

Effect of Job Displacement on Couple's Fertility Decisions*

Kristiina Huttunen

Labour Institute for Economic Research

Jenni Kellokumpu

University of Jyväskylä

Draft

September 2010

Abstract

This paper uses Finnish longitudinal employee-employer data (FLEED) matched to birth records to estimate the effects of job displacement on fertility. We distinguish between male and female job losses. We focus on couples where one spouse lost his/her job due to a plant closure and follow them several years before and after the job loss. As a comparison group we use similar couples that were not affected by a plant closure. In order to examine the possible channels through which job loss affects fertility we examine also the effect on earnings, employment and divorce. The results show that woman's own job loss decreases fertility only for highly educated and high wage women. Spouse's job loss has a significant negative impact on completed fertility.

Keywords: Plant closure, employment, earnings, divorce, fertility

JEL classification: J65, J13, J12

* Corresponding author: kristiina.huttunen@labour.fi. We would like to thank Joshua Angrist, David Autor, Amy Finkelstein, Jukka Pirttila, Kjell Salvanes and Till von Wachter for very useful comments and the participants in the following workshops and seminars: EALE 2009, EEA 2009, NBER Summer Institute 2010, ELE summer institute 2009, MIT labor lunch, and LSE/CEP Labour work shop.

1 Introduction

The question of how income affects people's fertility behavior has interested economists for decades (see e.g. Becker 1960, 1965, Becker and Lewis, 1973, Heckman and Walker, 1990). Several cross-sectional studies have documented that family size is negatively related to household income. The quality-quantity literature (Becker and Lewis, 1973, Becker and Tomes, 1976, and Angrist et al., 2007, to name a few) explains this finding by suggesting that parents not only demand number of children but also children with certain qualities. Several economic and demographic studies have documented a procyclical pattern of fertility using macro data (see. e.g. Silver, 1970, Ben-Porath, 1973). Dehejia and Lleras-Muney (2004) find that there is an important selection into pregnancy during recessions, which indicates that the effect of earnings on fertility may vary for women with different characteristics.

The challenge in studies that examine the relationship between income and fertility is how to obtain exogenous variation in income. Household's income and fertility tend to be jointly determined, which makes it difficult to disentangle the causal mechanism between income and fertility. Several studies have focused on changes in aggregate income (Heckman and Walker, 1990) or unemployment (Dehejia and Lleras-Muney, 2004) in order to mitigate the problems of reverse causality. However, the income effects may well vary between spouses and by individual's characteristics. In order to investigate this we would ideally need an exogenous shock to income and data on both spouses and their characteristics.

In this study we estimate the effect of job loss that is due to plant closure on couple's fertility behavior. A plant closure can be thought to be an exogenous shock to a worker's career, since it results in a separation of all plant's workers and it is not related to the worker's own job performance. Number of studies has shown that displaced workers suffer long lasting earnings

losses (e.g. Jacobson, Lalonde & Sullivan 1993, Stevens, 1997, Eliason & Storrie 2006, Huttunen, Møen & Salvanes 2010). Thus we can use plant closures to explore the causal effect of an income shock on fertility behavior.

A job loss is likely to have an indirect effect on a couple's fertility decisions through other ways than income changes. Job displacement increases the uncertainty concerning the future employment conditions since it increases temporal employment relationships and subsequent job displacements (Stevens 1997, 2001, Farber 2003, 2007). This can lead to a delay in having children (Fraser 2001). Job loss may have an indirect effect on fertility through increased risk of marital dissolution (Charles & Stephens 2004, Eliason 2004, Rege et al. 2007) and by increased health risk (Browning et al. 2006 and Martikainen et al. 2007) and mortality (Sullivan & von Wachter, 2009).

We use Finnish longitudinal employer-employee data (FLEED) matched to birth records. The data consist of all 16–70 year old Finnish residents in years 1988–2004. Each worker and their employer in these data have a unique identification code. In addition, information on workers' spouses is included, which makes it possible to create a sample of couples and follow them several years after a job loss. We focus on couples where one spouse lost his/her job due to a plant closure in 1991 and follow them several years before and after the job loss. As a comparison group we use similar couples that were not affected by a plant closure. We follow each couple for 4 years before a job loss and 13 years after a job loss in order to investigate the changes in their fertility in post-displacement years. The follow-up period of several years allows us to see whether the possible effects of job displacement on fertility are only temporary (postponement) or permanent (completed fertility). In order to examine the multiple channels through which a job loss can affect fertility, we first study the effect of job loss on several outcomes – average earnings, employment and divorce. We also take into account the possible

heterogeneity of the effect, and examine how the effect of job displacement on fertility varies by age, earnings and education.

This paper makes several contributions to the literature on the impacts of job displacement and that on general family economics. First, our set up and the data allow us to study the causal effects of income shocks on couple's fertility behavior at micro-level. We can distinguish between a woman's own and her spouse's job loss, and thus make a distinction between a shock to the woman's career and a pure income shock. Previous studies have either looked the effect of a woman's own job loss (Del Bono et al. 2008) or the effect of a husbands' job loss (Amialchuk 2008, Lindo 2009), Second, this work is one of few studies that examine the effect of job displacement on fertility. Finland in early 1990's is an interesting case study, since it experienced a very high recession where unemployment rose from 3 to 17 percent in less than 4 years. We argue that because of this unusually deep recession the sample of displaced workers can be tough as a representative group of the work force¹. Third, the rich data allow us to examine how this effect varies by various observable dimensions, such as education, spouse's income, family composition etc. We use our theoretical framework to interpret how the effect of job displacement may vary by worker characteristics.

The results show that a job loss leads to long-lasting income reduction. Woman's job loss decreases fertility only for highly educated women and for high wage earners. This is in line with traditional home production model (Gronau 1977), which indicates that for high wage earners, the income effect is likely to dominate over substitution effect. Another explanation is that career interruptions have more severe consequences for highly skilled women, since their skills

¹ See Korkeamäki and Kyyrä (2008), and Verho (2008) for previous studies that have examined the earnings effects of this recession on Finnish workers.

depreciate more rapidly during jobless periods². Finally, low educated women are much more likely to be unemployed after job loss. The opportunity costs of having children for the unemployed group is much higher than for women who pursuit directly to new jobs after job loss. Especially since the parental benefits in Finland exceed unemployment compensation for most women.

Spouse's job loss has a much stronger negative effect on fertility than woman's job loss. This again is inline with standard home production theory. Spouse's job loss will not affect the value of woman's time, and thus will affect fertility behavior trough income effects. Spouse's job loss also results in a relatively bigger loss in total family income. Finally, the husband's job displacement is known to increase the risk of divorce more than wife's job displacement (see e.g. Rege et al. 2007), which will indirectly influence fertility as well.

The paper proceeds as follows. The next section presents a brief theoretical framework. The third section gives an overview of the existing literature. In the fourth section we describe our data. The fifth section outlines the empirical set up. The sixth section presents the results and summarizes the implications of our estimates. The final section concludes.

2 Theoretical Framework

Job displacement can affect fertility in several ways. First, number of studies has shown that displaced workers suffer from long lasting earnings losses.³ In the traditional model of fertility (see e.g. Becker 1960, 1965) a reduction of worker's own wage (woman's own job loss) can affect fertility through income and substitution effects. If children are normal goods, reduction in

² Bertrand et al. (2010) show that career interruptions explain significant proportion of gender wage gap for highly skilled women. Adda et al. (2010) show that career interruptions decline wages more for women in abstract jobs than in other occupations.

income reduces fertility. This is the income effect. The wage reduction (or unemployment) makes the value of woman's time cheaper and reduces the opportunity costs of having children. This substitution effect increases fertility. The overall effect is ambiguous and depends on the relationship between market wages and the profitability of home production.

The static model of household production introduced by Gronau (1977) gives a useful theoretical set up to examine how income changes affect fertility of different type of people. In this model woman divides her time between market work (N), home production (H), and leisure (L). The person maximizes the amount of commodity Z, which is combination of goods and services X and leisure (time) L, $Z=Z(X,L)$. The goods can be divided to those produced at home X_H and at the market X_M . Perry (2004) uses the model by Gronau to illustrate how wage changes affect fertility decisions. The effect will depend on the relationship between market wage and the home production function. For high wage women who initially spend little time in home production, a decrease (an increase) in earnings will only affect the consumption of goods and thus decrease (increase) fertility since income effect dominates. Consider now a (low-wage) person who initially produces all childcare at home. If the wage increases, she will increase the amount of work she spends on market work, but it still remains optimal to provide all childcare at home. Thus for low wage women a wage increase may decrease fertility (since substitution effect dominates).

The above model examines wage effects on fertility in static framework. The extension to dynamic, or life-cycle, framework is useful since job loss may affect both the timing of births and completed fertility. In a dynamic framework the effect of earnings on fertility depends on whether the effect is transitory or permanent, and whether individuals are credit-constrained or not (see e.g. Hotz et al. 1997). Under perfect capital markets (i.e. no one is credit constrained) a

³ e.g. Jacobson et al. 1993, Eliason & Storrie 2006, Huttunen et al. 2010, Korkeamäki & Kyryä 2008.

transitory effect should not have an effect on fertility. However, for credit-constrained households a transitory effect may affect spacing of children, since they want to postpone childbearing to periods when incomes are higher. A permanent effect on earnings (income) affects the completed fertility.

So far we have been thinking about income changes that are due to woman's own job loss. The effect of husband's wage changes is likely to be different (see e.g. Heckman and Walker, 1990). Husband's job loss does not affect the value of woman's time and thus the income effect is likely to be the dominant one even for the low educated.

Job displacement is likely to influence couple's fertility decisions through other mechanisms than income changes. Job displacement increases instability through unemployment and subsequent job losses (e.g. Stevens 1997, Farber 2003). The increased uncertainty about future job and earning prospects may lead couples to delay having children (Ahn & Mira 2002, Fraser 2001). Women may want to postpone childbearing after job loss if they expect pregnant women or women with small children to face more difficulties in finding new job (Del Bono et al. 2008). The career interruptions may also influence workers from different skill categories differently. Generally highly skilled workers are assumed to have human capital that deteriorates more rapidly (see e.g. Dehejia Llerajas Muney, Adda et al. 2010). Highly skilled women do not want to be double penalized after job loss, and thus they may more easily decide to postpone childbearing after job loss. However, job displacement literature has documented (von Wachter and Weber Handwerker, 2010, Stevens, 1997) that highly educated workers tend to have shorter non-employment spells and suffer less severe earning losses after job displacement. These studies argue that skilled workers have more transferable human capital and better ability to re-accumulate skills faster. Finally, job displacement can influence couple's fertility behavior through several non-economic outcomes. It is known to increase the risk of divorce (Charles &

Stephens 2004, Eliason 2004, Rege et al. 2007), and influence workers health and mortality (Sullivan and von Wachter, 2010).

The above framework provides us with number of testable predictions. First, woman's job loss decreases the fertility of high wage earners (highly educated) if the effect on income is permanent. Second, the impact of woman's own job loss on fertility of low-wage earners is ambiguous. Third, the impact of husband's job loss is likely to decrease fertility more than wife's job loss. Transitory effect only decreases fertility of low wage workers since they are more likely to be credit constrained.

3 Previous Literature

Previous studies that have examined the effect of job displacement on fertility include Del Bono et al. (2008), Amialchuck (2008) and Lindo (2009). Del Bono et al. (2008) examine the effects of woman's own job loss using Austrian data from 1972–2002. When traditional family economics emphasize the income and substitution effects of a job loss on fertility Del Bono et al. consider the loss of future income and possible difficulties in finding employment when being pregnant or with small children as further effects that a job loss may have on fertility. Comparing the birth rates of displaced women with those unaffected by job losses they find that a job displacement reduces average fertility by 5 to 10 %. The strong average response is mainly due to white collar women. They also use a firm closure indicator interacted with industry, region, season and year dummies as instruments for unemployment and find that unemployment by itself has no negative effect on fertility. Their interpretation is, that it is not the loss of income (the income effect) that causes fertility to decline but the career interruption that occurs due the displacement.

Amialchuck (2008) examines how fertility responds to husband's job loss. Amialchuck uses the husband's layoffs and plant closures as sources of exogenous income shocks to a household. He uses Panel Study of Income Dynamics data from 1968. The effect of the husband's job loss on the hazard of having a child is modeled using log-logistic model. He finds that the husband's job loss makes couples to postpone having children but it does not change the completed fertility.

Lindo (2009) uses the PSID to examine the effect of husband's job loss on fertility. He finds that husband's job loss increases fertility in the years immediately after job loss, but the effect becomes negative for the later years. The effect on completed fertility is negative⁴.

Several studies have investigated the relationship between unemployment and fertility using either macro or micro data. The findings suggest that high unemployment tends to be associated with low fertility (e.g. Ahn and Mira, 2002, Adsera, 2005). The challenge in the studies is that female unemployment status is likely to be endogenous with respect to fertility decisions (see e.g. Angrist and Evans, 1998). Similarly the studies that examine the impact on income changes on fertility face the challenge that it is difficult to find exogenous variation in household income (Heckman and Walker, 1990). The studies tend to find a positive relationship between male earnings and fertility.⁵

Few studies have examined the heterogeneity in the effect of income or employment changes on fertility behavior. Dehejia and Lleras-Muney (2004) study the relationship between unemployment rate and selection into motherhood. They find that the fertility response to temporary shocks in income differs substantially by socioeconomic status and by race. In line with theory women who are more likely to be credit constrained (low educated black women)

⁴ In addition there are some case studies that have examined how closure of one factory influences worker's fertility behaviour. E.g. Beale & Nethercutt, (1986).

⁵ To review these literatures is beyond the scope of this paper. There is also a large literature that has focused on how financial incentives affect fertility (see e.g. Milligan, 2005).

have an incentive to postpone childbearing when unemployment rate is high, while non credit constrained low skilled women (low educated white women) tend to increase fertility in recessions.

4 Data and Empirical Specification

4.1 Data

The empirical analysis is based on a panel data set from Statistics Finland that links information on employees, establishments and firms. The data include all individuals who were 16–70 years old in 1988 to 2004. The data has unique individual, plant and municipality codes that can be used to merge additional information from other registers. Information on child births is drawn from the population registers provided by Statistics Finland. It has information on the time of birth and the gender of the child.

4.2 Structure of Sample

A sample of workers is constructed as follows. In the original data, which covers all (Finnish) private sectors plants in 1988–2004, we first define plant closures. A plant is an exiting plant in year t if it is in the data in year t but it is no longer there in year $t+1$ or in any of the years after $t+1$. We also check whether these are real plant closures. Those exiting plants for which more than 70 % of the workforce is working in a single new plant in the following year are not considered as real closures.

Then we merge the plant exit information to individual-level data. We restrict our sample to a (one third) random sample of 20–40 year old females. We merge spouse information on this data. When examining the effect of women’s own job loss we restrict the analysis to women who were working in Finnish private sector plants with at least 5 workers in year t ⁶. These years are labeled as base years, t . Because we are interested in changes in fertility behavior we first only consider women who did not give birth in year t . We divide this sample into displaced and non-displaced workers. A displaced worker is a worker who was separated between t and $t + 1$ from a plant that closed down during this time. In addition, we take so called early-leavers i.e. workers who left between t and $t + 1$ from plants that closed down between $t + 1$ and $t + 2$.

We then follow each worker and his spouse 3 years before a possible job loss, until the 13th year after a job loss. Thus we have a panel that consists of both pre- and post-displacement year information for both spouses. The construction of the sample allows us to use the rich information on the pre-displacement period to construct the pre-displacement comparability between those who were affected by the plant closure (*treatment group*) and those who were not (*control group*).

Our object is to look how job displacement affects earnings, employment, marital status and fertility. We define our outcome variables in following way. Employment is an indicator variable that gets value one if worker’s employment status is “employed”. Earnings are measured as annual taxable labor income in year t . Divorce status is defined by using a family status variable, which includes information on the incidence and timing of divorces in the data. Birth is an indicator variable that gets value one if the woman has given birth in current year.

⁶ The employment information is from the last week of the year. When examining the effect of husband’s job loss we restrict the sample of females whose spouses were working in plants with at least 5 workers in year t .

The combined data set has several attractive features. First, it allows us to reliably identify plant closures for the whole economy and follow all the workers affected by these plant close downs. Second, the follow-up period provides reliable information on the fertility patterns for both displaced and non-displaced workers. Third, since the data contain information on both spouses, we are able to control for rich set of family characteristics, including the joint income of the couple, spouse's age, tenure, employment and job loss status.

4.3 Empirical Specification

Because job loss may affect fertility decisions through various channels we first estimate the effect of a job loss on other outcomes – average earnings, employment and divorce. We begin by estimating the following simple model:

$$Y_{it} = X_{it}\beta + \sum_{j=-3}^{13} D_{it-j}\delta_j + \tau_t + \alpha_i + \varepsilon_{it} \quad (1)$$

Y_{it} is the outcome variable for individual i in year t . We use four different outcome measures: annual earnings in 1 000 euros, a dummy for being employed, a dummy for being divorced within a year, dummy for giving birth in a given year, and a number of births since third pre-displacement year. X is a vector of observable worker and firm pre-displacement characteristics; worker's age at the time of displacement, age squared, a dummy for education level (6 categories), a dummy for education field (10 categories), pre-displacement years of tenure, tenure squared, pre-displacement marital status, spouse's employment status in base year, spouse's earnings in base year, spouse's age and age squared, the number of children four years before job loss, pre-displacement plant size, pre-displacement region (21 categories) and industry dummies (10 categories), and time dummies.

The model is estimated using all pre- and post-displacement years, so that we can include worker fixed effects in earnings regressions. This way we can control for permanent differences between displaced and non-displaced workers. The main variable of interest is the displacement variable D_{it-j} . This is a dummy variable indicating whether a displacement occurs at time $t - j$, t being the observation year. A job loss is assumed to affect labor market outcomes four years before its occurrence and 13 years after its occurrence, hence $j = -3, 13$. We will estimate these models as a linear probability model by OLS or as a probit model. Our estimation method relies on an assumption that D_{it-j} is an exogenous shock to worker's careers. However, we are aware that this assumption may be violated for two reasons. First, the group of displaced workers may be selected if there is a selective turnover in plants before the closure. In other words, the workers who are still working in the plant when it closes down may not be a random sample of all workers. Second, there may be a systematic difference between displaced and non-displaced workers if plant closures are located into regions and industries that are in decline. We take this into account and include pre-displacement industry and region dummies to regressions. We also include into the analysis so called "early-leavers" i.e. workers who left their plants in the period before the closure occurred. We restrict estimation to couples (men and women who had spouse in year t) and estimate the model separately for each spouse⁷.

5 Results

5.1 Descriptive Analysis

The mean values of pre-displacement characteristics for displaced and non-displaced female workers are presented in Table 1. There should not be significant differences between these groups since a job loss that is a result of a plant closure should be independent of the worker's

⁷ We also estimate specification that includes both spouses' job displacement dummies in same regressions.

own performance. However, the group of displaced workers may be selected if there is selective turnover or if plant closures occur more frequently in regions and industries with certain type of workers. The difference in the characteristics immediately before job loss (year t) may also be caused by job loss. It is well known that earnings of displaced workers start to decrease before the job loss actually occurs (see Jacobson et al. 1993).

Table 1 shows that the displaced workers in these data are very similar to non-displaced workers. The only significant difference is in tenure and plant size. Non-displaced workers have longer tenure than displaced workers. This may reflect that young plants are more likely to die. Displaced workers are also more likely to be employed in smaller plants. This is in line with the fact that most of the disappearing plants are small. We do take these differences into account by conditioning on rich set of pre-displacement plant and worker characteristics, as well as on pre-displacement region and industry dummies in our estimations. We also check how results change when we drop the smallest plants from the analysis.

Figure 2 shows the average annual earnings of displaced and non-displaced women in the sample. The first figure shows earnings for all women. The earnings of the two groups are very similar before job loss. This does indicate that job displacement was an exogenous shock to these workers. Job displacement reduces the earnings of displaced workers and opens up a significant earnings gap between displaced and non-displaced workers. In line with previous findings (e.g. Jacobson et al. 1993) the earnings difference between displaced and non-displaced begins couple of years before the job loss occurs. Figure 2.b. presents the results for the estimation sample (women with spouse in year 0). In figure 2.c. we report the average taxable annual income (including taxable social security benefits) for displaced and non-displaced. All these figures

suggest that job loss reduces earnings permanently⁸. Figure 3 shows the employment pattern. Job loss decreases employment of displaced workers permanently.

5.2 The Effect of Woman's Job Displacement

We begin by estimating a simple linear regression model where we estimate the effect of job loss on annual earnings (in 1 000 euros) using all pre- and post-displacement years. We also include worker fixed effects in earnings regressions in order to control for possible permanent differences between displaced and non-displaced workers. The sample covers all workers who are employed and have non-zero earnings in year t , but not necessarily since then. These results are reported in figures 4. We find that displacement significantly reduces the earnings of displaced workers. The biggest drop is in the second year after a job loss. This is expected since the employment information in the data concerns the last week of the year. So for those labeled as displaced, the displacement is occurring at some time in year 1 and the earnings are from whole calendar year. On average displaced workers earn around 4 000 euros less a year in the second post-displacement year than similar non-displaced workers. The significant and negative effect on earnings appears to be long lasting: displaced workers earn around 1 000 euros less still in the 13th post-displacement year. There seems to be no significant difference in earnings before the displacement year. Figure 5 presents results of regression where the outcome variable is annual taxable income (including transfers). There is a significant long lasting impact on average incomes.

Figure 6 presents the probability to be employed in current year. The results show that the probability to be employed decreases strongly after a job loss. The effect is strongest immediately after the job loss and it remains significant until the 13th post-displacement year.

⁸ Note the drop in income is biggest in year 1, while the drop in annual wages is biggest in year 2. This is most likely explained by the fact workers may have delays in time they start receiving benefits and thus for a given year, the

The recovery of displaced workers in terms of earnings and employment is relatively slow. However, in the early 1990's Finland experienced a very severe recession and therefore these results should be taken as an upper bound.

Figure 7 presents the results for fertility. The dependent variable is the number of children by the end of the year. We use number of children in year $t-4$ as control in order to take accounts the permanent differences in fertility between displaced and non-displaced. The results indicate that there was no significant difference in fertility between displaced and non-displaced. The difference is negative but not statistically significant in all years.

5.3 Heterogeneity in the Effect of Woman's Job Displacement

As argued in section 2 there may be number of reason why the impact of job displacement on fertility may differ between skill groups. Figure 8 presents the results where we have split the sample into two groups by pre-displacement wage. We find that the impact of job loss is much stronger and statistically significant for high wage workers. The effect is strongest in years 3 to 6. The results indicate that by the fourth job displacement year they were approximately 6 less children born for displaced high wage women than for similar non-displaced workers. However, the impact seems to fade away in time, indicating that high wage women post pone having children, but do not change the completed fertility. By the 13th post-displacement year there is no difference in completed fertility between displaced women and similar non-displaced women.

When we split the sample by education, we find that there is important heterogeneity in the effect of job displacement on fertility (figure 9). Woman's job displacement decreases the fertility of highly educated women. The effect is however significant (confidence intervals not

annual income may include also benefits for previous year.

shown in this figure) only in years 3 to 5. It seems that highly educated women postpone births after child birth, but there is no impact on completed fertility.

The difference in the effect of job loss on fertility between wage and educational groups may be partly explained by the fact that job loss has a very different impact on employment of different educational groups. Highly educated women are much less likely to be non-employed after job loss than low educated women (Figure 10). Highly educated women are also more career-oriented and may not want to be double penalized after job loss.

Another important dimension is age. Job displacement reduces fertility significantly for women who were more than 27 years old at the time of job loss (results not reported). There is no effect for fertility of younger women. When splitting the sample by number of children before job loss, we find that woman's job displacement decreases fertility of childless women. It seems to have no effect on higher order births.

5.4 The Effect of Spouse's Job Displacement on Fertility

Next we ask how spouse's (man's) job loss affects couple's fertility decision. We begin using the same sample as when studying the effect of women's own job loss, i.e. by looking at the impact for couple's where women are employed in base year. Figure 11 reports the estimated coefficients for spouse's job loss variable on number of children. The results indicate that spouse's job loss significantly reduces couple's fertility. The impact seems to be persistent. By the year 13 there is a -0.056 difference in average number of children in couple's with displaced males and non-displaced males. This means that for each 100 displaced men, there are almost 6 less children born⁹.

⁹ The average number of children in non-displaced spouse group in year 13 is 1,67, which means the effect corresponds to -3,41 % reduction number of children.

We also examined how response to man's job loss depends on characteristics of both spouses. We find that man's job loss significantly reduces the fertility for highly educated women (figure 12), for high-wage women (not reported), for women in household where husband's share of household income is low (not reported). The results suggest that in families where woman is the principal earner and well-attached to labor market, both woman's own and her spouse's job loss have an important negative impact on fertility.

Next we further analyze how man's job loss affects women's employment, divorce and fertility behavior using a sample of both employed and *not employed* women. We take sample of employed men and their spouses in year t , and compare the ones who were displaced between t and $t+1$ to those who were not displaced during the period. Women do not have to be employed in year t and $t-1$. Table 2 shows the average pre-displacement characteristics of these workers. Displaced workers are similar to non-displaced workers. As before the only difference is in plant size and tenure. Table 3 shows that the husband's job displacement has no effect on wife's employment, except a small negative effect in year $t+1$ ¹⁰. This may be explained that the couples were working at the same plant when it closed down. There is no effect on divorce (except the slight negative effect in $t+4$ and $t+6$). The last column shows the effects of husband's job loss on fertility. Husband's job loss decreases fertility significantly. The effect seems to be significant and persistent.

¹⁰ Note the sample in table 3 differs from sample in table 2. In table 2 we have couples where male was working in a private sector in t and $t-1$, and who had a spouse. Table 3 is for all sectors and without employment restriction for $t-1$.

5.5 Robustness of the results

We check the robustness of these results in number of ways. First, we look how much the results vary if we drop smallest plants from our sample. The problem with using plant closure as a displacement definition is that small plants are overrepresented in our treatment group¹¹. The results did not change when we experimented with different size cut off, i.e. by dropping plants with less than 10, 20 or 50 workers. We also redid the analysis for different base years, 1992 and 1996. The results for 1992 were very similar. For year 1996 the estimated effects were much weaker, mainly since in the recovery period the earnings and employment losses were less severe. Another important difference was that in recovery period, the pre-displacement earning difference between displaced and non-displaced worker was bigger, indicating that the displaced workers in recovery period were more “selected”. We also dropped the restriction that women cannot have birth in year t . This did not influence our results.

6 Conclusions

In this study we have examined how a job loss that is due to a plant closure affects couple’s fertility decisions. Because a plant closure should be an exogenous shock to a worker’s career, we can, unlike previous studies, disentangle the causal effect of income changes on fertility behavior of couples. Our results indicate that while a woman’s job loss significantly decreases earnings and employment, there seems to be significant negative effect on fertility only for highly educated workers. This is in line with a standard home production model by Gronau (1977), which indicates that for high wage women the income effect is likely to be dominant. For

¹¹ Several job displacement studies (e.g. Jacobson et al. 1993) define job displacements as job losses that results from plant closure or from a significant downsizing of the plant and use a sample of bigger plants. This makes it possible to focus on a larger treatment group, which includes bigger plants as well. However, the inclusion of

low educated the effect of wage reduction is less clear since substitution effect may dominate. Another explanation may be that highly educated women are more attached to labor market and more concerned about losing human capital during career breaks. They do not want to be double penalized after job loss. Finally, institutional set up may be important as well. In Finland workers are entitled both to parental allowance and unemployment benefits right after losing their jobs. Both these benefits are proportional to previous earnings. Low-educated women are more likely to be unemployed after permanent job loss, and the unemployment benefits are smaller than a parental benefit. This indicates that woman's own job loss may in fact increase fertility of women who are not well attached to labor market.

When analyzing the impact of man's job loss on couple's fertility behavior we find that spouse's job loss decreases fertility more than woman's job loss. This is in line with assumption that man's job loss does not affect the value of woman's time and thus the income effect is likely to be the dominant even for the low educated.

References

Adda, Jerome, Christian Dustmann & Katrien Stevens (2010), The Career Costs of Children, mimeo.

Adsera, A. 2005. Vanishing Children: From High Unemployment to Low Fertility in Developed Countries. *American Economic Review*, Vol. 95 (2), 189–193.

Ahn, N. & Mira, P. 2001. Job bust, baby bust?: Evidence from Spain. *Journal of Population Economics*, Vol. 14, No. 3, 505–521.

downsizing plant separators may influence a new type of selection problem since the workers that were laid off may not be selected sample of firm's workforce.

Angrist, Joshua D & Evans, William N, 1998. "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *American Economic Review*, American Economic Association, vol. 88(3), pages 450-77, June.

Joshua D. Angrist & Victor Lavy & Analia Schlosser, 2005. "New Evidence on the Causal Link Between the Quantity and Quality of Children," NBER Working Papers 11835,

Amialchuck, A. 2008. The Effect of Husband's Earnings Shocks on the Timing of Fertility. University of Houston, mimeo.

Beale, N. & Nethercott, S. 1986. Job Loss and First Pregnancy in Young Women. *British Medical Journal*, Vol. 292, 799.

Becker, Gary. 1960. Economic Analysis of Fertility, in : Gary S. Becker & James S. Duesenberry & Bernard Okun *Demographic and Economic Change in Developed Countries*, 225–256.

Becker, Gary. 1965. A Theory of the Allocation of Time. *The Economic Journal*, Vol. 75, No. 299, 493–517.

Becker, Gary. & Lewis, H. 1973. On the Interaction between the Quantity and Quality of Children. *Journal of Political Economy*, 81(2) part 2, 279–288.

Becker, Gary S & Tomes, Nigel, 1976. "Child Endowments and the Quantity and Quality of Children," *Journal of Political Economy*, University of Chicago Press, vol. 84(4), pages S143-

62, August.

Ben-Porath, Yoram. 1973 Short-Term Fluctuations in Fertility and Economic Activity in Israel, *Demography*, Vol. 10, No. 2 (May, 1973), pp. 185-204

Bertrand, Marianne , Claudia Goldin and Lawrence F. Katz, 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors" *American Economic Journal: Applied Economics*, Vol. 2, No. 3, July 2010

Browning, M., Moller Dano, A. & Heinesen, E. 2006. Job displacement and stress-related health outcomes. *Health Economics*, John Wiley & Sons, Ltd., Vol. 15(10), 1061–1075.

Charles, Kerwin Kofi & Melvin Stephens. "Disability, Job Displacement and Divorce." *Journal of Labor Economics* 22, 2 (April 2004): 489—522

Cohen, A., Dehejia, R. & Romanov, D. 2007. Do Financial Incentives Affect Fertility? Working Paper 13700, National Bureau of Economic Research, Cambridge.

Dehejia, R. & Lleras Muney, A. 2004. Booms, Busts, and Babies' Health. *The Quarterly Journal of Economics*, MIT Press, vol. 119(3), 1091–1130, August.

Del Bono, E. 2001. Estimating the Fertility Responses to Expectations: Evidence from the 1958 British Cohort. Discussion paper, No. 80, University of Oxford.

Del Bono, E., Weber, A. & Winter-Ebmer, R. 2008. Clash of Career and Family: Fertility Decisions after Job Displacement. IZA Discussion paper, No. 3272, Bonn.

Gronau, R. 1977. Leisure, Home Production, and Work-The Theory of the Allocation of Time Revisited. *Journal of Political Economy*, University of Chicago Press, vol. 85(6), pages 1099-1123, December

Eliason, M. 2004. Lost Jobs, Broken Marriages. Forthcoming in *Journal of Human Resources*.

Eliason, M. & Storrie, D. 2004. Does Job Loss shorten Life? Goteborg University, Working Papers 153.

Eliason, M. & Storrie, D. 2006. Lasting or Latent Scars? Swedish Evidence on the Long-Term Effects of Job Displacement. *Journal of Labor Economics*, Vol. 24, No. 4, 83–856.

Farber, H. 2003. Job Loss in the United States, 1981–2001. Industrial Relations Section Working Paper No. 471, Princeton University.

Farber, H. 2007. Job Loss and the Decline in Job Security in the United States. Industrial Relations Section Working Paper No. 520, Princeton University.

Fraser, C. 2001. Income Risk, the Tax-benefit System and the Demand for Children. *Economica*, Vol 68, 105–125.

Heckman, J. & Walker, J. R. 1990. The Relationship between Wages and Income and the Timing and Spacing of Births: Evidence from Swedish Longitudinal Data. *Econometrica*, Econometric Society, vol. 58(6), pages 1411-41, November.

Hotz, J. V., J. A. Klerman, and R. J. Willis. The economics of fertility in developed countries. In M. R. Rosenzweig and O. Stark (Eds.), *Handbook of Population and Family Economics*, pp. 275-348.

Huttunen, K., Møen, J. & Salvanes, K. G. 2010. How Destructive is Creative Destruction? Effects of Job Loss on mobility, withdrawal and income. Forthcoming *Journal of the European Economic Association*

Jacobson, L. S., Lalonde, R. J. & Sullivan, D. G. 1993. Earnings Losses of Displaced Workers. *American Economic Review*, Vol. 83 (4), 685–709.

Korkeamäki, Ossi & Tomi Kyrrä, 2008. "A Distributional Analysis of Displacement Costs in an Economic Depression and Recovery," Discussion Papers 465, Government Institute for Economic Research Finland (VATT)

Lindo, J. 2009. Are Children Really Inferior Goods? Evidence from Displacement-driven Income Shocks. Forthcoming *the Journal of Human Resources*.

Martikainen, P., Mäki, N., & Jäntti, M. 2007. The Effects of Unemployment on Mortality following Workplace Downsizing and Workplace Closure: A Register-based Follow-up Study of Finnish Men and Women during Economic Boom and Recession. *American Journal of Epidemiology*, Vol. 165, No. 9, 1070–1075.

Milligan, K. 2005. Subsidizing the Stork: New Evidence on Tax Incentives and Fertility. *Review of Economics and Statistics* Vol. 87, No. 3 (August, 2005), pp. 539-555

Perry, C. D. 2004. Economic Well-Being of the Family. Thesis manuscript, Massachusetts Institute of Technology.

Rege, M., Telle, K. & Votruba, M. 2007. Plant Closure and Marital Dissolution. Discussion papers, No. 514, Statistics Norway, Research Department.

Silver, M. 1965. "Births, Marriages, and Business Cycles in the United States," *Journal of Political Economy*, University of Chicago Press, vol. 73, pages 237.

Stevens, Ann Huff. 1997. Persistent effects of Job Displacement: The Importance of Multiple Job Losses. *Journal of Labour Economics*, Vol. 15, No. 1, Part 1, 165–188.

Stevens, Ann Huff. 2001. "Changes in earnings instability and job loss," *Industrial and Labor Relations Review*, ILR Review, ILR School, Cornell University, vol. 55(1), pages 60-78.

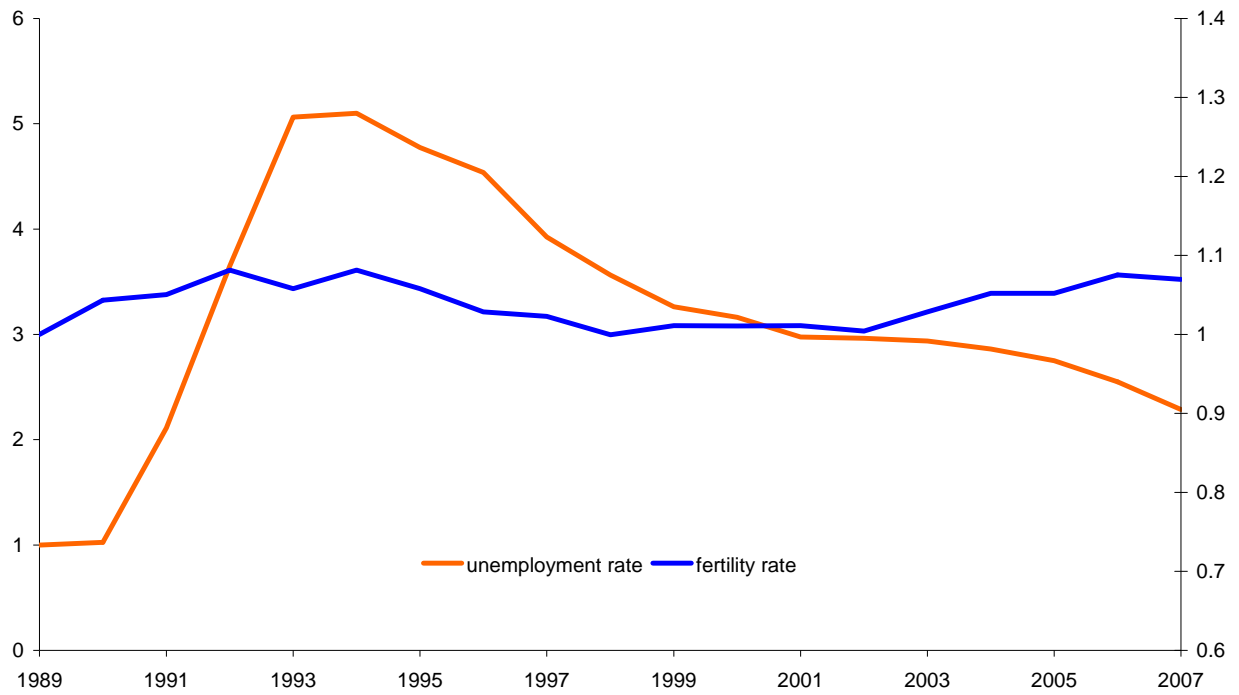
Sullivan, Daniel & von Wachter, Till. 2009. Job Displacement and Mortality: An Analysis Using Administrative Data, *Quarterly Journal of Economics*, August 2009, Vol. 124, No. 3: 1265–1306.

Verho, J. 2008. "Scars of recession: the long-term costs of the Finnish economic crisis," Working Paper Series 2008:9, IFAU - Institute for Labour Market Policy Evaluation.

von Wachter, Till & Weber Handwerker, Elizabeth (2010) "Variation in the Cost of Job Loss by Worker Skill: Evidence Using Matched Data from California, 1991-2000" forthcoming in Department of Economics Discussion Paper Series, Columbia University

TABLES AND FIGURES

Figure 1 Fertility Rate and Unemployment Rate in Finland 1989–2007



Note: The rates are normalized to one in year 1989.

Figure 2 a. Annual Earnings by Woman's Displacement Status (All women)

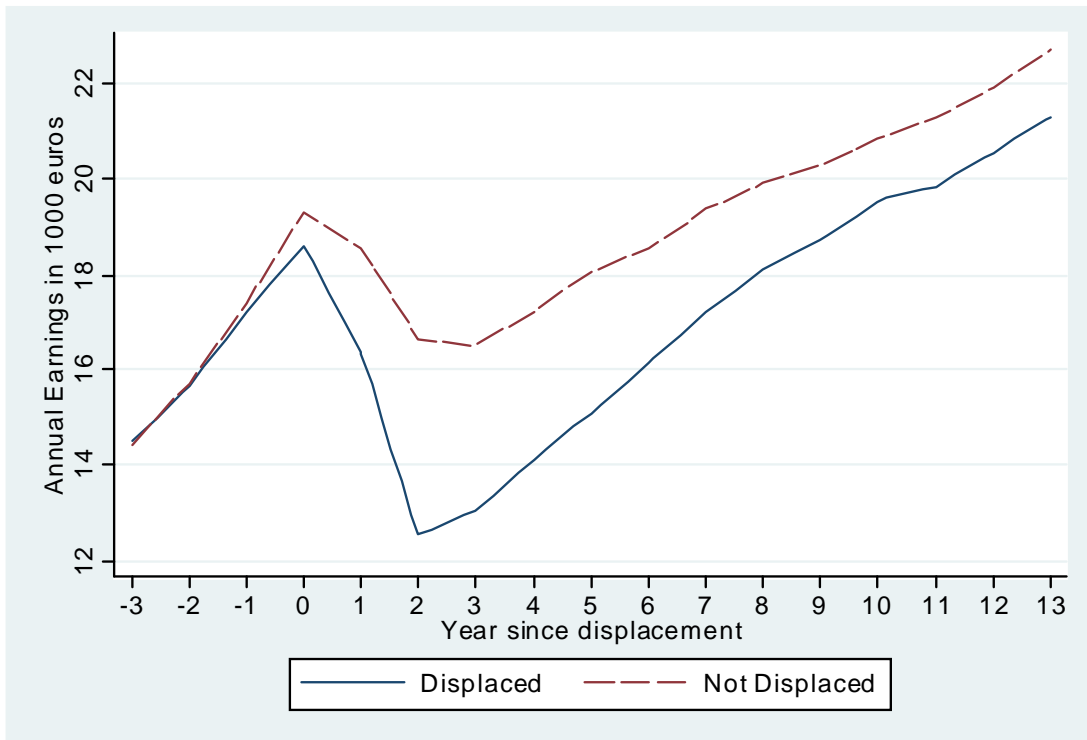
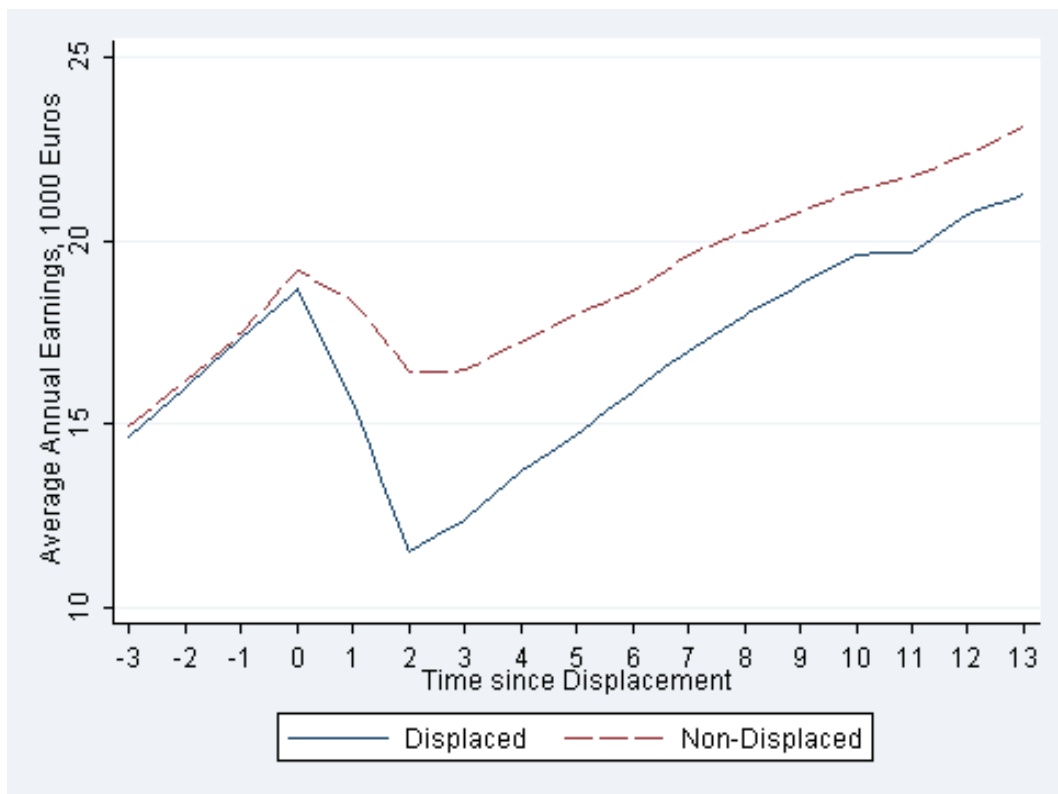


Figure 2.b. Woman's Annual Earnings by Woman's Displacement Status (Couples)



Figures 2.c. Woman's Annual Income by Woman's Displacement Status (Couples)



Figure 3 Share of Employed Women by Woman's Displacement Status (Couples)

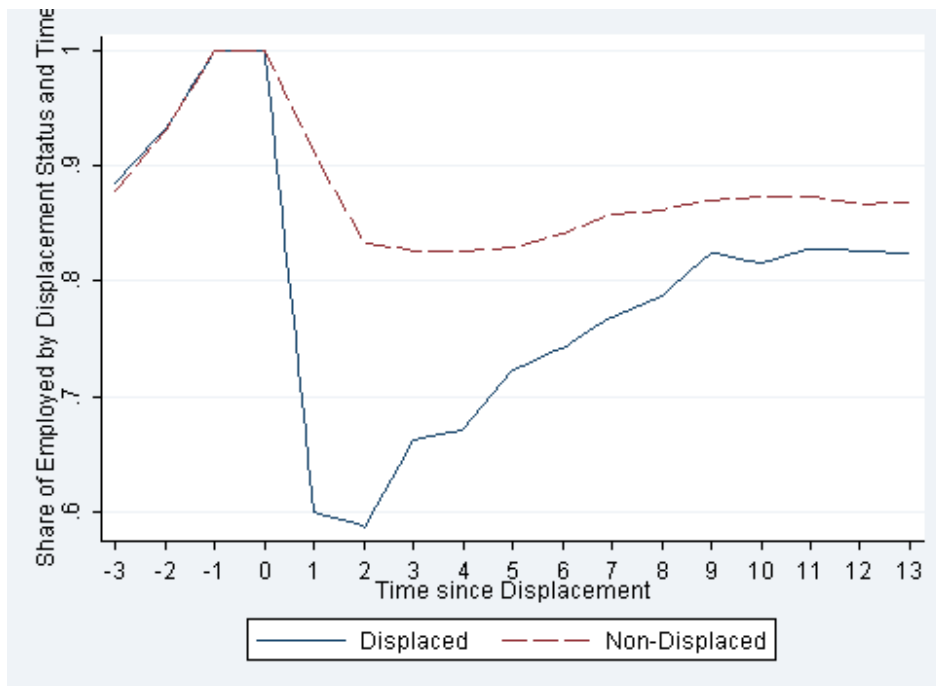


Table 1 Sample means of selected pre-displacement characteristics by woman's displacement status (couple sample):

By woman's job loss status	Displaced	Non-displaced
Age (woman)	31,81	32,09
Primary Education	0,26	0,25
Secondary Education	0,44	0,43
Tertiary Education	0,30	0,32
Experience	10,87	11,14
Tenure	4,59	5,57
Annual Earnings at t	18,66	19,17
Annual Earnings at $t-3$	14,64	14,92
Annual Income (incl. transfers) at t	18,80	19,25
Plant Size	44,84	156,05
Annual Earnings of the Spouse at t	22,88	23,14
Spouse Employed (man)	0,85	0,86
Spouse Displaced	0,07	0,03
Married	0,63	0,67
Any children at t	0,61	0,62
Number of Children at $t-4$	0,87	0,91
Observations	1446	38804

Table 2. Sample means of selected pre-displacement characteristics by man's displacement status

By man's job loss status	Displaced	Non-displaced
Women's characteristics:		
Age (woman)	31.73	32.05
Primary Education	0.22	0.21
Secondary Education	0.48	0.47
Tertiary Education	0.30	0.32
Experience	10.26	11.15
Annual Earnings at t	14.61	14.74
Annual Income (incl. transfers) at t	15.01	15.08
Employed	0.78	0.78
Man's characteristics:		
Age	34.05	34.49
Plant Size (man)	48.70	242.88
Annual Earnings of the Spouse at t	27.44	28.28
Annual income of spouse at t	27.63	28.47
Experience	11.28	11.48
Tenure	4.92	6.85
Married	0.70	0.73
Any children at t	0.68	0.70
Number of Children at $t-4$	1.03	1.08
Observations	2942	60272

Figure 4. Effect of woman's job displacement on her annual earnings

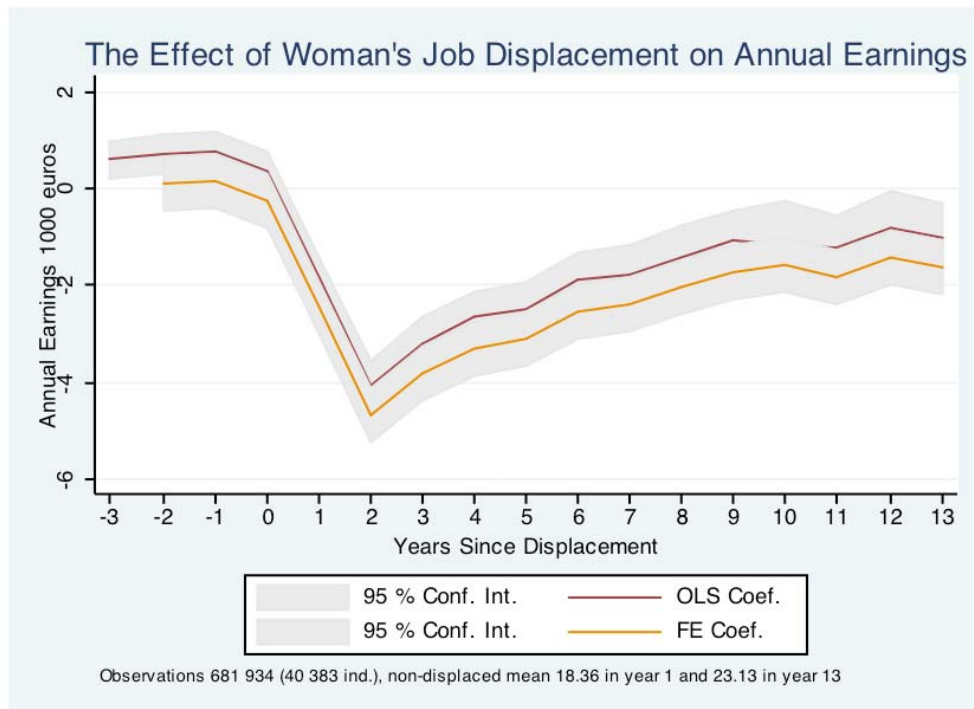
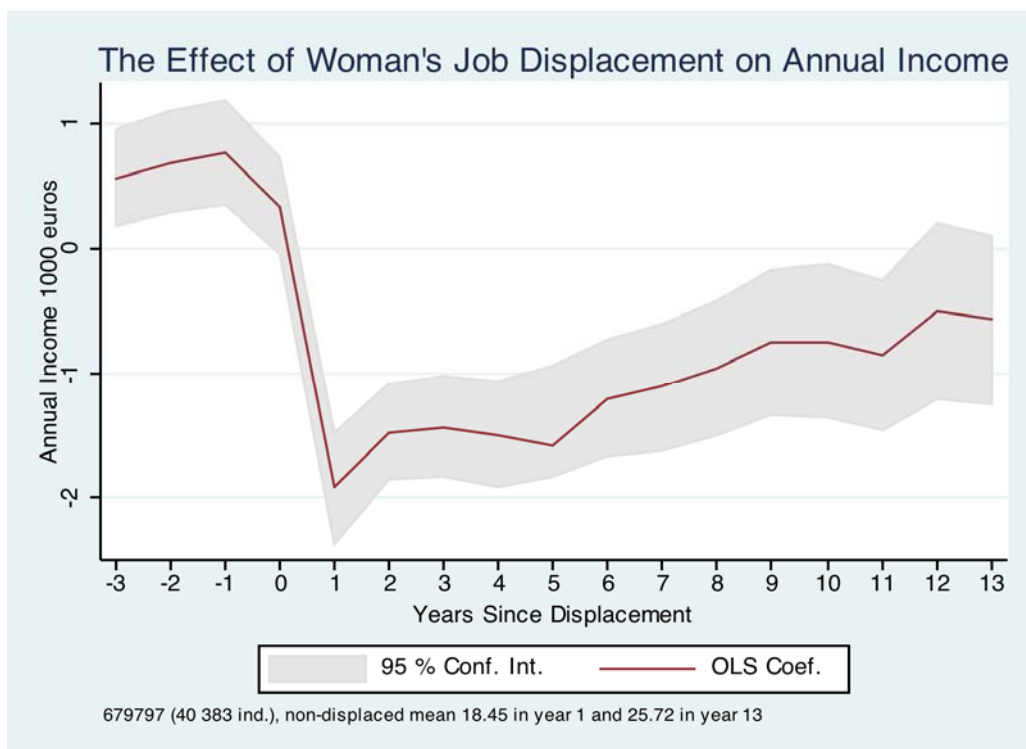
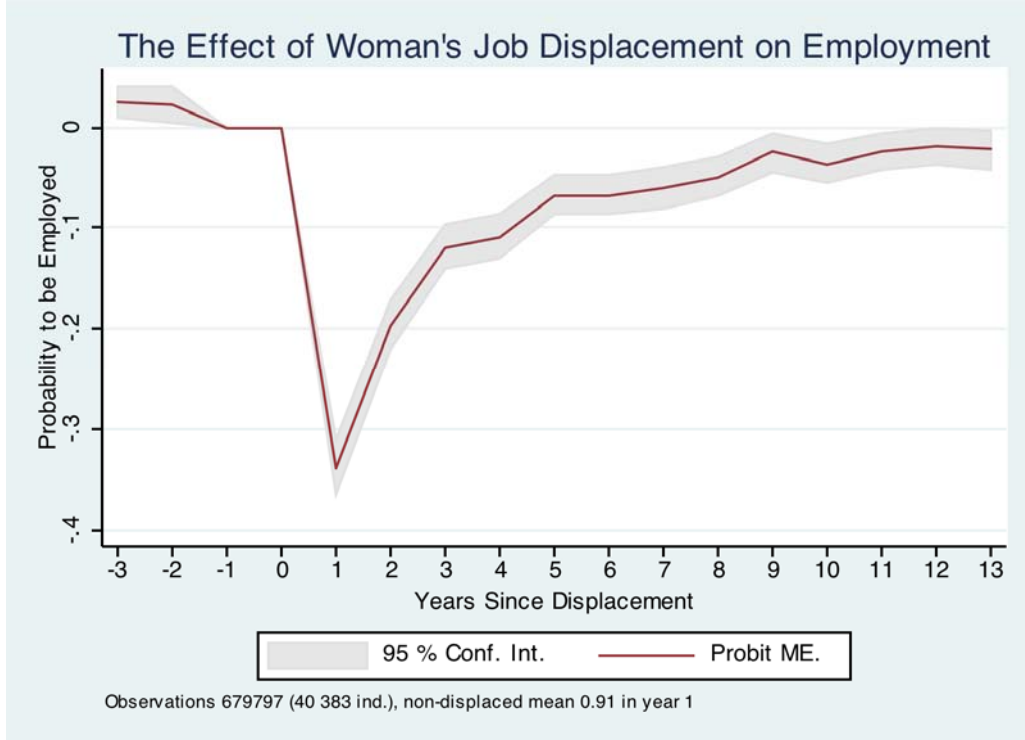


Figure 5. Effect of woman's job displacement on her annual taxable income



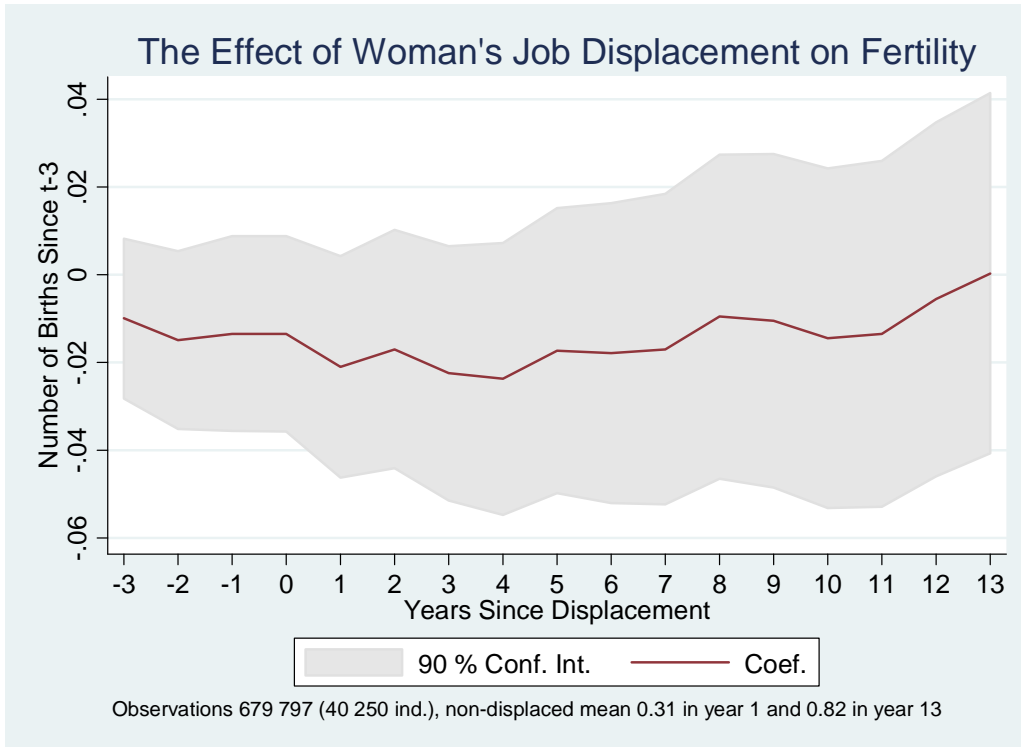
Sample consists of 20-40 years old women (in year 0) and who were employed in years -1 and 0 and had a spouse (cohabiting or married) in year 0. Controls include age, age squared, time dummies and following pre-displacement information: experience, experience squared, tenure, tenure squared, earnings three years before job loss, number of children in year t-4, spouse's earnings, spouse's employment status, dummies for education levels and fields, plant size, industry dummies, region dummies

Figure 6. Effect of women's job loss on employment in post displacement years



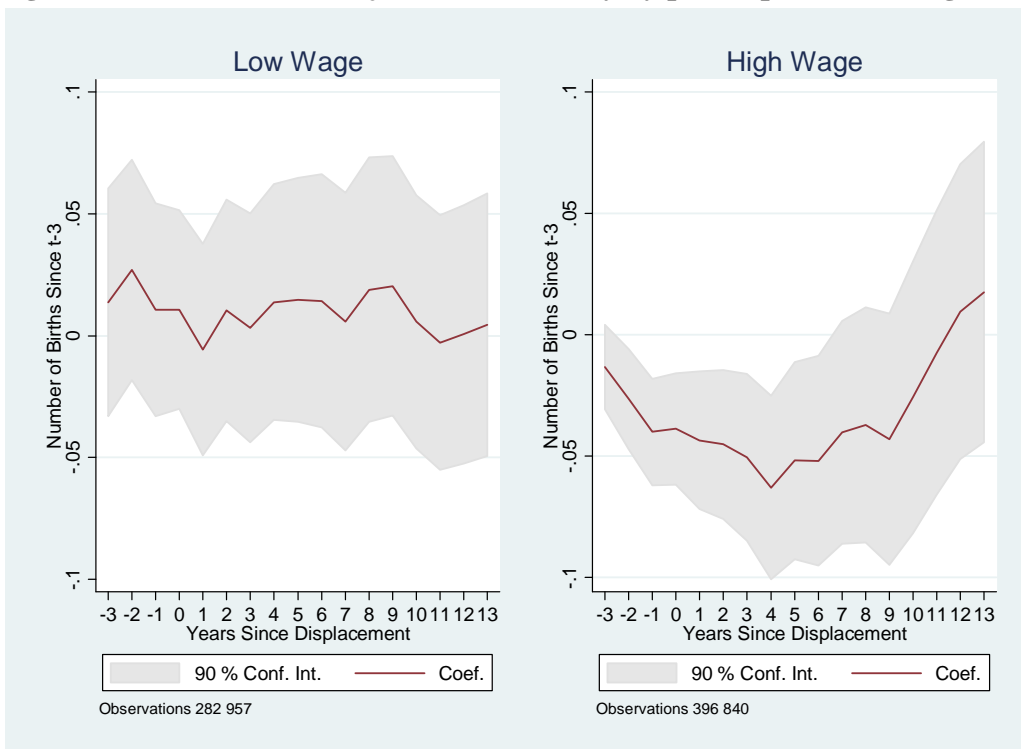
Sample consists of 20-40 years old women (in year 0) and who were employed in years -1 and 0 and had a spouse (cohabiting or married) in year 0. Controls include age, age squared, time dummies and following pre-displacement information: experience, experience squared, tenure, tenure squared, earnings three years before job loss, number of children in year t-4, spouse's earnings, spouse's employment status, dummies for education levels and fields, plant size, industry dummies, region dummies

Figure 7. Effect of women's job loss on fertility in post displacement years



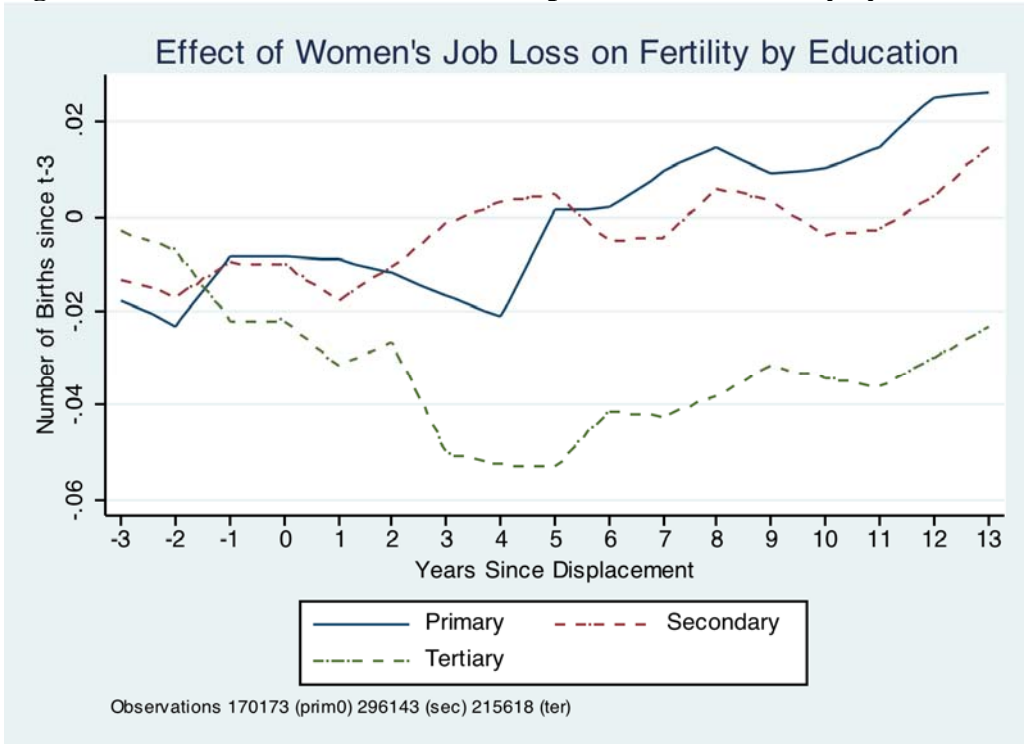
Sample consists of 20-40 years old women (in year 0) and who were employed in years -1 and 0 and had a spouse (cohabiting or married) in year 0. Controls include age, age squared, time dummies and pre-displacement information: experience, experience squared, tenure, tenure squared, earnings year -3, number of children -4, spouse's earnings, spouse's employment status, dummies for education levels and fields, plant size, industry dummies, region dummies

Figure 8. Effect of women's job loss on fertility by pre-displacement wage



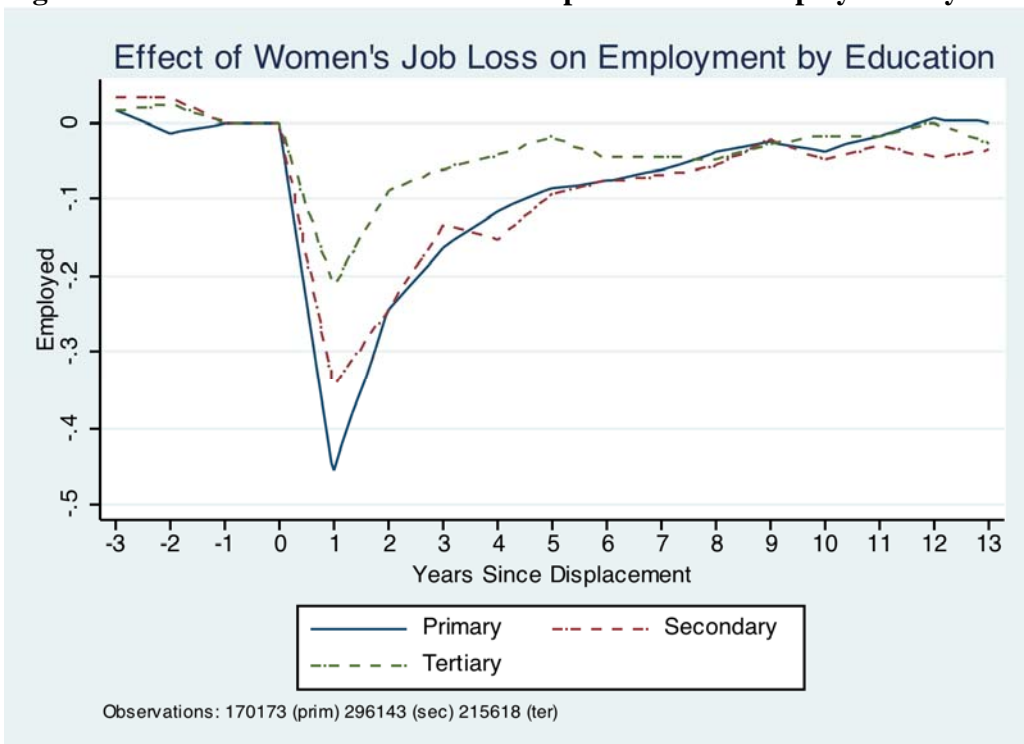
See txt. under figure 7.

Figure 9. The Effect of Woman's Job Displacement on Fertility by Education



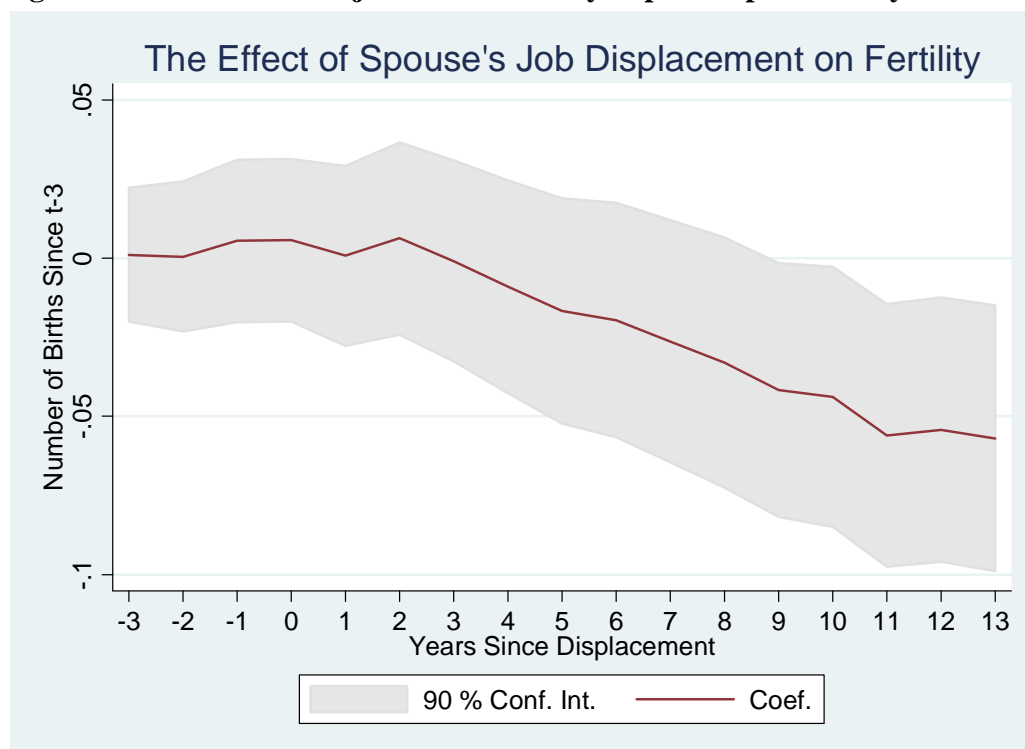
see text under figure 8.

Figure 10. The Effect of Woman's Job Displacement on Employment by Education



see text under figure 8.

Figure 11. Effect of man's job loss on fertility in post displacement years



See text under figure 8.

Table 3. Effect of Husband's job loss on wife's employment, divorce and fertility (sample 2)

	wife's employment probability		divorce probability at t		number of births by t	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Displaced t-1	-0,031***	-0,009	0,001	-0,002	0,007	-0,014
Displaced t-2	-0,008	-0,010	0,001	-0,001	-0,008	-0,015
Displaced t-3	-0,011	-0,010	0,000	-0,001	-0,022	-0,016
Displaced t-4	-0,001	-0,009	-0,002*	-0,001	-0,039**	-0,017
Displaced t-5	-0,014	-0,009	0,001	-0,001	-0,039**	-0,018
Displaced t-6	-0,005	-0,009	-0,002*	-0,001	-0,039**	-0,019
Displaced t-7	0,003	-0,008	0,001	-0,001	-0,046**	-0,019
Displaced t-8	0,004	-0,008	0,001	-0,002	-0,052***	-0,020
Displaced t-9	0,003	-0,008	-0,001	-0,001	-0,053***	-0,020
Displaced t-10	0,004	-0,007	0,001	-0,002	-0,051**	-0,020
Displaced t-11	0,008	-0,007	0,000	-0,001	-0,053**	-0,021
Displaced t-12	0,006	-0,008	-0,001	-0,001	-0,051**	-0,021
Displaced t-13	0,013*	-0,008	-0,001	-0,001	-0,052**	-0,021

Controls include age, age squared, time dummies and following pre-displacement information: experience, experience squared, tenure, tenure squared, earnings three years before job loss, age of youngest child, number of children, spouse's earnings, spouse's employment status, dummies for education levels and fields, spouse's plant size, industry dummies, region dummies.