Gender Gaps From Labor Market Shocks

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Abstract

Job loss leads to persistent adverse labor market outcomes, but assessments of gender differences in labor market recovery are lacking. We utilize plant closures in Denmark to estimate gender gaps in labor market outcomes and document that women face an increased risk of unemployment in the two years following job displacement. We decompose the gender gap and show that human capital explains half of women's increased risk of unemployment. In addition, childcare imposes an important barrier for women's labor market recovery regardless of individual characteristics. Gender differences in sorting across occupations and sectors prior to displacement play a very minor role.

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1 Introduction

Throughout the twentieth century, earnings and labor market participation rates of men and women converged alongside economic development in many middle- and high-income countries (Goldin, 1995). A large share of women moved from unpaid production in the home or in family businesses to being wage-earners in the labor market. With the inflow into paid employment, women have also become directly exposed to labor market shocks, such as job loss. This has been particularly visible since the onset of the Covid- 19 pandemic. Women, especially those with care-giving responsibilities, have been disproportionately affected (Alon et al., 2021). While a large literature has established that job loss leads to persistently lower earnings and higher unemployment rates in the long run (e.g. Jacobson, LaLonde and Sullivan (1993); Huttunen, Salvanes and Møen (2011); Ichino, Schwerdt, Winter-Ebmer and Zweimüller (2017); Lachowska, Mas and Woodbury (2020)), an understanding of gender differences in labor market recovery following job loss remains unexplored.

This paper investigates what are the effects of *women's* and *men's* job loss on future labor market outcomes. The literature provides several potential explanations for why there may exist substantial gender gaps after job loss. One important factor is the constraint that childcare may impose on women's labor market recovery. Much evidence shows that the arrival of children drives a wedge between men's and women's labor market trajectories (Harkness and Waldfogel (2003); Angelov, Johansson and Lindahl (2016); Lundborg, Plug and Rasmussen (2017); Kleven, Landais and Søgaard (2019)). Women are likely to change jobs around the arrival of their first child (Nielsen, Simonsen and Verner (2004); Hotz, Johansson and Karimi (2017)). This likely leads to gender differences in willingness to commute and search-behavior (Bütikofer, Loken and Willén (2020); Borghorst, Mulalic and Van Ommeren (2021); Le Barbanchon, Rathelot and Roulet (2021)) which may affect labor market outcomes following job loss. Another important source of overall gender gaps is differences in human capital, broadly defined to include education, occupation, and other types of sorting in the labor market (Goldin (2014); Goldin and Katz (2016); Petersen and Morgan (1995); Card, Cardoso and Kline (2015); Gallen, Lesner and Vejlin (2019)). Such differences might affect disparities in labor market recovery. In this paper, we will try to disentangle the roles these two channels play for recovery following job loss.

Our empirical analysis is based on employer-employee matched register data from Denmark. Denmark provides a good candidate country to study the gender gap in labor market outcomes following job displacement. First, the flexibility of the Danish labor market and generous education policies provide workers with ample opportunities to adjust to shocks. Second, the gender gap in labor force participation is small compared to international standards. Third, the Danish register data covers the full population and is linkable across domains. In addition to relevant worker and firm-level information, we have rich background information on each individual, such as their education and family characteristics.

To identify the effect of job loss on labor market outcomes, we use variation in job displacement from plant closures. As this is initiated by a firm-level shock, it makes the job loss and the timing plausibly exogenous to the individual. We defined the control group as workers matched on sociodemographic characteristics employed in a plant that is not closing. Our identifying assumption of the displacement effect is that the labor market outcomes of the individuals in the displacement and control groups would have evolved similarly over time in the absence of the displacement. We verify this parallel trends assumption by examining the leads to the event. The displaced men and women in our sample are very similar across family characteristics, but there are differences in sectorial occupation, education, and pre-displacement earnings. More importantly, their characteristics are representative of the universe of Danish workers in the private sector. We compute

the gender gaps following displacement as the differences in labor market trajectories of men and women following the plant closure, which can be understood as the unconditional gender gap in displacement. To estimate the conditional gap, we account for gender differences in confounding factors by comparing men and women who are displaced from similar jobs and are similar on other observable characteristics. While the unconditional gap is the policy relevant estimate, the conditional gap is important for understanding the source of persistent gender gaps.

We find substantial gender gaps in the risk of unemployment for the first two years following job loss. For both men and women, job loss leads to a reduction in earnings and an increase in unemployment for at least 6 years. Women on average experience a 14.2 % point increase in the probability of unemployment over the first two years, while for men this is lower at a 9.8 % point. Relatively, this amounts to a 45 percent greater unemployment shock for women. While the absolute drop in earnings is larger for men, they have higher initial earnings and overall lose a smaller relative share of their income. Heterogeneity analysis shows that workers with little formal training face the most adverse labor market trajectories after job loss. As women are particularly over-represented in this group, they face a worse labor market trajectory. Meanwhile, there is no gender gap among workers with vocational training or higher education. While women are worse off across all age groups, older women face the greatest absolute risk of unemployment and the biggest drop in earnings. However, the gender gaps are greater among younger workers. When we compare similar men and women, the conditional gaps are reduced, but never fully closed. To disentangle why women are consistently worse off, we turn to the relative importance of human capital and the role childcare plays and perform a Kitagawa (1955)-Oaxaca (1973)-Blinder (1973) decomposition. Observable differences explain approximately half of the gender gap in unemployment. Pre-displacement earnings and education are particularly important characteristics. In addition, both the absolute and the unexplained part of the gender gap grow in the presence of children, suggesting that childcare imposes a barrier for women's recovery regardless of individual characteristics. Finally, we show that initial sorting across occupations and sectors barely affects the gender gap in unemployment following displacement.

The main contribution of this paper is to address a shortcoming in the existing literature on adverse outcomes following job loss: the almost complete absence of women. In this literature, it is common to purely focus on male workers (e.g. Oreopoulos, Stevens and Page (2008); Sullivan and von Wachter (2009); Huttunen, Salvanes and Møen (2011); Davis and Wachter (2011); Browning and Heinesen (2012); Seim (2019); Halla, Schmieder and Weber (2020)).[1] Even among the studies that include women in their sample, they seldomly address gender differences (e.g. Eliason and Storrie (2006); Rege, Telle and Votruba (2009); Lachowska, Mas and Woodbury (2020); Jung and Kuhn (2018)). This tradition implies that conditions and constraints that are particularly important for women have not been identified and investigated. The paper closest to ours is the work by Illing, Schmieder and Trenkle (2021) who use German data to compare similar men and women and find that women's earnings losses are about 35% greater than men's upon displacement. This is partly driven by women being more likely to take up part-time work and mini-jobs, but also by lower earnings in full-time jobs.[2] We contribute with an explicit analysis of gender gaps in labor market outcomes following displacement and explore the circumstances under which gender gaps are mitigated or exacerbated. We show that men are better off than women as a result of higher levels of human capital and by not being constrained by child care.

[1] See Table A.1 for a comprehensive overview of the sex composition in this literature among papers that include estimates of labor market outcomes.

[2] Other examples of an explicit focus on women include the work by Bono, Winter-Ebmer and Weber (2012) showing that women's job loss leads to reduced fertility. Several papers have investigated women's responses to their husband's job loss (Halla, Schmieder and Weber (2020); Hardoy and Schøne (2014); Skoufias and Parker (2006)).

Our paper also contributes to the literature on gender gaps and parenthood. It is well-established that women's labor market trajectories drop dramatically at the onset of parenthood (Harkness and Waldfogel (2003); Ejrnæs and Kunze (2013); Daniel, Lacuesta and Rodríguez-Planas (2013); Angelov, Johansson and Lindahl (2016); Lundborg, Plug and Rasmussen (2017); Kleven, Landais and Søgaard (2019); Berniell et al. (2021); Delecourt and Fitzpatrick (2021)). This is partly attributed to reduced labor supply and employment in more flexible settings (Nielsen, Simonsen and Verner (2004); Kleven, Landais and Søgaard (2019); Hotz, Johansson and Karimi (2017)). When the responsibility of childcare falls disproportionately on women, it likely imposes a barrier to labor market recovery.[3] We document that having children increases the gender gap following job loss, regardless of mothers' characteristics. This provides insights into the mechanisms of the child penalty. Even after going back to work post birth, mothers' ability to adjust to labor market shocks is constrained by childcare responsibilities.

Finally, our paper contributes to the literature on changes to skill demand and sectorial structures in developed economies. There is a large amount of evidence on the increase in labor market polarization from trade-pressure (Autor, Dorn and Hanson (2015); Hummels et al. (2014); Utar (2018); Gu et al. (2020)) and technical changes (Autor and Dorn (2013); Autor, Katz and Kearney (2006); Goos, Manning and Salomons (2014)). The decline in employment in goods-producing industries has happened alongside a rise in the employment in service and has reduced gender gaps in labor market opportunities and outcomes (Petrongolo and Ronchi (2020); Ngai and Petrongolo (2017)). However, there is little evidence of how this transition affects gender gaps among workers in declining sectors.[4] While men often are the mode worker, women have worked in goods production since the onset of the industrial revolution (Wikander, Kessler-Harris and Lewis, 1995). In our sample, women constitute 30 % of the exposed workers. We focus on closing plants in manufacturing and document that, within goods production, women are worse off.

The remainder of the paper is organized as follows. Section II describes the institutional background, data, and the definition of plant closures. Section III presents the research design. Section IV contains the results along with robustness checks, and Section V discusses the mechanisms behind it. Section VI concludes the paper.

[3] Mörk, Sjögren and Svaleryd (2020) and Ruiz-Valenzuela (2021) provide overviews of the literature on job loss and inter-generational spillovers. This literature stands out in the job loss literature more broadly by often including a comparison between maternal and paternal job loss.

[4] Exceptions to this include Aksoy, Özcan and Philipp (2021), Ge and Zhou (2020) and Keller and Utar (2018).

2 Background and Data

In this section, we outline the main features of the Danish labor market and present a summary of Denmark's progress on gender equality. We describe the data and present the definition of plant closures and the displaced workers.

2.1 The Danish Labor Market

Danish firms can adjust employment with relative ease as a result of lax employment protection legislation. Wages are high, but indirect wage costs are among the lowest in the world (Eriksson and Westergaard-Nielsen, 2009). Employers in Denmark have among the highest freedom among OECD countries to dismiss permanent workers. This labor market model has led to job turnover rates that are similar to the UK and US rather than the rest of continental Europe (Hobijn and Sahin (2009); Botero et al. (2004)). Most employment spells are short (Andersen, 2021), and occupational mobility is high (Groes, Kircher and Manovskii, 2015). Relatively generous unemployment insurance ensures that workers bear low costs of changing jobs. The majority of workers are members of voluntary unemployment insurance funds. During the period of this analysis, benefits were 90 % of former earnings with a cap on the higher bound of the benefits. Insured workers receive this benefit for up to four years. Uninsured workers may receive social assistance and means-tested housing allowance. Recipients are required to search for jobs and face both monitoring and sanctions. The combination of a flexible labor market, fairly generous unemployment insurance, and active labor market policies are often referred to as the 'flexicurity model' (Andersen, 2021). This labor market model has mitigated shocks from globalization and technological changes (Humlum and Munch (2019); Andersen (2021)). However, workers with little formal education or occupation-specific human capital remain disproportionately affected by recent shocks (Hummels et al. (2014); Utar (2018); Gu et al. (2020); Humlum and Munch (2019)).

2.2 Gender Equality in Denmark

Denmark has - alongside other Nordic countries - long been praised for social policies that enable high female labor force participation. Compared to international standards, there is a relatively small gender gap in labor force participation, and more than 80 % of Danish mothers with children below the age of 10 work outside the home, and 2/3 work full time (Leira, 2010). Women's paid work increased dramatically from the 1960s onwards alongside expansions of the public sector that institutionalized work that previously took place in the family (Datta Gupta, Smith and Verner, 2008). The gender gap in participation decreased until the early '90s and has remained fairly stable since. Couples in Denmark face individual taxation which creates a strong incentive for secondary earners, often women, to participate in the labor market (Selin, 2014). Women's labor market participation is further enabled by parental leave schemes and daycare with close to universal coverage (Leira, 2010). The majority of the remaining gender gap is driven by the child penalty (Kleven, Landais and Søgaard, 2019). Upon parenthood, men's labor market trajectory is unaffected while women reduce hours and opt for jobs with more flexibility (Kleven, Landais and Søgaard (2019); Nielsen, Simonsen and Verner (2004)).

2.3 Data Sources and Descriptive Statistics

The starting point of our analysis is the Danish employer-employee matched register data covering the universe of Danish workplaces and all the corresponding workers. This register contains key labor market information such as wages, tenure, labor market status, and occupation. Information on unemployment insurance and social assistance allows us to construct a reliable measure for labor market participation (i.e. either working or actively searching). Mandatory pension payments are used to infer hours worked. We link this data with background information on sex, education, age, place of residence, marital status, and the number of children.

We consider the period from 1995 to 2006 for two reasons. First, while the employer-employee matched data goes back to 1981, Danish women's labor market participation did not plateau until the early 1990s. Second, we purposely end our analysis before the financial crisis. The shocks induced by the crisis affected many dimensions of the Danish economy (Jensen and Johannesen (2017); Renkin and Züllig (2021); Bonin (2020)). More importantly, men's labor force participation decreased more during the crisis than women's labor force participation. In sum, we consider a period where labor force participation of Danish men and women moved in tandem.

For each private-sector workplace with at least 5 workers, we classify a workplace as closing if the number of workers in the workplace reduces by 90 pct. or more between year $t-3$ and t. Hence our definition of an event is stricter than that of a mass layoff, by describing a full plant closure and follow Bingley and Westergaard-Nielsen (2003) and Browning and Heinesen (2012).[5] With this definition of a plant closure as a shock to displacement, we plausibly estimate a shock that is more orthogonal to displaced workers' characteristics than a mass layoff, where a large, yet selected, share of workers within a plant lose their job. Most of the plants close down within a year.[6] 95 % of the plants close fully and retain zero workers. The remaining 5 % retain on average 2.4 workers (median: 1). This number likely signifies either administrative workers finalizing the closure or simply a registration issue, likely occurring in firms with multiple plants.[7] On average, the workers are displaced from plants with 185 workers (median: 53). Displaced workers are categorized as treated the year they separate from the closing plant. For 59 % of workers, the year of full closure is identical to the year of displacement, and 94 % leave the plant within 2 years of full closure. In the robustness section, we modify our definitions by only including plants closing over 1 year and by increasing the cut-off for the size of plants we consider. Results remain largely unchanged.

We follow the most recent literature (de Chaisemartin and D'Haultfœuille, 2020) and define the control group as only including workers that never experience a plant closure. Our identification strategy relies on choosing an appropriate control group of workers. Both displaced and control workers are identified from a sample of workers with at least 1 year tenure at a manufacturing plant with at least 5 workers. We exclude students, self-employed/managers, and those on (part-time) early retirement, but we do not impose restrictions on future labor market outcomes.[8] We apply coarsened exact matching to match one-to-one without replacement to find the most suitable control group. We perform the matching separately for men and women and match on

[5] Bingley and Westergaard-Nielsen (2003) investigate the role of firm-specific human capital in labor market trajectory following job loss. Browning and Heinesen (2012) document increased risk of mortality and hospitalization among displaced men. Both papers use Danish data.

[6] To ensure that we do not misclassify a workplace as closing due to a merger, administrative changes in legal structure, etc., we follow the displaced workers and calculate the share of workers that remain co-workers the following year. If this share is above 50 pct., we do not consider the plant to be closing.

[7] 49 % of these plants are in firms with multiple plants.

[8] We only allow for workers to be treated once. While it is fairly rare for workers to be treated more than once, when we exclude these workers this leads to about 7.5 % reduction in the $person \times year$ number of observations.

pre-displacement earnings, marital status, age, educational groups, tenure at the firm, unemployment history, and labor market experience. In A.2, we report balancing tests of both these and other variables not used in the matching and find they, on average, balance. Our final sample consists of 1,492,791 observations, corresponding to 133,768 unique individuals, of which half of them are treated and 30 % are women. In A.3, we report the evolution in unemployment rates for control and treated workers. Prior to displacement, the two groups have extremely similar labor market trajectories.

In A.4, we report covariates separately for men and women. For the sample of women, all covariates balance except plant size. Exposed women work in plants that are bigger than women in the control group. The exposed men work in both plants and firms that are bigger than those of the control group. The year prior to displacement, exposed men earn 2240 DKK (~ €300 per year) more compared to the control group. While this difference is statistically significant at a 1 % significance level, this is hardly an economically meaningful amount. Displaced men are 1 % point less likely to have children and 0.8 % point less likely to work in 'Iron & Metal'. Comparing the men and the women, the most striking differences are on educational level and earnings. The women are much more likely to have little formal training, i.e. high school or less (53 % vs. 35 %). The year prior to displacement, the women earn 100,000 DKK (~ €13,500) less than the men. This corresponds to a gender gap of 26 %. The partners of the women earn a larger share of the household income than the partners of the men (49 % vs 33 %), implying that household income is higher for the men compared to the women. The largest sector for both sexes is 'Iron & Metal', followed by 'Food, Drinks & Tobacco'. For family characteristics, men and women are similar.

We focus exclusively on plant closures in the manufacturing sector. 70 % of all exposed workers in the sample period are in plants that are in the manufacturing sector. Every other sector has a share of exposed workers almost tenfold less, such as 'Retail & Service' (9 % of workers), 'Finance & Insurance' (6 % of workers) and 'Construction' (5 % of workers). Men are over-represented in construction, while women are over-represented in the service sector. Including this type of heterogeneity would make our gender gaps difficult to interpret. In Table A.4, we report a comparison between workers in the manufacturing sector and all other workers in the private sector. The workers in our sample are remarkably similar to all Danish private sector workers.

3 Empirical strategy

This paper assesses gender differences in labor market recovery following job displacement. However, with the aim of estimating the effect of job loss on future labor market outcomes, concerns related to endogeneity arise. The likelihood of a worker being displaced is likely to be correlated to individual unobservable characteristics. To overcome these issues of endogeneity, we exploit plant closures in the manufacturing sector make the timing of the job loss plausibly exogenous to the individual as it is initiated by a firm-level shock.

Our research design uses an event study specification that allows us to estimate the dynamic effects of job loss on displaced workers using the following baseline model separately for men and women:

$$Y_{i,j,t} = \alpha + \sum_{k=-6, t\neq -1}^{6} \beta_k PlantClosure_{i,j,t+k} + \sum_{k=-6, t\neq -1}^{6} \lambda_k Time_{i,j,t+k} + \theta_t + \theta_t \times \delta_j + u_{i,j,t} \quad (1)$$

where $Y_{i,j,t}$ is the dependent variable, $PlantClosure_{i,j,t+k}$ is a dummy variable equal to one in the year $t+k$ since the job displacement for individual i employed in plant p in the year of displacement, $Time_{i,j,t+k}$ identifies $t+k$ years since the event to capture cohort effects, θ_t captures year fixed effects, and $\theta_t \times \delta_j$ estimates municipality specific year fixed effects.[9] The dependent variables include: unemployment (whether the individual i is unemployed for at least 12 weeks in year t), labor earnings (the total labor income of individual i in year t), log(labor earnings), and labor market participation (whether the individual i is employed or actively searching in year t). Our matching procedure implies that we compare displaced workers with very similar non-displaced workers, so the inclusion of individual fixed effects or worker level covariates makes little difference.

This estimation strategy is a generalization of the Difference-in-Differences method and relies on the assumption that earnings and unemployment rates would have evolved similarly in the treated and control group in the absence of the plant closure, i.e. the assumption of parallel trends. If displacement is initiated by a firm level shock, the timing of the lay-off is arguably exogenous to the individual worker. In A.3, we show the evolution in unemployment rates for the displaced and control workers. The difference between these outcomes is what we estimate in Equation 1. The main independent variables are $\sum_{k=-6,k\neq -1}^{6} PlantClosure_{i,k}$ which are dummy variables equal to one for displaced workers in the k^{th} relative year. Our parameters of interest are β_k for $k = -6, -5, ..., 0, 1, ..., 6$, capturing the dynamic effects in 6 years before and after the plant closure of the workers exposed to the plant closure compared to similar workers. We interpret the significance of these coefficients as evidence of the causal relationship between job displacement and future labor market outcomes. Additionally, absence of meaningful effects in the pre-period can rule out anticipation effects.

The gender gap in labor market recovery is obtained by comparing displaced men to men in the control group and displaced women to women in the control group. This is the policy-relevant estimate. To estimate the conditional gender gap, we then compare similar men and women. To this end, we construct a new sample of men by matching all treated and control women to the men on the same set of variable as used in the initial matching procedure.[10] This provides us with a new 'matched' sample containing men similar to the women in our sample. We re-estimate Equation 1. This provides a gender gap where differences in observable characteristics are taken into account.

[9] Identifying the effect of plant closure on the exposed workers relies on the assumption that the plant closure does not affect the control group. If plant closures are large enough to affect the local labor market the control group will also be affected. Figure A.5 shows the dispersion of exposed workers across Denmark. Workers live in all municipalities except for small islands. Within commuting zones, the closures appear to be fairly spread out in the country. In the preferred specification, we include an interaction term between year and municipalities to capture local labor market effects. This makes little difference relative to the inclusion of municipality and year fixed effects separately.

[10] We choose to use women as the baseline because the sample of women is smaller (30 % of the sample). Had we used men as the baseline, we would not find a match for all men.

4 Gender Gaps Following Job Displacement

To measure the effect of women's and men's job loss on future labor market outcomes, we start by presenting results estimating Equation 1 for labor market outcomes for men and women respectively for up to 6 years following displacement. We investigate how sensitive our results are to the precise definition of the displaced group. We also show that our results are robust to recent advances regarding Difference-in-Differences applications with differential timing in treatment.

We then turn to the role of workers' characteristics to explore the circumstances under which gender gaps might be mitigated or exacerbated. Motivated by the existing literature, we investigate heterogeneity by age and educational attainment. Finally, we explore the role of childcare responsibility plays in labor market recovery.

4.1 Main Results

Figure 1 reports yearly labor market outcomes following displacement for men and women. Displaced men and women face an increased risk of entering long-term unemployment and experience substantial drops in earnings for up to 6 years. In the year of displacement and the following year, there is a substantial gender gap in the risk of entering unemployment (for 3 months or more). Women face an increased risk of 14.2 % point, while men experience an increase in risk by around 9.8 % point. Following the initial two years, the gender gap is greatly reduced and finally disappears. Women also experience a larger initial percentage drop in earnings. The second year following displacement, the gap has disappeared. Men lose a larger absolute amount of income. In the year of displacement and the following year, men lose 61,680 DKK (≈ €8,800) while women lose 57,210 DKK (≈ €7,700). This gap remains statistically significant throughout the period. Looking at non-participation rates (defined as the residual of time spent in employment and time spent being registered as unemployed), we don't find a gender gap following displacement. Both men and women face a 7.8 % point increase in the likelihood of being registered as non-participating.[11]

Subsequently using the matched sample of men with characteristics that are similar to the sample of women, we estimate the conditional increase in the risk of unemployment following job loss for men and women and compare the conditional and unconditional gender gap. Among the men matched on observables to women, the risk of unemployment stands at 11.6 % point and they lose DKK 61,680 (≈€8,300). This leads to a decrease in the magnitude of the gender gap, from the unconditional 45 % gender gap to the conditional 25 % gender gap.

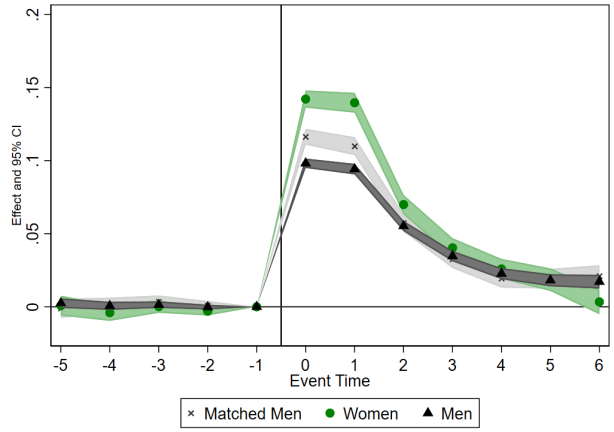
Across outcomes, the β_k for k < −1, i.e. before the displacement, allow us to investigate pre-trends and anticipation effects. We can test individual and joint significance for the years leading up to the displacement. For unemployment and earnings, none of the pre-periods are significantly different from zero, implying that our treated and control workers had similar earnings and unemployment rates. In general, we interpret this as the absence of dynamic selectivity into closing plants supporting the validity of our research design.[12] Our results are similar in magnitude to what Bingley and Westergaard-Nielsen (2003) and Bertheau et al. (2021) report for Denmark.

[11] Men are on average unemployed for 3.4 weeks while women are unemployed for 4.8 weeks. When men and women find a job, they are equally likely to find full time work.

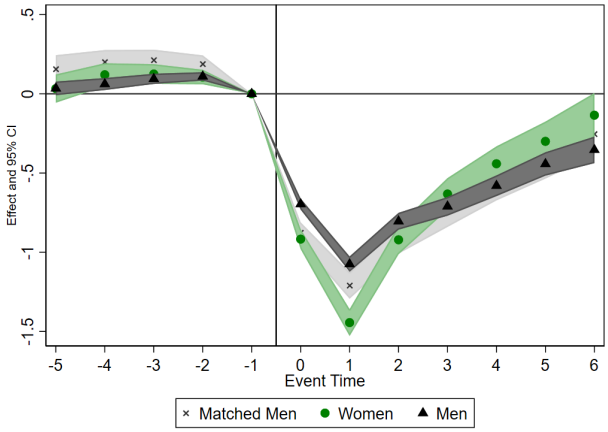
[12] For log(earnings), we observe an economically very small difference in pre-displacement earnings, suggesting that treated workers - both men and women - were on more favorable labor market trajectories than our control workers. If anything our estimated effect should then be biased towards zero as we are comparing treated workers with higher potential outcomes than their non-treated counterparts.

Figure 1: Labor Market Adjustment Following Displacement

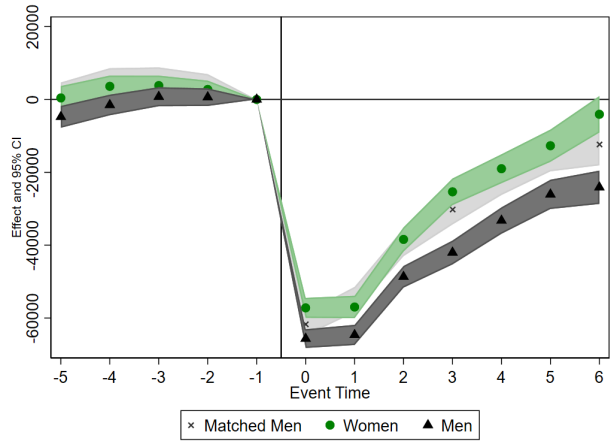
(a) Unemployment, By Gender



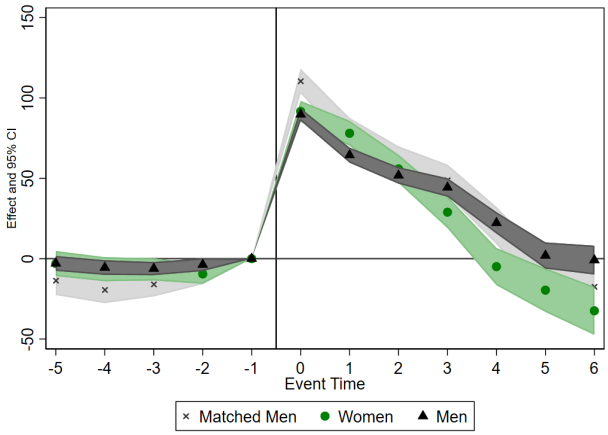
(b) Log(Earnings), By Gender



(c) Earnings, By Gender



(d) Non-participation, By Gender



Notes: Job displacement between -1 and 0. Black triangles denote displaced men, while green circles denote displaced women, relative to a control group of workers of their own gender who are not displaced. Grey crosses denote the men when they are compared to similar women. (a) shows the spike in risk of unemployment, defined as 3 months or more. Panel (b) and (c) show the drop in log(earnings) and earnings. Panel (d) shows the increase in non-participation, defined as neither working nor being registered as unemployed. Each panel shows the difference between the displaced workers and a matched control group with corresponding confidence intervals, obtained from estimating Equation 1. The corresponding regressions are reported in A.12.

Robustness: Intuitively, workers in smaller plants have more influence over the performance of the plant than workers in bigger plants. Approx. 12 % of the displaced workers were employed in plants with 5-10 workers, while more than 60 % of the workers are displaced from plants with 50+ workers. While the majority of plants in Denmark are fairly small, the workers in the sample are weighted by the plant size. Dropping workers displaced from plants with less than 10 workers hardly changes the point estimates. Only including plants with 50 or more workers reduces the sample by 35 % and estimates become less precise. The point estimates of the gender gaps in both unemployment and earnings shrink. This is driven by the men in the plants facing larger risk of unemployment, while the estimated risk for the women remains unchanged. This is reported in A.6.

We consider the event the year when the worker is no longer employed in the closing plant. For 59 % of the sample, the year of separation is the year of plant closure. In our definition of plant closures, we allow a three-year period for closure, yet 80 % of the workers are displaced from plants reducing the number of workers by 90 % in one year. To make sure our results are not driven by potential gender differences in timing of lay-off with respect to the closure, we limit our sample to only consider plants that close within 1 year. Importantly, the estimates for the gender gap in both unemployment and earnings remain unaffected. Among workers in plants who reduced the number of workers by 90 % in 1 year (i.e. closed within a year), the corresponding risk of unemployment is 14.8 % point and 10 % point. This is reported in A.6.[13]

Recent developments in the methodological literature have pointed out that in settings like this - with differential timing of treatment - the baseline specification might be biased towards zero. We consider plant closures over a 10 year period, and in A.7 we show that the occurrence of plant closures is relatively evenly distributed across the years in our sample. We implement the estimator proposed by Sun and Abraham (2021). The obtained estimates and our baseline estimates are virtually identical. This is a result of the control group mirroring the cohort shares of the treatment group across years as well as the dynamic specification controlling for cohort fixed effects.

4.2 Heterogeneous Effects

In Figure 2, we report the risk of unemployment by age and educational attainment. Men older than 50 face a high risk of unemployment compared to younger men. For all three age brackets, gender gaps exist. This implies that women older than 50 face the highest risk of unemployment. When we compare similar men and women using the matched sample, gender gaps among all three groups are reduced. Workers with a high school diploma or less education face the largest risk of unemployment and a large gender gap exists. These men face an increased risk of unemployment of 12.1 % points and the women facing a striking 17.8 % points risk of unemployment, relative to the control group. When comparing similar men and women, the gender gap remains largely unaffected.[14] As discussed before, women are over-represented in this group. Workers with vocational training face an increased unemployment risk of 10 % points. Those with at least some college face a risk of unemployment of 8 % points. There is no meaningful gender gap in these two groups.

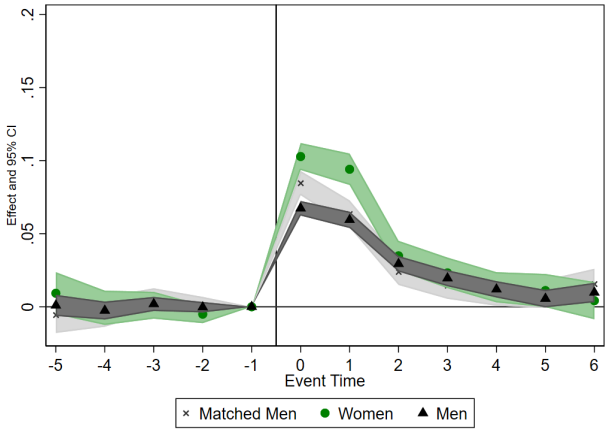
These results mirror the existing literature on job displacement and labor market shocks more broadly, while our contribution highlights the gender differences across these. Less educated workers face adverse labor market outcomes while more educated workers are more likely to adapt (Gu et al. (2020); Utar (2018); Hummels et al. (2014)). Specifically in the job closure literature, Ichino et al. (2017) document that older workers in Austria have lower re-employment probability after displacement and that women are worse off. Using Norwegian data, Salvanes, Willage and Willén (2021) show that the probability of employment decreases with age. Related, Kunze and Troske (2012) document gender gaps in search-duration among displaced German workers between 20-35 and link this to fertility and childcare.

[13] When we consider the heterogeneity by timing of separation, 'early leavers' (i.e. those that leave an unstable plant 2 or 3 years prior to full closure) fare slightly worse in the labor market, regardless of gender.

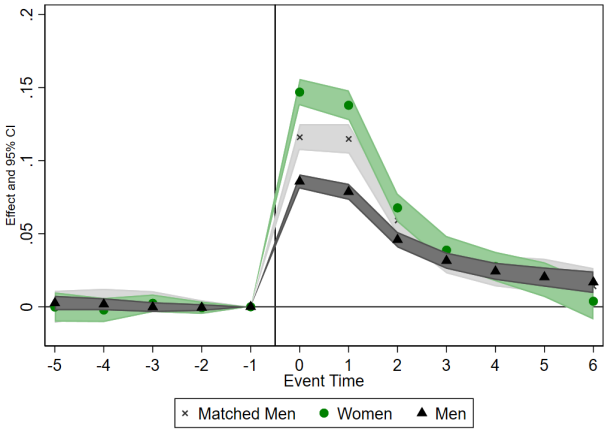
[14] The results are similar for log(labor earnings), with the oldest and the least educated workers being worse off. This is reported in A.8.

Figure 2: Heterogeneity of Unemployment Rates, by age and education

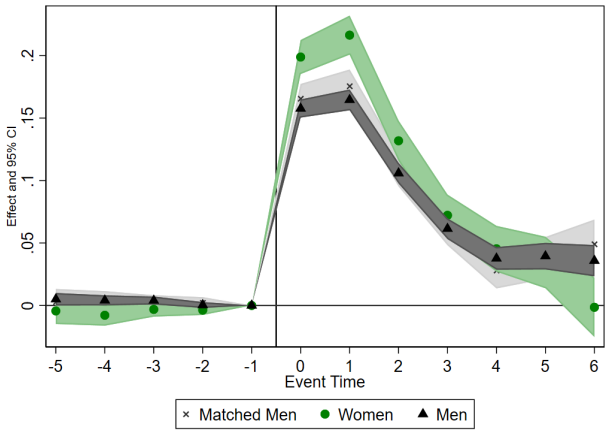
(a) Young (<= 35), By Gender



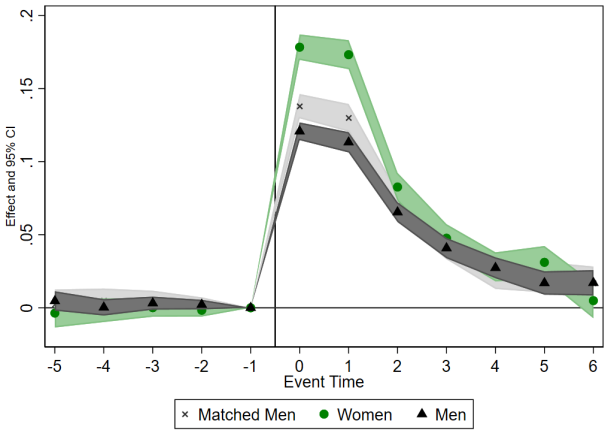
(b) Middle (> 35 & <= 50), By Gender



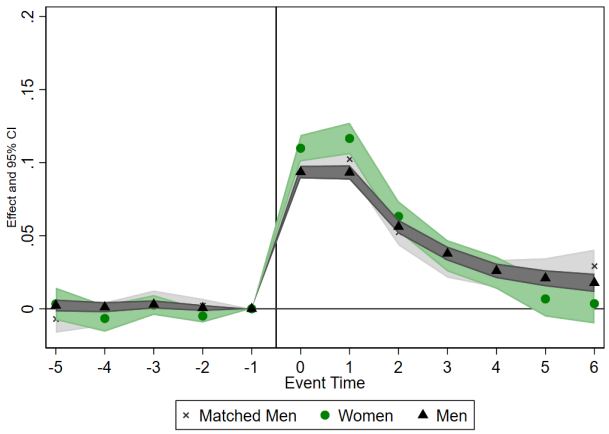
(c) Old (> 50), By Gender



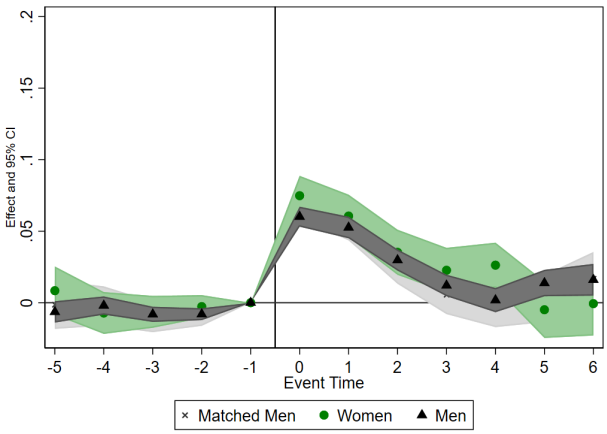
(d) High School or Less, By Gender



(e) Vocational Training, By Gender



(f) Higher Education, By Gender

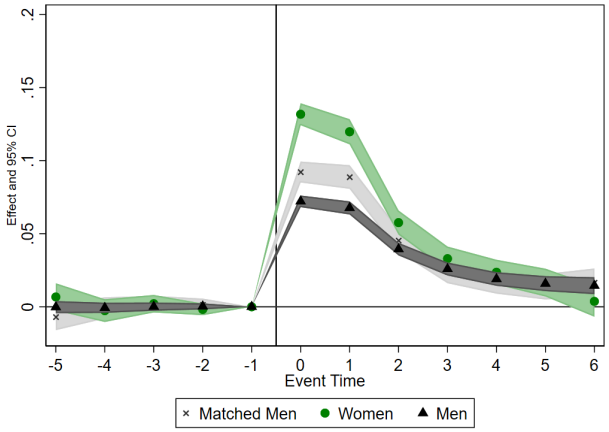


Notes: See Figure 1. Panel (a), (b) and (c) report the evolution in unemployment rates for workers in different age brackets. Panel (d) shows the unemployment rates for those with high school or less education, panel (e) reports the unemployment rates for workers with vocational training, and panel (f) reports unemployment for those with some higher education. The corresponding regressions are reported in A.12

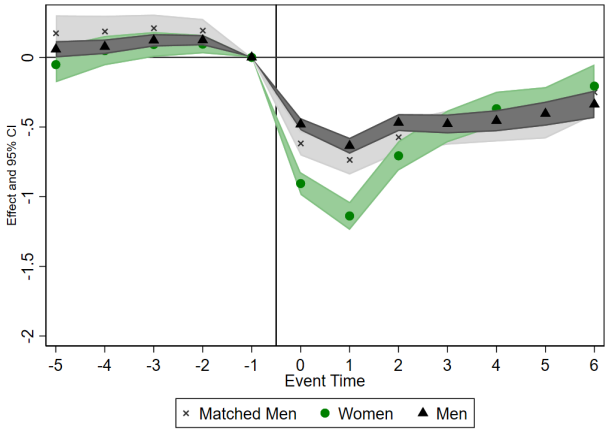
To directly explore the role of childcare, we estimate Equation 1 separately for households with and without children and report this in Figure 3. In the presence of children, there are large gender gaps both for entering unemployment and in relative earnings losses. Fathers face an increased risk of entering unemployment of 7.3 % points, while this number for mothers is 12.1 % points. This gap is also mirrored in log(earnings). Comparing similar men to similar women in the matched sample, the gender gap with children present in both earnings and risk of unemployment is almost unaffected and remains as high as the unconditional gap. In households without children, the gender gaps are much smaller, but it is worthwhile to notice that these workers are worse off compared to those with children. Among men without children in the household, there is a 12 % point increase in the risk of entering unemployment while this number is 15 % points for women and a very small gap in log(earnings).

Figure 3: Children

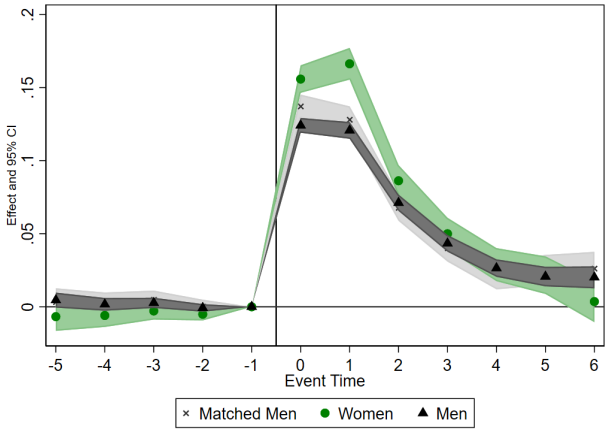
(a) Unemployment, Child in the HH



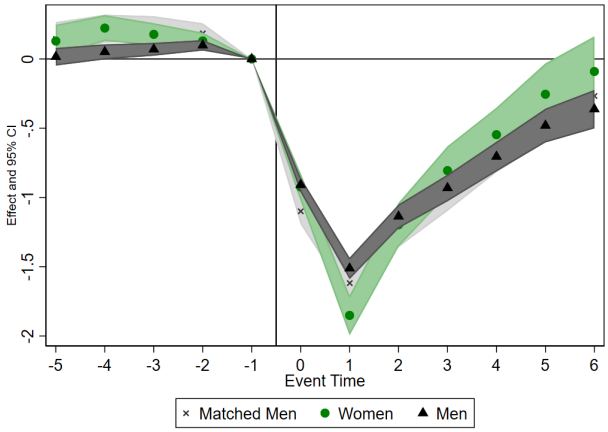
(b) Log(earnings), Child in the HH



(c) Unemployment, No Child in the HH



(d) Log(earnings), No Child in the HH



Notes: See Figure 1. Panel (a) reports the evolution in unemployment rate for workers with children in the household and panel (b) the equivalent estimate for those without children. Corresponding regressions are reported in A.12

5 Explaining the Gender Gap

To further understand the mechanisms behind the gender gap in unemployment after job displacement following the results discussed in the previous sections, we focus on the potential role of three mechanisms. The unconditional gender gap is 4.2 % points, and when we compare similar men and women in the matched sample, this decreases to 2.3 % points. The gap in log(earnings) is also halved. To understand which individual characteristics drive the reduction in the gaps, we perform a Kitagawa (1955)-Oaxaca (1973)-Blinder (1973)-decomposition (hereafter KOB). Second, we test whether gender differences in pre-displacement sectors, occupations, firms, plants, or years explain the gender gap in unemployment that follows job loss. Finally, we perform a KOB-decomposition separately for parents and non-parents to understand the role gender differences in childcare responsibilities play in disparities in labor market recovery.

Human Capital: To understand the characteristics that explain the gender gaps in unemployment and log(earnings), we perform a KOB-decomposition of the year following job loss and report this in A.9. Using tenure, pre-displacement earnings, education, age, and age squared, these observables explain 2.9 % points out of the 6.2 % points unconditional gender gap. These variables explain about 47 % of the gender gap in unemployment after job loss, but the majority remains unexplained. For log(earnings), 3.6 log-points out of 4.6 are explained by these characteristics. Higher pre-displacement earnings account for 40 % of the explained gap in unemployment and 75 % of the gap in log(earnings). Education accounts for 27 % of the gender gap in unemployment and the 6.4 % of the gap in log(earnings). Tenure at the closing firm and accumulated labor market experience matter less.

Pre-displacement Sorting: We investigate the role initial sorting across sectors, firms, and occupations play in gender gaps in unemployment. To account for this, we estimate the gender gap by comparing men and women displaced from the same occupations and sectors by adding pre-displacement fixed effects to the baseline regression. First, we add fixed effects at the sectorial level (with 7 different manufacturing sectors). We then add fixed effects at the occupation level (using 6-digit ISCO codes).[15] This is reported in Appendix A.10. These specifications have little implication for the gender gap. Finally, we report the distributions of fixed effects of year, and pre-displacement sector, occupation, firm, and plant, for displaced men and women, respectively. This is reported in Appendix A.11. Distributions of the obtained fixed effects across sexes are very similar. Combined, these exercises lead us to conclude that the gender gap in unemployment cannot be a result of initial differences in sorting, or because men and women are displaced in different years.

The Role of Childcare: We conduct the KOB-decomposition separately by parental status. This is reported in Appendix A.9. In the presence of children, the gender gap in the risk of unemployment is 7.5 % points and observables account for 3.0 % points, about 40 %. However, in households without children, the gender gap is 5.6 % points and observables account for 1/2 of this gap. For log(earnings), gender gaps across the two groups are 5.2 log-points. In the absence of children, this gap is fully accounted for by pre-displacement characteristics. With children, 27 % remains unexplained. Again, pre-displacement earnings is the most important variable, followed by education. Combined with the large gender gaps reported in 3, this leads us to conclude that childcare imposes an important differential barrier for women's labor market and that cannot be explained by their pre-displacement characteristics.

[15] As employer-specific fixed effects are conditioned on unemployment it is not meaningful to add fixed effects from the new job.

6 Conclusion

While women's and men's labor market outcomes have converged, substantial gender gaps remain. In this paper, we use administrative data from Denmark to show that displaced women following job loss are worse off than displaced men. While both men and women face adverse labor market outcomes for up to 6 years relative to non-displaced workers with similar characteristics, gender gaps exist in the first two years following job loss. Our analysis shows that men are shielded from larger adverse labor market outcomes by their higher levels of human capital, and by not being constrained by childcare. Women are particularly over-represented among workers with little formal education *and* they are worse off than their male counterparts. Moreover, we show that mothers are constrained by childcare, regardless of individual level characteristics.

When comparing displaced workers to non-displaced workers of their own gender, our results on earnings mirror those Illing, Schmieder and Trenkle (2021) report for German workers. However, when comparing similar men and women, German women experience a larger drop in both absolute and relative earnings. The main results from Germany are estimated on a sample of married workers, where marital status is observed using residency and surnames. We do not impose any restrictions on marital status. Denmark and Germany also differ along dimensions that may contribute to these differences. While Danish couples face individual taxation, German couples are taxed jointly. Childcare is heavily institutionalized and child penalties are smaller in Denmark (Kleven et al., 2019). While parenthood exacerbates gender gaps in both countries, the magnitude appears to be bigger in Germany.

Two implications follow. First, while the literature on the long-term negative effects following job displacement is large, systematic investigation of gender gaps is lacking. This striking gap in the literature implies that policy recommendations are perhaps not based on the most relevant estimates. For example, the existing evidence did not cover the most exposed workers during the Covid-19 pandemic (Alon et al., 2021) and conditions and constraints that are particularly important for women had not been identified. As the effects of job loss in Denmark are relatively muted as compared to other countries in Europe (Bertheau et al., 2021), we would expect these gender differences to be larger in other countries. The comparison between our results and those obtained by Illing, Schmieder and Trenkle (2021) confirms this. Second, we show that childcare responsibility imposes an important barrier to women's labor market recovery. We document this in Denmark where publicly provided daycare has close to universal coverage. In other settings, this channel might be even more important. To reduce gender inequality following job loss, policymakers could alleviate childcare constraints.

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Appendices

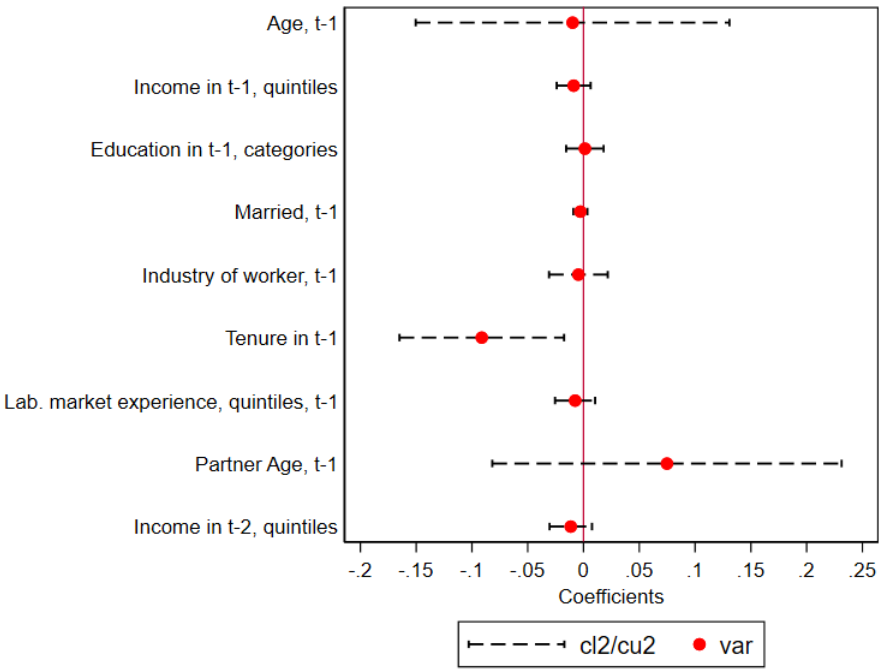
A.1 Literature on Job Loss and Earnings, Samples

Autor(s), year	Setting	Sex	Comments on gender gap
North America			
Jacobson, LaLonde and Sullivan (1993)	Pennsylvania	F, M	Women better of initially, but recover slower
Sullivan and von Wachter (2009)*	Pennsylvania	M	NA
Couch and Placzek (2010)	Connecticut	F, M	Larger % drop for women
Davis and Wachter (2011)	US	M	NA
Krolikowski (2018)	US	F, M	Not reported
Jung and Kuhn (2018)	US	F, M	Not reported
Lachowska, Mas and Woodbury (2020)	Washington	F, M	Sex only available for subset of data
Oreopoulos, Stevens and Page (2008)*	Canada	M	NA
Europe			
Bingley and Westergaard-Nielsen (2003)	Denmark	F, M	Not reported
Bennett and Ouazad (2019)**	Denmark	M	Women as robustness
Eliason and Storrie (2006)	Sweden	F, M	Not reported
Seim (2019)	Sweden	M	NA
Rege, Telle and Votruba (2009)	Norway	F, M	Not reported
Hardoy and Schøne (2014)	Norway	M	NA
Huttunen, Salvanes and Møen (2011)	Norway	M	NA
Gathmann et al. (2020)***	Finland	F, M	Women worse off
Hijzen, Upward and Wright (2010)	UK	F, M	Smaller % drop for women
Schmieder, Wachter and Heining (2020)	West-Germany	M	Women as robustness
Illing, Schmieder and Trenkle (2021)	Germany	F, M	Women worse off
Ichino et al. (2017)	Austria	F, M	Women worse off, no dynamics
Halla, Schmieder and Weber (2020)	Austria	M	NA
Raposo, Portugal and Carneiro (2021)	Portugal	F, M	Not reported
Leombruni, Razzolini and Serti (2013)	Italy	F, M	Women worse off
Other			
Appleton et al. (2001)	China	F, M	Women worse off, no dynamics
Bognanno and Delgado (2005)	Japan	F, M	No difference, no dynamics
Khanna et al. (2021)**	Columbia	F, M	Women worse off
Bhalotra et al. (2021)**	Brazil	F, M	No difference
Rucci, Saltiel and Urzúa (2020)	Chile/Brazil	F, M	Not reported

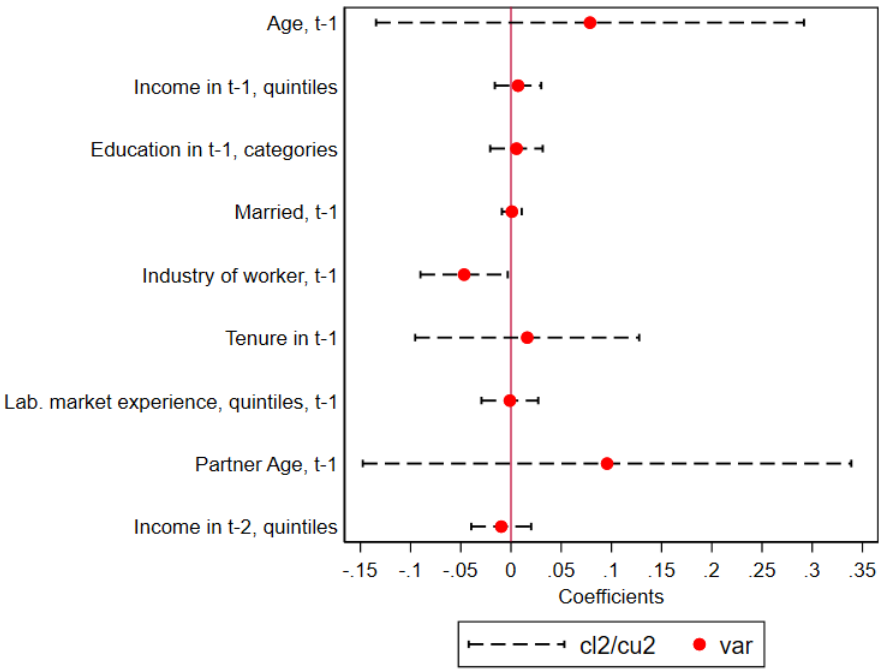
*spillover to children is in the main outcome, **crime is the main outcome, ***health is in the main outcome

A.2 Balancing after Matching

(a) Men



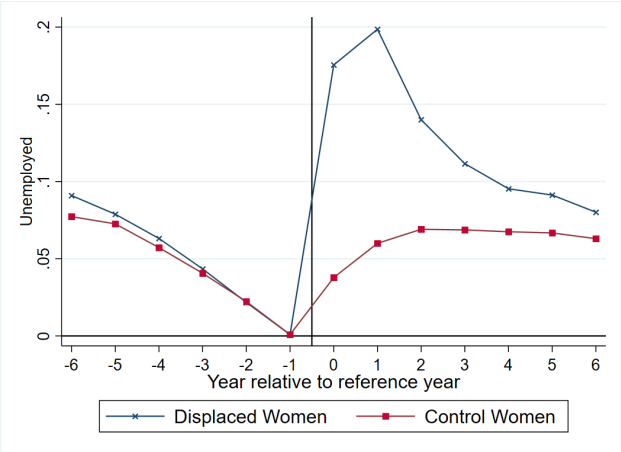
(b) Women



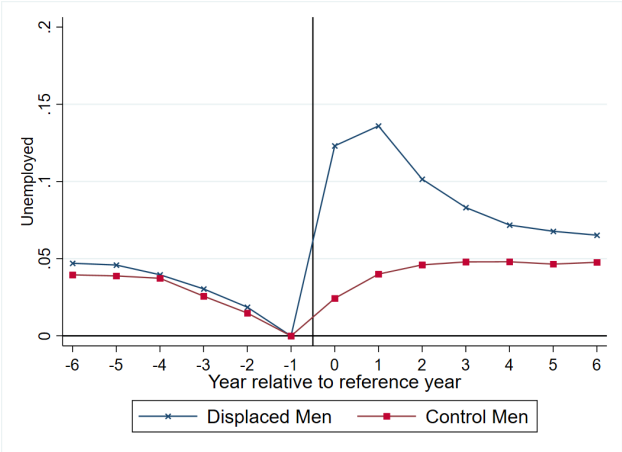
Note: We perform the matching separately for men and women and match on pre-displacement earnings, marital status, age, educational groups, tenure at the firm, unemployment history, and labor market experience. Continuous variables are discretized in deciles before matching. We do not match on patners' age or on income in year t-2.

A.3 Unemployment Rates, Treatment and Control

(a) Women



(b) Men



Note: Evolution of Unemployment (3 months or more) for the exposed and control workers. Panel (a) compares the probability to be unemployed (for 3 months or more) of women who are displaced (blue, X) to the control women (red, circles) based on estimation equation (1). Panel (b) shows the equivalent picture for men. The control group is a matched control group which resembles the displaced individual at the reference date.

A.4 Descriptive statistics

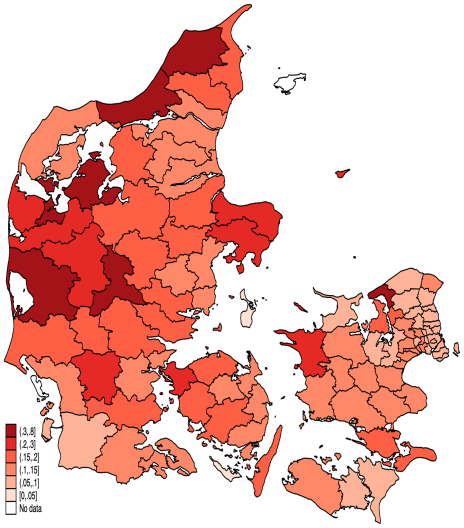
Table 1: By gender for the full population and for the estimating sample

	Male		Female	
	Full private sector	Sample	Full private sector	Sample
Age	41.02	41.22	40.59	40.25
	(11.21)	(10.94)	(10.82)	(10.53)
Age difference	2.07	2.14	-2.48	-2.60
	(4.14)	(4.11)	(4.41)	(4.40)
Children in HH (dummy)	0.48	0.49	0.54	0.56
	(0.50)	(0.50)	(0.50)	(0.50)
Number of children	0.98	0.96	0.87	0.88
	(1.035)	(1.022)	(1.051)	(1.048)
Married	0.58	0.60	0.54	0.56
	(0.49)	(0.49)	(0.50)	(0.49)
Cohabits	0.19	0.20	0.19	0.21
	(0.39)	(0.40)	(0.39)	(0.41)
Have vocational edu.	0.43	0.50	0.37	0.35
	(0.50)	(0.50)	(0.48)	(0.47)
Have university degree	0.08	0.04	0.07	0.05
	(0.27)	(0.20)	(0.25)	(0.21)
			Industry	
Food, Drinks & Tobacco	0.09	0.16	0.11	0.20
	(0.29)	(0.373)	(0.31)	(0.407)
Wood, Paper & Graphics	0.07	0.12	0.07	0.14
	(0.26)	(0.33)	(0.26)	(0.34)
Iron & Metal	0.28	0.43	0.20	0.32
	(0.29)	(0.50)	(0.20)	(0.47)
			Earnings (in DKK)	
Labor market earnings	392,426	382,655	299,452	280,413
	(228,932)	(186,555)	(155,584)	(147,417)
Labor market earnings, partner	236,884	221,193	376,614	349,434
	(161,557)	(149,971)	(279,293)	(237,321)
Own share of HH income	0.65	0.65	0.49	0.48
	(0.21)	(0.22)	(0.24)	(0.24)

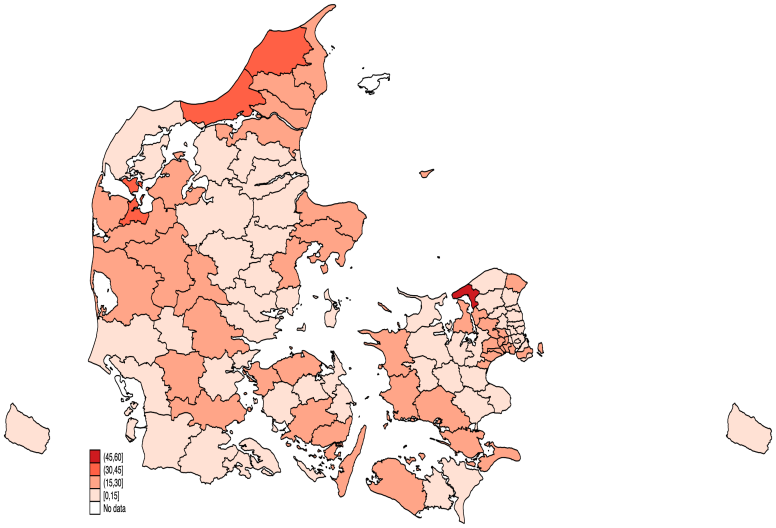
Notes: The table contains means and standard deviation (in parentheses) of key variables.
Earnings are adjusted for inflation and reported in 2019-levels.
Full population refer to all employees in the Danish private sector

A.5 Geographical Location of Exposed Worker

(a) % of Displaced Workers among Working Population across Municipalities



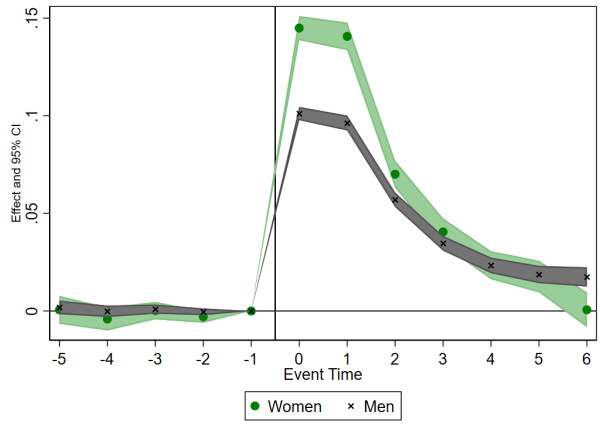
(b) % of Displaced Workers among Production Workers across Municipalities



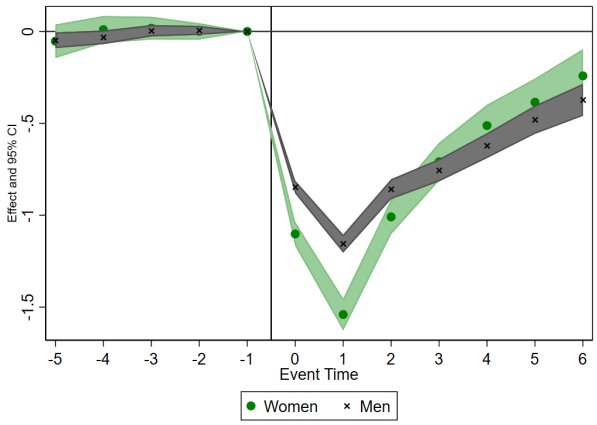
Note: Data is missing for the small islands of Rømø and Læsø, where less than 5 displaced workers live.

A.6 Sensitivity to Plant Closure Definition

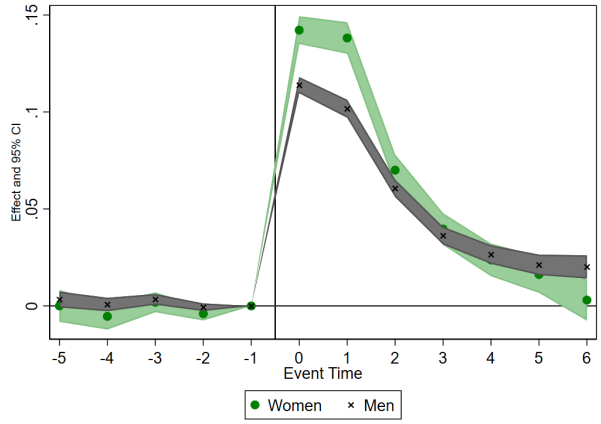
(a) 10+ workers, Unemployment



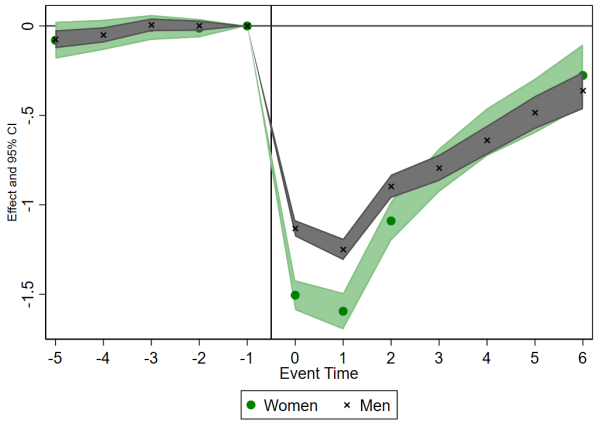
(b) 10+ workers, Log(Labor Earnings)



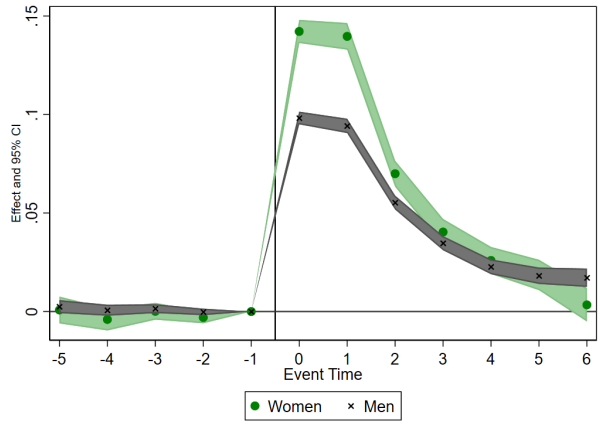
(c) 50+ workers, unemployment



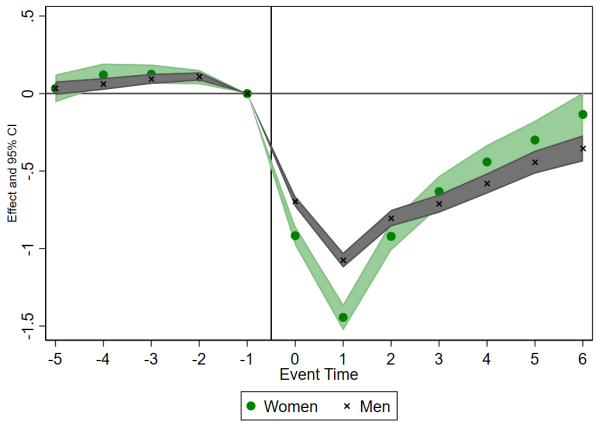
(d) 50+ workers, Log(Labor Earnings)



(e) 1 year closure, Unemployment



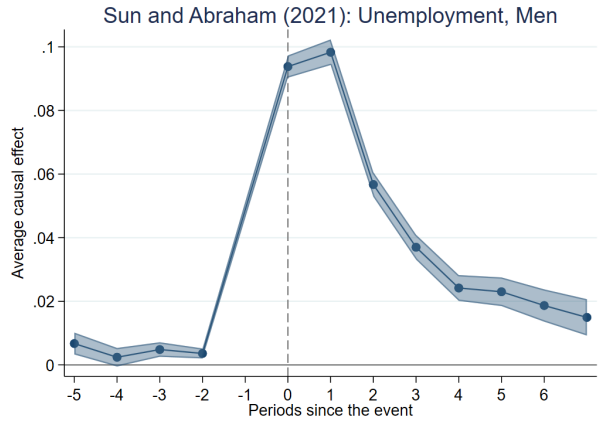
(f) 1 year closure, Log(Labor Earnings)



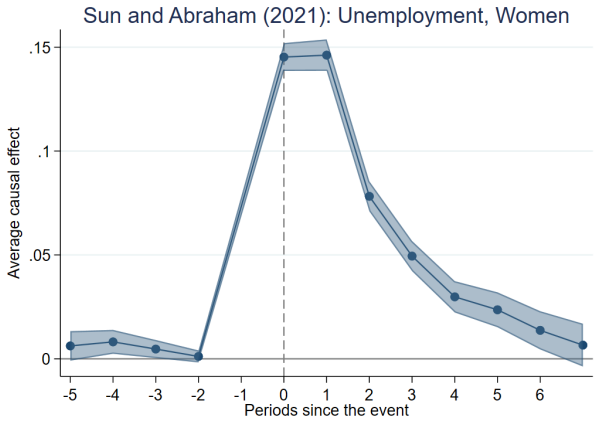
Notes: See Figure 1. Panel (a) and (b) shows displacement effects on workers in plants with at least 10 workers. Panel (c) and (d) show the effect on workers in plants with at least 50 workers. Panel (e) and (f) restrict the sample to only considering plants that close down over 1 year.

A.7 Robustness Estimators

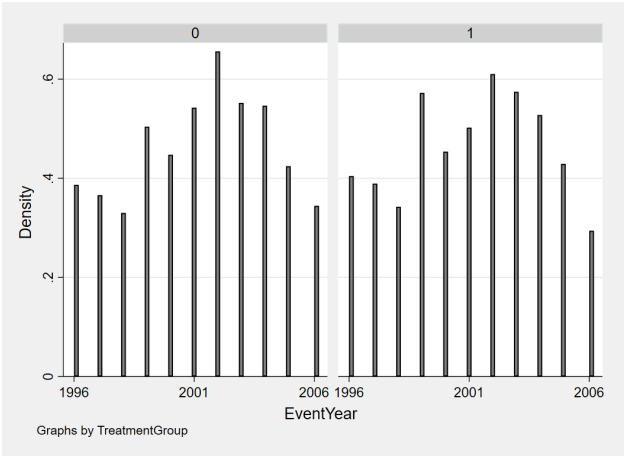
(a) Event Study Estimators: Men



(b) Event Study Estimators: Women

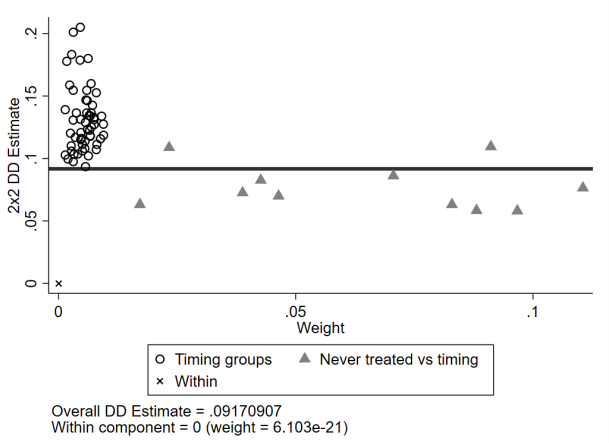


(c) Histogram: Event Years



Distribution of event years for control and treatment group, respectively.

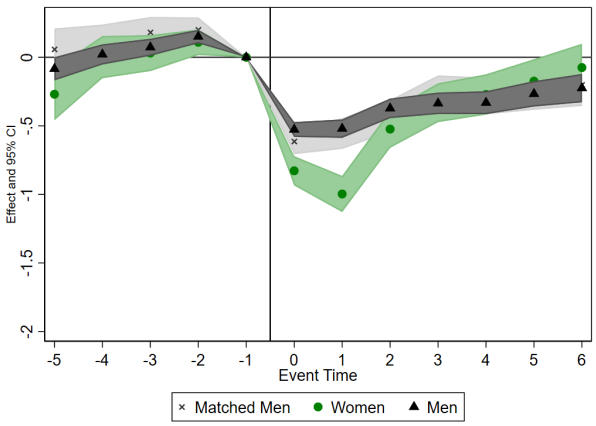
(d) Goodman-Bacon (2021) Decomp



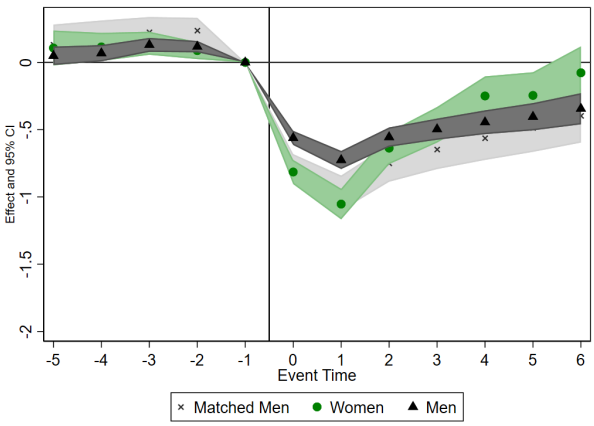
Note: Top panel report estimates obtained using the estimator proposed by Sun and Abraham (2021), specifying the control group to be the never-treated worker, for men and women, respectively. The bottom panel shows the distribution of event years and the decomposition proposed in Goodman-Bacon (2021) showing our estimation does not contain negative weights and the average treatment effect reflects the comparison between the never-treated and timing of events in the treated group.

A.8 Heterogeneity, Earnings

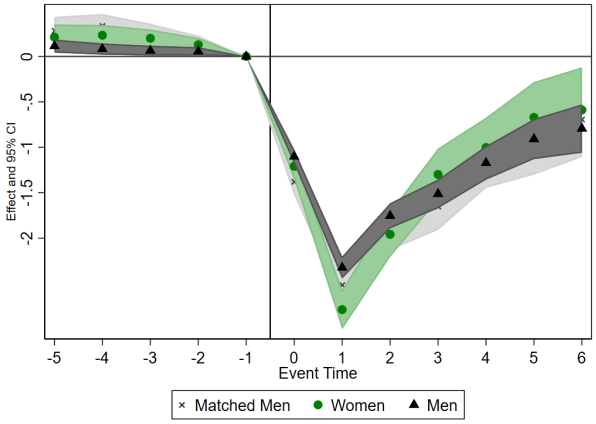
(a) Young (<= 35), By Gender



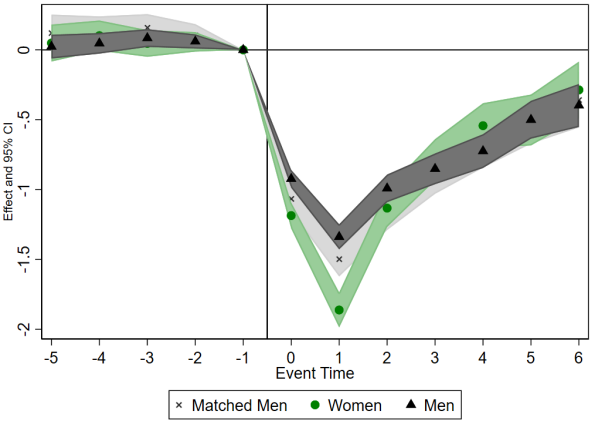
(b) Middle (> 35 & <= 50), By Gender



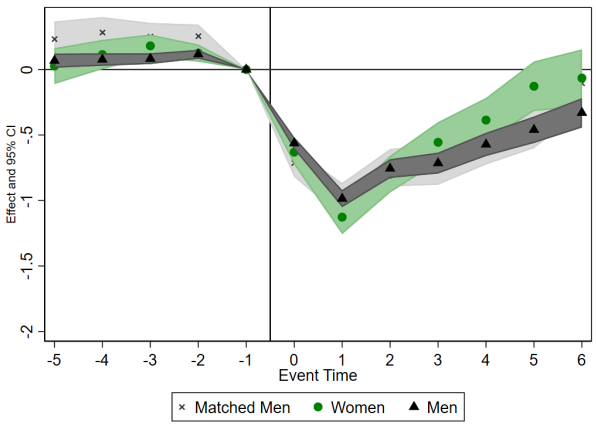
(c) Old (> 50), By Gender



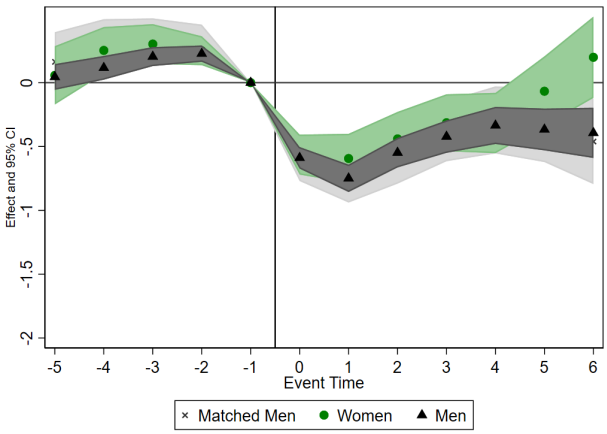
(d) High School or Less, By Gender



(e) Vocational Training, By Gender



(f) Higher Education, By Gender



Notes: See Figure 1.

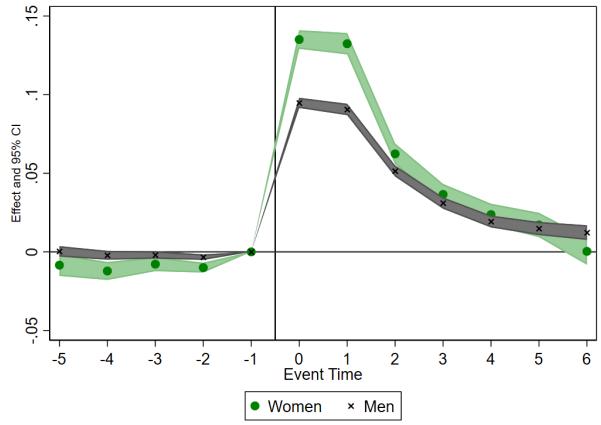
A.9 Kitagawa (1955)-Oaxaca (1973)-Blinder (1973)-Decomposition

	Unemployment			Log(earnings)		
	All	W. children	W.o. children	All	W. children	W.o. children
Men	0.134***	0.0985***	0.168***	0.872***	0.918***	0.828***
	(0.00163)	(0.00205)	(0.00250)	(0.00155)	(0.00186)	(0.00245)
Women	0.196***	0.174***	0.223***	0.825***	0.866***	0.776***
	(0.00301)	(0.00387)	(0.00470)	(0.00281)	(0.00345)	(0.00459)
Difference	-0.0621***	-0.0752***	-0.0557***	0.0464***	0.0527***	0.0514***
	(0.00342)	(0.00438)	(0.00532)	(0.00321)	(0.00392)	(0.00520)
Explained	-0.0287***	-0.0297***	-0.0274***	0.0359***	0.0391***	0.0515***
	(0.00139)	(0.00213)	(0.00190)	(0.00177)	(0.00263)	(0.00276)
Unexplained	-0.0334***	-0.0455***	-0.0283***	0.0105***	0.0136***	-7.97e-05
	(0.00372)	(0.00496)	(0.00560)	(0.00351)	(0.00472)	(0.00546)
Explained						
Earnings	-0.0119***	-0.0122***	-0.00995***	0.0275***	0.0269***	0.0301***
	(0.00118)	(0.00183)	(0.00151)	(0.00153)	(0.00253)	(0.00205)
Tenure	-0.000187	0.000423**	-0.00167***	0.000122	-0.000207**	0.00133***
	(0.000174)	(0.000173)	(0.000385)	(0.000113)	(9.60e-05)	(0.000316)
Labor Market Experience	-0.0122***	-0.0170***	-0.00662***	0.0112***	0.0172***	0.00724***
	(0.000790)	(0.00128)	(0.000873)	(0.000735)	(0.00127)	(0.000864)
Higher Education (==1)	-0.00228***	-0.00290***	-0.00113**	0.000678***	0.00104***	0.000351**
	(0.000310)	(0.000407)	(0.000479)	(0.000140)	(0.000253)	(0.000168)
Vocational Training (==1)	-0.00550***	-0.00488***	-0.00556***	0.00354***	0.00271***	0.00530***
	(0.000526)	(0.000601)	(0.000934)	(0.000430)	(0.000513)	(0.000813)
Age	0.00316***	-0.000688	-0.0127***	0.0139***	0.00822***	-0.0194***
	(0.000881)	(0.00218)	(0.00361)	(0.00196)	(0.00187)	(0.00530)
Age squared	0.000201	0.00755***	0.0102***	-0.0211***	-0.0167***	0.0265***
	(0.000818)	(0.00241)	(0.00281)	(0.00254)	(0.00218)	(0.00668)
Unexplained						
Earnings	-0.00417	-0.00196	0.00195	-0.0942**	-0.294	-0.00174
	(0.00905)	(0.0122)	(0.0140)	(0.0431)	(0.412)	(0.115)
Tenure	0.000895	-0.00153	-0.00308	-0.00574	0.0304	-0.000159
	(0.00828)	(0.0104)	(0.0134)	(0.0129)	(0.0617)	(0.0106)
Labor Market Experience	-0.0484***	-0.0314***	-0.0617***	0.0297	-0.0118	0.00134
	(0.00930)	(0.0121)	(0.0149)	(0.0182)	(0.0567)	(0.0888)
Higher Education (==1)	0.00292*	0.00326	0.00241	-0.00617*	-0.0161	-0.000119
	(0.00171)	(0.00229)	(0.00256)	(0.00341)	(0.0236)	(0.00789)
Vocational Training (==1)	0.00593**	0.000502	0.00744*	-0.00722	0.00190	-0.000264
	(0.00281)	(0.00382)	(0.00409)	(0.00501)	(0.0152)	(0.0175)
Age	0.0265	-0.377**	0.384**	-0.130	0.705	-0.0111
	(0.103)	(0.153)	(0.167)	(0.159)	(1.069)	(0.737)
Age squared	0.0373	0.238***	-0.140	0.0105	-0.565	0.00460
	(0.0511)	(0.0773)	(0.0881)	(0.0735)	(0.775)	(0.305)
Observations	61,131	30,826	30,305	61,131	30,826	30,305

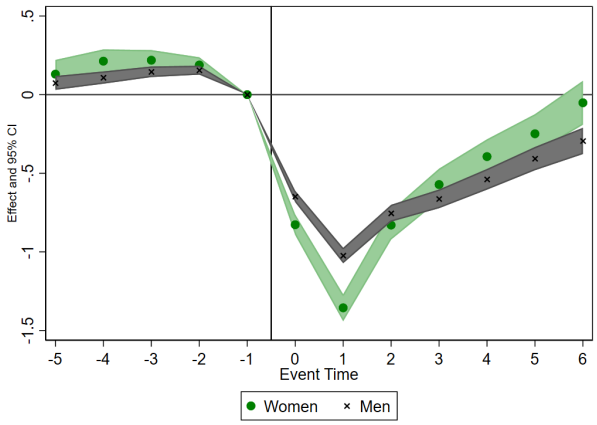
Standard errors clustered at the individual level in parentheses
Only displaced workers, the year following displacement
*** p<0.01, ** p<0.05, * p<0.1

A.10 Sorting, Sectors and Occupations

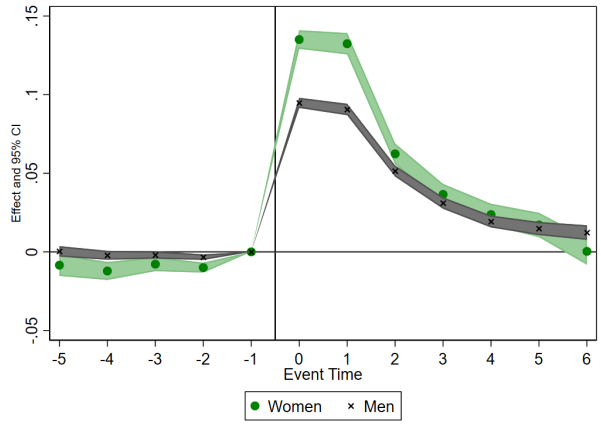
(a) Displacement Effect on Unemployment, Including Industry Fixed Effects



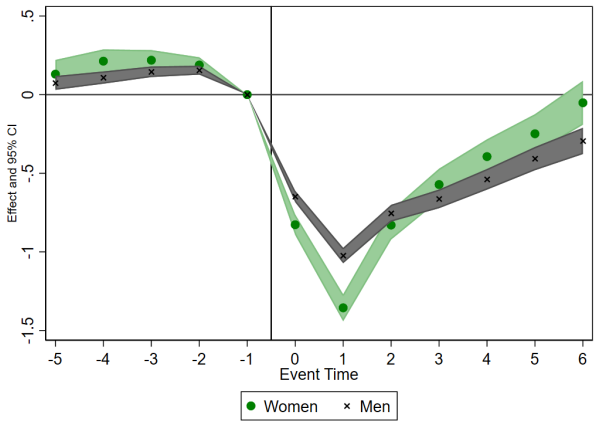
(b) Displacement Effect on Earnings, Including Industry Fixed Effects



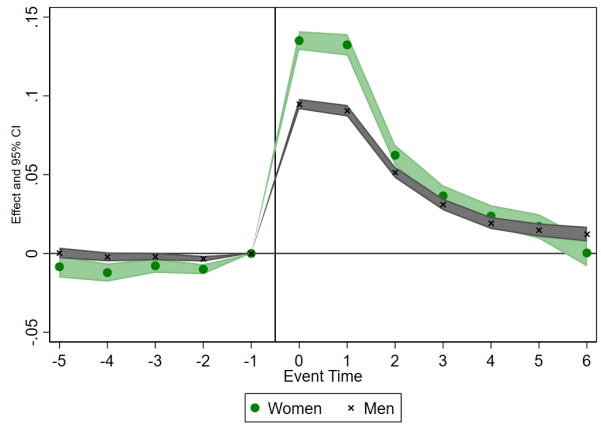
(c) Displacement Effect on Unemployment, Including Occupation Fixed Effects



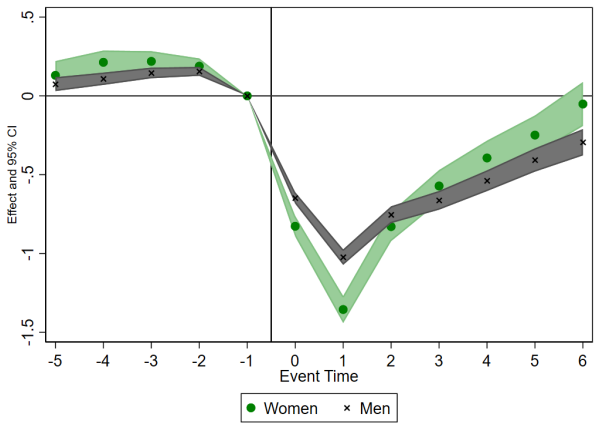
(d) Displacement Effect on Earnings, Including Industry Fixed Effects



(e) Displacement Effect on Unemployment, Including Industry and Occupation Fixed Effects



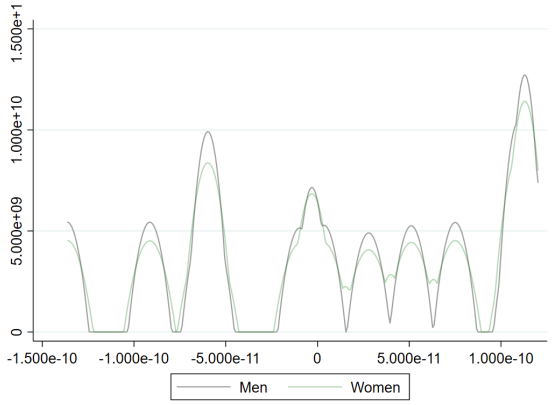
(f) Displacement Effect on Unemployment, Including Industry and Occupation Fixed Effects



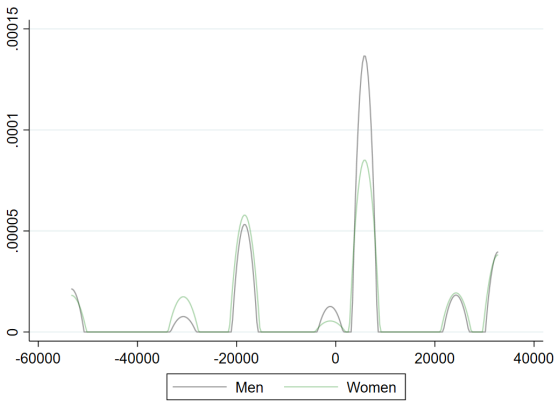
Notes: See Figure 1.

A.11 Fixed Effects, Men and Women

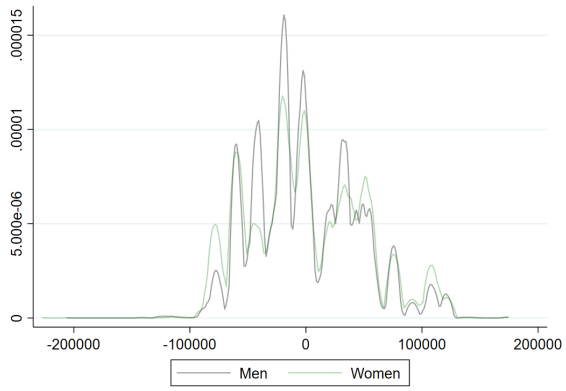
(a) Gender distribution across years



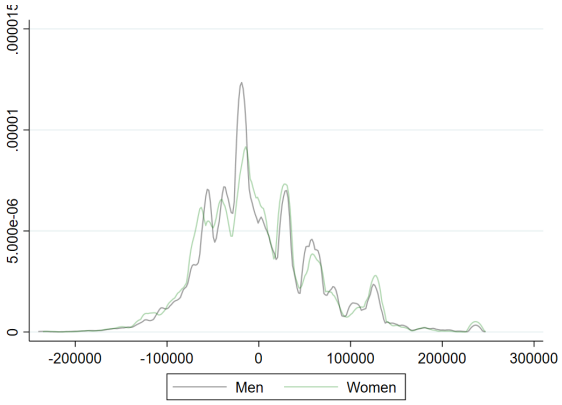
(b) Distribution across industries



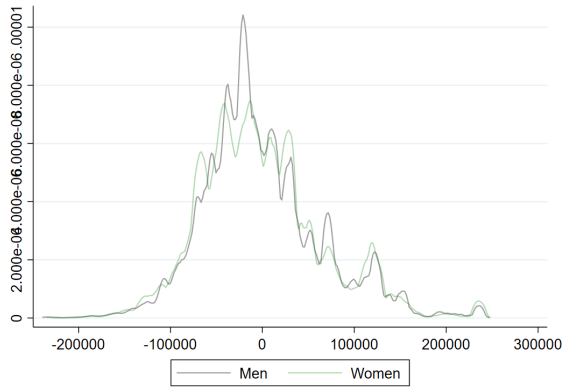
(c) Distribution across occupations



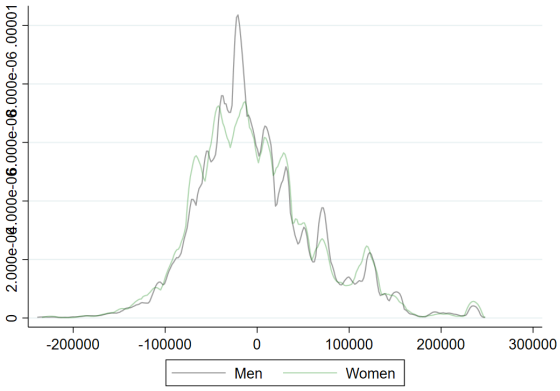
(d) Distribution across firms



(e) Distribution across plants



(f) Distribution across occupations and plants



Notes: Fixed effects obtained from estimating Equation 1 on the sample on displaced workers, i.e. without control workers.

A.12 Regression Tables

Labor market outcomes, by gender

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Unemployment			Log(labor earnings)			Labor Earnings			Non-participation		
VAR	Men	Women	Matched Men	Men	Women	Matched Men	Men	Women	Matched Men	Men	Women	Matched Men
t-5	0.00250	0.000772	-0.00109	0.0343	0.0333	0.156***	-4,772***	421.8	599.9	-2.944	-3.051	-13.58***
	(0.00169)	(0.00347)	(0.00334)	(0.0221)	(0.0455)	(0.0446)	(1,533)	(1,670)	(2,075)	(2.377)	(3.970)	(4.616)
t-4	0.000659	-0.00402	0.000850	0.0617***	0.120***	0.201***	-1,511	3,608**	4,980***	-5.525**	-6.551*	-19.37***
	(0.00143)	(0.00286)	(0.00275)	(0.0194)	(0.0372)	(0.0385)	(1,442)	(1,505)	(1,846)	(2.338)	(3.826)	(4.224)
t-3	0.00147	0.000121	0.00349	0.0945***	0.125***	0.213***	755.9	3,819***	5,501***	-6.195***	-6.670*	-15.90***
	(0.00115)	(0.00218)	(0.00217)	(0.0166)	(0.0317)	(0.0333)	(1,333)	(1,389)	(1,686)	(2.110)	(3.530)	(3.867)
t-2	-0.000198	-0.00303**	0.000863	0.110***	0.106***	0.189***	634.1	2,753**	3,965***	-3.731*	-9.515***	-8.476**
	(0.000854)	(0.00150)	(0.00160)	(0.0136)	(0.0234)	(0.0277)	(1,233)	(1,237)	(1,526)	(2.049)	(3.120)	(3.751)
t-1												
t	0.0982***	0.142***	0.116***	-0.696***	-0.917***	-0.876***	-65,654***	-57,210***	-61,680***	89.71***	91.68***	110.5***
	(0.00165)	(0.00300)	(0.00277)	(0.0178)	(0.0321)	(0.0332)	(1,316)	(1,402)	(1,615)	(1.976)	(3.306)	(3.888)
t+1	0.0942***	0.140***	0.110***	-1.075***	-1.444***	-1.209***	-64,636***	-56,975***	-54,948***	64.41***	78.04***	78.85***
	(0.00187)	(0.00346)	(0.00314)	(0.0247)	(0.0432)	(0.0429)	(1,414)	(1,571)	(1,786)	(2.406)	(3.947)	(4.429)
t+2	0.0553***	0.0700***	0.0574***	-0.804***	-0.921***	-0.918***	-48,678***	-38,415***	-39,207***	51.78***	55.86***	60.48***
	(0.00181)	(0.00337)	(0.00307)	(0.0271)	(0.0467)	(0.0466)	(1,518)	(1,702)	(1,943)	(2.636)	(4.467)	(4.809)
t+3	0.0347***	0.0404***	0.0326***	-0.710***	-0.632***	-0.740***	-42,008***	-25,345***	-30,166***	44.30***	28.94***	48.93***
	(0.00184)	(0.00339)	(0.00313)	(0.0301)	(0.0511)	(0.0508)	(1,671)	(1,863)	(2,122)	(2.940)	(5.060)	(4.875)
t+4	0.0227***	0.0259***	0.0195***	-0.580***	-0.441***	-0.563***	-33,239***	-19,011***	-21,614***	22.26***	-4.949	20.60***
	(0.00193)	(0.00350)	(0.00324)	(0.0334)	(0.0559)	(0.0559)	(1,850)	(2,027)	(2,352)	(3.406)	(5.904)	(5.899)
t+5	0.0182***	0.0186***	0.0192***	-0.443***	-0.300***	-0.416***	-26,056***	-12,689***	-14,608***	1.964	-19.58***	-13.13*
	(0.00213)	(0.00394)	(0.00347)	(0.0377)	(0.0635)	(0.0610)	(2,052)	(2,263)	(2,610)	(4.171)	(6.930)	(7.020)
t+6	0.0172***	0.00338	0.0210***	-0.354***	-0.135*	-0.253***	-24,109***	-4,067	-12,307***	-0.904	-32.46***	-17.42**
	(0.00239)	(0.00433)	(0.00379)	(0.0428)	(0.0715)	(0.0679)	(2,337)	(2,555)	(2,945)	(4.590)	(7.638)	(7.822)
N	1,064,186	429,137	438,526	1,064,186	429,137	438,526	1,064,186	429,137	438,526	964,095	389,465	396,453
R-sq	0.026	0.037	0.029	0.030	0.034	0.029	0.014	0.027	0.013	0.023	0.020	0.018

Standard errors clustered a the individual level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Heterogeneous effects, by age, by gender

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Young			Middle			Old	
Var	Men	Women	Matched Men	Men	Women	Matched Men	Men	Women	Matched Men
									height
t-5	0.000961	0.00928	-0.00555	0.00257	-0.000176	-6.13e-06	0.00499*	-0.00436	0.00287
	(0.00370)	(0.00735)	(0.00631)	(0.00254)	(0.00513)	(0.00561)	(0.00258)	(0.00534)	(0.00527)
t-4	-0.00256	-0.000680	-0.00338	0.00174	-0.00220	0.00329	0.00409**	-0.00783*	0.00344
	(0.00315)	(0.00599)	(0.00525)	(0.00212)	(0.00421)	(0.00461)	(0.00209)	(0.00425)	(0.00411)
t-3	0.00195	0.00105	0.00456	-0.000216	0.00242	0.00357	0.00396**	-0.00312	0.00212
	(0.00247)	(0.00468)	(0.00415)	(0.00175)	(0.00307)	(0.00363)	(0.00164)	(0.00298)	(0.00311)
t-2	-0.000279	-0.00504	0.000554	-0.000533	-0.000644	-0.000262	0.000370	-0.00371*	0.00222
	(0.00183)	(0.00314)	(0.00317)	(0.00122)	(0.00213)	(0.00242)	(0.00122)	(0.00198)	(0.00227)
t-1									
t	0.0674***	0.103***	0.0847***	0.0858***	0.147***	0.116***	0.158***	0.199***	0.166***
	(0.00256)	(0.00471)	(0.00423)	(0.00250)	(0.00462)	(0.00455)	(0.00371)	(0.00695)	(0.00597)
t+1	0.0595***	0.0941***	0.0636***	0.0787***	0.138***	0.115***	0.165***	0.216***	0.176***
	(0.00287)	(0.00549)	(0.00473)	(0.00282)	(0.00521)	(0.00517)	(0.00425)	(0.00797)	(0.00677)
t+2	0.0294***	0.0349***	0.0240***	0.0459***	0.0677***	0.0592***	0.106***	0.132***	0.109***
	(0.00273)	(0.00524)	(0.00460)	(0.00273)	(0.00498)	(0.00505)	(0.00423)	(0.00821)	(0.00676)
t+3	0.0196***	0.0232***	0.0146***	0.0315***	0.0388***	0.0332***	0.0614***	0.0722***	0.0616***
	(0.00281)	(0.00534)	(0.00465)	(0.00285)	(0.00494)	(0.00526)	(0.00424)	(0.00845)	(0.00685)
t+4	0.0120***	0.0134**	0.0102**	0.0243***	0.0275***	0.0244***	0.0377***	0.0454***	0.0281***
	(0.00287)	(0.00528)	(0.00482)	(0.00302)	(0.00515)	(0.00536)	(0.00463)	(0.00935)	(0.00737)
t+5	0.00559*	0.0111*	0.00880*	0.0204***	0.0186***	0.0214***	0.0395***	0.0344***	0.0380***
	(0.00307)	(0.00580)	(0.00490)	(0.00338)	(0.00609)	(0.00585)	(0.00543)	(0.0105)	(0.00856)
t+6	0.00981***	0.00422	0.0156***	0.0168***	0.00379	0.0141**	0.0359***	-0.00145	0.0491***
	(0.00340)	(0.00652)	(0.00529)	(0.00380)	(0.00640)	(0.00632)	(0.00640)	(0.0121)	(0.0100)
N	359,810	149,709	164,346	420,367	180,622	157,904	284,009	98,806	116,276
R-squared	0.017	0.030	0.022	0.021	0.036	0.027	0.062	0.076	0.057

Standard errors clustered at the individual level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Heterogeneous effects, by educational attainment, by gender

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High School or Less			Vocational			Higher Education		
Var	Men	Women	Matched Men	Men	Women	Matched Men	Men	Women	Matched Men
t-5	0.00466	-0.00362	0.00234	0.00227	0.00339	-0.00689	-0.00641*	0.00842	-0.00130
	(0.00340)	(0.00503)	(0.00520)	(0.00208)	(0.00566)	(0.00483)	(0.00381)	(0.00863)	(0.00868)
t-4	0.000311	-0.00168	0.00489	0.00110	-0.00661	-0.00364	-0.00194	-0.00718	-0.00230
	(0.00287)	(0.00412)	(0.00423)	(0.00178)	(0.00462)	(0.00408)	(0.00325)	(0.00746)	(0.00700)
t-3	0.00317	9.59e-05	0.00520	0.00299**	0.00260	0.00603*	-0.00809***	-0.00636	-0.00988*
	(0.00229)	(0.00317)	(0.00331)	(0.00145)	(0.00347)	(0.00329)	(0.00271)	(0.00569)	(0.00546)
t-2	0.00220	-0.00169	0.00236	0.000551	-0.00492**	0.00227	-0.00802***	-0.00271	-0.00757*
	(0.00168)	(0.00221)	(0.00246)	(0.00107)	(0.00227)	(0.00231)	(0.00213)	(0.00410)	(0.00438)
t-1									
t	0.121***	0.178***	0.138***	0.0936***	0.110***	0.104***	0.0601***	0.0748***	0.0708***
	(0.00309)	(0.00444)	(0.00425)	(0.00223)	(0.00462)	(0.00427)	(0.00356)	(0.00708)	(0.00625)
t+1	0.113***	0.173***	0.130***	0.0933***	0.117***	0.103***	0.0526***	0.0606***	0.0572***
	(0.00355)	(0.00508)	(0.00484)	(0.00251)	(0.00549)	(0.00480)	(0.00385)	(0.00761)	(0.00695)
t+2	0.0654***	0.0827***	0.0699***	0.0562***	0.0632***	0.0525***	0.0298***	0.0352***	0.0268***
	(0.00347)	(0.00493)	(0.00478)	(0.00241)	(0.00532)	(0.00464)	(0.00378)	(0.00805)	(0.00692)
t+3	0.0409***	0.0476***	0.0428***	0.0378***	0.0362***	0.0304***	0.0121***	0.0227***	0.00574
	(0.00355)	(0.00491)	(0.00492)	(0.00245)	(0.00547)	(0.00466)	(0.00384)	(0.00799)	(0.00698)
t+4	0.0274***	0.0280***	0.0228***	0.0260***	0.0247***	0.0240***	0.00182	0.0263***	-0.00171
	(0.00367)	(0.00507)	(0.00505)	(0.00256)	(0.00562)	(0.00479)	(0.00432)	(0.00801)	(0.00783)
t+5	0.0170***	0.0311***	0.0209***	0.0209***	0.00676	0.0243***	0.0138***	-0.00489	0.00293
	(0.00409)	(0.00570)	(0.00534)	(0.00282)	(0.00616)	(0.00528)	(0.00471)	(0.0101)	(0.00842)
t+6	0.0171***	0.00491	0.0169***	0.0178***	0.00354	0.0293***	0.0161***	-0.000641	0.0168*
	(0.00443)	(0.00617)	(0.00581)	(0.00321)	(0.00695)	(0.00571)	(0.00567)	(0.0114)	(0.00950)
N	369,723	229,119	215,074	537,779	149,251	167,178	156,684	50,767	56,274
R-squared	0.032	0.047	0.036	0.027	0.030	0.026	0.014	0.019	0.016

Standard errors clustered at the individual level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Heterogeneous effects, by presence of children, by gender

	(1)	(2)	(3)	(4)	(5)	(6)
		Children			No Children	
Var	Men	Women	Matched Men	Men	Women	Matched Men
t-5	-0.000211	0.00673	-0.00696	0.00457*	-0.00673	0.00331
	(0.00212)	(0.00478)	(0.00460)	(0.00263)	(0.00497)	(0.00479)
t-4	-0.000664	-0.00262	-0.000783	0.00168	-0.00593	0.00198
	(0.00179)	(0.00397)	(0.00371)	(0.00224)	(0.00402)	(0.00399)
t-3	0.000125	0.00213	0.00173	0.00269	-0.00284	0.00492
	(0.00145)	(0.00305)	(0.00293)	(0.00180)	(0.00302)	(0.00315)
t-2	0.000287	-0.00175	0.00145	-0.000754	-0.00508**	0.000287
	(0.00107)	(0.00205)	(0.00212)	(0.00134)	(0.00217)	(0.00234)
t-1						
t	0.0722***	0.132***	0.0923***	0.124***	0.156***	0.137***
	(0.00203)	(0.00382)	(0.00366)	(0.00259)	(0.00480)	(0.00409)
t+1	0.0677***	0.120***	0.0888***	0.121***	0.166***	0.128***
	(0.00229)	(0.00439)	(0.00414)	(0.00294)	(0.00553)	(0.00463)
t+2	0.0395***	0.0576***	0.0454***	0.0712***	0.0863***	0.0678***
	(0.00221)	(0.00423)	(0.00400)	(0.00287)	(0.00547)	(0.00460)
t+3	0.0259***	0.0330***	0.0241***	0.0434***	0.0500***	0.0401***
	(0.00227)	(0.00422)	(0.00406)	(0.00292)	(0.00557)	(0.00470)
t+4	0.0190***	0.0237***	0.0172***	0.0265***	0.0288***	0.0216***
	(0.00240)	(0.00435)	(0.00419)	(0.00306)	(0.00578)	(0.00492)
t+5	0.0159***	0.0166***	0.0137***	0.0207***	0.0217***	0.0251***
	(0.00263)	(0.00486)	(0.00446)	(0.00343)	(0.00657)	(0.00532)
t+6	0.0145***	0.00372	0.0165***	0.0202***	0.00358	0.0262***
	(0.00297)	(0.00538)	(0.00493)	(0.00385)	(0.00721)	(0.00581)
N	549,415	249,714	210,140	514,771	179,423	228,386
R-squared	0.018	0.033	0.022	0.035	0.047	0.036

Standard errors clustered at the individual level in parentheses
*** p<0.01, ** p<0.05, * p<0.1