6 suggest almost no postponement effect for the first and the third births, and significant postponement for the second births only in 4-5 years after the displacement. Layoffs alone have a significant postponement effect for the first birth in 8 and more years after the displacement, and plant closings have a significant postponement effect for the second births in 4 years after the displacement as suggested by Table 7.

In order to reduce the bias due to selection based on unobservables, I also estimated hazard models for the sample that included ever displaced couples only. Ever displaced couples could be a better match to each other in terms of their observable and unobservable characteristics. In the case of ever displaced husbands sample I was taking advantage of the variation in the timing of displacements between these couples. But the downside of restricting the sample to ever displaced couples is the reduction in the sample size and the possibility that the timing of displacements for different workers is not exogenous. Table 8 presents the results from estimating hazard models for the first and the second births for ever displaced couples only. Separate results are presented for the general displacements and for the plant closings. Layoffs category encompasses workers who were fired, and displacements due to layoffs may to some extent be anticipated based on the personal attitude to the laid-off worker. Plant closings, on the other hand, should affect everyone irrespectively of their personal characteristics. Plant closings, unlike layoffs, could be thought of being exogenous to household's characteristics, as plant closings occur at a bigger scale and are not correlated to individual characteristics of the workers. The estimated coefficients suggest that there is a significant postponement of first births after 6 periods following general displacements, but no effect is due to plant closings. Plant closings seem to be generating postponement of the second births in the 6-7 years after the displacement.

Finally, given the fact that the timing of fertility is affected, it would be interesting to see whether fertility postponement due to displacements translates into a lower completed fertility. Table 10 presents coefficients from the OLS regression for the total number of kids and marginal effects from Probit regressions for the binary indicators of having 2 or more and 3 or more kids for PSID women aged 40 and above and 45 and above in 1992, by sample composition and by types of displacements. Only a few of those women had only one child in 1992. All regressions include educational, religion, regional variables and a full set of dummies for woman's ages. Estimates from Table 10 suggest no effect of ever being displaced on completed fertility. This result is puzzling, since it goes against findings from the previous literature. No effect of displacements on the total completed fertility here can be partly attributed to much individual heterogeneity still unaccounted for in the regressions. However, the results in this paper are consistent with the trends in age specific fertility observed in the US: younger women tend to postpone childbearing and older women tend to catch up on the number of births starting in early 1980s.

As an avenue for further investigation, even though total fertility was shown not to be affected by displacements, displaced couples might adjust on the child quality side. For example, mothers who have to work as a result of her husband's displacement, will spend less time on children and this might have an impact on the child development and future educational achievement. Stress, associated with husband's displacement might further deteriorate conditions in which the child is grown up. Various measures of child outcomes like reported child health, progress in school and parental inputs into childbearing are worth looking at. Also, if medical complications such as premature births and birth defects occur more frequently as woman ages, then postponement of births may have a direct adverse effect on child health.

This paper abstract from the general equilibrium effects of husbands' displacements. However, bigger-scale displacements might lower women's market wages and labor demand in the same localities, which could create an additional negative effect on fertility.

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Table 1. Comparison of never displaced and displaced couples [a]

	Never displaced [b]	Displaced [c]
Total number of observations	27024	19916
Total number of couples	2950	1796
% White *	69.458	63.864
% Catholics	17.864	17.483
% in Northeastern region [d]	14.78	15.702
% in North central region [d]	23.864	22.829
% in Southern region [d]	45.288	45.935
% in Western region [d]	16.068	15.535
Mean husband years of education *	12.906	12.111
Mean wife years of education *	12.81	12.145
Mean husband's hourly wages *	10.667	9.355
Mean husband's ann. labor earn. *	24076.295	19324.310
Mean total ann. family income *	35794.849	27803.591
Husband's age *	33.601	32.136
% of husbands in manufacturing [e] *	24.529	31.304
Wife's age *	30.812	29.645
Mean number of kids *	2.156	2.3
Number of first births	956	495
Number of second births	1139	779
Number of third births	519	414
Number of general displacements [f]	0	1796
Number of plant closures	0	734
Number of layoffs	0	1392

[a] Unweighted tabulations using the 1968-1992 PSID surveys. Only using the workers first displacement from the 1969-1992 PSID surveys. Dollar figures are in 82-84 dollars using yearly CPI from BLS web-site.

[b] Averages include all observations for every never displaced couple.

[c] Pre-displacement industry, wages, earnings and income are taken from the survey year prior to the reported displacement. Couples not in the sample prior to the displacement year are excluded from these calculations.

[d] Percentages based on the region reported in the last sample year.

[e] Industry information was not asked until 1971. Husband is considered working in the manufacturing if he worked there at least once. Average percentage of years worked by each husband in the manufacturing is reported here.

[f] Counts either first layoff or first plant closure.

* Difference in means between the samples is statistically significant at 5% level assuming independence of the two samples.

Table 2. Estimates of the log-logistic hazard model of having a first birth, by type of displacement.[a-d]

	General displacements		Plant closings		Layoffs	
Variable	Tm. ratio	z-statistic	Tm. ratio	z-statistic	Tm. ratio	z-statistic
Dummy 'Husband displaced from job':						
1-2 years in the future	0.986	-0.45	1.037	0.89	0.957	-1.02
0-1 years ago	0.970	-0.95	1.056	1.33	0.928	-1.77
2-3 years ago	1.050	1.69	1.062	1.21	1.043	1.25
4-5 years ago	1.038	0.62	1.049	0.44	1.030	0.37
6-7 years ago	1.207	3.19	1.124 [g]	0.85	1.423	3.28
8 and more year ago	1.368	2.26			1.303	1.32
Wife's education:						
Dummy for 12 grades	1.079	2.10	1.091	2.07	1.086	2.21
Dummy for some college	1.155	3.85	1.173	3.85	1.158	3.91
Dummy for having a BA	1.220	5.23	1.241	5.13	1.223	5.24
Dummy for having an MA	1.300	6.60	1.328	6.46	1.304	6.51
Dummy for catholic religion	0.971	-1.33	0.970	-1.37	0.967	-1.53
White race	1.027	1.03	1.032	1.07	1.024	0.86
Region indicators	yes		yes		yes	
Year effects	yes		yes		yes	
Number of observations	3143.00		3143.00		3143.00	
Number of subjects	1123		1123		1123	
Number of failures	965		965		965	
P-val. for the after-disp. coeff.test [e]	0.00		0.46		0.01	
P-val. for the gamma coeff. test [f]	0.00		0.00		0.00	
Log pseudolikelihood	1054.13		1051.59		1056.10	

[a] Survival time ratios are equal to the exponentiated coefficients.

[b] Omitted categories include displaced more than 2 years in the future and never displaced.

[c] Educational dummies were used instead of years of education due to a large number of missing observations on the years of completed education.

[d] Robust standard errors adjusted for clusters at the couples level.

[e] P-value for the Wald test of the hypothesis that all after-displacement dummies are jointly 0.

[f] P-value for the hypothesis that the parameter gamma of the log-logistic hazard is 0. Parameter gamma was always estimated to be between 0 and 1, suggesting an inverted U-shape hazard function.

[g] Due to a low number of observations, all of the subsequent dummies were absorbed in the preceding dummy.

Table 3. Estimates of the log-logistic hazard model of having a second birth, by type of displacement.[a]

Variable	General displacements Tm. ratio	General displacements z-statistic	Plant closings Tm. ratio	Plant closings z-statistic	Layoffs Tm. ratio	Layoffs z-statistic
Dummy 'Husband displaced from job':						
1-2 years in the future	0.875	-0.93	0.714	-0.34	0.923	-0.38
0-1 years ago	0.969	-0.41	1.080	0.7	0.123	-0.42
2-3 years ago	1.031	0.44	1.084	0.82	0.963	-0.24
4-5 years ago	1.273	3.11	1.400	2.64	1.266	1.91
6-7 years ago	1.387	3.83	1.110	0.28	1.806	1.48
8 and more year ago	1.485	2.87	1.546	1.97	1.145	0.17
Wife's education:						
Dummy for 12 grades	1.009	0.15	0.995	-0.06	0.937	-0.29
Dummy for some college	1.009	0.12	0.995	-0.05	0.853	-0.36
Dummy for having a BA	0.705	-0.48	0.616	-0.39	0.877	-0.69
Dummy for having an MA	0.151	-8.58	0.143	-4.44	0.029	-5.45
Dummy for catholic religion	0.956	-0.47	0.963	-0.35	0.565	-1.49
White race	0.898	-1.53	0.903	-1.21	0.719	-0.76
Region indicators	yes		yes		yes	
Year effects	yes		yes		yes	
Number of observations	6771.00		6771.00		6771.00	
Number of subjects	2159.00		2159.00		2159.00	
Number of failures	1435.00		1435.00		1435.00	
P-val. for the after-disp. coeff.test	0.00		0.09		0.03	
P-val. for the gamma coeff. test	0.00		0.00		0.00	
Log pseudolikelihood	1060.31		1053.22		1059.67	

[a] All of the footnotes to Table 2 apply here.

Table 4. Estimates of the log-logistic hazard model of having a third birth, by type of displacement.[a]

Variable	General displacements Tm. ratio	General displacements z-statistic	Plant closings Tm. ratio	Plant closings z-statistic	Layoffs Tm. ratio	Layoffs z-statistic
Dummy 'Husband displaced from job':						
1-2 years in the future	1.062	0.3	0.915	-0.31	1.100	0.38
0-1 years ago	1.062	0.41	1.514	2.22	0.955	-0.31
2-3 years ago	0.856	-1.16	0.808	-0.35	0.856	-1.07
4-5 years ago	1.291	1.9	1.959	1.8	1.273	1.39
6-7 years ago	1.024	0.19	0.830	-0.56	1.078	0.53
8 and more year ago	1.159	0.91	0.988	-0.02	1.175	1.04
Wife's education:						
Dummy for 12 grades	0.990	-0.1	1.010	0.09	0.996	-0.04
Dummy for some college	0.919	-0.77	0.929	-0.53	0.922	-0.72
Dummy for having a BA	0.924	-0.48	0.991	-0.05	0.919	-0.55
Dummy for having an MA	1.268	1.41	1.386	1.64	1.277	1.49
Dummy for catholic religion	0.846	-1.29	0.787	-1.48	0.860	-1.23
White race	1.011	0.15	1.025	0.22	1.017	0.23
Region indicators	yes		yes		yes	
Year effects	yes		yes		yes	
Number of observations	4065		4065		4065	
Number of subjects	1460		1460		1460	
Number of failures	647		647		647	
P-val. for the after-disp. coeff.test	0.21		0.15		0.42	
P-val. for the gamma coeff. test	0.00		0.00		0.00	
Log pseudolikelihood	378.15		378.27		377.01	

[a] All of the footnotes to Table 2 apply here.

Table 5. Comparison of never displaced and displaced couples with husbands working in the manufacturing. [a]

	Never displaced [b]	Displaced [c]
Total number of observations	10575	11876
Total number of couples	1093.00	992.00
% White *	69.53	64.11
% Catholics	16.83	16.53
% in Northeastern region [d]	14.18	14.42
% in North central region [d]	28.45	24.19
% in Southern region [d]	44.10	46.17
% in Western region [d]	13.27	15.22
Mean husband’s years of education *	12.66	11.98
Mean wife’s years of education *	12.64	11.99
Mean husband's hourly wages *	10.98	9.53
Mean husband's ann. labor earn. *	24494.40	19577.79
Mean total ann. family income *	35672.85	27597.95
Husband's age *	32.88	31.74
Wife's age *	30.38	29.41
Mean number of kids *	2.17	2.35
Number of first births	354.00	279.00
Number of second births	450.00	468.00
Number of third births	202.00	260.00
Number of general displacements [f]	0.00	992.00
Number of plant closures	0.00	384.00
Number of layoffs	0.00	813.00

[a-f] All footnotes from Table 1 apply here.

* Even though the differences in means are still statistically significant at 1% level, the corresponding t-statistics (not reported) decreased considerably.

Table 6. Estimates of the log-logistic hazard model of transition to the first, the second and the third child, for husbands working in the manufacturing; all displacements combined. [a]

	First births		Second births		Third births	
	General displacements		General displacements		General displacements	
Variable	Tm. ratio	z-stat.	Tm. ratio	z-stat.	Tm. ratio	z-stat.
Dummy 'Husband displaced from job':						
1-2 years in the future	0.938	-1.22	0.951	-0.97	0.959	-0.06
0-1 years ago	0.900	-2.38	0.995	-0.14	0.971	-0.07
2-3 years ago	1.006	0.08	0.928	-1.18	0.842	-0.52
4-5 years ago	1.043	0.32	1.148	2.36	1.189	1.15
6-7 years ago	1.088	0.89	1.137	1.62	1.041	0.29
8 and more year ago	1.114	1.43	1.036	0.18		
Wife's education:						
Dummy for 12 grades	1.138	2.10	1.087	2.12	0.922	-0.66
Dummy for some college	1.201	2.75	1.090	1.31	0.844	-0.88
Dummy for having a BA	1.293	3.80	1.084	0.91	0.947	-0.34
Dummy for having an MA	1.304	3.67	1.199	2.31	1.014	0.08
Dummy for catholic religion	0.939	-1.34	1.086	2.18	0.858	-0.52
White race	1.030	0.70	0.938	-1.70	1.132	0.60
Region indicators	yes		yes		yes	
Year effects	yes		yes		yes	
Number of observations	1289.00		1867.00		1861.00	
Number of subjects	472.00		837		668.00	
Number of failures	420.00		644		322.00	
P-val. for the after-disp. coeff.test	0.06		0.11		0.78	
P-val. for the gamma coeff. test	0.00		0.00		0.00	
Log pseudolikelihood	486.87		778.36		220.57	

[a] All of the footnotes to Table 2 apply here.

Table 7. Estimates of the log-logistic hazard model of transition to the first and the second child, for husbands working in the manufacturing; by type of displacement.[a]

	First births				Second births			
	Plant closings		Layoffs		Plant closings		Layoffs	
Variable	Tm. ratio	z-stat.	Tm. ratio	z-stat.	Tm. ratio	z-stat.	Tm. ratio	z-stat.
Dummy 'Husband displaced from job':								
1-2 years in the future	1.054	0.99	0.894	-1.51	0.976	-0.23	0.940	-1.00
0-1 years ago	0.928	-0.98	0.892	-2.06	1.100	1.66	0.975	-0.62
2-3 years ago	1.114	1.03	0.968	-0.40	0.779	-0.65	0.946	-0.78
4-5 years ago	1.081	0.49	1.004	0.04	1.203	1.93	1.141	1.93
6-7 years ago			1.288	2.68	1.293	2.69	1.059	0.89
8 and more year ago					1.254	2.96		
Wife's education:								
Dummy for 12 grades	1.141	2.03	1.143	2.53	1.098	2.46	1.083	2.01
Dummy for some college	1.219	2.84	1.199	2.99	1.111	1.92	1.075	0.96
Dummy for having a BA	1.316	4.05	1.301	4.25	1.069	0.72	1.096	1.01
Dummy for having an MA	1.337	3.85	1.279	3.67	1.246	2.86	1.215	2.47
Dummy for catholic religion	0.945	-1.29	0.933	-1.70	1.091	2.25	1.084	2.11
White race	1.028	0.62	1.039	0.74	0.930	-2.07	0.938	-1.73
Region indicators	yes		yes		yes		yes	
Year effects	yes		yes		yes		yes	
Number of observations	1289.00		1289.00		1867.00		1867.00	
Number of subjects	472.00		472.00		837		837	
Number of failures	420.00		420.00		644		644	
P-val. for the after-disp. coeff.test	0.48		0.02		0.00		0.23	
P-val. for the gamma coeff. test	0.00		0.00		0.00		0.00	
Log pseudolikelihood	483.97		487.74		777.86		777.22	

[a] All of the footnotes to Table 2 apply here.

Table 8. Estimates of the log-logistic hazard model of transition to the first and the second births, for ever displaced couples, for general displacements and plant closings.[a]

	First births				Second births			
	General displacements		Plant closings		General displacements		Plant closings	
Variable	Tm. ratio	z-statistic	Tm. ratio	z-statistic	Tm. ratio	z-statistic	Tm. ratio	z-statistic
Dummy 'Husband displaced from job':								
1-2 years in the future	0.940	-1.62	0.990	-0.14	0.946	-1.03	0.981	-0.23
0-1 years ago	0.935	-1.45	1.038	0.71	1.000	-0.01	1.058	1.33
2-3 years ago	1.018	0.41	1.064	0.86	1.014	0.27	1.038	0.60
4-5 years ago	1.025	0.37	1.024	0.18	1.097	1.38	1.005	0.01
6-7 years ago	1.167	2.25	1.057	0.23	1.164	2.65	1.213	2.73
8 and more year ago	1.390	2.75			1.046	0.15	1.143	0.79
Wife's education:								
Dummy for 12 grades	1.078	1.48	1.110	1.47	1.025	0.61	1.024	0.46
Dummy for some college	1.166	2.52	1.213	2.66	1.098	1.82	1.103	1.05
Dummy for having a BA	1.229	3.12	1.276	3.05	1.145	2.77	1.165	2.49
Dummy for having an MA	1.308	3.20	1.402	4.07	1.233	1.70	1.305	2.36
Dummy for catholic religion	1.020	0.57	1.029	0.73	1.045	1.11	1.046	0.96
White race	1.050	1.18	1.070	0.98	0.924	-2.11	0.929	-1.44
Region indicators	yes		yes		yes		yes	
Year effects	yes		yes		yes		yes	
Number of observations	1068.00		1068.00		1568.00		1568.00	
Number of subjects	362.00		362.00		691.00		691.00	
Number of failures	323.00		323.00		533.00		533.00	
P-val. for the after-disp. coeff.test	0.00		0.92		0.06		0.08	
P-val. for the gamma coeff. test	0.00		0.00		0.00		0.00	
Log pseudolikelihood	359.79		354.74		628.13		626.29	

[a] All of the footnotes to Table 2 apply here.

Table 9. Estimates of the log-logistic hazard model of transition to the first, second and third births, controlling for the displaced sample composition, for general displacements.[a,b]

	First births		Second births		Third births	
Variable	Tm. ratio	z-stat.	Tm. ratio	z-stat.	Tm. ratio	z-stat.
Dummy 'Husband displaced from job':						
1-2 years in the future	0.979	-0.58	0.926	-0.65	0.056	-8.40
0-1 years ago	1.026	0.86	0.983	-0.22	0.985	-0.11
2-3 years ago	1.011	0.23	1.093	1.26	0.819	-0.95
4-5 years ago	1.084	1.00	1.389	4.50	1.430	1.68
6-7 years ago	1.225	2.62	1.447	4.20	1.170	1.23
8 and more year ago	1.078	1.08	1.474	2.03		
Wife's education:						
Dummy for 12 grades	1.080	1.97	1.012	0.24	1.057	0.41
Dummy for some college	1.163	3.89	1.035	0.53	0.917	-0.59
Dummy for having a BA	1.233	5.30	0.933	-0.56	0.914	-0.52
Dummy for having an MA	1.309	6.44	0.830	-0.53	1.266	1.35
Dummy for catholic religion	0.971	-1.24	0.932	-0.73	0.769	-1.94
White race	1.029	1.07	0.902	-1.81	1.037	0.46
Region indicators	yes		yes		yes	
Year effects	yes		yes		yes	
Number of observations	2776		5469		3438.00	
Number of subjects	989		1822		1224.00	
Number of failures	868		1263		563.00	
P-val. for the after-disp. coeff. test	0.12		0.00		0.22	
P-val. for the gamma coeff. test	0.00		0.00		0.00	
Log pseudolikelihood	974.16		1058.18		347.78	

[a] All of the footnotes to Table 2 apply here.

[b] Displaced couples had to have observations for at least 1 period before and 2 periods after the displacement in order to be in the sample.

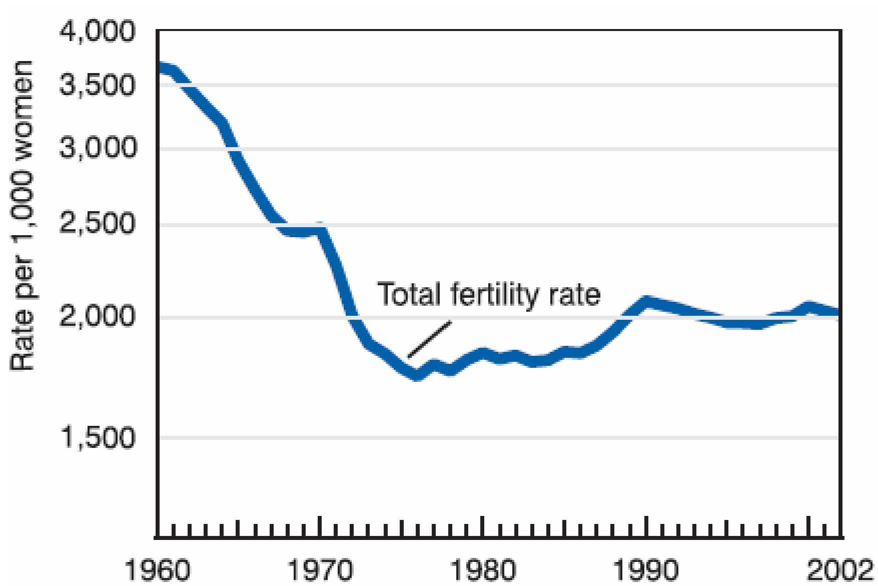
Table 10. Table of coefficients from OLS for the number of kids and marginal effects from Probit regressions for the binary indicators of having 2 or more and 3 or more kids at certain minimum ages of women in 1992, by sample composition and by types of displacements. [a]

		Women 40 and older in 1992						
			Number of kids		2 or more kids		3 or more kids	
		N obs.	Coeff.	t-stat	Marg.eff.	z-stat	Marg.eff.	z-stat
Full sample	General displacements	2500	0.038	0.76	0.007	0.42	0.013	0.57
	Plant closures	2500	-0.004	-0.06	0.018	0.91	-0.020	-0.70
	Layoffs	2500	0.087	1.58	0.009	0.55	0.037	1.48
Manufact.	General displacements	1257	0.006	0.08	0.006	0.29	-0.002	-0.06
	Plant closures	1257	-0.031	-0.39	0.012	0.47	-0.019	-0.51
	Layoffs	1257	0.061	0.85	0.009	0.41	0.024	0.72

		Women 45 and older in 1992						
			Number of kids		2 or more kids		3 or more kids	
		N obs.	Coeff.	t-stat	Marg.eff.	z-stat	Marg.eff.	z-stat
Full sample	General displacements	1707	0.008	0.12	0.001	0.07	0.018	0.63
	Plant closures	1707	-0.030	-0.37	0.002	0.09	-0.024	-0.67
	Layoffs	1707	0.062	0.84	0.018	0.83	0.042	1.27
Manufact.	General displacements	794	-0.046	-0.50	0.011	0.41	-0.014	-0.35
	Plant closures	794	-0.095	-0.89	0.005	0.15	-0.042	-0.88
	Layoffs	794	0.024	0.24	0.023	0.78	0.010	0.22

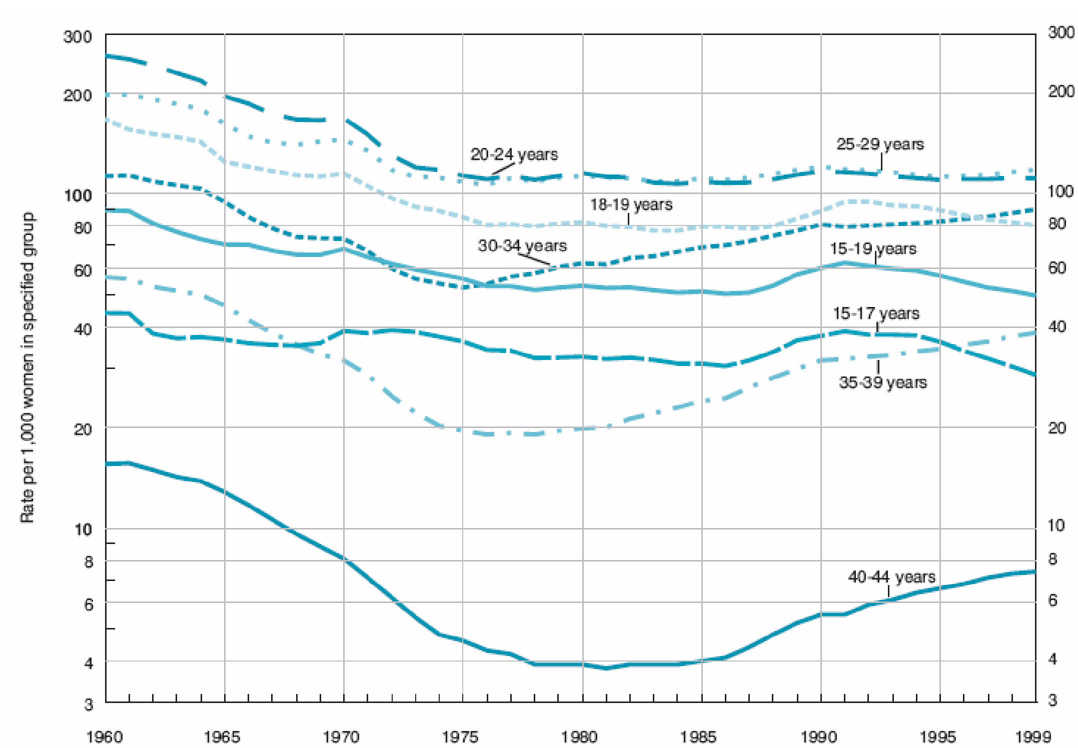
[a] Data: cross-section of PSID couples observed in 1992. All regressions include educational, religion, regional variables and full set of dummies for woman's age.

Figure 1. Total fertility rate in the US in 1960-2002.



Source: National Center for Health Statistics (NCHS).
http://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52_17.pdf

Figure 2. Birth rates by age of mother in the US in 1960-1999.



Source: National Center for Health Statistics (NCHS).

http://www.cdc.gov/nchs/data/natality/nvsr49_1f2.pdf

Figure 3. Effect of displacements on husband's hourly wages.

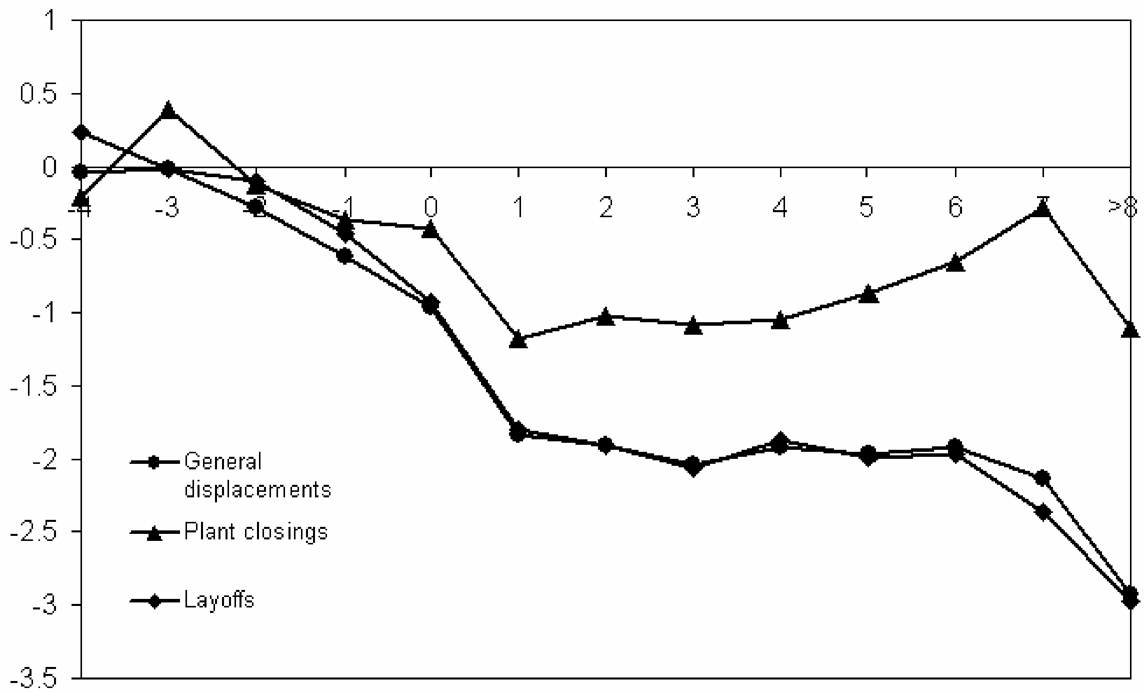


Figure 4. Effect of displacements on husband's annual labor earnings.

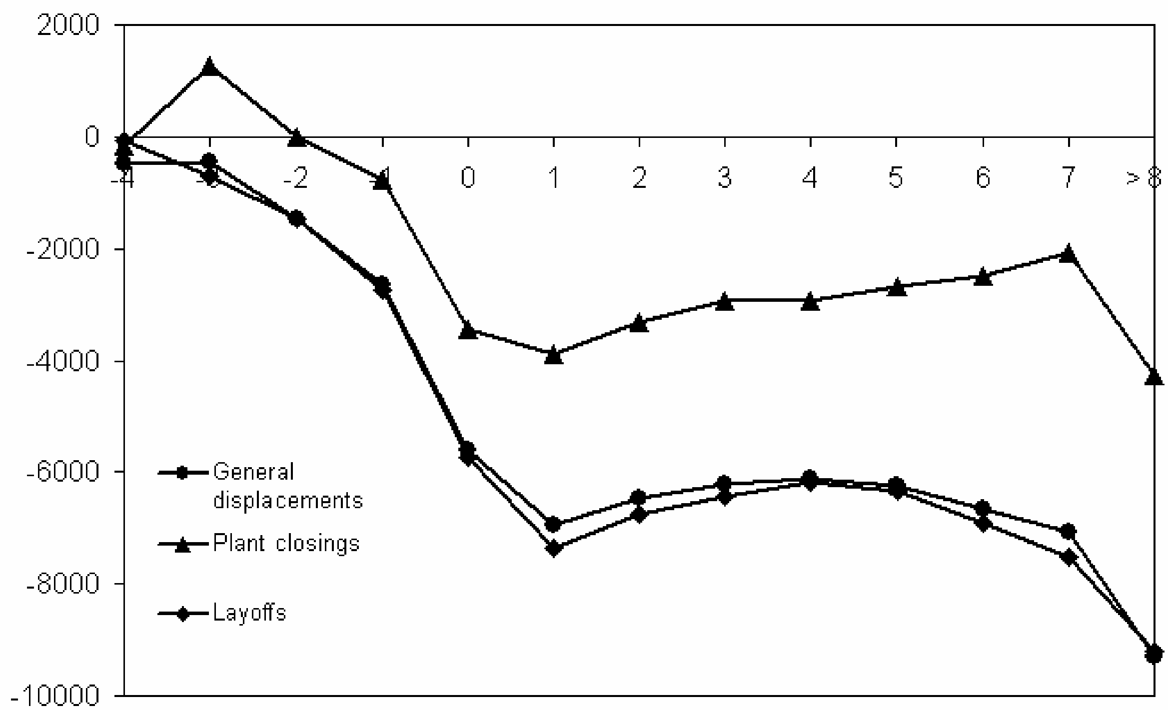


Figure 5. Effect of displacements on family's total income.

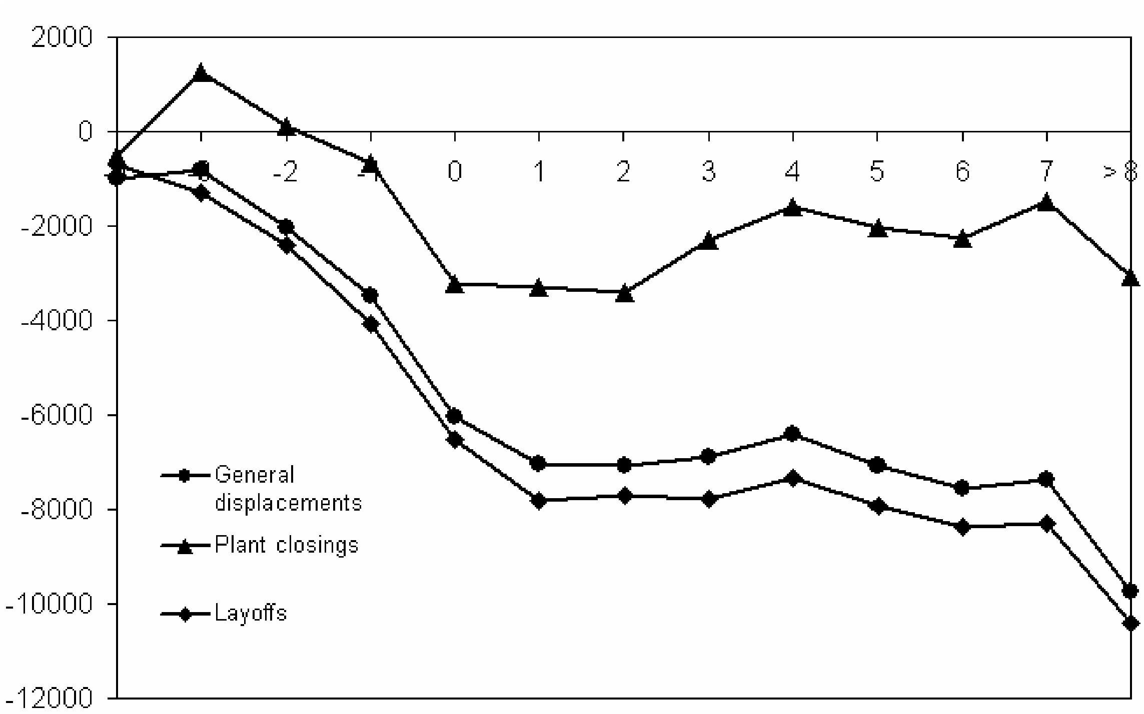


Figure 6. Patterns of attrition from the sample of ever displaced couples who were present in the second period before the displacement, by type of displacement.