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February 25, 2021

Abstract

Using administrative labor market data matched to mortality and patient records, we document that male job displacement increases mortality for both men and his partner. For every 10,000 displaced men, there are 110 additional deaths. Of those, 60% accrue to the displaced worker but 40 % are due to excess spousal mortality. We further document a stunning gender asymmetry: while male job displacement generates persistent health effects, no such dire consequences are observed after a woman's job loss. We explore four explanations for this pattern: risk sharing through spousal labor supply; earnings losses and public insurance; widowhood; and family structure.

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1 Introduction

Workers who lose their job in a plant closure or mass layoffs experience less stable jobs and lower earnings than non-displaced workers – even decades after the initial displacement (Ruhm, 1991; Jacobson et al., 1993; Eliason and Storrie, 2006; Couch and Placzek, 2010; Huttunen et al., 2011). More recently, the literature has gone beyond the labor market to investigate the health consequences for displaced workers (Black et al., 2015; Browning et al., 2006; Eliason and Storrie, 2009; Sullivan and von Wachter, 2009). Sullivan and von Wachter (2009), for instance, document that displaced men suffer a substantially higher mortality risk, which seems closely related to their sizable earnings losses.[1]

The detriments of job loss might not be confined to displaced workers but fan out to their partners. Social scientists have long underscored that family interactions shape individual behavior, particularly in the context of labor supply, leisure and consumption (Becker, 1991; Browning et al., 2014; Blundell et al., 2016). Such spillover effects could benefit the couple if they absorb or reduce some of the negative consequences of job displacement. One compensation mechanism, and an important motive for marriage, is risk sharing. If one person suffers an unexpected shock such as an illness or job loss, pooling income helps to stabilize financial resources for the family. Moreover, partners may increase their labor supply to compensate for some of the earnings lost. Yet, we can imagine scenarios where spillovers have potentially adverse effects on the partner. A displaced worker might develop or exacerbate harmful behavior like heavy drinking, depression or even domestic violence harming both partners mentally or physically. In the most extreme case, a person might even die following a job loss with severe consequences for the partner left behind. Until now, we still lack a good understanding of how spillovers manifest in the family after a labor market shock and the channels that foster or mitigate them. Ignoring such potential externalities in the family may severely under- or overestimate the actual costs from job displacement. Moreover, such spillovers have important implications for public policy. Positive spillovers like risk sharing, for instance, reduce the need for government programs, while negative spillovers such as domestic violence, in turn, raise the demand for public interventions.

In this paper, we investigate the size and nature of health spillovers in couples. We start out with estimating the effects of job loss on mortality and health of displaced workers *and* their partners to quantify the full health costs of job displacement. In a second step, we explore four potential mechanisms for the health spillovers we document: widowhood; spousal labor supply; the role of earnings and public insurance; and the impact of gender roles. Analyzing health spillovers is often

[1] Displacement is also associated with higher hospitalization rates among surviving men (Browning and Heinesen, 2012). Whether women also face a higher mortality risk after they lose their job remains debated (Black et al., 2015; Eliason and Storrie, 2009).

hampered by two key challenges. First, it is difficult to obtain suitable data that allow linking the records of both partners and that contain detailed information about labor market outcomes, health and mortality. Our analysis matches employer-employee data with detailed records on employment, earnings and public transfers to mortality and patient records for every adult over several decades. Most importantly, we can match partners in a couple irrespective of whether they are married or cohabitating, using a unique identifier for the partner in the data.[2]

The second key challenge is how to identify causal effects of job loss on health and labor market outcomes. The concern is that a worker's job loss is not a random event and might be correlated with pre-displacement health risks because employers lay off workers with poor health or because declining industries employ less healthy workers, for instance. To overcome this challenge, our empirical strategy proceeds in three steps. Rather than using all laid off workers, we focus on workers who lose their job because their plant closes down. Plant closures can be considered exogenous from the individual worker's perspective as all workers in the plant lose their job irrespective of prior performance. Yet, workers whose plants close down might still have characteristics that make them more likely to have worse health or career trajectories. To address this concern, we focus in our second step on the many plant closures that occurred during Finland's great depression of the early 1990s (Gorodnichenko et al., 2012). Due to the breakup of the Soviet Union, GDP fell by a stunning 11% and unemployment rates quadrupled to 16% over a two-year period (see figure A1). Below we document that workers displaced in the many plant closures during the depression resemble the average worker both in terms of observable characteristics and health or earnings trajectories prior to displacement. The third step in our estimation strategy is an event study model with comparing the outcomes of workers displaced in a plant closure to an appropriate control group. Our main control group consists of workers who were not displaced during the depression years. To control for potential selection into plants or industries with a higher probability of closing down, we use a sample of workers who get displaced in the future as an alternative control group.

We first show that male job loss significantly increases both his own and his partner's risk of dying. For every 10,000 displaced men, there are 24 additional deaths in the first five years after job loss. Fourteen (or 60%) of the additional deaths occur among displaced workers, but a stunning ten additional deaths (or 40%) occur among partners of displaced men. Twenty years after job displacement, excess mortality is a sizable 110 additional deaths per 10,000 displaced men. Partners of displaced men, therefore, carry a sizable share of the health burden associated with job displacement. We then document a notable gender asymmetry: while there are sizable health spillovers after male job dis-

[2]Throughout the article, we will use the terms partner and spouse interchangeably.

placement, no such spillovers are found after female job displacement. If a woman loses her job in a plant closure, the mortality risk of the displaced woman and her partner remains unchanged. This gender asymmetry is evident in single as much as in dual earner couples. As such, the asymmetry cannot be explained by differential health status of working and non-working spouses. The gender asymmetry is not due to differential attachment to the labor market of men and women as employment rates and potential work experience are very similar in our sample. The gender asymmetry is also not accounted for by gender-specific selection into the public or private sector. While women are more likely to work in the public sector than men, we find very similar asymmetries in the combined sample of public and private sector firms.

We then turn to hospitalization and cause-specific mortality records. Displaced men are more likely to die from heart diseases. There is a clear indication of a substantial psychological component like stigma or loss of self-worth after job displacement. Displaced men and their partners, are more likely to suffer from mental health issues than their non-displaced peers. These findings substantiate the profound societal costs of job loss that go beyond monetary or health damages to the displaced worker.

Our comprehensive data enables us to investigate several mechanisms for the observed health spillovers in couples. Spouses might respond to their partner's job loss by expanding their own labor supply. An increase in spousal employment would raise spousal earnings and family income, but could also imply additional stress for the partner. Spousal labor supply could explain the health asymmetry if women increase their labor supply after their partner's job loss, but men's labor supply remains unchanged. We find very small spousal labor supply responses both at the extensive and intensive margin – irrespective of whether a man or a woman gets displaced. Ten years after displacement, spousal employment is 1% higher for spouses of displaced workers than for spouses of non-displaced workers. Spousal annual earnings after male displacement also rise by only 3% in the long run. A second channel for the observed spillovers could be a persistent decline in family resources, which reduces a couple's investments in health-promoting activities or goods.[3] We find some support for this explanation: the absolute decline in earnings and total family income is more severe when a man loses his job than when a woman loses her job in a plant closure. In addition, the decline in family resources is systematically related to mortality after male job displacement accounting for around one-fourth of excess male mortality.

[3] A decline in family income might reduce the intake of health-damaging goods like alcohol or smoking. The empirical evidence suggests that men smoke more after they lose their job, however (Black et al., 2015). Hence, the inward shift of the budget constraint after a job loss seems to reduce the demand for health, resulting in fewer health investments and worse health status of the displaced and other family members (Grossman, 1972; Deaton, 2001).

We find little support for the hypothesis that widowhood following displacement is responsible for the mortality spillover despite strong co-morbidity in couples. Finally, we provide additional evidence that family structure play a role for the observed health burden. Relationships are more likely to break down immediately after a man loses his job, but there are few gender differences in partnership stability in the long run. Moreover, displaced men in traditional couples with a male breadwinner suffer a lower health burden than men in non-traditional couples. These patterns cannot be explained by differences in income or earnings losses between traditional and modern couples. The observed patterns point, instead, to gender-specific roles within the family as a potential stabilizer of health.

Our paper makes several contributions to the literature. We contribute to the job displacement literature by investigating for the first time health spillovers in couples. We show that the health burden of job displacements is much bigger than the costs for the displaced worker alone. While excess mortality after a man's job displacement is similar in magnitude to estimates in the literature (Sullivan and von Wachter, 2009), accounting for health spillovers raises the excess mortality of job displacement by 40%. Moreover, we document an important gender asymmetry where excess mortality in couples is strong and persistent after male job displacement, but absent after female job displacement. Finally, we assess four distinct mechanisms that could aggravate or mitigate the health perils after job displacement: widowhood, spousal labor supply, loss of economic resources and family structure.

We also shed new light on family health spillovers. Public health research has long documented a widowhood effect, i.e. higher mortality risks after the loss of a partner (Elwert and Christakis, 2008; Martikainen and Valkonen, 1996; Ytterstad and Brenn, 2015). More recently, several studies have discussed positive family spillovers after a person obtains treatment to stop smoking (Fletcher and Marksteiner, 2017) or experiences a negative health shock (Fadlon and Nielsen, 2019). In both cases, spouses improve their own health behavior in response to changes in their partner's health behavior or status.[4] Our study differs from the existing studies in two important ways: first, we investigate health spillovers in response to a labor market shock. Second, we document that such shocks do not spill over symmetrically in a partnership. It matters whether a man or a woman loses the job in a plant closure.[5] We further provide a detailed investigation which mechanisms help explain why negative health spillovers persist after job displacement. Our paper also contributes to the literature on spousal labor supply. Early studies focused on whether female labor supply increases in response

[4] Persson, Qiu, and Rossin-Slater (Persson et al.) in turn show that information about family medical history influences diagnoses and treatment for ADHD but has little effect on the well-being of the marginal patient. Here, family spillover effects emerge because of the health care system using genetic disposition on health status; both factors are absent in our setting.

[5] Job loss may also affect children living in the household. It is known to reduce fertility (Del Bono et al., 2012; Huttunen and Kellokumpu, 2016), while the consequences for older children remain disputed (Rege et al., 2011; Hilger, 2016; Mjörk et al., 2018; Page et al., 2019; Fradkin et al., 2019).

to a husband's unemployment spell. Most studies either found no or small responses (Lundberg, 1985; Maloney, 1987; Mincer, 1962), though slightly larger responses in the long run (Stephens, Jr., 2002). More recent analyses of spousal labor supply after job loss again find small effects (Goux et al., 2014; Halla et al., 2019). One potential explanation is that generous unemployment provisions crowd out spousal labor supply responses (Cullen and Gruber, 2000; Hendren, 2017). Yet, our results, like others, suggest that unemployment insurance provides only partial and temporary insurance against the persistent income losses of displacement (Hendren, 2017). Finally, we provide a new angle on the importance of gender norms. Recent evidence shows that women suffer less domestic violence if their bargaining position improves (Aizer, 2010); and that women violating traditional gender norms live in less stable relationships and even adjust their labor supply to conform with gender norms.(Bertrand et al., 2015; Fortin, 2005). Our study may point to a role for gender norms as the health toll of job displacement is more pronounced among men and esp. men in non-traditional couples than among women.

2 Empirical Strategy

2.1 Data Sources

We combine several administrative datasets covering the full population of residents and plants in Finland between 1988 and 2013. Three characteristics make our data uniquely suited for analyzing health spillovers in couples. First, we have data on the full population of plants and their workforce. The data allow identifying plant closures and to distinguish them from breakups or other forms of restructuring. Second, we can follow an individual's health and labor market career over more than two decades as our data contain the complete work history, mortality and hospitalization records of each adult in Finland. Third, and most importantly, our data contain an identification number for spouses or cohabitating partners. By linking the individual records between couples, we can study whether job displacement of one person spills over to spousal health, labor supply and earnings.

We next describe each data source in more detail. Information on individual job histories, worker and plant characteristics come from the Finnish Longitudinal Employer-Employee Data (FLEED). For each individual, we observe employment status, education, occupation, industry and region of employment at the end of each year. We define an indicator for employment if the individual is employed in the current year and zero otherwise. We define five skill groups based on the level of formal education: compulsory education, upper secondary (including vocational training), lowest tertiary (some college), lower tertiary (Bachelor degree) or post-graduate education (Masters or Ph.D.).

We further distinguish between fields of education (e.g. natural sciences, social sciences and business, humanities and arts, health and welfare, agriculture and technology).

Based on partner IDs, we can identify couples and thus link the couple's labor market histories and earnings. The data further contain information on the number of dependent children in the household. A couple is separated in our data if a person has no longer the same partner or has a different partner in a year compared to our reference year of job loss. Earnings are measured as annual taxable labor income in the current year. We also observe annual taxable income, which includes transfers, such as unemployment or sickness benefits, pensions, as well as parental and child benefits.[6] Family income is constructed by adding up the total taxable income including transfers for both spouses. We use these data below to assess the importance of earnings and income losses for displaced workers, for instance.

To study mortality, we merge cause-of-death statistics from Statistics Finland to the employer-employee data using the unique person and partner IDs. The mortality statistics report all deaths and their detailed causes according to the ICD classification.[7] We define cumulative mortality for each post-displacement year starting from one-year mortality and continue up to twenty-year mortality. The 20-year mortality risk, for instance, is an indicator equal to one if an individual dies between the base year of displacement t and $t + 20$; and zero otherwise. For the analysis of cause-specific mortality, we group causes of deaths into five broad classes: cancer, circulatory and heart disease, suicide, accidents (including traffic) and alcohol-related deaths. We define the cumulative twenty-year mortality risk, for instance, as an indicator equal to one if a person has died from cancer between base year t and $t + 20$; and zero otherwise.

To shed light on health and health behaviors more broadly, we use information from the Finnish Hospital Discharge Register. The hospital discharge register provides complete and high-quality information about all inpatient consultations including the dates of hospital admissions, diagnosed medical conditions and medical operations. We group visits into six broad causes based on the main diagnosis.[8] In addition to the five causes for mortality (cancer, circulatory and heart disease, suicide, accidents and alcohol-related diseases), we also include visits because of mental health issues. Our outcome variables are indicators equal to one if an individual had an inpatient visit, which was diagnosed by a specific cause, over a certain time period; and zero otherwise.

[6] All individuals who have been employed and paid unemployment insurance for at least ten months over the two years prior to an unemployment spell are eligible for unemployment benefits. Unemployment benefits are on average 60 percent of the last gross earnings and can be received for 23 months (or 500 days). After exhaustion, individuals are eligible for a much lower transfer of around 22 percent of average monthly earnings.

[7] Diagnoses are coded using the ICD-9 classification until 1995 and ICD-10 classification since 1996. Appendix table A1 provides the ICD-9 and ICD-10 codes to construct our cause-specific mortality and hospitalization variables.

[8] Validation studies have found the quality and completeness of the Finnish Hospital Discharge Register to be exceptionally high (Sund, 2012).

We restrict our sample to workers between the ages of 20 and 49 with at least one year of tenure at their employer in the year of displacement. We drop public sector employees in our main analysis as plant closures are less frequent in the public sector; we show below that including public sector workers does not affect our results. In addition, we restrict our sample to workers in plants with at least 10 and at most 1,000 employees. We further restrict the sample to individuals with a partner or spouse who was at least 18 years old in the base year. Using the data for all plants in the private sector with more than ten employees from 1990 to 1993, we define a plant closure if a plant is observed in the data in year t (say, 1991) but no longer observed in $t+1$ (say, 1992) or thereafter. To ensure that we capture a true plant closure and not merely a change in the plant identifier or a spin-off, we further require that less than 70 percent of the individuals leaving a plant are observed in a single other plant in the following year. We then define workers as displaced if they were employed in a plant in t or $t-1$ that closed down between t and $t+1$. Plants might start to shed labor even before the actual plant closure, and some workers might quit and leave before the plant actually closes (see, e.g., Eliason and Storrie, 2006; Pfann and Hamermesh, 2008). To capture these early leavers, we include employees who left their job between $t-1$ and t in a plant that closed down between t and $t+1$ in our sample of displaced workers.

It is important to point out that a job loss, regardless of whether it was due to a plant closure, mass layoff or separation, does not imply the loss of health insurance for the displaced worker and the immediate family. Finland has publicly provided health care for all residents irrespective of employment. In addition, all employers provide occupational health services to their employees under the Occupational Safety and Health Care Act. If an employee loses her job, she loses access to occupational health services but still has full access to public health services.[9]

2.2 Identification Strategy

Our analysis traces the mortality risk, hospitalization and labor market performance of individuals for several years before and up to twenty years after job loss. It is well known that workers experiencing a job loss are likely to have unobservable characteristics or differential career and health trajectories than individuals who did not lose their job. To identify causal effects, our empirical strategy proceeds in three steps: first, we focus on workers who lose their job in a plant closure. Second, we restrict our sample to the many plant closures that occurred during the great depression that hit Finland in the

[9] Quality differences across public and occupational health care services seem to be small. There is some evidence that waiting times for doctor appointments are lower in the occupational health care system (see Karanikolos, 2018 for a comprehensive survey of the Finnish health care system). Complex and dangerous procedures like major operations are almost always performed within the public health care system for all patients.

early 1990s. Finally, we define an appropriate control group who resemble displaced workers both in terms of observable characteristics as well as earnings and health trajectories prior to displacement.

Our first step selects workers who lost their job in a plant closure. The sample includes early leavers, i.e. individuals who leave the plant in the period before it shuts down. From the perspective of the individual worker, plant closures can be considered an exogenous shock as all employees in a plant are displaced, irrespective of their productivity, job performance or prior health status. Workers who are laid off, in contrast, have worse unobservables than workers who remain employed (see, e.g., Gibbons and Katz, 1991). Yet, workers might select into firms or industries where plant closures are more frequent. If the likelihood of working for a plant closing down is correlated with future career trajectories or health risks, individuals who are displaced in a plant closure might still be a selected sample compared to the average non-displaced worker.

We therefore restrict our sample in the second step to displaced workers whose plant closed down during the great depression that hit Finland after the breakup of the Soviet Union. After 1990, much of Finland's export sector, specialized in producing for the socialist economies of the Former Soviet Union, collapsed resulting in many plant closures in the export sector and beyond. The economic crash that followed reduced Finland's GDP by a stunning 11 percent between 1990 and 1993 (see figure A1). In the labor market, unemployment quadrupled from 3.5 percent in 1990 to over 16 percent in 1993 (Gorodnichenko et al., 2012). Workers who lost their job in a plant closure during the great depression are much closer to the average worker in terms of observable and unobservable characteristics (see also Davis and von Wachter, 2011; Huttunen and Kellokumpu, 2016).

As a simple event study design without control group is highly sensitive to life-cycle patterns, the third step relies on the choice of an appropriate control group who did not suffer a job displacement. Our main control group are non-displaced workers because they have similar observable characteristics, pre-depression earnings and health trajectories than displaced workers. It is important to note that the control group consists of individuals who remain with their current employer, but also of workers who are fired, get displaced or separate voluntarily from their employer later on, for instance. One potential concern with non-displaced workers as control group is that workers might be sorting into more and less risky plants and jobs on the basis of unobservable characteristics. To address this issue, we use workers who get displaced in a plant closure in the future as an alternative control group. Using workers displaced in the future overcomes the potential selection problem of workers sorting into plants and jobs in which a plant closure is more likely. We show below that the dynamics in mortality are very similar between workers displaced during the great depression and those who get displaced

several years later.[10] Both control groups are constructed to satisfy the same sample restrictions with respect to age, tenure, plant size, sector and partners as our treated group with a plant closure in the great depression.

Figure A2, which shows annual earnings (in 1,000 euros) and employment of displaced (in red) and non-displaced workers (in blue), provides visual support for our identification strategy. In each panel, negative numbers on the x-axis show pre-displacement years, positive numbers the post-displacement years (positive numbers) where year zero refers to the base year, i.e. one of the depression years 1991, 1992 or 1993. The left-hand side shows results for men, the right-hand side for women. In the pre-displacement period, employment rates (top panels (a) and (b)) and earnings (bottom panels (c) and (d)) evolve very similarly for displaced and non-displaced workers – both in terms of levels and growth rates. The pre-displacement evolution supports our argument that plant closures during the great depression were unrelated to the performance of the displaced workers prior to displacement. The picture looks completely different for workers who are displaced in non-depression years. Appendix figure A3 shows that there are sizable pre-displacement differences in earnings; in addition, their earnings losses are small or transitory after job displacement (Davis and von Wachter, 2011). We demonstrate below that our treatment and control group also have similar health dynamics prior to displacement.

Even if a plant closure is an exogenous event for the individual worker, workers displaced in a plant closure may still systematically differ from workers who do not get displaced in terms of their skill level, age or other characteristics that affect their mortality risk. To check for such pre-displacement differences, table A2 compares observable characteristics for displaced and non-displaced workers prior to displacement. Displaced workers are slightly younger and work in smaller plants than non-displaced workers, while displaced men have slightly lower, displaced women slightly higher pre-displacement earnings than non-displaced men and women. Hence, if anything, we would expect them to suffer lower earnings losses and mortality after displacement than the average non-displaced workers. To adjust for these differences, we include a comprehensive set of pre-displacement worker characteristics and earnings in our estimation.

[10] Using a sample of layoffs, Hilger (2016) proposed the peers of workers who lose their job in a mass layoff as an alternative control group. We do not follow this approach for two reasons: first, our analysis focuses on plant closures where all workers get displaced. Second, peers of workers displaced in mass layoff sample differ from the sample of displaced workers along many observable characteristics in our data.

2.3 Estimation Approach

2.3.1 Effects of Job Loss on Health and Mortality

To track health outcomes for displaced workers relative to our control group, we estimate variants of the following model:

$$Y_{i,t,\tau} = \gamma_\tau \, JobLoss_{i,t} + X_{i,t-1} \, \beta_\tau + \lambda_r + \theta_t + \epsilon_{i,t,\tau} \tag{1}$$

where $Y_{i,t,\tau}$ represents health outcomes (mortality or hospitalization) τ years after (or before) displacement for individual i who was employed or displaced in base year t. For all-cause or cause-specific mortality, the dependent variable is $Pr(Death_{i,t,\tau} = 1)$, which measures the cumulative mortality between the base year t and post-displacement period τ. To study hospitalization for specific causes, the dependent variable is an indicator $Pr(Visit_{i,t,\tau} = 1)$ equal to one if individual i had at least one hospital visit τ years post-displacement; and zero otherwise.

The main independent variable $JobLoss_{i,t}$ is an indicator equal to one if worker i was displaced in a plant closure between base year t and $t+1$; the variable is equal to zero if she was not displaced in base year t (where $t = 1991, 1992$ or 1993). For individuals who get displaced multiple times in the great depression, we focus on their first displacement. We include $X_{i,t}$ to control for any observable differences prior to displacement. As individual characteristics, we include dummies for each age in base year t to capture earnings differences over the life-cycle and the health effects of aging. We control both for the level and field of education to account for the well-known health gradient in education. We further include labor market experience, firm tenure and earnings in base year t to adjust for differences in career trajectories prior to displacement. We further include plant size in base year t and industry fixed effects at the 2-digit level to account for differences in labor demand and health risks across plants and industries. We account for regional differences in labor market prospects or the quality of health services through region fixed effects (λ_r). Equation (1) further includes base year dummies (θ_t) to ensure that we compare displaced and non-displaced workers in the same base year t. Finally, we control for the family structure prior to displacement as this might influence an individual's health and well-being: whether the individual is married and whether the individual has children in base year t. We also control for the following characteristics of the partner in base year t: dummies for each individual age, the level and field of education, a dummy variable for partner employment and its interaction with the partner's labor market experience, plant size and industry of employment.[11]

[11] The interactions ensure that we include displaced workers both with and without working partners.

To allow for flexible health effects of job displacement, we estimate equation (1) separately for each year $-3 \leq \tau \leq 20$. For hospitalization, we plot the γ_τ coefficients for the pre- and post-displacement years and the corresponding confidence intervals. Our estimates show no differences in hospitalization risk prior to displacement between displaced and non-displaced workers. For mortality, we cannot compare pre-displacement mortality ($\tau < 0$) because our treatment requires that an individual has to be alive in the base year to be displaced in a plant closure. To demonstrate the absence of pre-displacement differences, we show that workers displaced in the future do not exhibit differential pre-displacement mortality. Our key identifying assumption in equation (1) is that health outcomes of displaced workers would have evolved similarly to non-displaced workers in the absence of displacement conditional on our control variables. This assumption implies that plant closures are uncorrelated with unobservables that affect the health of the workforce. Note that displacement effects on health cannot be explained by a worsening health infrastructure or industrial decline as we control for region and detailed industry fixed effects.

To analyze the effect of job loss on spousal health, we estimate variants of the following model:

$$Y^S_{i*,t,\tau} = \gamma^S_\tau \, JobLoss_{i,t} + X_{i,t} \, \beta^S_\tau + \lambda^S_r + \theta^S_t + \epsilon^S_{i*,t,\tau}, \tag{2}$$

where the dependent variables $Y^S_{i*,t,\tau}$ are health outcomes (mortality or hospitalization) of the spouse $i*$ in year τ after i's displacement. As above, $JobLoss_{i,t}$ is an indicator variable equal to one if person i who is married or cohabitates with person $i*$ was displaced from his or her job in base year t (where $t = 1991, 1992$ or 1993); and zero if he or she was not displaced in year t. The set of observable characteristics $X_{i,t}$ is the same as in equation (1) above.[12] Estimating equation (2) separately for each pre- and post-displacement year τ, the coefficients γ^S_τ measure the cumulative effect of i's job displacement on the partner $i*$'s health within τ years of displacement relative to the mortality of spouses of non-displaced workers. The identifying assumption in equation (2) is that the outcomes of spouses of non-displaced workers are a valid counterfactual for the outcomes of spouses of displaced workers after displacement conditional on our control variables. This assumption could be violated if the probability of job loss is correlated across spouses because the couple works in the same firm or same industry. Below, we show that restricting the sample to dual earners in the base year and controlling for the job loss of each partner does not affect our results. As such, correlated risk of job loss cannot explain the spillovers we observe.

[12] In particular, we control for spousal level and field of education, individual age dummies, spousal employment and spousal labor market characteristics by interacting spousal experience, plant size and industry with spousal employment to include non-working spouses (all variables measured in base year t).

2.3.2 Effects of Job Loss on Employment, Earnings and Income

We then explore potential mechanisms for the observed spillovers, in particular income pooling and spousal labor supply. Here, we rely on an event study approach commonly used in the displacement literature (Jacobson et al., 1993; Davis and von Wachter, 2011; Huttunen et al., 2011). Pooling pre- and post-displacement years, we estimate variants of the following model:

$$Y_{i,t,\tau} = \sum_{\tau=-3}^{20} \gamma_\tau JobLoss_{i,t,\tau} + X_{i,t,\tau}\,\beta + \alpha_t + \delta_\tau + \theta_i + \epsilon_{i,t,\tau}, \tag{3}$$

where the dependent variable $Y_{i,t,\tau}$ is employment, annual earnings or annual income of worker i (or partner $i*$) observed in period τ after the base year t. The key independent variables $JobLoss_{i,t,\tau}$ are indicators equal to one for individual i observed in period τ who was displaced in base year t; and zero otherwise. We include the same comprehensive set of control variables $X_{i,t,\tau}$ for the worker, spouse, region, plant and industry as in equation (1). Dummies for each individual age control for any differences in earnings capacity across a worker's career. Fixed effects for time since displacement τ (δ_τ) and for each base year (α_t) absorb any potential level differences in employment, wages or income between displaced and non-displaced workers in different depression years t.[13]

Including individual fixed effects θ_i implies that we only require changes in earnings and income (and not levels) of non-displaced workers to be a valid counterfactual for the outcomes of displaced workers in the absence of a plant closure. The fixed effects specification further ensures that our results are not driven by compositional changes in the treatment or control group through selective dropout or withdrawal from the workforce. The parameters of interest are γ_τ, which measure the changes in employment, earnings or income for displaced workers (or their spouses) relative to those for non-displaced workers (or their spouses) $-2 \leq \tau \leq 20$ years before or after displacement relative to the pre-displacement year $\tau = -3$. If our identifying asssumption is valid, the coefficients γ_{-2}, γ_{-1} and γ_0 in equation (3) should be close to zero and statistically insignificant.[14]

[13] One could even include base year (t) x post-displacement fixed effects (τ) interactions, which allow post-displacement earnings or incomes of individuals displaced early in the depression to evolve differently than the earnings or incomes of workers displaced later on. The estimates from this even more flexible specification are very similar to the ones reported here. As such, it seems that the evolution of earnings and income after displacement do not depend on the particular timing of displacement during Finland's great depression.

[14] Though this condition is neither sufficient nor necessary, it is commonly used to gauge the absence of differential pre-trends (Kahn-Lang and Lang, 2020). Another concern with event studies emerges when pooling cohorts of individuals treated at different times (Abraham and Sun, 2019). In our case, we only pool three depression years (1991-1993) and control for level differences in outcomes through base year fixed effects (α_t).

3 Empirical Results

3.1 Mortality Effects after Job Displacement

We first examine the direct effect of job displacement on the displaced worker. Studying the mortality risk of job loss is interesting in its own right and aids in interpreting spillovers in the couple. If we find no adverse impact on mortality for the displaced worker, we would not expect to see sizable health spillovers on the spouse. Figure 1 plots the coefficients and 90 percent confidence intervals from equation (1) for cumulative mortality (all causes) within τ years after job loss. Displaced men (panel (a)) face a higher mortality risk than non-displaced men shortly after the job loss but even twenty years later. We find a strikingly different pattern for women. Losing the job in a plant closure has literally *no* impact on women's mortality risk as shown in panel (b) of figure 1. The estimates are even slightly negative in the first three years after displacement suggesting short-run health gains for women displaced in a plant closure. These reductions in mortality could be related to reduced stress from work and more time to invest in health-promotion activities relative to non-displaced women. After six years after displacement, estimates turn positive, but remain close to zero and never reach statistical significance.

We report estimates for cumulative five-year and twenty-year mortality in table 1. Mortality estimates for male job loss are shown in columns (1)–(2) and estimates for female job loss in columns (3)–(4). As mortality risks are small, the coefficients can be interpreted as percentage point changes in mortality five or twenty years after job loss relative to the change in mortality risk of non-displaced workers. The gender asymmetry in mortality after job displacement is clearly reflected in the estimates. In the medium run, men who got displaced in a plant closure face a 0.14 percentage points or 20 percent (compared to a mean of 0.7 percentage points) higher mortality risk than non-displaced men (column (1) in table 1). For every 10,000 displaced men, there are thus 14 additional deaths over a five-year period. The higher mortality risk of displaced workers persists even in the long run. Twenty years after displacement, the mortality risk is 0.69 percentage points (column (2)) resulting in 69 excess deaths for every 10,000 displaced men. In percentage terms, the long-term effect (12%) is smaller than the medium-term effect because of catch-up mortality among non-displaced men.[15] The excess mortality we find for men is smaller in the first years after job displacement than in United States,

[15] Martikainen et al. (2007) finds that an unemployment spell raises mortality more during economic booms than during recessions in Finland. Should our estimates therefore be interpreted as a lower bound of the true effect? We do not think so. Individuals who get displaced in a period of economic growth are much more negatively selected compared to either the average non-displaced worker or individuals who lose their job in a plant closure during a recession. Hence, the larger estimates for displacements outside of recessions are likely an overestimate as non-displaced workers have better unobserved labor market outcomes or lower unobserved health risks than workers who become unemployed during an economic expansion.

but remarkably similar for the two countries in the long run (Sullivan and von Wachter, 2009).[16] One potential explanation for the smaller short-run mortality effect is that most workers in the United States lose their employer-provided health insurance after displacement. They might also suffer from larger income losses than Finnish men losing their job in a plant closure. We investigate this question in more detail in the next section.

For women, there is no mortality effect whatsoever – neither in the medium nor in the long run (columns (3)–(4) of table 1). The five-year mortality risk is 0.04 percentage points or 13 percent *lower*, while twenty-year mortality is 0.05 percentage points or 1.4 percent higher than for non-displaced women; both estimates fail to reach statistical significance. Hence, the mortality effect for displaced women is only about one-third the mortality effect of displaced men in the medium run and less than one-tenth in the long run.

The direct mortality effects of job displacement in figure 1 could reflect a selection effect of workers with higher mortality or health risk into closing plants. To assess this concern, we construct an alternative control group of workers who are displaced in the future. Specifically, we compare the effect for workers displaced between 1991 and 1993 on 5-year mortality to workers displaced in later years. The results are reported in column (5) and (6) of Table 1. The point estimate is actually larger than in the baseline suggesting that the sample of workers displaced in the great depression faces similar mortality risk than workers displaced year.[17] Yet, the estimates are somewhat noisier because the comparison sample is much smaller than in the baseline. However, plants closing down after the deep recession may employ different workers than plants that close down during the recession. To investigate this, the left-hand side of figure 3 compares the mortality risk of workers in years before the plant closure. Here, we take all plants in our base year sample, and compare the mortality of individuals employed in a plant in $\tau = -3, -2, -1$ or 0 that closed down between year 0 and 1 to the mortality of individuals working in plants that closed down in later years. The results clearly show that workers in plants that closed down during the depression had very similar mortality risk prior to displacement than workers displaced later.[18]

[16] A Swedish study finds no effect on long-run mortality, but larger effects on five-year mortality than our study (Eliason and Storrie, 2009). Yet, the Swedish study covers men between the ages of 25 and 65, while men in our sample are aged between 20 and 49 in the base year. Hence, there is more catch-up mortality of non-displaced workers in the Swedish sample over time (ten or more years after displacement) as male cohorts reach their retirement age.

[17] Our result is consistent with the evidence in Hilger (2016) that fathers who get laid off in a recession are more productive than fathers laid off in a boom if work productivity is negatively correlated with mortality.

[18] In Section 3.4 we further investigate the selection into closing plants by comparing the hospitalization risk of displaced and non-displaced workers prior to displacement.

3.2 Spillovers Effects of Job Displacement

We now turn to the question whether job displacement has negative consequences for the partner of a displaced person as well. Evidence of such negative spillover effects would imply that the societal costs of job displacement exceed the damage suffered by the displaced worker alone. Figure 2 plots the coefficients and 90 percent confidence intervals from estimating the model in equation (2) separately for each post-displacement year. The dependent variable is now the mortality risk of the (female) partner and the key independent variable is whether a (male) person got displaced in a plant closure, and vice versa. Panel (a) shows that women face a higher mortality risk after her partner gets displaced. The coefficients are consistently larger than zero and statistically significant eight years after the man's job loss. The elevated mortality risk stabilizes about a decade after displacement. Stunningly, panel (b) of figure 2 suggests no such dire consequences for the partners of displaced women. Men's mortality hovers close to zero within the first decade after the job loss of their partner and never reaches statistical significance.

The bottom panel of table 1 quantifies the health spillovers and compares them to the direct mortality effect on the displaced person. Male job loss raises spousal mortality risk by about 0.1 percentage points or 28 percent (compared to a mean of 0.37 percentage points) over the first five years after displacement. Hence, for every 10,000 displaced men, there are 10 additional spousal deaths within the first five years after displacement. Over a twenty-year period, the effect accumulates to 41 additional partner deaths, an increase of 14 percent. For the partners of displaced women, in turn, we find zero spillover effect on mortality both in the medium and long run (see columns (3)–(4) of table 1. The coefficients for husbands are even slightly below zero and hence, of opposite sign than the direct effect on displaced men in table 1, while the standard errors are slightly larger. Spousal mortality after female displacement even declines by about 5 percent (-0.0006/0.0121) in the medium run and is essentially zero in the long run.

To rule out concerns about differential pre-trends in mortality, we compare the mortality risks of women whose partner gets displaced in 1991 to 1993 to women whose partner gets displaced in some later year. The right-hand side of figure 3 shows no pre-differential mortality risk among partners of displaced workers. Column (6) of table 1 further supports our identifying assumption: the point estimate for 5-year mortality is, just like for the direct effect, larger and somewhat noisier than in the baseline. Irrespective of which control group we use, we find substantial negative health effects after male job loss both for the displaced worker and their partner; yet, we find no such dire consequences after a woman loses her job.

3.3 Alternative Samples of Displaced Workers

The stunning spillover and gender asymmetry in mortality we document might be due to differences in the sample of men and women considered. We now demonstrate that differences in employment rates, job risk or the type of job loss cannot explain our results. Women's differential mortality after male and female job loss could be related to their employment status. If employed women are healthier or less affected by their partner's job loss than non-employed women, the direct effect of female job loss would be lower than the spillover effect of male job loss on women. We re-estimate equations (1) and (2) and restrict the sample to couples where both spouses were employed in the base year. Columns (1) of table 2 indicate that the direct effect of male job loss on 5- and 20-year male mortality in dual earner couples is similar to those in the full sample, which includes couples with non-working spouses.

The spillover effects after male job loss in figure 2 could be the direct consequence of partners losing their job in the same depression. A couple's risk of job loss might be positively correlated if they work in the same firm or industry, for instance. Appendix figure A4 shows that partners of displaced men have a 3.5 percent higher likelihood of separating from their job than partners of non-displaced men though the effect vanishes over time. Column (2) of table 2 adds a control for spousal job displacement in the base year and thus compares the mortality of displaced and non-displaced workers conditional on job displacement of their partner. Just like in the baseline, displaced men face a substantially higher mortality risk (see the top panel in column (1)); even more importantly, the spillover effect on their partners is also very similar to the baseline (see the bottom panel of column (1)). Hence, correlated risk of job loss cannot explain the higher mortality risk for partners of displaced men.

While employment rates in our sample are similar for men and women (see table A2), many more women work in the public sector. As the public sector offers more job security on average, more women with health risks could be working in the public sector. As a result, the sample of women employed in the private sector might be less vulnerable to the detrimental effects of job displacement than the sample of men. To assess whether selection into public sector jobs explains the observed gender asymmetry, we re-estimate our mortality regressions combining employees in the public and private sector. While plant closures are less frequent in the public sector, they do occur during the depression, esp. in public services like energy suppliers. The results are shown in columns (3) and (4) of table 2. The direct effect of male job loss is very similar to the effects estimates for the private sector alone; the spillover effect on the partner are slightly smaller possibly because a partner working in the public sector benefits from higher job security and less disruption during the great depression. Plant closures, or the underlying great depression we analyze, might be esp. harsh for workers most exposed to stress or most vulnerable in terms of their health. As an alternative setup, we analyze

mortality for a sample of workers who lost their job in a mass layoff. Mass layoffs by the employer, like plant closures, should be largely exogenous to the health problems and career performance of individual workers prior to displacement. The mass layoff sample consists of all workers who lost their job at a plant that reduced its employment by more than 30 percent between t and $t+1$. The last two columns of table 2 show that men who lose their job in a mass layoff also suffer higher mortality in the medium and long run; the spillover effects on the partner are more muted than for workers displaced in plant closures. The yearly estimates in appendix figure A5 indicate that mass layoffs also raise the mortality of displaced men and their partners. Hence, the negative effects of job displacement are not restricted to potentially traumatic plant closures, but also visible during mass layoffs.

3.4 Effects on Cause-Specific Hospitalization and Mortality

To learn more about the type of health issues that emerge among displaced workers and their partners, we turn to cause-specific hospitalization and mortality records. We collapse mortality and hospitalization records into five broad causes: accidents, alcohol-related deaths, cancer, heart disease and suicides. For hospitalization, we also investigate mental health issues. We re-estimate equation (1) where the dependent variables are now inpatient visits and medical treatment for a specific cause (measured within five or twenty years after displacement) or cause-specific mortality (measured by an indicator if the person died within five or twenty years after the displacement). We then use the corresponding outcomes for the partners of the displaced worker to investigate spillover effects based on equation (2).

Hospitalization and mortality might be positively or negatively correlated – even for the same cause. The two are negatively correlated if displaced workers or their partners are less likely to seek treatment and later die from that specific cause (like cancer, for example). The two would be positively correlated if a job loss leads to illness, for which a person seeks treatment, but still dies from it (like a heart attack, for instance). Finally, specific causes for hospitalization or mortality might also be correlated because of competing risks: a job loss might raise alcohol consumption, which in turn could trigger a heart attack later on.

Table 3 shows that displaced men are more likely to be treated for mental health issues than their non-displaced peers. Over a five-year period, treatment for mental health issues by 17 percent (0.00215/0.0127).[19] Turning to mortality by major causes reveals that displaced men are more likely to die from cardiovascular diseases in the long run (see table 4). The risk to die from heart disease is

[19]The higher incidence of inpatient visits for mental health disorders disappears in the long run as non-displaced workers catch up on inpatient visits with displaced workers (see the top panel of appendix table A4). Health care expenditures, esp. for anti-depressants, also seem to increase for men after a plant closure (Kuhn et al., 2009).

a stunning 44 percent (0.00081/0.00183) higher after five years and still 15 percent (0.00254/0.0165) higher after twenty years than for non-displaced workers. Moreover, we observe many more suicides among displaced men over the twenty-year period than among non-displaced men, an increase by 30 percent (see table 4, column (10)). Turning to spousal health, the bottom panel of table 3 shows that partners are not immune to the mental strain of male displacement. Spouses are more likely to be treated for alcohol-related diseases (see column (2)), an increase by 44 percent (0.00113/0.0026) in the medium run, which persists in the long run.[20]

Women who lose their job in a plant closure do not have differential hospitalization rates than non-displaced women (see the top panel of appendix table A6). Women seem to have lower mortality from heart disease after job displacement than their non-displaced peers (see appendix table A7). Spouses have opposing effects: mental health issues seems to increase, hospitalization for cancer appears to go down (see appendix table A6) – consistent with no overall effect.[21]

To check that workers displaced during the depression are comparable *before* the plant closure to employees not displaced in a plant closure, figure 4 plots the estimated effect of risk of hospitalization in the years prior to plant closure. Hence, we estimate the annual risk of hospitalization for alcohol or mental causes in the years -3 to 1 for workers who lost their job in plant closure between years 0 and 1 relative to workers not displaced in those years. The results indicate no differences in health prior to the plant closure. The effect on annual hospitalization turns positive only in the year when the plant closes down. The evidence in figure 4 further support our identification strategy and shows convincing evidence that our results actually identify the causal effects of plant closures on health.

4 Explaining the Health Spillovers

Our results so far show that job loss not only reduces long-run health and life expectancy of the displaced worker; it also generates sizable and persistent negative spillovers for their partner. For every 10,000 displaced men there are 24 additional deaths in the first five years after job displacement and 110 additional deaths after two decades. 60% of that excess mortality accrues to the displaced men and a stunning 40% to their partners. The health spillovers we document are, in percentage terms, as negative for the partners as for the directly affected worker.[22] Surprisingly, negative health effects only occur after a man's job displacement. We find no evidence of persistent negative health

[20] The bottom panel of appendix table A4 shows a 17% higher hospitalization rate for alcohol even in the long run. With respect to cause-specific mortality, we do not find statistically significant differences between partners of displaced and non-displaced workers (see appendix table A5).

[21] Appendix table A8 documents a similar pattern for cause-specific mortality of the partner.

[22] In absolute terms, the number of additional deaths per 10,000 displaced men is higher than for their partner as men face a higher mortality rate on average.

consequences after women lose their job. Hence, men only suffer a higher mortality risk if they lose their job, but not if their partner gets displaced from their job. The opposite is true for women: they face a higher mortality or hospitalization risk only if their partner gets displaced, but not if they themselves lose their job in a plant closure. For both partners in the couple, it is more deadly if the man loses his job than if the woman loses her job. How can we explain these health spillovers and the observed gender asymmetry? In this section, we explore four potential mechanisms for the observed pattern: spousal labor supply; loss in economic resources and public insurance; widowhood; and the role of gender roles. We discuss each of them in turn.

4.1 Spousal Labor Supply

Spouses might increase their own labor supply after the partner's job loss. The literature on added workers and second earners has long stressed that spousal labor supply might be one mechanism to insure the family against unemployment and other negative labor market shocks (Lundberg, 1985; Stephens, Jr., 2002; Halla et al., 2019). Spouses who take up a job or work more hours are likely to face more work-related stress and have less time for health-promoting activities, which might be detrimental for spousal health. Spousal labor supply could explain the observed gender asymmetry in health spillovers if women increase their labor force attachment or earnings after male job loss, whereas men do not adapt their behavior after female job loss. Such differential responses might be expected in an environment where women's labor force attachment has traditionally been lower than men's attachment. To estimate spousal labor supply responses, we use equation (3) but replace the dependent variable with employment or earnings of the spouse ($i*$) of displaced individual i. We include the same set of worker and spousal characteristics as before. In earnings regression we further include worker fixed effects; the coefficients γ_τ in the earnings regressions identify spousal earnings changes in year τ after i's displacement compared to the pre-displacement period $(t-3)$ and relative to the partners of non-displaced workers.

Panels (a) and (b) of figure 5 plots how female and male employment responds to their partner's job loss. Employment of men and women declines in the first two years after their partner's job loss but returns back to its normal level after the end of the great depression. Over time, employment slightly increases relative to partners of non-displaced workers. Overall, however, employment effects are very modest irrespective of the time horizon or the gender of the displaced worker. The short-run employment decline is between 1.6 percentage points (for female partners) and 2.1 percentage points (for male partners). In the long run, spouses increase their employment rate by at most 1.3 percentage points in response to job displacement. The extensive margin responses are economically negligible

for both men and women, especially if compared to employment rates of 95 percent for women and 96 percent for men prior to displacement. To convert this into a participation elasticity, we relate the absolute change in employment rates in year 5 after displacement (0.3 percentage points) to the losses in husband's cumulative earnings (-17 percent). The resulting (semi-) elasticity of $\eta^P = 0.022$ is very similar to the elasticity of women's employment response after their husband's displacement in Austria (Halla et al., 2019).

Spouses might also increase their earnings, which capture responses both at the intensive and extensive margin. Interestingly, we find similarly modest changes in spousal earnings after displacement (panels (c) and (d) of figure 5). For women, earnings remain unchanged for the first eight years after their partner's job loss. In the long run, women's annual earnings are up to 700 euros higher than before the displacement relative to the spouses of non-displaced workers. The earnings changes for men in response to their partner's job displacement follow a similar pattern: earnings only increase in the long run by at most $1,100$ euros. These additional spousal earnings amount to just 3 percent of annual earnings among partners of non-displaced workers, however.[23]

What does the observed labor supply response tell us about spillover effects in couples? The short-run decline in partner employment could be explained by leisure complementarities (Goux et al., 2014). If leisure complementarities are used for health-promoting activities, they could explain why we find a small decline in mortality after female job loss for both displaced women and their spouses shortly after displacement (see panel (b) in figures 1 and 2). Yet, leisure complementarities cannot explain why the mortality of men and their partners increase after male job loss (see panel (a) in figures 1 and 2). In order to explain the gender asymmetry in mortality effects, the couple would have to engage in health-promoting activities after a woman's job loss, but in health-damaging activities after a man's job loss. The negative short-run effect on employment could also be the result of the severe economic depression we analyze. Partners might have a difficult time keeping their old job, finding a new one or increasing working hours when employers prefer to downsize rather than hire new employees. Figure A4 indeed suggests that women are more likely to separate from their job after male job displacement. Yet, this depression effect decreases over time and vanishes eventually. As such, the small spousal labor supply response cannot be attributed to the lack of job opportunities, especially because figure A2 showed that employment rates of displaced workers do catch up with their non-displaced peers over time.

[23] Previous evidence suggests that labor supply responses are lower among women with very young children (Halla et al., 2019). Unfortunately, we do not observe the exact age structure of the children, but only the total number of dependent children under 18 in the household. Given that our spousal labor supply effects are very small in the full sample (where couples have children of all ages), our results cannot be explained by the presence of small children in the household.

Overall, both extensive and intensive labor supply responses after job loss are too small in magnitude to explain the higher mortality of partners after male job loss or the absence thereof after female job loss. The absence of a sizable labor supply response in the long run could be the result of the high employment rates of women and men prior to displacement. If most individuals work full-time, there is limited room for an added worker effect or adjustments in working hours. We think that high employment rates are unlikely to be the sole reason for the small response at the extensive and intensive margin. Halla et al. (2019) report similar small effects for Austria, an environment with much lower female employment rates than in Finland. Another explanation is that private insurance through spousal labor supply responses gets crowded out by public insurance (Cullen and Gruber, 2000; Hendren, 2017). We investigate the role of public insurance in the next section.

4.2 Monetary Losses and Public Insurance

Earnings Losses Negative health spillovers could be the consequence of declining family resources, which reduces the couple's demand for health-promoting goods or activities. Economic deprivation could further explain the gender asymmetry if earnings losses are larger and more persistent after male than after female job loss. To explore the role of family resources, we use our event study design from equation (3) that compares earnings changes for displaced workers in some post-displacement year τ relative to earnings changes for non-displaced individuals. The top panels of figure 6 show the effect for annual earnings after male job displacement (panel (a)) and after female job displacement (panel (b)). Male job loss causes substantial and persistent earnings losses. The strongest decline is observed in the second year after displacement where male earnings are $11,000$ euros or about 33 percent lower than mean earnings of non-displaced workers. Over a five-year period, displaced men lose $30,000$ euros or 17 percent of their total earnings capacity (see column (1) in appendix table A9). Male earnings never fully recover to pre-displacement levels even two decades after job loss. Twenty years after displacement, the cumulative earnings loss amounts to $76,300$ euros or 10 percent of total earnings capacity (see column (2) of appendix table A9). Displaced women also experience sizable earnings losses: in absolute terms, the decline is with around $7,000$ euros lower than after male job loss, though with 31 percent very similar for men and women. Cumulative earnings losses amount to $22,000$ euros or 20 percent over a five-year and $47,700$ euros or 10 percent over a twenty-period (see columns (5)–(6) in appendix table A9). Overall then, job displacement is associated with sizable and persistent earnings losses for both men and women.

Income Losses and Public Insurance Lower earnings need not translate into economic hardship if earnings losses are compensated by private or public insurance. As spousal labor supply responses

are small, private insurance plays a rather limited role in our context. One reason could be crowding out by unemployment insurance, for instance. Panels (c) and (d) in figure 6 show the impact of job displacement on personal income, which includes public transfers like unemployment and sickness benefits. Personal income declines by less than personal earnings suggesting some insurance against job loss. However, public insurance is incomplete and does not compensate for the persistent earnings losses from job displacement.

Public transfer compensate for about one-third of the total earnings losses after male displacement over a five-year period.[24] The insurance provided by public transfers is even more modest in the long-run. The cumulative loss in personal income twenty years after male displacement is 59,800 euros. Hence, public transfers compensate only 22 percent of the earnings lost over the two decades (see column (2) in bottom panel of appendix table A9). For women, public transfers compensate almost half (46 percent) of the earnings losses in the medium-run, but only 25 percent in the long run.[25] Finally, panels (e) and (f) in figure 6 trace the impact of job displacement on family income, which consists of earnings for both spouses and public transfers. The panels show that family resources decline by less than earnings losses but exhibits a pattern very similar to personal income. The similar dynamic of personal and family income after displacement underscore the modest added worker effects documented in the previous section.[26]

Monetary Losses and Excess Mortality Are the differences in earnings losses between men and women large and persistent enough to account for the health spillovers and, in particular, their asymmetry across gender? To answer this question, we need to quantify how earnings or income are related to mortality. While a large literature reports a negative association between various measures of income and mortality, there is much less agreement on the direction of causality and causal pathways linking economic resources and health.[27] In the absence of a consensus in the literature about the size of the causal relationship, we use estimates of the correlation between pre-displacement earnings (averaged over three years prior to displacement) and mortality following Sullivan and von Wachter (2009). This correlation should in part reflect the effect of earnings on mortality. If some displaced individuals have worse health and hence, lower labor market earnings prior to displacement, the partial correlation we

[24] The cumulative earnings loss in the first five years after male displacement is 30,200 euros. The cumulative personal income loss over the same period is 19,000 euros (see column (1) of appendix table A9). Hence, the five-year loss in personal income is 36 percent lower than the earning loss.

[25] The cumulative earnings loss in the first five years after female displacement is 22,000 euros; the cumulative personal income loss over the same period is 11,800 euros (compare columns (5) in appendix table A9. Hence, the five-year loss in personal income is 46 percent lower than the earning loss.

[26] The modest private insurance through spousal earnings is also evident from appendix table A9. Spousal earnings after either male or female job loss after five years (see columns (3) and (7) in appendix table A9) or even twenty years (see columns (4) and (8) in appendix table A9) are never statistically significantly different from zero.

[27] Using shocks to income like lottery wins, some studies report negative effects on mortality (Lindahl, 2005), some zero effects (Cesarini et al., 2017) and some even positive effects on mortality (Snyder and Evans, 2006).

estimate is larger in absolute terms than the causal effect of earnings on mortality. Hence, if anything, our calculations overestimate the contribution of earnings losses to excess mortality.

The calculations are shown in table 5. The correlation of pre-displacement log earnings with 5-year male mortality is -0.0019. Furthermore, the mortality risk for displaced men increases by 20 percent relative to non-displaced men over the first five years after job loss.[28] Hence, the elasticity of 5-year mortality with respect to earnings for displaced men is -0.27. A reduction in earnings by 10 percent would then raise the 5-year mortality of displaced men by 2.7 percent. Our results further indicate that displaced men lose 17 percent of their cumulative earnings over a five-year period. Multiplying the earnings losses with the earnings elasticity of mortality, we obtain that earnings losses raise mortality by 4.6 percent. Relative to the total mortality increase of 20 percent, earnings losses may thus account for 22.5 percent of the increased mortality risk for displaced men (see the bottom row of column (1) in table 5). We obtain a very similar contribution of 20.5 percent for 20-year male mortality (see column (2) of table 5).[29] Earnings losses thus account for at most one-fourth of the rise in male mortality after male job displacement, which is much lower than the contribution of 50-75 percent reported for the U.S. (Sullivan and von Wachter, 2009). The reason is not that Finnish men have lower earnings losses after displacement than displaced men in the U.S.. Earnings losses turn out to quite similar in the two countries ranging from 10 to 17 percent in Finland and from 15 to 20 percent in the U.S.. The two countries mainly differ in the estimated association between pre-displacement earnings and mortality. The elasticities are around -0.3 in Finland but -0.5 in the U.S.. One likely explanation for the lower sensitivity is that workers in Finland, unlike their U.S. peers, do not lose their health insurance after job displacement.[30] We did the same calculation for personal income, which reflects more closely the loss of actual economic resources (see columns (3) and (4) of table 5). Personal income can account for only 14 percent of the increase in (5-year or 20-year) mortality for displaced men, which is even lower than the contribution of 20-25 percent for earnings. The difference underscores that public insurance of job-related earnings losses partially shields a family from the negative consequences of job displacement. At the same time, the relatively small contribution of income also indicates that job displacement implies much more than the mere decline in actual economic resources.

[28] The coefficient of job displacement on 5-year mortality is 0.0014, while the baseline 5-year mortality rate is 0.0071. Hence, 0.0014/0.0071=0.20.

[29] Interestingly, the elasticity of mortality with respect to earnings does not change much with time elapsed since displacement (-0.24 for 20-year mortality compared to -0.27 for 5-year mortality). Yet, earnings losses become smaller in percentage terms over time (10 percent over a 20-year period rather than 17 percent over a 5-year period) as long-run earnings recover relative to their non-displaced peers. At the same time, catch-up mortality among non-displaced men seems to reduce the 20-year mortality differential to 12 percent (rather than 20 percent over a 5-year period).

[30] Another potential explanation is that the correlation between pre-displacement earnings and mortality suffers from reverse causality or omitted variable bias. The empirical correlation would be then higher in the U.S. than in Finland, if poor health reduces earnings more in the U.S. than in Finland, for instance.

Can the loss in economic resources also account for some of the health spillovers we observe in couples? Columns (5)-(8) of table 5 indicate a negative correlation between spousal mortality and male pre-displacement earnings as expected. The elasticity of spousal mortality is around -0.17 both in the medium and in the long run – and thus only two-thirds of the earnings elasticity of mortality for displaced men. Compared to the overall increase in spousal mortality (28 percent in the medium run and 14 percent in the long run), male earnings losses may therefore account for around 10-12 percent of the health spillovers in couples. The explanatory power of male income losses for spousal mortality is again somewhat lower (7-10 percent) than for earnings.

What do our findings indicate for the link between economic resources and health? First, monetary losses after male job loss may account for up to 25% of the excess mortality among men. This result clearly shows that earnings or income losses are important for health. We acknowledge that the correlation of mortality with pre-displacement earnings and income might not fully reflect a causal effect. It may well be that individuals with lower pre-displacement earnings had worse health that prevented them from working. In that case, our calculations provide an upper bound to the contribution of economic resources to health. Second, women's earnings losses are smaller in absolute terms than men's earnings losses and eventually return to their pre-displacement level. These smaller monetary losses could account for some of the observed gender asymmetry if the relationship between earnings and mortality were non-linear.[31] It could be that a couple can compensate moderate earnings losses without negative health consequences. Once earnings losses exceed some threshold, however, as in the case of male job displacement, the compensatory mechanisms break down with negative health consequences for the couple. Finally, the loss in economic resources can only explain a small share of the rise in spousal mortality. Together with the modest contribution to excess mortality for displaced men, these findings suggest that the higher mortality risk after job loss has a strong non-monetary component.

4.3 Spousal Death or Breakdown of Relationship

Job displacement may affect couples in ways other than declining financial resources or joint decision-making about labor supply. In particular, we have seen that men are much more likely to die within a few years of displacement. It is well known that the grief and potential social isolation associated with a person's death reduces the remaining life expectancy of the partner left behind. The spillover effect after male job displacement (and its absence after female displacement) might then just be the

[31] For female displacement, the direct and spillover effects on mortality are small. In addition, the relationship between pre-displacement earnings and mortality is much smaller than for displaced men. Therefore, despite sizable earnings and income losses for women after displacement, earnings and income play a limited role for explaining mortality.

result of the higher excess mortality of men after job loss, rather than a direct consequence of the displacement per se.

To investigate this potential explanation for health spillovers, we relate spousal mortality to job displacement and the occurrence of partner death. The specification is the same as in equation (2) augmented by an indicator whether the displaced worker died within five years of displacement. The results in table 6 show three interesting patterns: becoming a widow or widower within five years after the partner's displacement is indeed deadly in the medium and in the long run. The coefficient on partner death in columns (1) and (2) indicates sizable co-morbidity in couples within five and twenty years after displacement.[32] It is interesting to note, however, that the negative effects of widowhood are very similar across genders. Both men and women are more likely to die when their partner passed away within five years after displacement (compare columns (1) and (3) and (2) and (4) in table 6). The effects are even slightly stronger for men than for women. Most importantly, the gender asymmetry in health spillovers after job loss remains the same as in the baseline even conditional on the partner's death. Hence, widowhood can neither explain the spillover effects after displacement nor their stunning gender asymmetry.

Even if the partner remains alive, the loss of a well-paid job followed by a period of un- or non-employment is likely to strain the couple's relationship. Destructive or aggressive coping strategies of the displaced worker could reduce the actual and possibly future gains from marriage. As a result, the relationship might break down – with negative health consequences for both partners (Charles and Stephens, 2004; Mjörk et al., 2018; Rege et al., 2011). A strained or broken relationship could explain the gender asymmetry in health spillovers if the relationship is more adversely affected when a man loses his job than when a woman loses her job, for example, because a man's role is to provide economically for the family. To investigate the effects of job displacement on breakups and separations, we use the empirical model in equation (1) where the dependent variable is now an indicator whether a couple either gets divorced or stops cohabitating in year τ after displacement. The dynamics of the cumulative probability of breakup of couples with a displaced partner relative to couples without a displacement is shown in figure A6 for male job loss (panel (a)) and female job loss (panel (b)). More couples divorce or separate in year two after male job loss, but then relationships return to a normal pattern compared to couples of non-displaced workers. Following female job loss, the estimates are similar in magnitude but less precisely estimated. Hence, neither the widowhood effect nor breakdowns of relationship help to explain the spillovers or gender asymmetry.

[32] The impact for twenty-year mortality will isolate a causal effect if partner death within five years after displacement is pre-determined and hence, uncorrelated with health or labor market shocks affecting mortality of the partner left behind.

4.4 Family Structure

Even if the relationship does not break down, a person's job loss might shake some couples to the core, while other couples are better equipped to absorb such negative shocks. Here, we explore the role of family structure for the link between mortality and job displacement. In particular, we analyze whether the effects of male job loss differ in traditional and modern couples.We define a modern couple as one where women have at least as much formal education as her husband.[33] Economically, a traditional couple with a main breadwinner might be more or less vulnerable to male job displacement than a modern couple. A traditional couple with a male breadwinner should experience larger earnings losses after male job displacement than a couple where both partners have similar labor market skills.[34] Yet, partners in traditional couples might have more room to expand their labor supply to compensate the earnings losses of the displaced. Beyond monetary concerns, traditional and modern couples might be differently affected because of actual or perceived gender roles. Following a long line of research in social psychology and sociology, Akerlof and Kranton (2000) introduced the idea that social categories, like husband and wife in a couple, come with a prescribed role or set of expected behavior. A person who identifies with the prescribed role could then incur large psychic costs if he or she cannot fulfill the expected norms or behavior. Men who identify with the role of a traditional breadwinner might be more negatively affected when they lose their job in a plant closure than men in non-traditional earning couples. Yet, non-traditional couples seem to have less stable relationships, which might reduce the couple's ability to overcome a negative labor market shock (Bertrand et al., 2015). To compare the health burden of job displacement for traditional and modern couples, we rerun our mortality regressions using equation (1) separately for traditional and non-traditional couples.

Surprisingly, figure 7 suggests that both partners in modern couples experience higher mortality risk after male job loss than couples without male job displacement. Traditional couples, in turn, do not experience any excess mortality after male job loss.[35] Even more interestingly, this pattern is not explained by differential losses in economic resources. Appendix table A10 shows that modern couples actually suffer *smaller* losses in family earnings than traditional couples because of income pooling. For both modern and traditional couples, spousal employment is largely unresponsive to male job loss. Spouses in modern couples do earn more in the long run than spouses in traditional couples but

[33] One could also define traditional as couples where the man contributes more than 50% to family resources prior to displacement following Bertrand et al. (2015). The mortality patterns for this alternative definition are similar but statistically noisier than our definition based on education.

[34] Earnings losses might be even higher in the case of the male breadwinner if specialization in the couple allows the husband to accept attractive job opportunities or invest more in job-specific skills, for instance, than husbands in non-traditional couples.

[35] Male job loss should improve the relative bargaining position of the wife and hence, the resources available to her. Changes in relative bargaining positions does not explain why the mortality of both spouses goes up in non-traditional couples, but not in traditional couples, however.

the effect is very small – just like in the full sample. As such, the bigger mortality effect for modern couples cannot be explained by a sharper decline in economic resources or weaker spousal labor supply response. The picture looks very different after female job displacement (see figure A7). In traditional couples, displaced women suffer higher long-term mortality, while their partners are less likely to die in the short run. In modern partnerships, in contrast, displaced women are less likely to do in the short run, possibly of less stress and more time to invest in health-promoting activities. There is again no effect on their partner or their own mortality in the long run.[36]

Overall, the evidence clearly indicates that relationships are under additional strain when the man loses his job. The fact that the mortality risk differs by family structure in non-trivial ways highlights that monetary losses alone cannot explain the health spillovers in couples. Instead, patterns for mortality and family resources point to a substantial psychological component. One factor could be that job loss is a more severe blow to men in more equal partnerships or that the couple is stressed by the violation of gender norms than in traditional couples where the division of labor is well defined.

5 Discussion and Conclusion

A long line of research has shown that individuals who are displaced for exogenous reasons suffer severe earnings losses and excess mortality. Our analysis shows that the dire health effects are not confined to the displaced worker. Using administrative data over more than two decades, we show that man's job loss during an economic downturn significantly increases his own mortality, but also his partner's risk of dying. For every 10,000 displaced men, there are 110 extra deaths within two two decades. Up to 40 percent of this excess mortality fall upon the partners of displaced men. Our study also reveals a stunning gender asymmetry: when a man loses his job in a plant closure, both he and his spouse suffer negative health consequences. When a woman loses her job, in contrast, we find no such dire health consequences.

We investigate four channels for the observed health spillovers and gender asymmetry. First, spousal labor supply response may insure the couple against negative shocks like job loss reducing the health burden on the displaced worker. We find only very modest spousal labor supply responses for both men and women. As such, they cannot explain neither the health spillovers nor the gender asymmetry. We then investigate the role of declining economic resources and public insurance, for which we find some support. Earnings losses may account for around one-quarter of the direct effect

[36] We also explore whether the presence of dependent children in the base year influences mortality. Women do not seem to suffer higher mortality after male job loss if they have dependent children. There is little difference for displaced men with or without dependent children. We find again no effect on mortality after female job loss for couples with or without children.

of male job displacement on male mortality. As public transfers provide only partial and temporary insurance, financial hardship helps to explain why the health burden for the couple is worse after male job displacement; the monetary channel seems less successful in accounting for health spillovers in couples, however. Third, we show that the death of the displaced worker along cannot explain the health spillovers of job displacement even though we document a sizable widowhood effect. Finally, we explore whether some couples are better able to absorb the negative consequences of job displacement than others. Men's health, in contrast, suffers less within a traditional couple where the man is more educated than his partner. These findings, which are not explained by differences in spousal labor supply or earnings losses, point to a substantial psychological component of job loss.

Our study highlights that the societal burden of job displacement is much higher than the economic and health consequences for the displaced workers alone. A second novel result is that the health burden for families with a displaced worker goes well beyond economic deprivation. From this perspective, periods of economic recession or even depression imply a persistent toll on human lives and the long-run health of the population. The size of health spillovers we find has important policy implications and needs to be taken into account when designing public policies to mitigate or insure workers against negative labor market shocks. By highlighting the health costs of great recessions, our results further provide important insights into the current pandemic. In particular, our results show that there is no simple trade-off between economic and health costs as economic recessions also carry a substantial health burden among displaced workers and their families.

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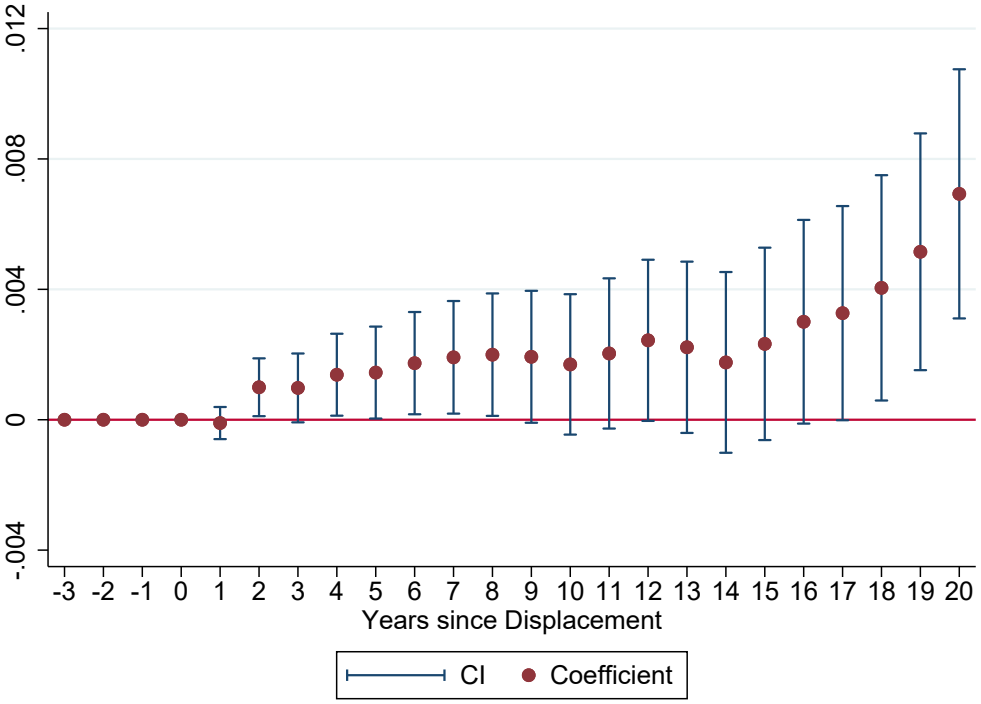
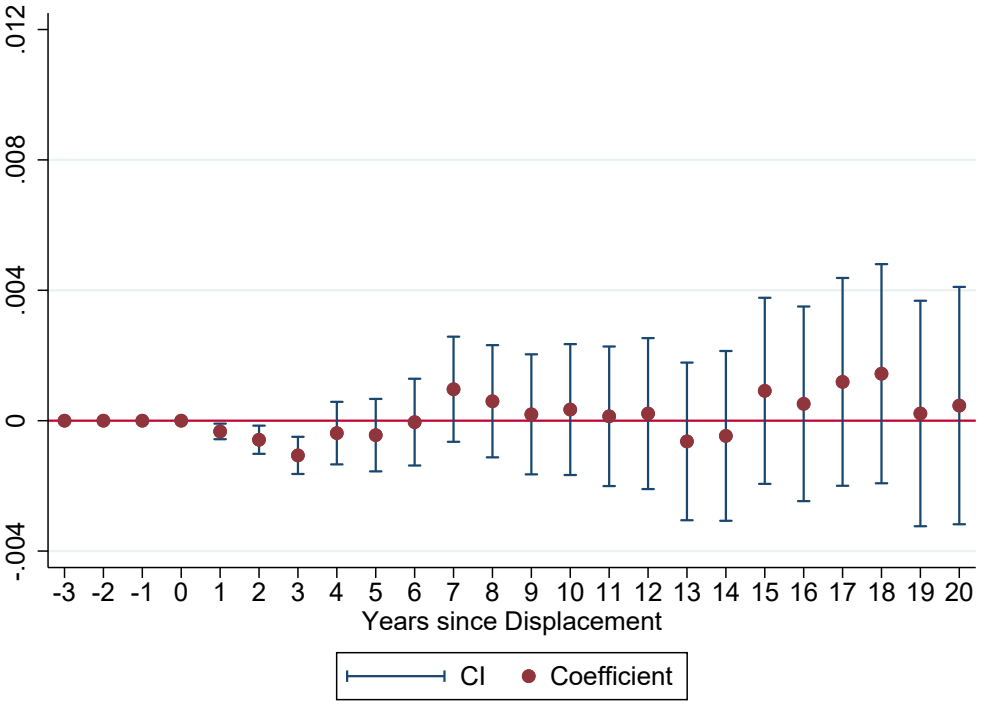


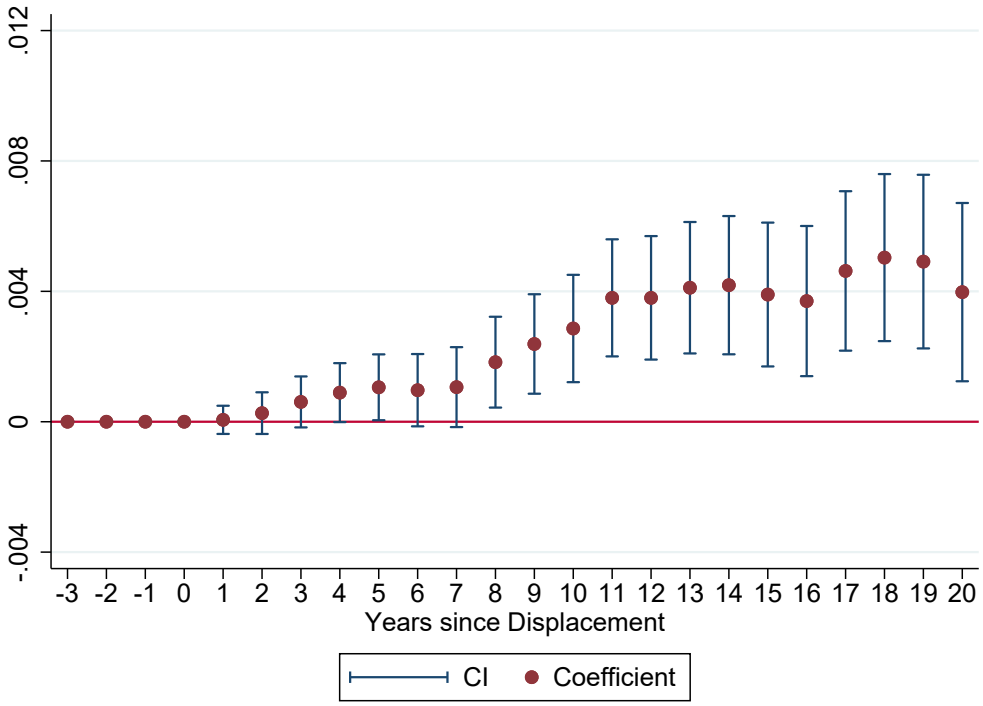
(a) Male Job Displacement and Male Mortality



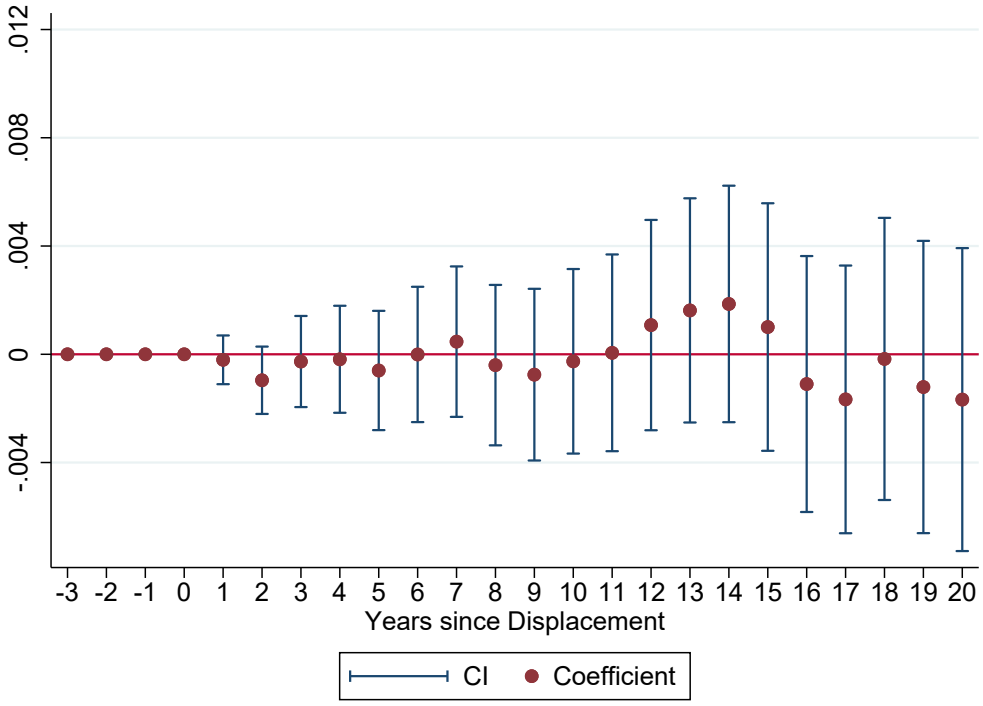
(b) Female Job Displacement and Female Mortality

Figure 1: Direct Mortality Effect of Job Displacement

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (1), which estimates the effect of displacement on the probability that a worker dies by the year denoted on the x-axis.



(a) Male Job Displacement and Female Mortality



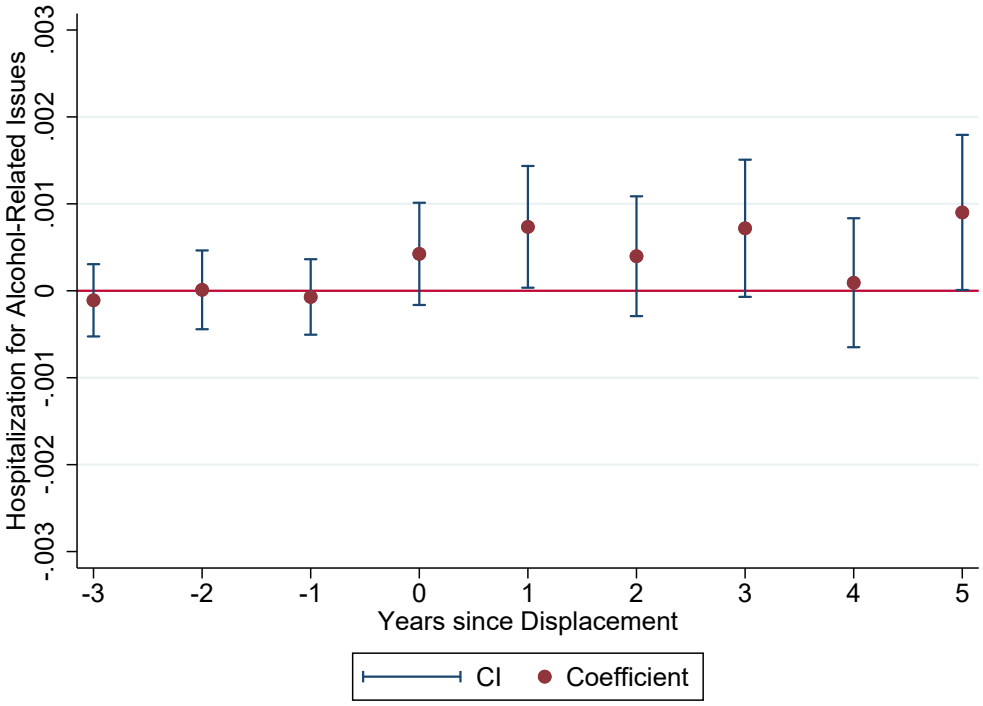
(b) Female Job Displacement and Male Mortality

Figure 2: Spousal Mortality Effect of Job Displacement

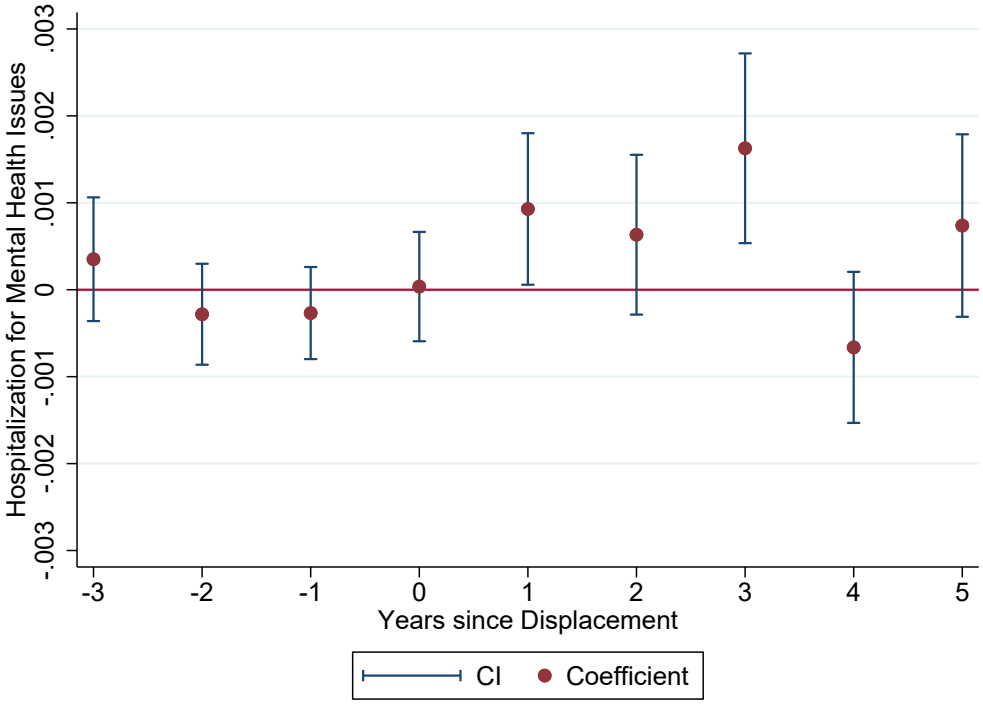
Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (2), which estimates the effect of displacement on the probability that the partner dies by the year denoted on the x-axis.

Figure 3: Alternative Control Group: Workers Displaced in the Future

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (1), which estimates the effect of displacement on the probability that a worker dies by the year denoted on the x-axis. The control group consists of workers working in plants that did not close down during the depression years (1991-1993) but closed down slightly later (1994-1999).



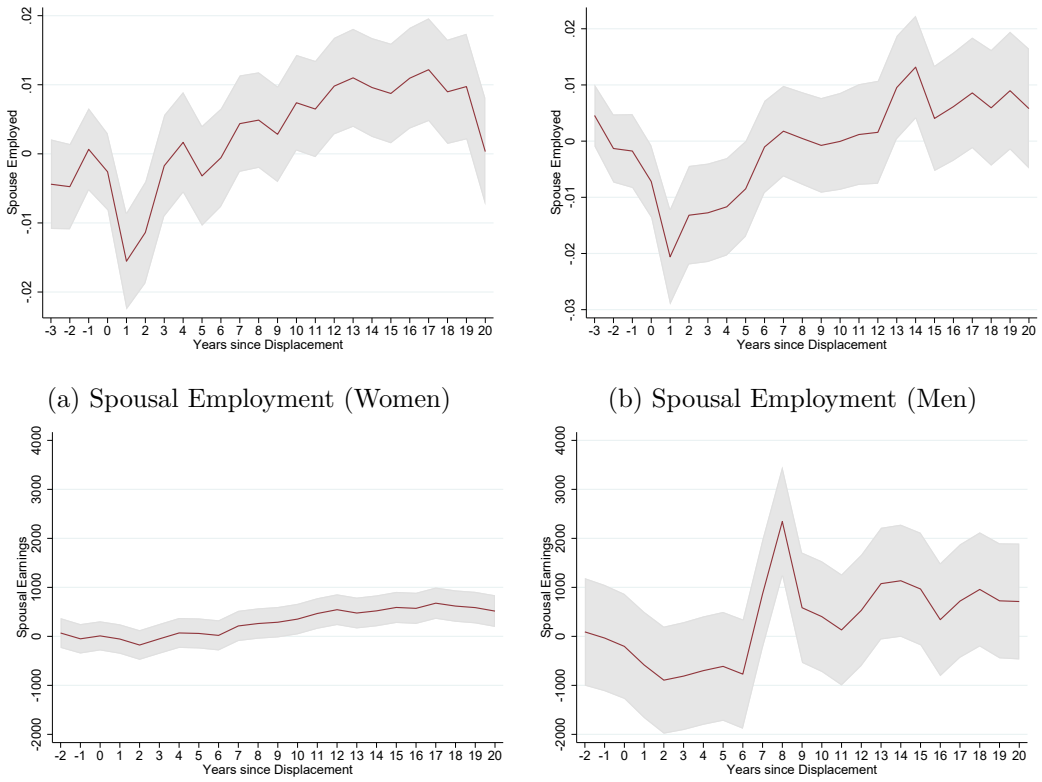
(a) Alcohol-Related Issues



(b) Mental Health Issues

Figure 4: Male Job Displacement and Hospitalization

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (1), which estimates the effect of displacement on the probability that a displaced man is hospitalized for alcohol (panel (a)) or mental health issues (panel (b)) by the year denoted on the x-axis.



(a) Spousal Employment (Women)

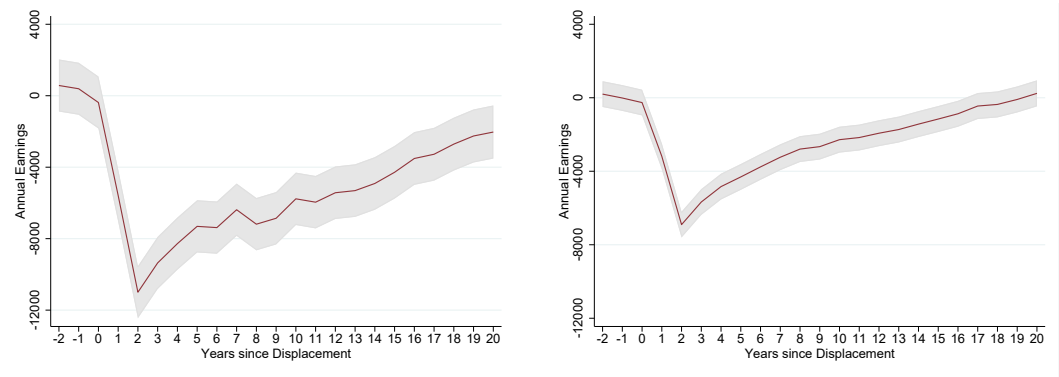
(b) Spousal Employment (Men)

(c) Spousal Earnings (Women)

(d) Spousal Earnings (Men)

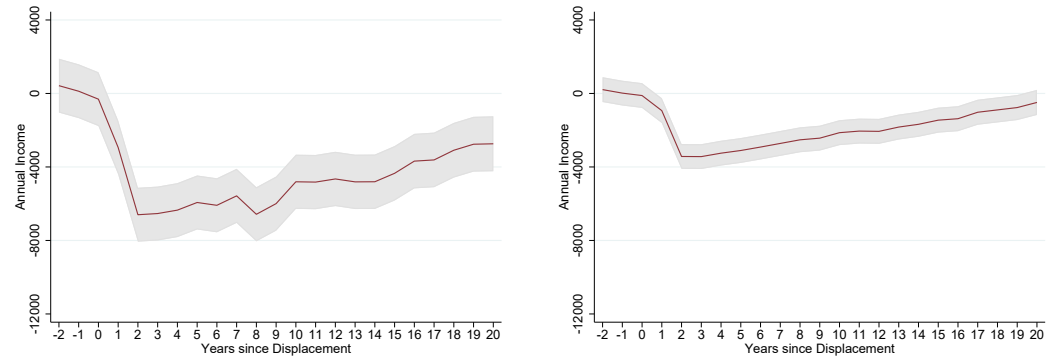
Figure 5: Effect of Job Displacement on Spousal Earnings and Employment

Notes: The figure displays coefficients and confidence intervals from regression equation (3), which estimates the effect of displacement on spousal employment (upper panel) and spousal earnings (lower panel) in the years before and after male (left-hand side) and female (right-hand side) job displacement. The earnings regression includes individual fixed effects, and drops the displacement indicator for year -3 from the regression.



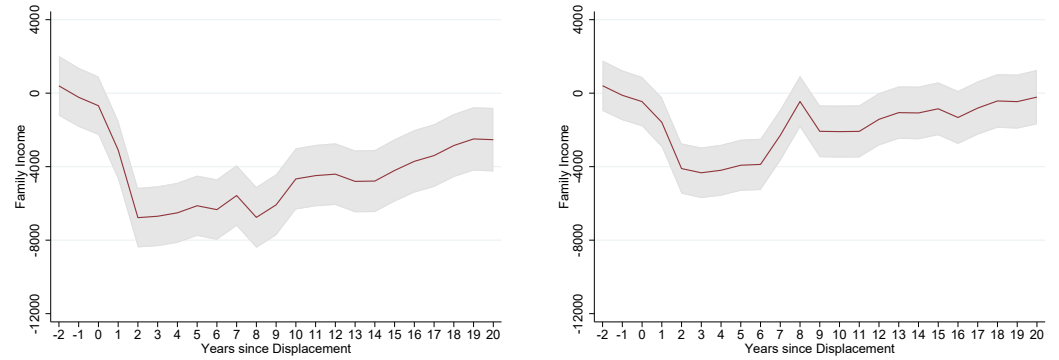
(a) Annual Earnings (Men)

(b) Annual Earnings (Women)



(c) Annual Income (Men)

(d) Annual Income (Women)

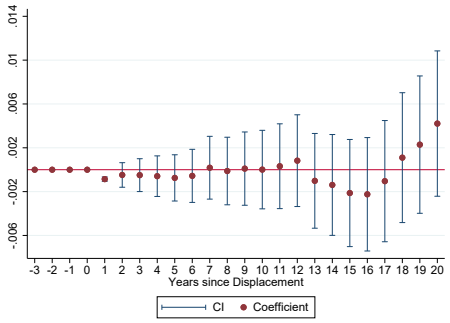


(e) Family Income (Men)

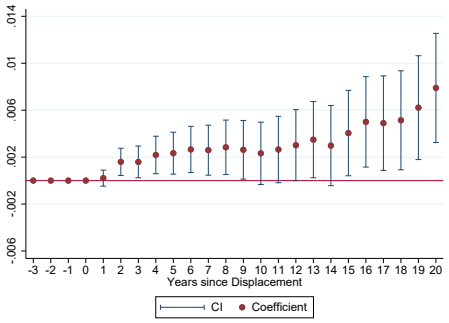
(f) Family Income (Women)

Figure 6: Effect of Job Displacement on Earnings and Income

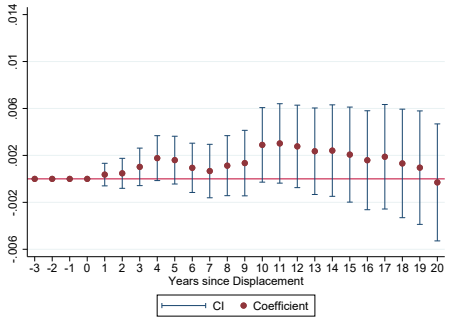
Notes: The figure displays coefficients and confidence intervals from regression equation (3), which estimates the effect of displacement on worker's earnings and employment in the years before and after male (left-hand side) and female (right-hand side) job displacement



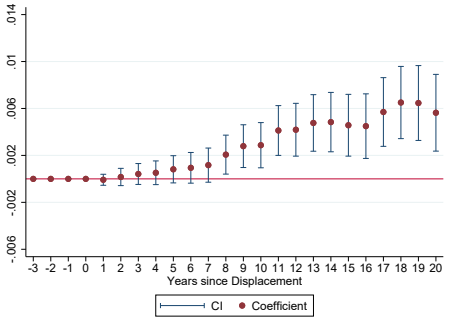
(a) Male Mortality (Traditional)



(b) Male Mortality (Non-Traditional)



(c) Spousal Mortality (Traditional)



(d) Spousal Mortality (Non-Traditional)

Figure 7: Effects of Male Job Displacement on Mortality by Family Structure

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (2), which estimates the effect of male job displacement on the probability that a person dies by the year denoted on the x-axis. Traditional couples are those where the woman has lower educational attainment than her partner or husband. Non-traditional couples are those where the woman has a higher (or equal) level of education than her partner or husband.

Table 1: Direct and Spillover Effects of Job Displacement

	Direct Effect				Displaced Worker Sample	
	Male Job Loss		Female Job Loss		Male Job Loss	Female Job Loss
	5-Year	20-Year	5-Year	20-Year	5-Year	5-Year
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00144*	0.00687***	-0.00044	0.00046	0.00170	0.00055
	[0.00085]	[0.00231]	[0.00067]	[0.00220]	[0.00145]	[0.00095]
Observations	468,016	468,016	345,240	345,240	26,968	19,502
Mean of Dependent Variable	0.007	0.059	0.003	0.032	0.007	0.003
R^2	0.005	0.030	0.003	0.018	0.025	0.019
	Spillover Effect				Displaced Worker Sample	
	Male Job Loss		Female Job Loss		Male Job Loss	Female Job Loss
	5-Year	20-Year	5-Year	20-Year	5-Year	5-Year
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00103*	0.00409**	-0.00064	-0.00164	0.00179*	-0.00109
	[0.00061]	[0.00166]	[0.00133]	[0.00339]	[0.00092]	[0.00218]
Observations	468,016	468,016	345,240	345,240	26,968	19,502
Mean of Dependent Variable	0.004	0.030	0.012	0.089	0.004	0.013
R^2	0.005	0.027	0.015	0.073	0.020	0.042

Notes: The table reports the direct (top panel) and spillover (bottom panel) effect of male and female job displacement in t on mortality by $t+5$ and $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of dying by year $t+5$ or $t+20$. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table 2: Specification Checks of Direct and Spillover Mortality after Male Job Loss

	Direct Effects					
	Dual Earner Couple		Private & Public		Mass Layoff	
	20-Year (Baseline)	20-Year	5-Year	20-Year	5-Year	20-Year
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00676**	0.00670**	0.00140*	0.00526**	0.00148***	0.00425****
	[0.00270]	[0.00270]	[0.00079]	[0.00212]	[0.00048]	[0.00131]
Spousal Displacement		0.00194				
		[0.00372]				
Observations	348,799	348,799	551,489	551,489	468,016	468,016
Mean of Dependent Variable	0.060	0.060	0.007	0.060	0.007	0.059
R^2	0.029	0.029	0.005	0.030	0.005	0.030
	Spillover Effects					
	Dual Earner Couple		Private & Public		Mass Layoff	
	20-Year (Baseline)	20-Year	5-Year	20-Year	5-Year	20-Year
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00324*	0.00324*	0.00076	0.00265*	0.00047	0.00115
	[0.00183]	[0.00183]	[0.00057]	[0.00152]	[0.00034]	[0.00093]
Spousal Displacement		-0.00007				
		[0.00259]				
Observations	348,799	348,799	551,489	551,489	468,016	468,016
Mean of Dependent Variable	0.028	0.028	0.004	0.031	0.003	0.030
R^2	0.018	0.018	0.005	0.027	0.005	0.027

Notes: The table reports the direct (top panel) and spillover (bottom panel) effect of male job displacement in t on mortality by $t+5$ and $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. Results for dual earner sample, where both spouses are employed in base year in columns (1)-(2), for sample including public sector workers in columns (3)-(4) and for sample including mass layoffs in columns (5)-(6). In all of the specifications, the dependent variable is the probability of dying by year $t+5$ or $t+20$. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table 3: Male Job Displacement and Hospitalization

	Direct Effect (5-Year Hospitalization)					
	Accidents	Alcohol	Cancer	Heart	Mental Illness	Suicide
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	-0.00031	0.00143	-0.00010	-0.00225	0.00215*	0.00020
	[0.00187]	[0.00087]	[0.00070]	[0.00152]	[0.00113]	[0.00039]
Observations	468,016	468,016	468,016	468,016	468,016	468,016
Mean of Dependent Variable	0.042	0.007	0.005	0.031	0.013	0.002
R^2	0.006	0.004	0.004	0.014	0.004	0.002
	Spillover Effect (5-Year Hospitalization)					
	Accidents	Alcohol	Cancer	Heart	Mental Illness	Suicide
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00191	0.00113**	0.00088	-0.00244	0.00101	0.00003
	[0.00146]	[0.00056]	[0.00095]	[0.00178]	[0.00109]	[0.00048]
Observations	468,016	468,016	468,016	468,016	468,016	468,016
Mean of Dependent Variable	0.023	0.003	0.010	0.041	0.013	0.003
R^2	0.005	0.004	0.008	0.012	0.009	0.003

Notes: The table reports the effect of male job displacement on hospitalization of the man (top panel) and the partner (bottom panel) where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of being hospitalized by year $t+5$ for a specific cause. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table 4: Direct Effect of Male Job Displacement on Cause-Specific Mortality

	5-Year Mortality					20-Year Mortality				
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Suicides (5)	Accidents (6)	Alcohol (7)	Cancer (8)	Heart (9)	Suicides (10)
Job Displacement	0.00004	-0.00008	0.00020	0.00081*	0.00014	0.00019	0.00143	0.00101	0.00254**	0.00166**
	[0.00031]	[0.00024]	[0.00040]	[0.00047]	[0.00035]	[0.00077]	[0.00091]	[0.00126]	[0.00127]	[0.00078]
Individual Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plant Size (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Displacement Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spousal Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	468,016	468,016	468,016	468,016	468,016	468,016	468,016	468,016	468,016	468,016
Mean of Dependent Variable	0.001	0.001	0.002	0.002	0.001	0.006	0.008	0.017	0.017	0.006
R^2	0.002	0.002	0.003	0.004	0.002	0.003	0.004	0.016	.015	0.002

Notes: The table reports the effect of male job displacement on cumulative mortality by $t+5$ and $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of dying by year $t+5$ or $t+20$. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table 5: Contribution of Earnings/Personal Income to Male and Spousal Mortality

	Male Mortality				Spousal Mortality			
	Male Earnings		Male Personal Income		Male Earnings		Male Personal Income	
	5-year	20-year	5-year	20-year	5-year	20-year	5-year	20-year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male Displacement	0.00148*	0.00700***	0.00147*	0.00693***	0.00102*	0.00413**	0.00102*	0.00412**
	[0.00086]	[0.00231]	[0.00085]	[0.00231]	[0.00061]	[0.00166]	[0.00061]	[0.00166]
Men's Log Earnings/Income (Pre-Displacement)	-0.00189****	-0.0141****	-0.00195****	-0.0137****	-0.00064**	-0.00511****	-0.00070**	-0.00593****
	[0.000510]	[0.00142]	[0.00057]	[0.00156]	[0.00031]	[0.00100]	[0.00034]	[0.00108]
Earnings/Income Elasticity of Mortality	-0.269	-0,241	-0,277	-0,234	-0,175	-0,169	-0,190	-0,196
Male Earnings/Income Loss (%)	-0,170	-0,100	-0,102	-0,070	-0,003	0,008	0.007	0.012
Mortality Increase through Earnings/Income Loss	0,046	0,024	0.028	0,016	0,030	0,017	0,019	0.014
Total Mortality Effect (%)	0.203	0.117	0.203	0.117	0.280	0.135	0.280	0.135
Contribution of Economic Channel	22,5%	20,5%	13,9%	14,0%	10,6%	12,4%	6,9%	10,1%

Notes: The table calculates the contribution of earnings and income drops on the mortality effect of job loss for the displaced and their spouse in $t+5$ and $t+20$. The earnings/income elasticity of mortality is calculated as the pre-displacement log earnings/income effect on mortality relative to baseline mortality. We use average log earnings/income on the 3-year pre-displacement period for the interaction of pre-displacement and mortality effect of job loss. Each regression includes the full set of control variables. See notes to previous tables for details. Standard errors are reported in square brackets. * p < 0.10, ** p < 0.05, *** p < 0.001.

Table 6: Spousal Mortality

	Male Job Loss		Female Job Loss	
	5-Year	20-Year	5-Year	20-Year
	(1)	(2)	(3)	(4)
Job Displacement	0.00101*	0.00406**	-0.00063	-0.00161
	[0.00061]	[0.00166]	[0.00133]	[0.00339]
Displaced Dead by $t+5$	0.0108****	0.0262****	0.0290****	0.0737****
	[0.00270]	[0.00593]	[0.00801]	[0.0156]
Individual Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes
Plant Size (Pre-Job Loss)	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Year of Displacement Fixed Effects	Yes	Yes	Yes	Yes
Spousal Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes
Observations	468,016	468,016	345,240	345,240
Mean of Dependent Variable	0.004	0.030	0.012	0.089
R^2	0.006	0.027	0.016	0.073

Notes: The table reports the effect of male and female job displacement in t on cumulative spousal mortality by $t+5$ or $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of spousal death by time $t+5$ or $t+20$. Displaced Dead by $t+5$ controls for the displaced dying by $t+5$. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

For Online Publication: Supporting Material for "In Sickness and in Health: Job Displacement and Health Spillovers in Couples"

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February 25, 2021

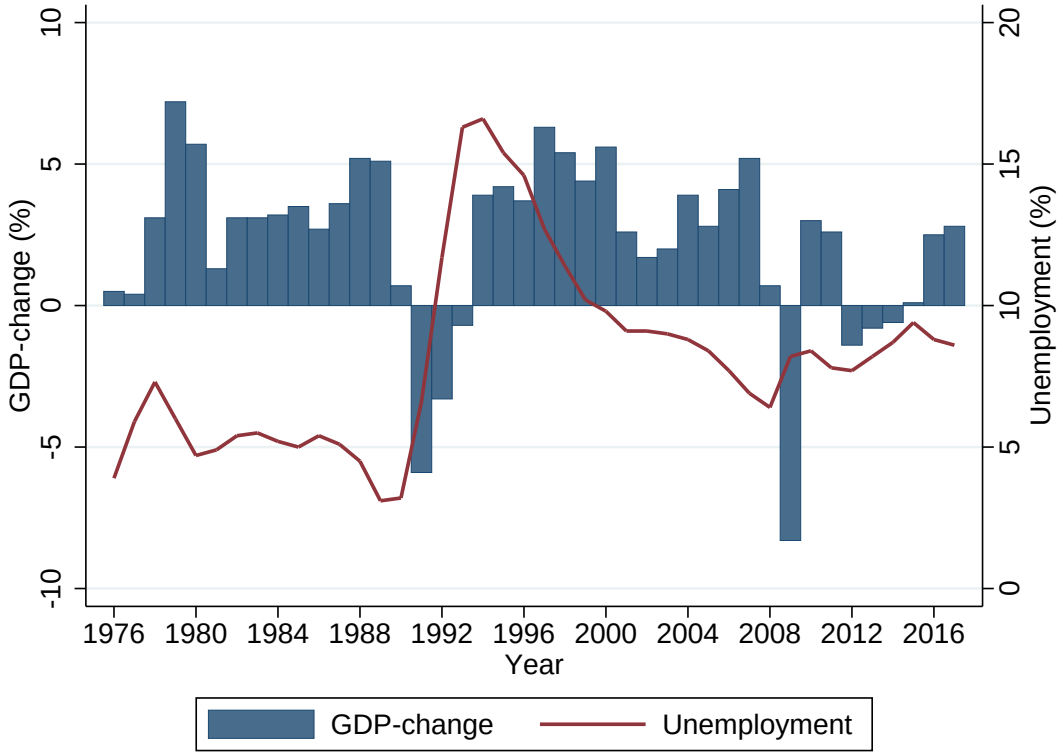
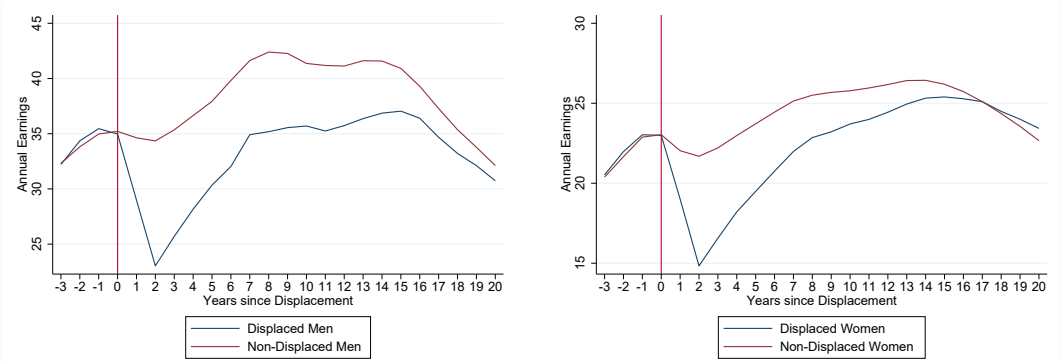


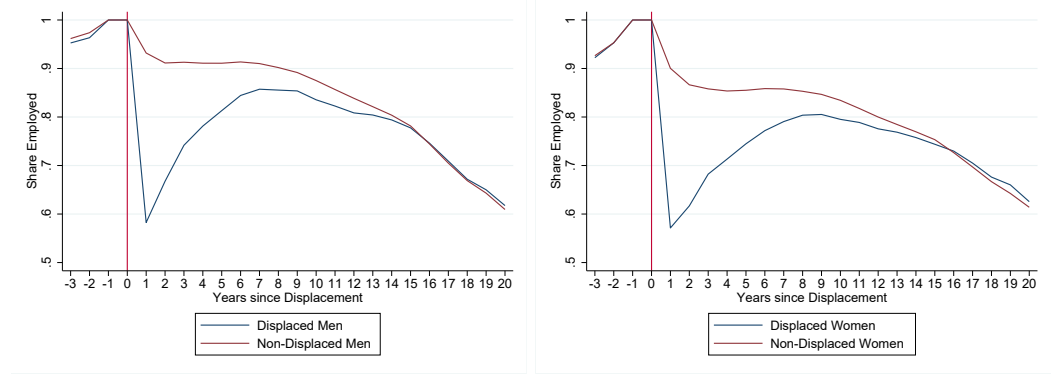
Figure A1: Unemployment and GDP during Finland's Great Depression of the 1990s

Notes: The figure plots the evolution of the GDP-change and unemployment rate in Finland from the year 1976 to 2017.



(a) Annual Earnings (Men)

(b) Annual Earnings (Women)



(c) Share Employed (Men)

(d) Share Employed (Women)

Figure A2: Earnings and Employment after Male and Female Job Displacement

Notes: The figure plots the mean annual earnings and employment status of male (left-hand side) and female (right-hand side) workers working in plants with between 10 and 1000 workers in base years 1991-1993. Displaced workers refer to group that lost their job in plant closure between year 0 and 1 where year 0 denotes one of the base years.

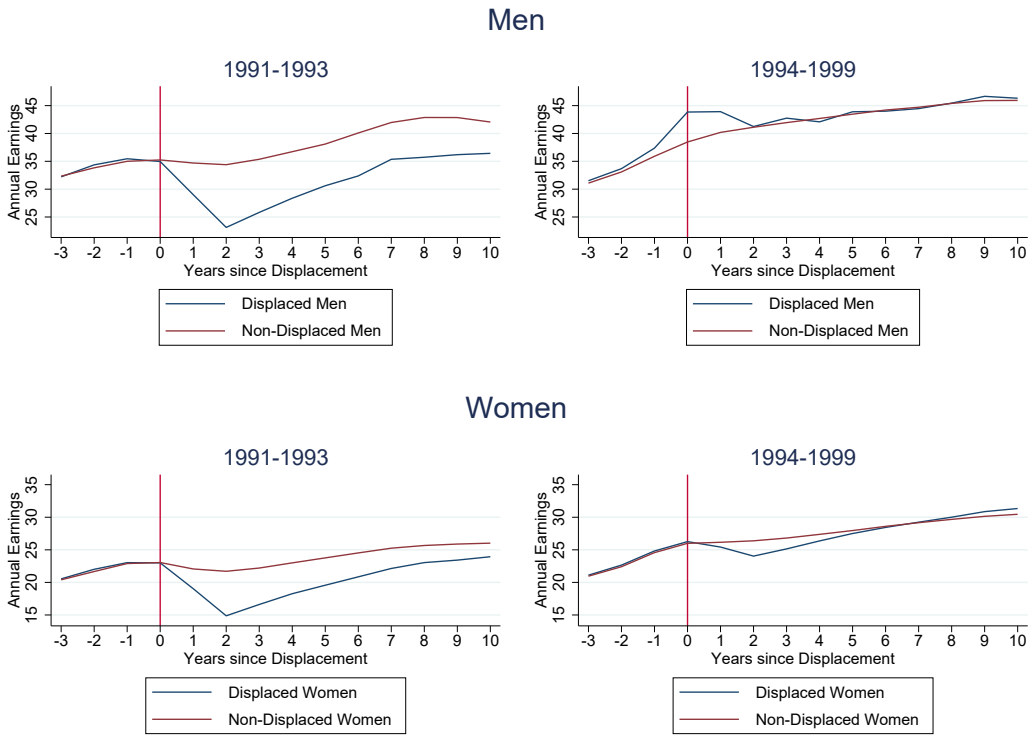


Figure A3: Earnings after Male and Female Job Displacement in Depression and Non-Depression Years

Notes: The figure plots the mean annual earnings of male (top panel) and female (bottom panel) workers working in plants with between 10 and 1000 workers in base years 1991-1993 (left-hand side) and 1994-1999 (right-hand side). Displaced workers refer to group that lost their job in plant closure between year 0 and 1 where year 0 denotes one of the base years.

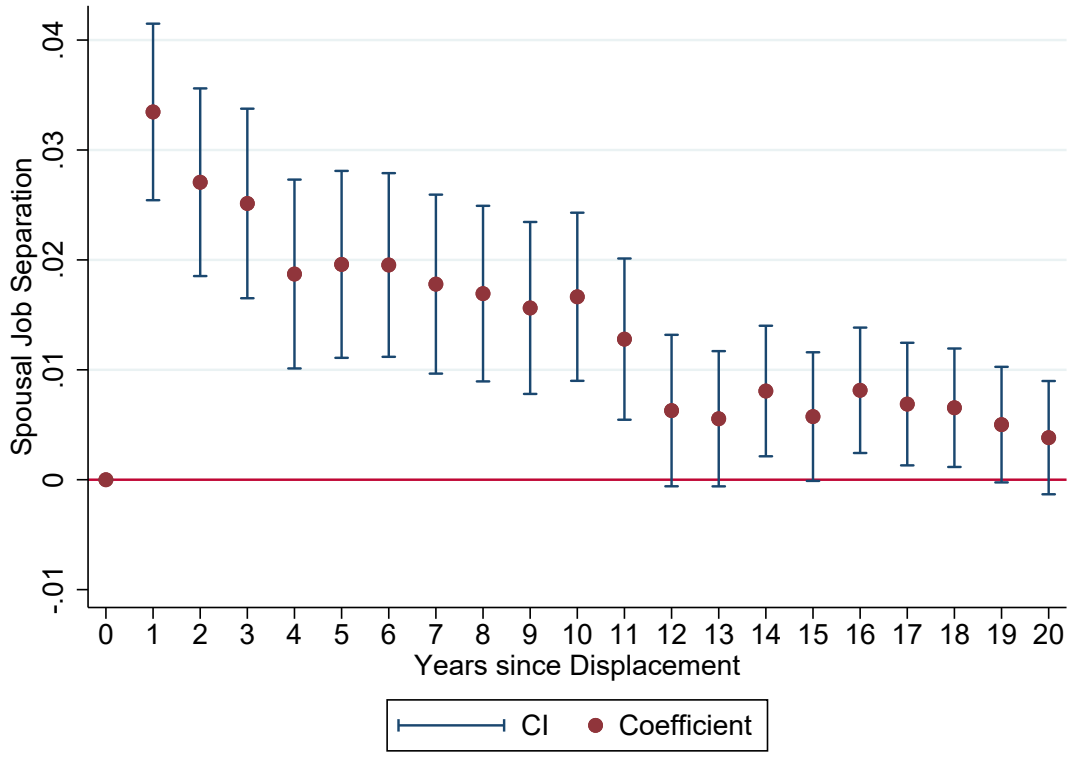
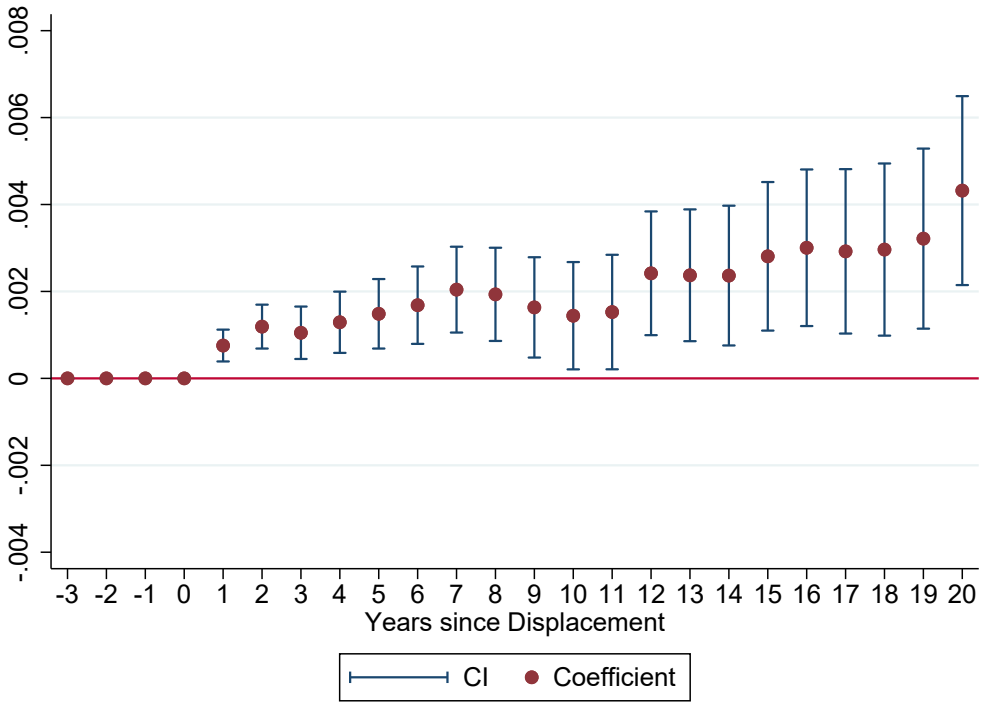
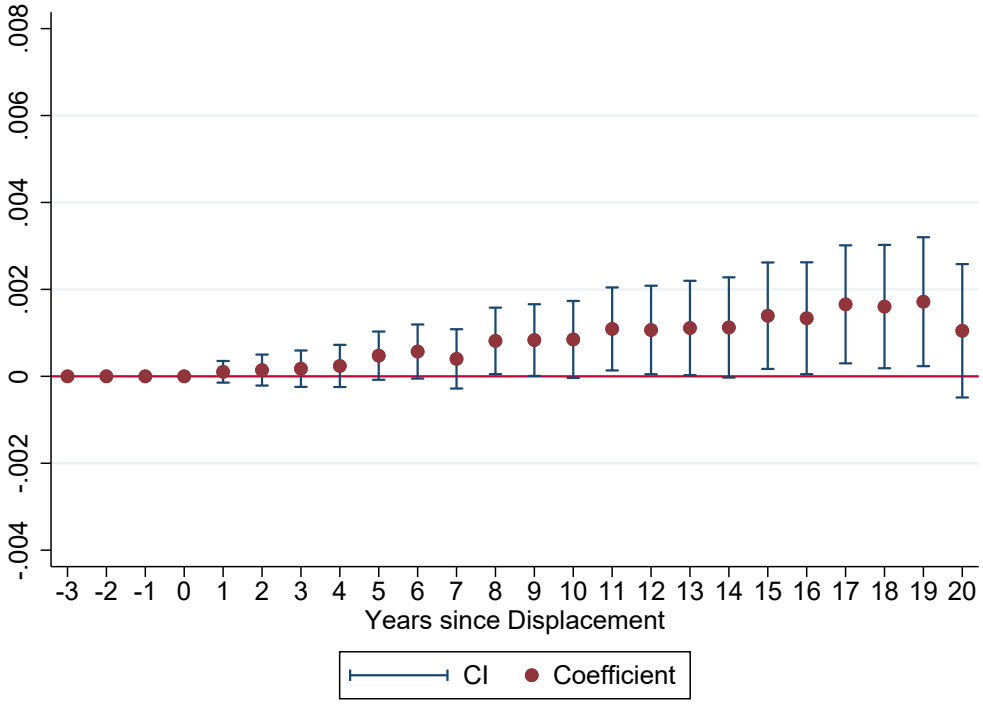


Figure A4: Job Separation of Partner after Male Displacement

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (2), which estimates the effect of displacement on the probability that a worker's spouse separated from her base year plant by the year denoted on the x-axis.



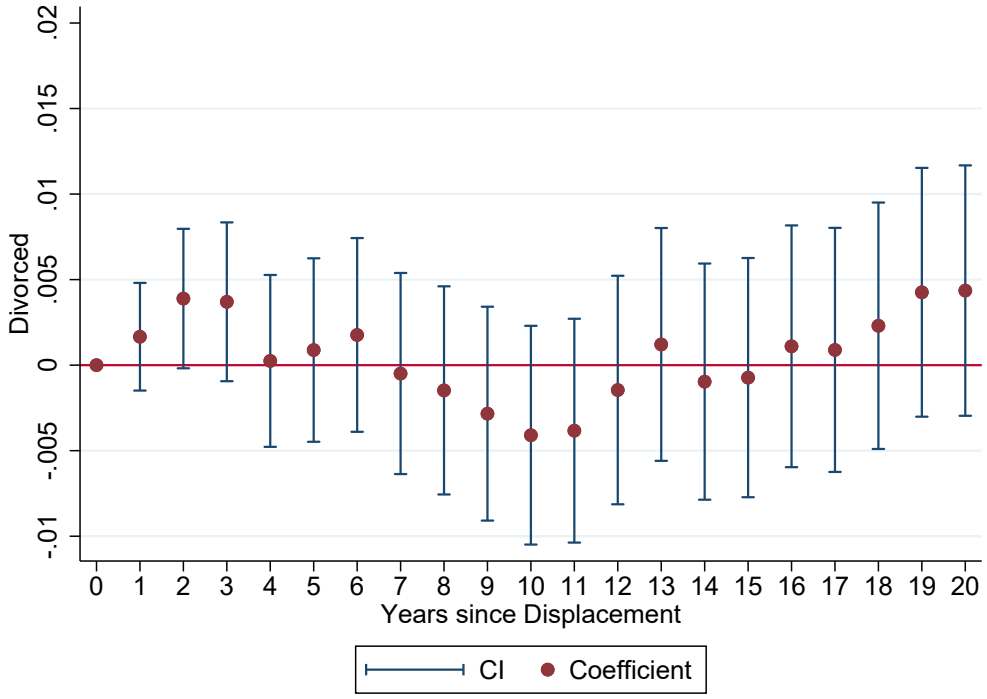
(a) Direct Effect of Male Job Displacement



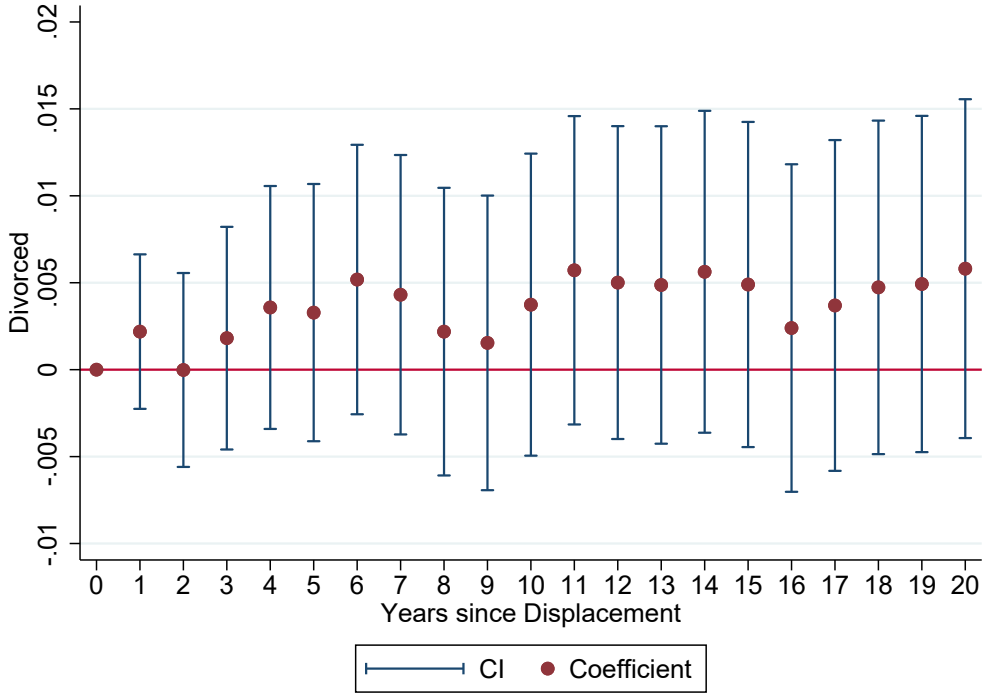
(b) Spillover Effect of Male Job Displacement

Figure A5: Direct And Spousal Mortality after Male Displacement in Mass Layoff Sample

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (2) estimating the effect of job displacement due to either plant closure or downsizing on the probability that a worker dies by the year denoted on the x-axis.



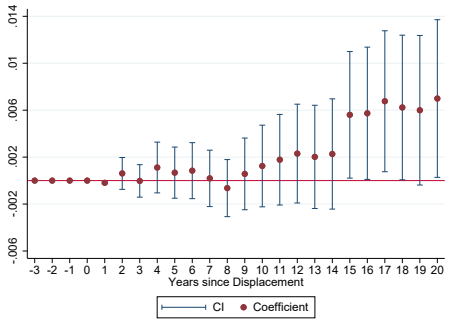
(a) Male Job Displacement



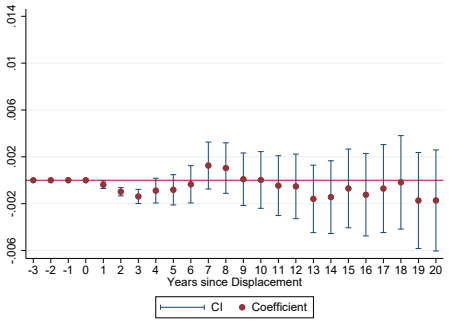
(b) Female Job Displacement

Figure A6: Effect of Job Displacement on Separation

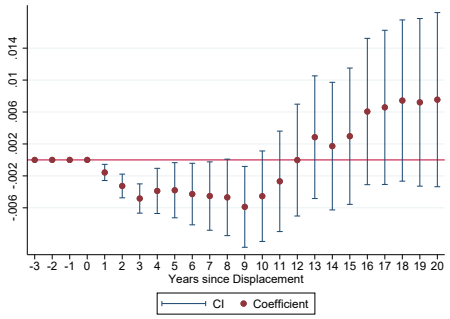
Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (2), which estimates the effect of displacement on the probability that a person separates from his or her base year partner by the year denoted on the x-axis.



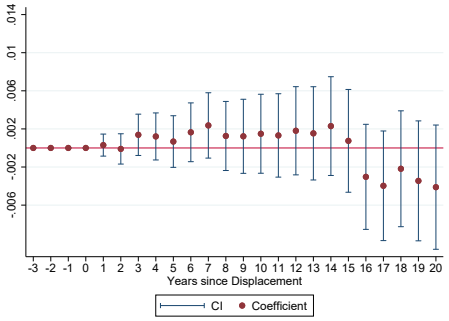
(a) Female Mortality (Traditional)



(b) Female Mortality (Non-Traditional)



(c) Spousal Mortality (Traditional)



(d) Spousal Mortality (Non-Traditional)

Figure A7: Effects of Female Job Displacement on Mortality by Family Structure

Notes: The figure displays coefficients and confidence intervals from separate regressions of equation (2), which estimates the effect of female job displacement on the probability that a person dies by the year denoted on the x-axis. Traditional couples are those where the woman has lower educational attainment than her partner or husband. Non-traditional couples are those where the woman has a higher (or equal) level of education than her partner or husband.

Table A1: ICD-10 and ICD-9 Codes for Disease Groups

	Death certificate	Hospitalization (patient records)	
Disease group	Statistics Finland Classification (corresponding ICD-10 codes)	ICD-10 (1996-2013)	ICD-9 (1988-1995)
Accidents	V01-X44, X46-Y89	V01-X44, X46-Y89	E800-E840, E860-E990, 850
Alcohol	F10, G312, G4051, G621, G721, I426, K292, K70, K852, K860, 0354, P043, Q860, X45	F10, G312, G4051, G621, G721,I426, K292, K70, K852, K860, X45	291, 303, 3050, 3575, 4255, 5353, 5713, 5770D-F, 5771C-D 7607A, 7795A, E851
Cancer	C00-D48	C00-C97	140-208
Heart	I00-I425, I427-I99	I00-I59, I70-I99	390-429, 440-459
Mental illness	-	F00-F99	290-319
Suicide	X60-X84, Y870	X60-X84	E950-E959

Notes: The table provides the ICD-9 and ICD-10 codes used to construct the cause-specific mortality and hospitalization variables. Disease groups are coded using the ICD-9 classification until 1995 and ICD-10 classification since 1996.

Table A2: Characteristics of Displaced and Non-Displaced Workers

	Men			Women		
	Displaced Workers	Non-Displaced Workers	p-value	Displaced Workers	Non-Displaced Workers	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Age	36.19	36.51	0.00	35.86	36.07	0.02
Low-skilled	0.31	0.31	0.81	0.38	0.38	0.36
Medium-skilled	0.37	0.37	0.67	0.32	0.34	0.00
High-skilled	0.32	0.32	0.49	0.30	0.28	0.01
Labor Market Experience	15.31	15.74	0.00	15.82	15.90	0.45
Tenure	2.54	2.94	0.00	2.54	2.85	0.00
Plant Size	75.40	183.30	0.00	70.96	156.00	0.00
Annual Earnings	33,977	33,683	0.08	21,833	21,631	0.10
Annual Earnings (3 yrs. before job loss)	32,212	32,326	0.51	20,530	20,387	0.29
Earnings growth (2-3 yrs. before job loss)	0.26	0.52	0.00	0.56	0.65	0.52
Employment (2 yrs. before job loss)	0.96	0.97	0.00	0.95	0.95	0.97
Annual Personal Income	35,753	35,368	0.03	23,760	23,470	0.02
Married	0.75	0.77	0.00	0.74	0.74	0.43
Number of Children	1.31	1.32	0.26	1.04	1.06	0.17
Dead in year t+5	0.0084	0.0070	0.10	0.0029	0.0034	0.46
Dead in year t+20	0.0663	0.0584	0.00	0.0326	0.0322	0.87

Notes: All variables are measured in the pre-displacement year, i.e. 1991, 1992 or 1993 unless stated otherwise. Low-skilled means the person has finished compulsory education; medium-skilled means the person has finished upper secondary education; and high-skilled implies a university or college degree. Earnings and income are deflated to 2009 euros. The last two rows of the table report the cumulative mortality of the displaced by $t + 5$ or $t + 20$.

Table A3: Specification Checks of Direct and Spillover Mortality after Female Job Loss

	Direct Effects					
	Dual Earner Couple		Private & Public		Mass Layoff	
	20-Year (Baseline)	20-Year	5-Year	20-Year	5-Year	20-Year
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00084	0.00072	0.00001	-0.00062	0.00071*	0.00132
	[0.00236]	[0.00237]	[0.00064]	[0.00192]	[0.00041]	[0.00118]
Spousal Displacement		0.00229				
		[0.00241]				
Observations	283,191	283,191	463,993	463,993	345,240	345,240
Mean of Dependent Variable	0.030	0.030	0.003	0.032	0.003	0.032
R^2	0.017	0.017	0.003	0.017	0.004	0.018
	Spillover Effects					
	Dual Earner Couple		Private & Public		Mass Layoff	
	20-Year (Baseline)	20-Year	5-Year	20-Year	5-Year	20-Year
	(1)	(2)	(3)	(4)	(5)	(6)
Job Displacement	0.00115	0.000931	0.00033	0.00034	0.00016	-0.00110
	[0.00356]	[0.00356]	[0.00122]	[0.00302]	[0.00074]	[0.00183]
Spousal Displacement		0.00395				
		[0.00357]				
Observations	283,191	283,191	463,993	463,993	345,240	345,240
Mean of Dependent Variable	0.076	0.076	0.012	0.087	0.012	0.089
R^2	0.046	0.046	0.014	0.070	0.015	0.073

Notes: The table reports the direct (top panel) and spillover (bottom panel) effect of female job displacement in t on mortality by $t+5$ and $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. Results for dual earner sample, where both spouses are employed in base year in columns (1)-(2), for sample including public sector workers in columns (3)-(4) and for sample including mass layoffs in columns (5)-(6). In all of the specifications, the dependent variable is the probability of dying by year $t+5$ or $t+20$. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table A4: Male Job Displacement and Hospitalization in the Long Run

	Direct Effect on Hospitalization (20-Year)					
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Mental Illness (5)	Suicide (6)
Job Displacement	-0.00190	-0.00052	0.00037	-0.00178	-0.00094	0.00050
	[0.00368]	[0.00177]	[0.00198]	[0.00322]	[0.00202]	[0.00079]
Observations	468,016	468,016	468,016	468,016	468,016	468,016
Mean of Dependent Variable	0.184	0.035	0.047	0.144	0.049	0.007
R^2	0.010	0.009	0.029	0.043	0.008	0.003
	Spillover Effect on Hospitalization (20-Year)					
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Mental Illness (5)	Suicide (6)
Job Displacement	-0.00058	0.00227**	-0.00107	-0.00383	0.00144	0.00104
	[0.00316]	[0.00113]	[0.00227]	[0.00310]	[0.00197]	[0.00100]
Observations	468,016	468,016	468,016	468,016	468,016	468,016
Mean of Dependent Variable	0.128	0.013	0.065	0.131	0.045	0.010
R^2	0.010	0.007	0.024	0.026	0.013	0.006

Notes: The table reports the long-run direct effect (top panel) and spillover effect (bottom panel) of male job displacement in t on the hospitalization by $t + 20$ where the worker is displaced (in either t or $t - 1$) from a plant that shuts down between year t and $t + 1$. The dependent variable is the probability of the spouse being hospitalized by year $t + 5$ or $t + 20$ due to a specific cause. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table A5: Spillover Effect of Male Job Displacement on Cause-Specific Mortality

	5-Year Mortality					20-Year Mortality				
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Suicides (5)	Accidents (6)	Alcohol (7)	Cancer (8)	Heart (9)	Suicides (10)
Job Displacement	0.00020 [0.00021]	-0.00005 [0.00012]	0.00055 [0.00043]	-0.00008 [0.00019]	0.00008 [0.00020]	0.00072 [0.00047]	0.00091 [0.00058]	0.00122 [0.00115]	0.00083 [0.00065]	-0.00051 [0.00036]
Individual Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plant Size (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Displacement Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spousal Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	468,016	468,016	468,016	468,016	468,016	468,016	468,016	468,016	468,016	468,016
Mean of Dependent Variable	0.000	0.000	0.002	0.001	0.000	0.002	0.003	0.015	0.005	0.002
R^2	0.001	0.002	0.003	0.004	0.001	0.002	0.003	0.013	0.014	0.002

Notes: The table reports the effect of male job displacement in t on cumulative mortality of the spouse by $t+5$ or $t+20$ where the worker is displaced (in either t or$t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of the spouse dying by year $t+5$ or $t+20$ due to a specific cause. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table A6: Female Job Displacement and Hospitalization

	Direct Effect on Hospitalization (5-Year)					
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Mental Illness (5)	Suicide (6)
Job Displacement	-0.00273	0.00031	0.00103	-0.00144	-0.00061	-0.00031
	[0.00175]	[0.00063]	[0.00136]	[0.00227]	[0.00118]	[0.00052]
Observations	345,240	345,240	345,240	345,240	345,240	345,240
Mean of Dependent Variable	0.024	0.002	0.011	0.041	0.010	0.002
R^2	0.005	0.003	0.008	0.013	0.004	0.002
	Spillover Effect on Hospitalization (5-Year)					
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Mental Illness (5)	Suicide (6)
Job Displacement	-0.00184	-0.00022	-0.00164*	0.00227	0.00318*	0.00100
	(0.00250)	(0.00139)	(0.00096)	(0.00240)	(0.00182)	(0.00071)
Observations	345,240	345,240	345,240	345,240	345,240	345,240
Mean of Dependent Variable	0.045	0.013	0.008	0.039	0.019	0.002
R^2	0.006	0.013	0.009	0.027	0.013	0.004

Notes: The table reports the effect of female job displacement on hospitalization of the displaced woman (top panel) and her partner (bottom panel) where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of being hospitalized by year $t+5$ due to a specific cause. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * p < 0.10, ** p < 0.05, *** p < 0.001.

Table A7: Direct Effect of Female Job Displacement on Cause-Specific Mortality

	5-Year Mortality					20-Year Mortality				
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Suicides (5)	Accidents (6)	Alcohol (7)	Cancer (8)	Heart (9)	Suicides (10)
Job Displacement	-0.00007	-0.00006	-0.00032	-0.00022	0.00023	0.00046	0.00007	-0.00015	-0.00135*	0.00013
	[0.00015]	[0.00015]	[0.00048]	[0.00021]	[0.00029]	[0.00057]	[0.00070]	[0.00161]	[0.00073]	[0.00054]
Individual Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plant Size (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Displacement Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spousal Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	345,240	345,240	345,240	345,240	345,240	345,240	345,240	345,240	345,240	345,240
Mean of Dependent Variable	0.000	0.000	0.002	0.000	0.000	0.002	0.003	0.017	0.005	0.002
R^2	0.003	0.001	0.003	0.002	0.002	0.002	0.004	0.012	0.005	0.002

Notes: The table reports the effect of female job displacement in t on cumulative mortality by $t+5$ and $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of dying by year $t+5$ or $t+20$ due to a specific cause. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table A8: Spillover Effect of Female Job Displacement on Cause-Specific Mortality

	5-Year Mortality					20-Year Mortality				
	Accidents (1)	Alcohol (2)	Cancer (3)	Heart (4)	Suicides (5)	Accidents (6)	Alcohol (7)	Cancer (8)	Heart (9)	Suicides (10)
Job Displacement	0.00104*	-0.00036	-0.00002	-0.00033	-0.00073*	-0.00005	-0.00131	0.00269	-0.00142	0.00065
	[0.00060]	[0.00045]	[0.00065]	[0.00067]	[0.00043]	[0.00108]	[0.00135]	[0.00200]	[0.00191]	[0.00103]
Individual Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plant Size (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Displacement Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spousal Characteristics (Pre-Job Loss)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	345,240	345,240	345,240	345,240	345,240	345,240	345,240	345,240	345,240	345,240
Mean of Dependent Variable	0.002	0.001	0.003	0.003	0.002	0.008	0.013	0.025	0.027	0.007
R^2	0.002	0.004	0.007	0.008	0.002	0.004	0.007	0.031	0.036	0.003

Notes: The table reports the effect of female job displacement in t on cumulative mortality of the spouse by $t+5$ or $t+20$ where the worker is displaced (in either t or$t-1$) from a plant that shuts down between year t and $t+1$. The dependent variable is the probability of the spouse dying by year $t+5$ or $t+20$ due to a specific cause. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table A9: Cumulative Earnings and Income Losses of the Couple

	Male Job Loss				Female Job Loss			
	Earnings		Spousal Earnings		Earnings		Spousal Earnings	
	5-year	20-year	5-year	20-year	5-year	20-year	5-year	20-year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Job Displacement	-30,181.1****	-76,263.7****	-252.9	2,825.2	-21,994.7****	-47,705.3****	-1,622.6	1,304.9
	[776.4]	[5,100.9]	[450.4]	[2,253.6]	[651.8]	[3,128.1]	[1,090.9]	[7,141.6]
Observations	468,016	468,016	468,016	468,016	345,240	345,240	345,240	345,240
Mean of Dependent Variable	177,262	763,555	80,891	372,583	111,926	488,713	126,086	513,095
R^2	0.393	0.200	0.379	0.286	0.358	0.312	0.343	0.271
	Male Job Loss				Female Job Loss			
	Income		Spousal Income		Income		Spousal Income	
	5-year	20-year	5-year	20-year	5-year	20-year	5-year	20-year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Job Displacement	-18,980.8****	-59,807.5****	699.9*	5,063.2**	-11,824.4****	-35,984.0****	-1,506.2	-62.25
	[695.1)	[5,317.2]	[409.1]	[2,244.8]	[530.2]	[2,987.0]	[1,022.2]	[7,275.5]
Observations	468,016	468,016	468,016	468,016	345,240	345,240	345,240	345,240
Mean of Dependent Variable	186,601	852,938	97,702	436,450	124,764	567,766	146,539	624,699
R^2	0.383	0.191	0.368	0.287	0.386	0.304	0.319	0.246

Notes: The table reports the effect of male (left-hand side) and female (right-hand side) job displacement in t on worker's and their spouse's cumulative earnings (top panel) and income (bottom panel) by $t+5$ and $t+20$ where the worker is displaced (in either t or $t-1$) from a plant that shuts down between year t and $t+1$. All specifications include the following pre-displacement characteristics for the displaced worker and partner: individual age dummies, annual earnings, labor market experience, level and field of education, plant size, 2-digit industry. Spousal labor market characteristics are interacted with an indicator for spousal employment to include non-working spouses. Controls also include whether the couple is married or has children in the baseline, region and base year dummies. Standard errors are reported in square brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$.

Table A10: Monetary Losses and Spousal Labor Supply by Family Structure

	Male Earnings				Male Personal Income			
	5-year		20-year		5-year		20-year	
	Traditional	Non-Traditional	Traditional	Non-Traditional	Traditional	Non-Traditional	Traditional	Non-Traditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Job Displacement	-32,953.0***	-29,169.5***	-98,366.2***	-67,051.1***	-22,337.9***	-17,753.3***	78,197.6***	-52,266.7***
	[1,773.5]	[819.6]	[11,705.1]	[5,318.8]	[1,624.2]	[719.4]	[12,502.6]	[5,434.5]
Observations	130,973	337,043	130,973	337,043	130,973	337,043	130,973	337,043
Mean of Dependent Variable	215,519	162,395	974,630	681,532	224,223	171,981	1,069,765	768,681
R^2	0.397	0.344	0.214	0.164	0.396	0.327	0.217	0.148
	Spousal Employment				Spousal Earnings			
	5-year		20-year		5-year		20-year	
	Traditional	Non-Traditional	Traditional	Non-Traditional	Traditional	Non-Traditional	Traditional	Non-Traditional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Job Displacement	0.00171	0.00012	0.00273	-0.00039	-756.5	34.30	-1,763.9	4,831.2*
	[0.00596]	[0.00346]	[0.00390]	[0.00229]	[912.9]	[582.4]	[4,100.6]	[2,798.8]
Observations	130,973	337,043	130,973	337,043	130,973	337,043	130,973	337,043
Mean of Dependent Variable	0.859	0.887	0.942	0.952	75,299	83,064	346,956	382,541
R^2	0.057	0.051	0.043	0.056	0.213	0.281	0.158	0.271

Notes: The top panel of the table reports the effect of male job displacement on male annual earnings and male personal income in $t+5$ and $t+20$ years for couples where the woman has a lower level of formal education than her husband or partner (traditional family structure); and couples where the woman has a higher or equal level of education than her husband or partner (non-traditional family structure). The bottom panel of the table reports the effect of male job displacement on spousal earnings and spousal employment in $t+5$ and $t+20$ years for non-traditional and traditional couples respectively. The controls are the same as in previous tables. * p < 0.10, ** p < 0.05, *** p < 0.01.