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Is there a desired added worker effect? Evidence from involuntary job losses

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Is There A Desired Added Worker Effect? Evidence From Involuntary Job Losses

Mattis Beckmannshagen and Rick Glaubitz

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Is There a *Desired* Added Worker Effect? Evidence from Involuntary Job Losses*

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Abstract

Existing research has found little to no evidence for an added worker effect. However, studies to date have only analysed individuals' actual labor supply responses to their partners' job loss, neglecting to consider a potential mismatch between desired and actual labor supply adjustments. Using data from the German Socio-Economic Panel (SOEP), we study individuals' changes in actual and desired working hours after their partners' involuntary job loss in an event study design. Our results show that neither desired nor actual working hours change significantly. Thus, we provide first evidence that the absence of the added worker effect is in line with individuals' stated labor supply preferences and is not the result of an inability to realise desired working hours.

JEL Code: J22 · H55

Keywords: labor supply · desired working hours · added worker effect · event study

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1 Introduction

In the early 2020s, labor markets around the world have been facing great challenges. Globally, economies have been suffering from the consequences of the COVID-19 pandemic and the Russian invasion of Ukraine. As other European countries, Germany has experienced a spike in energy prices and high inflation. This economic climate has presented various challenges for many firms, leading to an increased risk of layoffs and bankruptcies. Furthermore, recent advancements in artificial intelligence and automation technologies have started the Fourth Industrial Revolution ("industry 4.0"), which is transforming whole industries and predicted to lead to the replacement of entire occupations and the creation of new jobs (Dauth et al., 2021). Against this background, the recent upsurge of economic literature examining the effects of firm closures or, more generally, job losses (Illing et al., 2021; Jarosch, 2023; Schmieder et al., 2023) appears to be very timely.

For affected households, an involuntary job loss constitutes a negative shock to their household income. This income shock is particularly large if the partner affected by the job loss is the household's main earner. One focus of the economic literature has been to examine how households react to such income shocks and, in particular, whether or not the other partner tries to compensate for the loss of income by expanding their labor supply. The international evidence for these "added worker effects", as they are known in the literature (Lundberg, 1985), is mixed and their existence and magnitude likely depends on the design and generosity of national unemployment insurance schemes (Bredtmann et al., 2018). For Germany, recent studies find little evidence for a significant added worker effect (Fackler and Weigt, 2020; Illing et al., 2021).

Theoretically, there are at least two potential explanations for the absence of an added worker effect. First, individuals might not want or need to increase their labor supply in response to their partners' job loss. This can be due to different reasons: There might be a lack of incentive due to the generosity of the benefit system or there might be a lack of capacity or flexibility due to strong intra-household specialization. For example, one partner might mainly focus on breadwinning while the other partner shifts their time to housework and care work. In such cases, it might be more cumbersome to change these roles within the household than it is for the partner who has lost their job to find a new one.

An alternative potential explanation for an absence of the added worker effect is that while partners would in fact prefer to adjust their labor supply, they are not able to realise their preferred labor supply adjustment. At the intensive margin, for example, employees and their employers might not find a compromise regarding the extent of working hours adjustments. One can imagine a scenario wherein an employee might only want to increase their working hours from 20 hours per week to 25 hours per week

but the employer only offers a full-time position (40 hours) or a part-time position (20 hours). Furthermore, timing might be a factor: an individual might want to increase hours immediately after their partner’s job loss, but the employer might need a considerable amount of time to restructure processes at work. By then, the partner could already be re-employed. Similar issues might arise at the extensive margin: an inactive partner might want to take up employment but might be unable to immediately find a suitable job due to a lack of experience or search frictions. Thus, while there may be a preference for an extension of labor supply, people may fail to realise it.

However, existing empirical studies on the added worker effect solely focus on actual working hours (see e.g. Fackler and Weigt, 2020; Illing et al., 2021). As is common in labor economics, authors rely on the axiom of *revealed* labor supply preferences, assuming that actual working hours fully reflect an individual’s labor supply preferences. A potential mismatch between the actual working hours and the individual’s *stated* labor supply preferences is hereby overlooked. The idea that the response in observed working hours to a partner’s job loss may not necessarily reflect the desired change in working hours was first proposed by Maloney (1987). However, to the best of our knowledge, no empirical study to date has extensively analyzed the effect of a partner’s job loss on an individual’s desired working hours.¹

Using data from the German Socio-Economic Panel (SOEP, see Goebel et al., 2019) which offers information on both actual and desired labor supply, we examine reactions in actual and desired working hours to a partner’s involuntary job loss. Thus—while there might not be an actual added worker effect—we shed light on the question of whether a *desired* added worker effect exists. In our main analysis, we focus on exploring the effect of men’s job loss on the actual and desired working hours of their female partners. The reason for this procedure is that women are more often working part time and thus have a higher potential for an extension of labor supply.² Accordingly, our main contribution lies in discovering whether or not there is a mismatch between women’s responses in actual labor supply and their stated labor supply preferences after their male partners involuntarily lose their jobs. In doing so, we also analyze whether household income shocks constitute one root of mismatches between desired and actual working hours, a topic which has received more attention through the grown literature on labor market imperfections (Manning, 2013; Faberman et al., 2020).

We implement an event study analysis to compare the labor supply preferences of

¹Triebe (2015) touches on the effect of job loss on partners’ stated preferences for an extension of labor supply in one of her sub-analyses. However, her analysis is very limited. As she compares desired working hours post-treatment with actual working hours pre-treatment, the analysis neglects the potential pre-existence of hours mismatches and therefore does not warrant a plausible interpretation of the effect of partners’ job loss on desired working hours.

²See Section 2 for a more extensive discussion. The full analysis is additionally conducted for men’s (desired) labor market responses to their female partners’ involuntary job loss. Results are presented in the Appendix. Due to a limited number of observations, we cannot include same-sex couples.

women whose male partners are affected by an involuntary job loss to those of women whose households do not experience such a shock to household income but are very similar in other individual and household characteristics. We distinguish between couples in which the female partner was in employment when her male partner lost his job and couples in which the female partner was not employed at the time of her partner’s job loss. For the first group of couples, we consider actual and desired working hours. For the latter, we explore the women’s probability of taking up employment, their stated intent to do so and their job search effort. We also run an extensive set of sensitivity analyses to assess the robustness of our empirical strategy, investigate effect heterogeneity, and examine the reactions of strongly affected households.

We do not find evidence for a significant desired added worker effect on the extensive and intensive margin. In fact, actual and desired working hours largely remain the same for the treatment and the control group. Neither do we find a significantly increased realised or intended reaction to take up employment among female partners who are not employed at the time of their partners’ job loss. These findings are robust for several sub-groups and for different econometric specifications. Thus, we provide evidence that the absence of the added worker effect reflects the labor supply preferences of women and is not due to labor market frictions preventing women from adjusting working hours to their changed preferences.

Sensitivity analyses hint that shock intensity (magnitude and persistence) is limited and therefore the reactions to the shocks are small. Many of the male partners affected by a job loss find new positions relatively quickly. For this short time period out of employment the unemployment insurance in Germany offers a high replacement rate. As a result, the female partner’s need to extend labor supply might not be particularly high. When focusing on households which experience more intense shocks, we find small and partially significant positive effects on the female partners’ desired and actual working hours. However, these effects are very small and of similar magnitude for desired and actual working hours. Thus, even in households that are particularly affected, we find no evidence that income shocks are a driver of mismatches between desired and actual working hours.

Our study contributes to two different strands of literature: first, the literature on the added worker effect and secondly, the literature on differences between desired and actual working hours.

Following the seminal work by Lundberg (1985), a number of influential studies for different countries - e.g. Austria (Halla et al., 2020), the Netherlands (De Nardi et al., 2021), Norway (Blundell et al., 2015), the U.S. (Stephens, 2002) and a cross-country study for 28 European countries (Bredtmann et al., 2018) - analyze the added worker effect and suggest that the design of a country’s unemployment insurance and benefit system shape the labor market reactions of spouses to their partners job loss.

For Germany, there are several studies analysing the added worker effect based on SOEP data. Despite finding substantial and persistent earnings losses of displaced workers, Fackler and Weigt (2020) find no evidence for a significant added worker effect when analysing partners' earnings after displacement. Triebe (2015) provides evidence for an added worker effect for married but not for unmarried couples. Another study based on SOEP data by Ehlert (2012) finds no evidence for a significant increase in working hours for West German women in response to their husbands' job loss. Illing et al. (2021) are the first authors to analyze the added worker effect using German administrative data. However, similarly to earlier studies based on survey data, they find no evidence for an added worker effect in Germany—regardless of the gender of the displaced worker. In fact, Illing et al. (2021) show that the opposite is the case: both for men and women, displacement leads to modest declines in their partners' earnings over the following years.

The absence of a meaningful added worker effect for Germany is often explained by the generous tax and transfer system mitigating the income shock resulting from unemployment to such a large extent that partners' incentives to increase working hours are low (e.g. Ehlert, 2012; Fackler and Weigt, 2020). However, the vast majority of existing studies focus on the partner's realised labor supply responses and interpret these as fully reflecting labor supply preferences.³ In doing so, they neglect the possibility that partners could in fact prefer to increase their labor supply but are unable to immediately realise the preferred increase in working hours. In this case, while desired working hours would increase, actual working hours would remain unchanged.

As we know from existing studies, mismatches between desired and actual hours have severe consequences on individuals' health (Bassanini and Caroli, 2015; Bell et al., 2012), well-being (Başlevent and Kirmanoğlu, 2014; Wooden et al., 2009), and the income distribution (Beckmannshagen and Schröder, 2022). While the consequences are wide-ranging, the causes of mismatch between desired and actual working hours are manifold: mismatches can arise due to a limited number of jobs available, job openings with non-negotiable working hours due to employers' higher bargaining power, search frictions or other market imperfections (see e.g. Altonji and Paxson, 1992; Bloemen, 2008; Chetty et al., 2011; Lachowska et al., 2023).⁴ Adding to this strand of literature, one aim of this paper is to analyze whether shocks to household income are another driver of hours mismatches.

³Similarly to our paper, existing studies on the added worker effect primarily focus on labor supply responses at the intensive margin. However, some of them additionally analyze the extensive margin, i.e. whether previously unemployed individuals join the labor force as a response to their partners' job loss (e.g. Kohara, 2010; Triebe, 2015; Halla et al., 2020). While international evidence is mixed, a limited number of studies even show a decline in partners' labor market participation or job search efforts—the so-called "discouraged worker effect" (e.g. Lundberg, 1985; Hardoy and Schöne, 2014)—which is in line with the findings of Illing et al. (2021) for Germany.

⁴For a detailed theoretical underpinning of the economic rationale behind desired working hours and mismatches between desired and actual working hours, see Beckmannshagen and Schröder (2022), Appendix A.

The remainder of the paper is structured as follows: Section 2 describes our data source and the focal variables for the analyses. Section 3 explains the applied empirical strategy. Section 4 presents our main results as well as a set of sensitivity analyses. In Section 5 we discuss the results in the context of the existing literature while Section 6 concludes.

2 Data

2.1 SOEP data and focal variables

Our empirical analysis is based on data from the German Socio-Economic Panel (SOEP). The SOEP is a representative household panel survey which has been conducted on a yearly basis since 1984 and, as of 2019, comprises around 30,000 respondents living in 15,000 households (Goebel et al., 2019). The SOEP has a number of characteristics that are vital for our analysis. First, being the only available data source for Germany offering longitudinal information on both desired and actual working hours, the SOEP allows for a comprehensive investigation of a potential heterogeneous effect of involuntary job losses on partners' actual and desired working hours. Secondly, it offers a rich set of socio-economic information on individuals' labor market activities and preferences, allowing for detailed analysis and high-quality matching. Importantly, information is not only available for the household head but also for their partners. Therefore, due to its panel structure, the SOEP allows us to follow individuals and their partners over time, which is key for our analysis of actual working hours and working hours preferences before and after treatment.

The key variable to identify treated couples is the generated `pgjobend` variable which contains the reason why an individual's employment was terminated. The variable always refers to the time between the interviews of consecutive survey waves. Based on the `pgjobend` variable we compute a treatment indicator variable which categorises people as treated if the given reason for an employment termination is either a dismissal by the employer or a plant closure. In line with the existing literature on causal effects of involuntary job losses (e.g. Chan and Huff Stevens, 2001; Kohara, 2010; Hennecke and Pape, 2022), we define both plant closures and dismissals as causes of involuntary job loss, which allows us to analyze the affected households' labor supply responses in a sufficiently large sample.⁵

In our main analysis we consider couples in which the male partner experienced a job loss due to dismissal or plant closure while at the same time the female partner was also

⁵Our results remain robust when we only analyze households affected by plant closures (see Figure 4). Plant closures and mass layoffs are viewed as the most exogenous sources of job losses and are used in recent studies on the added worker effect drawing on large administrative data (e.g. Halla et al., 2020; Illing et al., 2021). However, the SOEP does not offer any information on mass layoff events and only focusing on plant closures would significantly reduce our sample size to 150 couples, which would not allow us to conduct sensitivity or sub-group analyses.

employed. For these couples, our outcome variables are the following:

- Men's employment status at the time of the interview
- Men's gross yearly labor income
- Women's actual working hours
- Women's desired working hours⁶
- Women's gross yearly labor income
- Household net yearly income
- Women's hours mismatch⁷

While the first two outcome variables capture the first stage of our analysis, i.e. an income shock induced by a job loss, the following four outcome variables aim at measuring the women's reaction and the effect on household net income. By examining women's working hours we focus on the intensive margin of labor supply of women already in employment. By contrast, in a sub-analysis we consider couples in which the male partner experienced a involuntary job loss while at that time the female partner was not employed. For these couples our outcome variables are the following:

- Women's employment status at the time of the interview
- Women's intent to return to work⁸
- Whether women actively searched for a job in the last two weeks
- Whether women would start a job within the next two weeks if they were offered a position

By considering these variables, we capture intended or realised reactions on the extensive margin of employment, i.e., whether women who were not employed before their partners' job loss exhibit a higher tendency to take up employment after their partners' job loss.

Our observation period covers the years 1997 to 2019, with job losses experienced between 1999 and 2017. Since we conduct an event study it is important to be able to

⁶See Figure A.10 in the Appendix for the exact wording of the survey question capturing desired working hours. Also, Beckmannshagen and Schröder (2022) Appendix B provides strong evidence that the desired working hours variable is empirically meaningful, i.e. longer desired hours today predict an extension of actual working hours in the future.

⁷The hours mismatch, Δh , is defined as the difference between desired and actual working hours.

⁸The intent to return to work is surveyed with a 4-point Likert scale. For the analysis we recoded it as a binary variable, with "not at all" and "rather unlikely" recoded as 0, while "rather likely" and "for certain" recoded as 1.

observe our key variables two years prior and after treatment. The SOEP did not survey desired working hours in 1996, which is why the earliest event year that we study is 1999. We choose 2017 as our last event year because we do not want to analyze labor market outcomes that happened after the onset of the COVID-19 pandemic in 2020.⁹

2.2 Treatment and control group

In our main analysis, we focus on exploring the effect of men’s job loss on the actual and desired working hours of their female partners. Women are particularly affected by hours mismatches (Beckmannshagen and Schröder, 2022). Thus, exploring whether shocks to household income are a driving factor of women’s hours mismatches is of great interest. Furthermore, the vast majority of male workers work full time (91%) with an average of 42 actual working hours per week. Thus, there is simply little scope for a labor supply extension among men. In contrast, only 48% of female workers are employed in full-time jobs and the average number of actual weekly working hours is 31 hours.¹⁰ As a result, on average, there is more potential for women to extend their labor supply after their partners’ job loss, making it particularly interesting to concentrate primarily on the labor supply adjustments of women. Nonetheless, we also conduct our analysis for the male partners’ labor supply reaction to their female partners’ job losses. The results are presented in Figure A.2 in the Appendix. As expected, we find no effects on desired and actual working hours of men after their partners’ job loss.

For our empirical analysis, we divide couples into two groups: a treatment group and a control group. The treatment group refers to couples for whom the male partner is affected by involuntary job loss due to plant closure or dismissal. Couples in which the male partner was never affected by an involuntary job loss are assigned to the *unmatched* control group. Between the years 1999 and 2017, a total of 5,082 men surveyed in the SOEP experienced a job loss due to plant closure or dismissal. However, as depicted by Table 1, imposing a variety of sample restrictions reduces the number of treated couples substantially. We only include men in stable employment relationships, meaning they were employed in the two years prior to their job loss ($t-2$ and $t-1$).¹¹ Additionally, for reasons of comparability between the treatment and control group, we exclude civil servants and individuals in self-employment from the control group as they cannot be affected by plant closures or dismissals in the same way as regular employees. Furthermore,

⁹The pandemic and the regulatory reactions present a multifaceted shock to the labor market and—for example due to closed childcare facilities—to the division of time and labor within households. Disentangling the different effects of an involuntary job loss and other pandemic-related measures is not feasible in our setting.

¹⁰The reported average full time rates and actual working hours for men and women are obtained from the unrestricted sample (time period 1999-2017) and refer only to individuals in regular employment.

¹¹Following Illing et al. (2021), we include both men that were working on a full-time and men working on a part-time basis prior to their job loss in order to account for recent labor market trends of rising male part-time rates.

Table 1. Sample Restrictions and Observations

Sample restriction	Treated obs.	Control obs.
Men affected by involuntary job loss	5,082	176,111
Employed in two years prior to job loss	3,617	122,972
Not civil servants or self-employed	2,813	74,188
In stable relationship	1,339	38,751
Age 24-55 at the time of job loss	1,040	29,832
Both partners' employment status observed	1,029	29,540
No missings in all matching variables	1,003	29,017
Only keeping the first experienced job loss	796	29,017
Partner employed before job loss	562	20,938
Outcome variables non-missing	444	17,070
After matching	430	430
Partner not employed before job loss	234	8,079
After matching	172	172

Note: Table shows number of couples in treatment and control group after the stepwise implementation of sample restrictions. *Source:* SOEP v37.

since our aim is to investigate the (desired) added worker effect within existing couples, we only consider couples in stable relationships. Our definition of stable relationships includes both married and cohabiting unmarried couples who remain together for the entire observation period from $t-2$ to $t+2$.¹² Men affected by job loss have to be between the age of 25 and 55 in the year prior treatment. We choose these age limits since we primarily want to analyze individuals who have finished their education and fully entered the work force while at the same time also excluding old-age workers to avoid transitions into early retirement. This age restriction also applies to their female partners. Some individuals face multiple involuntary job losses in their careers. In our main specification, we only consider their first observed job loss in the time period from 1999 to 2017 as we do not want to consider the same individuals twice at two different points in time. Also, we want to minimize the potential that couples have experienced similar shocks to their household income before and thus react differently due to anticipation.¹³ Our final pre-matching sample comprises of 796 couples in the treatment group¹⁴ and 29,017 potential

¹²Although the SOEP data structure would theoretically allow us to follow both partners after a separation, we refrain from including couples separating during the five-year observation period. We do this in order to limit the risk that our investigations of labor supply responses to partners' job loss are biased by simultaneous labor supply adjustments around separation, which can be quite strong (see e.g. Johnson and Skinner, 1986; Özcan and Breen, 2012; Brüggmann, 2020). While we acknowledge the proven link between job loss and separation (see e.g. Charles and Stephens, 2004; Eliason, 2012), its implication for our analysis is limited since we only exclude 34 couples which otherwise meet all requirements to be part of the treatment group.

¹³In a robustness check we instead consider only the latest experienced involuntary job loss in the observation period. As shown in Figure A.3 in the Appendix, this does not change our main results.

¹⁴The involuntary job losses that we consider in our event study are fairly evenly distributed over time. An exception is the period from 2002 to 2005, which has particularly high numbers of involuntary job

couple-period observations in the control group.

By imposing these restrictions to both the treatment and control group, naturally both groups are at least to a certain extent comparable before job loss (see Table 2). For example, they are of similar age and have a similar family situation (number of children, marital status). However, as depicted by Table 2 they also differ in a number of important characteristics on individual (e.g. tenure, gross labor income), establishment (firm size), and partner level (partners' full time rate, partners' gross labor income).

As our empirical approach relies on the comparison of couples in the treatment and control group to estimate the causal effect of involuntary job loss on partners' actual and desired labor supply, it is necessary to ascertain a high degree of comparability between both groups. We therefore apply a matching procedure to match treated couples to suited controls.

3 Empirical approach

We match control units from the pool of never-treated to treatment units based on a broad set of sociodemographic characteristics and labor market variables in the pre-shock period to obtain a control group that is closely comparable to our treatment group. More specifically, we match 1:1 and combine propensity score matching and exact matching. We match year-by-year and then stack treatment and control pairs from each year to ensure that we compare treatment and control group in the same year.¹⁵ Further, since the gender-specific labor supply decisions and gender norms in East Germany vary widely from West Germany (see e.g. Jessen, 2022), we only compare West (East) German couples with West (East) German couples. Lastly, while we also consider cohabiting unmarried couples if they are in a stable relationship, labor supply decisions of married couples might differ from those of unmarried couples, for example due to joint taxation (Bick and Fuchs-Schündeln, 2017). We thus only compare (un)married couples with (un)married couples. Consequently, the exact matching variables are the calendar year in which the job loss occurred, marital status, and place of residence (East Germany or West Germany).

Propensity scores are estimated based on the following set of variables which refer to the male partners in the pre-shock period unless stated otherwise: age, education, gross labor income, gross labor income two years before job loss, tenure with firm, firm size, a dummy indicating full-time position, a dummy indicating full-time position two years before job loss, female partners' education, female partners' gross labor income, female partners' gross labor income two years before male partners' job loss, a dummy indicating full-time position for the female partners, a dummy indicating full-time position for the

losses in our sample. During this period Germany was often referred to as the “sick man of Europe” with a recession in 2003 and high unemployment rates (Dustmann et al., 2014).

¹⁵Our approach is similar to Schmieder et al. (2023) and aims to avoid the Goodman-Bacon (2021) critique of event study designs with treatment in multiple periods.

female partners two years before job loss, dummy variables indicating presence of children in the age groups under 3, 3 to 5, 6 to 12, 12 to 18, a dummy indicating a person in need of care in the household, household net income, household net income two years before the male partners' job loss.

We select these variables because they likely influence household time use and labor supply. We only keep matched couples for whom common support is given.¹⁶ As shown in Table 2 the matching procedure results in 430 matched couples in the control group whose sociodemographic characteristics are very similar to the characteristics of the 430 treated couples with no statistically significant differences.¹⁷

Table 2. Sample Means, Controls vs. Treated

	Controls (raw)		Controls (matched)		Treated	
	Mean	sd	Mean	sd	Mean	sd
Married	0.87	0.33	0.84	0.36	0.84	0.36
East	0.24	0.42	0.36	0.48	0.36	0.48
Age	43.34	7.19	42.21	7.41	42.24	7.61
No. of Children	0.93	0.99	0.86	0.97	0.87	0.92
Need of care	0.01	0.12	0.02	0.13	0.01	0.12
Tenure	14.63	9.44	8.91	7.46	8.78	9.01
Firm size over 200	0.61	0.49	0.31	0.46	0.28	0.45
Primary educ.	0.30	0.46	0.34	0.47	0.37	0.48
Full time	0.96	0.19	0.96	0.19	0.95	0.21
Gross labor inc.	53,191	25,033	39,258	21,005	37,267	27,047
Partner primary educ.	0.21	0.41	0.22	0.42	0.22	0.42
Partner full time	0.43	0.50	0.57	0.50	0.55	0.50
Partner gross labor inc.	26,858	19,044	25,280	18,709	25,270	17,568
Household net inc.	59,233	22,087	52,531	22,037	50,995	22,945
No. of observations	18,199		430		430	

Note: Displayed are descriptive statistics of socioeconomic characteristics for the unmatched pool of potential control individuals, the matched control group, and the treatment group after matching. Primary education refers to having obtained the basic school qualification which is reached after 9 years of schooling in Germany. *Source:* SOEP v37.

We analyze different outcomes of the matched groups in an event study framework. More specifically, we run OLS regressions with individual and year fixed effects as well as a set of dummies for the pre- and post-shock relative periods and their interactions with the treatment dummy. In this setting, the coefficients of the post-shock interaction dummies measure the period-specific average treatment effect of the involuntary job loss on the treated (ATT). The regression equation takes the form

¹⁶We use the Stata command `kmatch` (Jann, 2017) and specify the `comsup` option, which ensures that common support is given based on the minima and maxima comparison (Caliendo and Kopeinig, 2008).

¹⁷We conducted t-tests for all displayed variables and none of the differences are statistically significant. The smallest p-value of 0.23 was obtained for gross income.

$$Y_{it} = \sum_{k=-2, k \neq -1}^2 \gamma_k P_{it}^k + \sum_{k=-2, k \neq -1}^2 \delta_k P_{it}^k \times T_i + \nu_i + \tau_t + \epsilon_{it}, \quad (1)$$

with Y_{it} being the outcome of interest for person i in year t (e.g. a woman's desired working hours), $\{P_{it}^k\}_{k=-2, k \neq -1}^2$ being a set of relative period-dummies running from -2 to 2 but excluding the reference period $k = -1$, with a shock occurring between period $k = -1$ and period $k=0$ if the person is in the treatment group. T_i is the respective treatment group dummy, ν_i are individual fixed effects, τ_t are year fixed effects, and ϵ_{it} is an idiosyncratic error. The coefficients of interest are the δ_k which can be interpreted as ATTs.

For our empirical strategy it is essential to assume that the involuntary job loss comes as a shock that is exogenous to our the main outcome variables, i.e. the female partner's labor supply preferences.¹⁸ Thus, the central identifying assumption for allowing a causal interpretation of the coefficients is the common trend assumption (see e.g. Goodman-Bacon, 2021). In our application the common trend assumption states that in the absence of the male partner's involuntary job loss, differences in outcomes of the treatment and control groups would remain constant. If this assumption holds, one can interpret the differences in outcomes between treatment and control group, i.e. the depicted coefficients as causal effects. To show that the common trend assumption holds, we show pre-trends, i.e. differences for all outcome variables prior to the treatment in our result graphs.

4 Results

The presentation of our results is structured in three parts. First, we show our main analyses that focus on women's intensive margin labor supply adjustments after their partners experienced a job loss. Thus, in these analyses we only consider women who are in employment when their partners' job loss occurred. Secondly, we examine extensive margin adjustments; that is, we examine whether women who were not employed when their partners lost their jobs have a higher tendency to take up employment after the job loss occurred. Lastly, we conduct a comprehensive set of tests to assess the robustness of our results.

4.1 Intensive margin adjustments

Figure 1 comprises six panels with the main outcome variables of interest. Panel A and B show how the male partner was affected by a job loss and thus present the first stage

¹⁸In the context of the partner's labor supply preferences, it is very likely that our outcome of interest—desired working hours of female partners—is uncorrelated to their male partner's dismissal. We therefore consider both job loss due to plant closure and due to dismissal as an exogenous shock to household income. In a robustness check we consider plant closures and dismissals separately and the outcomes do not significantly differ, which strengthens our joint approach (see Figure 4).

to our analyses. Panel A depicts the employment rate of male partners. By construction, all male partners in the treatment and control group were in employment in the two years prior to the job loss. While all men in the treatment group experience a job loss between period -1 and 0, the employment rate of treated men drops by 45 percentage points (pp) compared to the control group in period 0. Thereafter, there is a partial recovery and the effect is around -25 pp in period 1 and 2. Accordingly, many of the men affected by a job loss find a new employment relatively quickly.

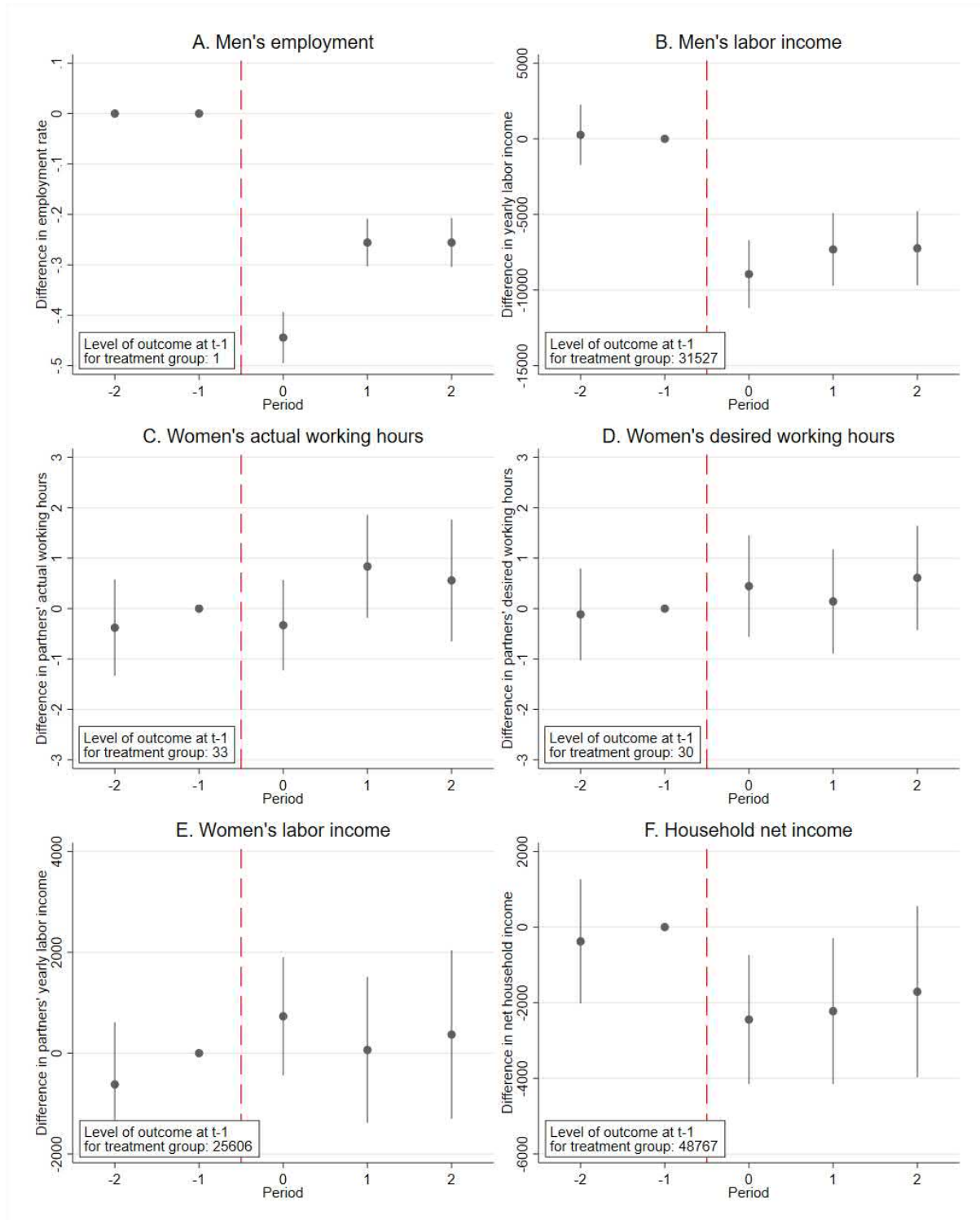
Panel B shows how men's yearly gross labor income is affected by a job loss. In period 0, it drops by around 9,000 € compared to the labor income of the control group. Thus, the unexpected job loss clearly affects men's labor income with an average relative reduction of about 28% in period 0. Again, one can observe a slight recovery in the periods thereafter: in period 2 the effect is at around -7,500 €. However, as depicted by Panel A, a substantial proportion of the affected men take up a new position relatively quickly and are back in employment at the time of the survey in period 0, which is also reflected in their incomes.

Panel C shows how the female partners' actual working hours react to the job loss of their male partners. There is no immediate reaction to the job loss in period 0. The point estimates for period 1 and 2 indicate a slight increase in actual working hours in these periods; however, none of the effects is statistically significant at the 95% level. Consequently, we do not find a significant adjustment on the intensive margin of labor supply and therefore no evidence of an added worker effect.

However, the stated labor supply preferences of women might still have changed after their male partners' job loss. Panel D therefore depicts how women's desired working hours develop after the shock to household income. While the point estimates indicate a very small increase in desired working hours in all post-shock periods, none of the estimates is statistically significant.

In Panel E we examine women's labor income after their partners' job loss. Similarly to women's labor supply, we do not find significant changes in women's labor income after their male partners' job loss.

Lastly, in Panel F, we analyze how the men's involuntary job loss affects household net income. In the periods after the shock, household net income drops on average by about 2,000 €, which amounts to a decline of 4% relative to the pre-shock household net income. Thus, the effect of the male partners' job loss on household net income is considerably smaller (both in absolute and relative terms) than its effect on men's individual gross labor income (Panel B). Furthermore, in general, the effect of men's job loss on household net income is only temporary as we only find a significant drop in periods 0 and 1. In period 2, the point estimate is smaller and not statistically significant. Both the small magnitude and the short-term nature of the drop in household net income might explain the absence of larger adjustments in the female partners' labor supply or



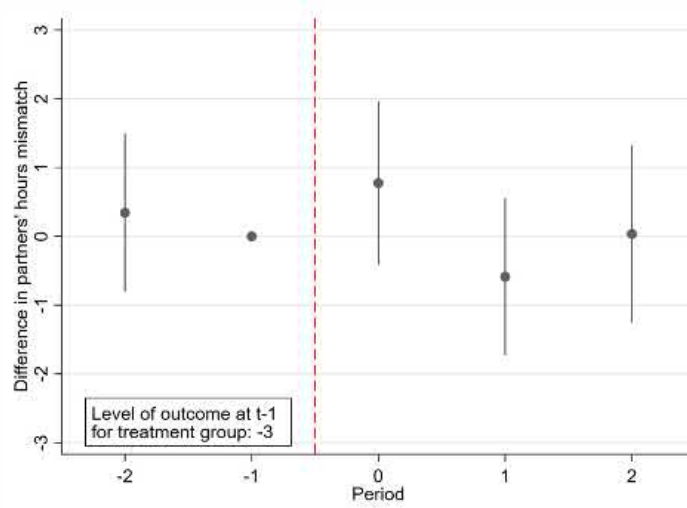
Note: Shows period-specific coefficients according to Eq.(1). Bars give robust 95% confidence intervals of the respective coefficients. All incomes are price-adjusted and presented in 2019 Euros. Number of individual observations: 860 (430 treated, 430 control units). *Source:* SOEP v37.

Figure 1. Main outcomes after men's job loss

labor supply preferences.

As mismatches between desired and actual hours can have serious consequences on earnings and well-being, we are particularly interested in whether a shock to household

income due to a partner's job loss causes such mismatches. Therefore, in Figure 2 the effect of male partners' job loss on women's hours mismatches is examined. Similar to the findings for desired and actual working hours, there is no clear pattern of changing hours mismatches after the male partners' job loss. While point estimates indicate some minor fluctuations after the shock, none of the coefficients is statistically significant at the 95% confidence level. Thus, there is no indication that a partner's job loss can be considered as one of the drivers of women's hours mismatches.



Note: Shows period-specific coefficients according to Eq.(1). Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 860 (430 treated, 430 control units). *Source:* SOEP v37.

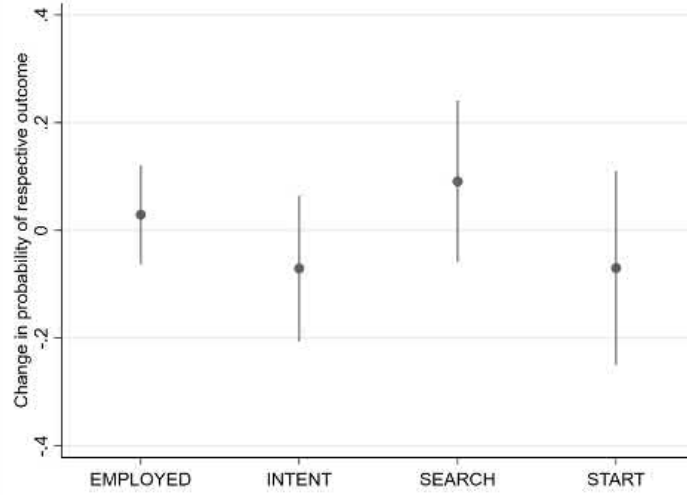
Figure 2. Women's hours mismatch after men's job loss

4.2 Extensive margin adjustments

For female partners who are not in employment at the time of the interview before their male partner experiences a job loss, desired or actual working hours are not observed. For these women we therefore consider other outcome variables that capture their probability of actually taking up employment or their intent to do. As our sample contains only 172 couples after matching for which this is the case, we deviate from our period-specific event study framework and instead compare our outcomes of interest in the pre-shock period with the period after the job loss occurs in a standard differences-in-differences approach.¹⁹

Figure 3 depicts the outcomes for women who were out of employment when their male partners experienced a job loss. The first coefficient presents the actual extensive employment margin; that is, it shows whether women who are out of employment when their partners experience the job loss have a higher probability of taking up employment than women who are out of employment and whose partners do not experience a job loss. As shown, women's probability of taking up employment does not increase significantly.

¹⁹See Eq. (2) in the Appendix for the detailed regression equation that we estimate.



Note: Shows coefficients of a diff-in-diff regression of extensive margin outcomes according to Eq.(2). Bars give robust 95% confidence intervals of the respective coefficients. EMPLOYED stands for the effect on employment probability, INTENT for the effect on a dummy variable capturing the stated intent to (re-)enter employment, SEARCH for the effect of actively searching for a job within two weeks prior to the survey, while START stands for the effect on a dummy capturing whether the respondent would be able to start a new position within two weeks. Number of individual observations for EMPLOYED: 344 (172 treated, 172 control units). For INTENT, SEARCH, and START the number of observations is slightly lower because we can only analyze these outcomes for women who are still unemployed in the period after the job loss. *Source:* SOEP v37.

Figure 3. Extensive margin outcomes

Women’s employment probability remaining unaffected by their partners job loss does not rule out that women in affected households adjusted their labor supply preferences in terms of their intent to take up employment or their job search behavior. However, the second, third, and fourth coefficient depicted in Figure 3 show that neither women’s stated intent to enter employment, the active job search behavior, nor the willingness to start a new position within two weeks significantly changed after their partners’ job loss. Thus, also for the extensive margin of employment, we do not find any significant effect of the male partners’ job loss on women’s actual employment probability nor on variables capturing their stated labor supply preferences.

4.3 Robustness checks

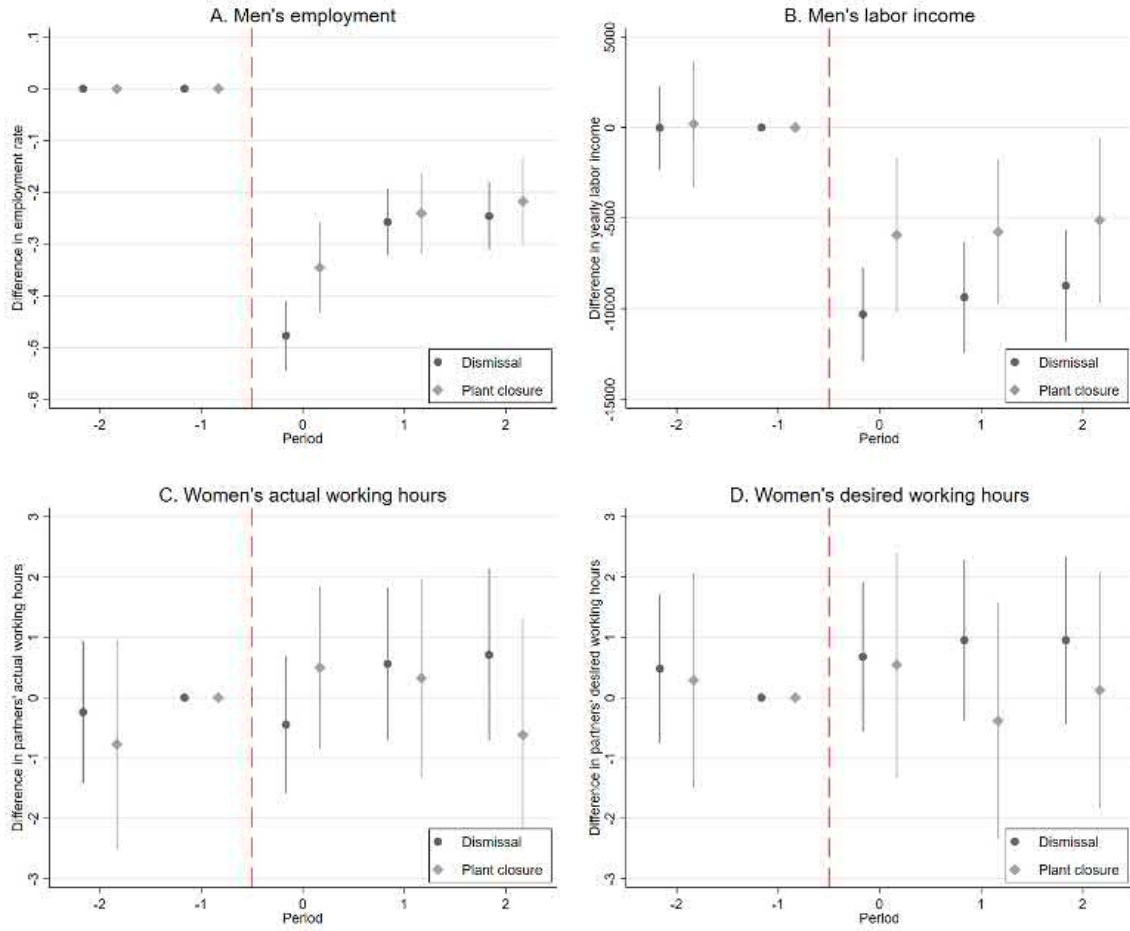
As we find no significant effects of a partner’s involuntary job loss on women’s labor supply preferences, we conduct a variety of sensitivity analyses to assess the robustness of the null effects and examine whether the results change for some particularly affected couples. The sensitivity analyses can be classified into three broad categories. First, we investigate the robustness of our empirical strategy by using an alternative matching approach, an alternative estimator proposed by Callaway and Sant’Anna (2021) and differentiating between different types of involuntary job loss (plant closure vs. dismissal). Secondly, we explore the heterogeneity of women’s (desired) labor market responses to their partners’ job loss for a number of different sub-groups (e.g. women with vs. without children, women working full-time vs. part-time jobs before their partners’ job loss). And

lastly, we investigate whether the "shock intensity" (e.g. duration of men's unemployment, relative loss in household income) matters for women's (desired) working hours adjustments following their partners' involuntary job loss.

Robustness of empirical strategy First, we provide an alternative to our baseline estimates, which are based on exact matching and propensity score matching. Figure A.4 presents estimates based on exact matching and the commonly used Mahalanobis distance matching approach (Mahalanobis, 1936) using the same matching variables. The results based on this alternative matching approach are fairly similar to our baseline estimates and no significant desired added worker effect can be found.

Furthermore, the recent literature on dynamic treatment effects has emphasized the importance of taking into account time-specific heterogeneous treatment effects when estimating ATTs in standard two-way fixed effects models and pooling events at different points in time (Goodman-Bacon, 2021). To ensure that heterogeneous treatment effects along event timing do not bias our main estimates, we re-run our main analysis using the estimator proposed by Callaway and Sant'Anna (2021). The aggregate group-time ATTs estimated based on Callaway and Sant'Anna (2021) do not substantially alter our results (see Figure A.5). This is not surprising given the fact that we follow Schmieder et al. (2023) in their strategy of stacking matched treatment-control groups for each year of job loss, which already has strong similarities to the estimator proposed by Callaway and Sant'Anna (2021).

Additionally, we differentiate between two different types of involuntary job loss: layoff due to plant closure and dismissal. There is an extensive literature on the effects of unexpected job loss focusing solely on individuals affected by plant closures or mass layoffs as these job loss events are seen as credibly exogenous (e.g. Marcus, 2013; Schmieder et al., 2023). However, as already explained in Section 2.1, we also include dismissals as another type of involuntary job loss. In order to make sure that also including dismissals does not bias our main results, Figure 4 shows outcomes after differentiating between couples for which the male partner was dismissed and couples for which the male partner was affected by plant closure. As we can see in Figure 4 (Panel A), the drop in the employment rate between period -1 and period 0 is more severe for dismissed workers (-48 pp) than for individuals who lost their job due to plant closure (-34 pp). This large drop in the employment rate is accompanied by an income loss of around 10,000 € for dismissed workers. At the same time, income loss of men affected by plant closure between period -1 and period 0 is around 5,500 €. While employment rates converge very quickly, differences in income losses seem to be more persistent for these two groups. Regarding the female partners' labor supply responses, we find no clear pattern for actual working hours. In contrast, for desired working hours, the point estimates for women with dismissed partners are higher, which could be due to the persistently higher



Note: Shows period-specific coefficients according to Eq.(1) differentiated for couples affected by dismissal or plant closure. Bars give robust 95% confidence intervals of the respective coefficients. Gross labor income is price-adjusted and presented in 2019 Euros. Number of individual observations: Plant closure: 266 (133 treated, 133 control units); dismissal: 528 (264 treated, 264 control units). Note that the overall number is lower than in our main specification because the underlying logit estimations of our year-by-year propensity score matching procedure do not converge in all years due to the small sample size after splitting the sample. *Source:* SOEP v37.

Figure 4. Different types of involuntary job loss—dismissals vs. plant closures

income losses that these couples experience. However, most importantly, no significant differences in actual and desired labor supply responses can be found for these two types of involuntary job loss.

Heterogeneity by sub-groups In our baseline analysis, which is based on the full sample, we do not find any evidence for a significant female labor supply response to male partners' involuntary job loss—both with regards to their actual and desired working hours. In order to gain a deeper understanding of whether this lacking response is universal or whether there are more responsive groups, we perform a number of different sensitivity checks to analyze heterogeneity in labor supply responses for different sub-groups.

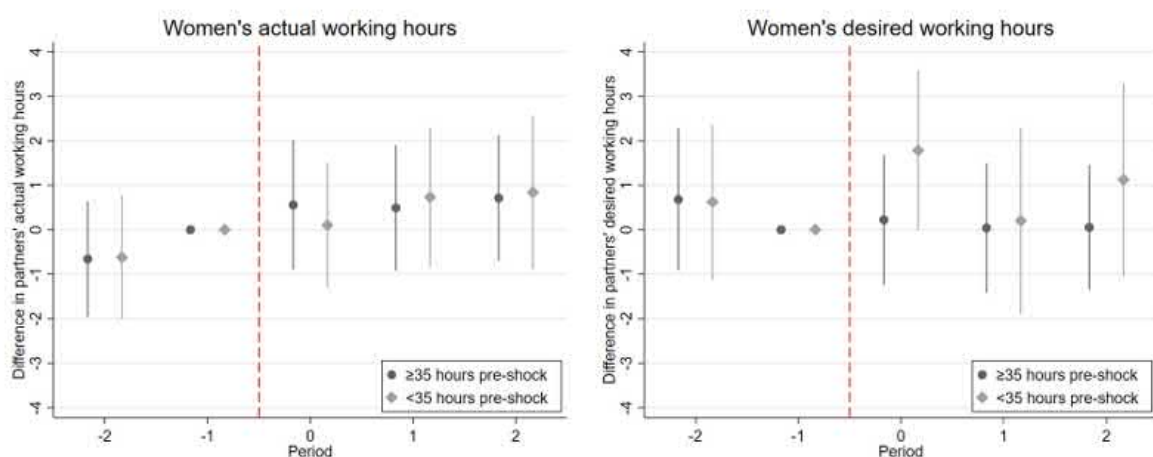
First, we investigate whether married women react differently than unmarried women.

In our main specification we consider all cohabiting couples in stable relationships, regardless of their marital status. However, theoretically, there are different ways in which marital status could influence labor supply responses. For example, unmarried women might not respond as strongly to their partners' job loss as married women since they might not see themselves as forming an economic unit with their partner. Indeed, evidence on a lower degree of income pooling in unmarried compared to married couples (e.g. Hiekel et al., 2014; Evans and Gray, 2021) can be interpreted as a sign of higher degrees of individualism and independence. In line with this argument, Triebe (2015) finds evidence for an added worker effect for married but not for unmarried couples. On the other hand, higher marginal effective and participation tax rates due to joint taxation of married couples could prevent wives from increasing their labor supply at the extensive and intensive margin—especially once their partners are re-employed (see e.g. Bick and Fuchs-Schündeln, 2017). To assess whether marital status impacts our results, we exclude unmarried couples from the analysis, which reduces our sample size by 16%. As depicted by Figure A.6, no substantial differences to our baseline results occur when only analysing married couples.

Next, we examine the role of children in the household for the effect of partners' job loss on female labor supply. Raising children is one of the major determinants of within-household division of time and thus also of labor supply decisions. Accordingly, the presence of children in different age groups has major implications for the added worker effect (Halla et al., 2020; Cammeraat et al., 2023). Therefore, in Figure A.7, we differentiate between the labor supply responses of women with children and women without children living in the same household. While point estimates indicate small positive adjustments of actual and desired working hours among women without children, we find no significant effect on actual or desired hours for women with children or for women without children. As the children's age might be an important factor for the mother's time budget, we also separately examine mothers of children under or over 12 years old. With smaller groups under investigation, we lose precision and find insignificant point estimates very close to zero and no meaningful differences between the different groups.

Furthermore, we want to investigate whether the (desired) added worker effect is stronger for women working fewer hours before their partners' job loss. Naturally, the potential scope for the added worker effect is larger among women working part-time jobs than among women working full-time jobs. We therefore divide our sample of women who are employed in the year before their partners' involuntary job loss into two groups: 1) women working at least 35 hours, and 2) women working fewer than 35 hours. The average number of actual weekly working hours for women working fewer than 35 hours is 23 hours in $t-1$ while it is considerably larger for the group of women working 35 hours or more (37 hours). As depicted by Figure 5, responses in actual working hours are not

statistically significant and roughly equal in size for both groups. However, we find an increase in desired working hours for women working fewer than 35 hours per week before their partners' involuntary job loss in period 0. Desired working hours increase by around two additional hours, an 8% increase in comparison to their pre-shock desired working hours (24 per week). With a p-value of 0.051 the effect is on the verge of statistical significance. As a result, there is a clear mismatch between the responses in actual and desired working hours in period 0. The increase in desired working hours vanishes in period 1 and period 2 and is therefore only temporary. In contrast, we find no evidence for an increase in desired working hours for women who worked 35 or more hours before their partners' job loss.



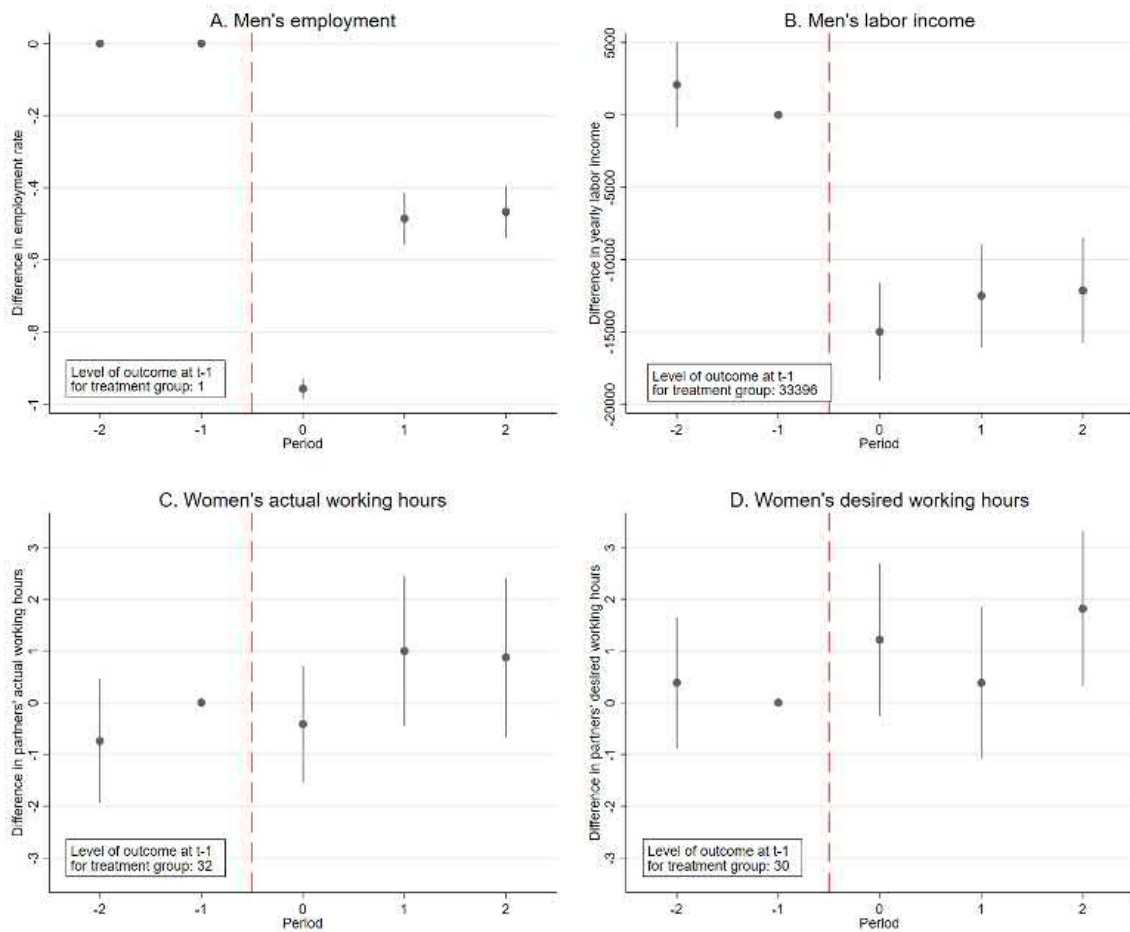
Note: Shows period-specific coefficients according to Eq.(1) differentiated for women with different levels of pre-shock working hours. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 304 women with <35 hours pre-shock (152 treated, 152 control units); 408 women with ≥ 35 hours pre-shock (204 treated, 204 control units). Note that the overall number is lower than in our main specification because the underlying logit estimations of our year-by-year propensity score matching procedure do not converge in all years due to the small sample size after splitting the sample. *Source:* SOEP v37.

Figure 5. Different levels of pre-shock working hours

Accounting for shock intensity One of the potential reasons for the absence of stronger labor supply responses could be the limited intensity and persistence of the income shock that households experience after the male partner's job loss. As depicted in Panel A of Figure 1 and described in Subsection 4.1, the majority of men are back in employment relatively quickly and average effects on household income are modest (around -4%).

The following set of sub-analyses examines whether labor supply reactions of female partners differ for couples for whom the experienced shock was particularly severe. First, we repeat our main analyses but restrict our sample to only include couples in which the male partner was still out of employment when the interview in period 0 was conducted. Figure 6 shows results for this sub-group analysis. Panels A and B show that—as expected—the shock was more intense for this group. For men affected by an involuntary

job loss, the employment probability in period 0 is reduced by 95%²⁰ while yearly gross income on average drops by 15,000 €, which amounts to 45% of pre-shock income. Thus, the negative income shock is substantially larger than it is in our baseline analysis where yearly gross income on average drops by around 9,000 € (see Panel B of Figure 1). Panel C displays actual hours of the female partner. As for the main analysis, we do not find any significant effect on actual hours. However, the point estimates indicate a slight increase of one hour in period 1 and period 2. Due to a lack of precision after reducing the sample by more than half, the estimates are not statistically significant. Panel D shows the female partners' desired working hours. In all post-shock periods point estimates are positive, indicating a slight increase in desired working hours. However, the effect is only statistically significant at the 95% level in period 2 and indicates an increase of close to 2 hours per week or 6.7%.



Note: Shows period-specific coefficients according to Eq.(1) for a restricted sample of only couples in which the men were still unemployed in period 0. Gross labor income is price-adjusted and presented in 2019 Euros. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 420 (210 treated, 210 control units). *Source:* SOEP v37.

Figure 6. Larger shock intensity: longer unemployment spells

²⁰Note that the ATT is not 100% because some men in the control group might also move out of employment for other reasons than an involuntary job loss.

Secondly, we take into account the relative income loss that couples experience due to the involuntary job loss. We restrict the sample to contain only couples in the top half of relative income loss from period -1 to 0. Results are presented in Figure A.8 in the Appendix. The results are generally very similar to the results of sub-group analyses for couples in which the male partner was still unemployed in period 0. Point estimates for both actual and desired hours indicate small increases in post-shock periods but are insignificant.

Lastly, we restrict the sample to contain only couples, in which the male partner worked in full-time employment prior to losing his job. As 95% of men in the treatment group work in full-time employment, this only slightly reduces the sample. Due to the large overlap with the baseline sample, the results which are displayed in Figure A.9 in the Appendix mirror our main results, as would be expected.

Overall, examining sub-groups for whom the experienced shock was particularly severe yields more insights with respect to the dynamics of female labor supply preferences after the male partners' job loss. There is evidence that women's desired working hours tend to increase after a job loss that puts their male partners out of employment for a longer period of time. However, due to the small sample size these results should be interpreted rather cautiously.

5 Discussion

The main focus of our study is to analyze both the actual and the desired labor supply response of women to their male partners' involuntary job loss. Primarily, we investigate changes at the intensive margin, i.e. changes in actual and desired working hours. In line with existing studies for Germany (e.g. Fackler and Weigt, 2020; Illing et al., 2021), we find no evidence for an added worker effect in actual labor supply. Moreover, we provide novel evidence for the absence of a significant effect on desired working hours. We thus show that the absence of the added worker effect generally reflects the stated labor supply preferences of women and cannot be attributed to labor market frictions preventing women from adjusting working hours according to their changed preferences.

Several potential reasons why women do not seem to desire an increase of their labor supply are conceivable. One reason could be that the loss in household net income is not that severe or sufficiently long-lasting for women to adjust their labor supply preferences. In line with recent studies for Germany (e.g. Illing et al., 2021; Jarosch, 2023; Schmieder et al., 2023) we find evidence for, on average, significant and persistent gross earnings losses for individuals affected by job loss (see Figure 1, Panel B). However, reduction in household net income (after taxes and benefits) is much less severe and no longer statistically significant just two years after the job loss occurs (see Figure 1, Panel F). Thus, the German tax and transfer system plays a substantial role in mitigating the

income shock, which is in line with findings by Ehlert (2012) and Fackler and Weigt (2020).²¹ Fackler and Weigt (2020) show that redistributive measures of the tax and transfer system reduce the household income gap between couples affected by job loss and their non-affected counterparts by around 93% in the first year after job loss and by approximately 72% in the longer run (five years after job loss occurs).

In addition to the rather generous unemployment insurance system, many of the male partners affected by an involuntary job loss appear to find new jobs relatively quickly. In fact, the effect on men’s employment implies that the employment rate in the treatment group is only reduced by 25% compared to the control group in period 1 (see Figure 1, Panel A). Thus, for the majority of the affected men, the time between job loss and re-employment appears rather short.²² As a result, it is likely that in most cases the male partners’ temporary unemployment does not lead to a persistent change in the intra-household division of housework. While Foster and Stratton (2018) show that significant labor market events can indeed affect the division of time spent on housework between partners, recent results for Germany by Hennecke and Pape (2022) cast doubt on the persistence of these effects. Hennecke and Pape (2022) show that a father’s job loss significantly increases paternal childcare and housework in the short-run; however, effects reverse shortly after re-employment and no strong evidence for persistent changes in bargaining powers or gender role attitudes exists. Against this background, the lack of a response in women’s actual and desired working hours could also be the result of both factors: first, the anticipation that short-term changes in the intra-household division of housework and childcare are not persistent and second, the actual reversal to the prior intra-household division of these tasks once their partner finds a new job. Generally, gender roles in Germany are on average more traditional than in most other Western societies (Kleven et al., 2019). These traditional gender roles in Germany might be a crucial determinant for the absence of women’s labor supply response as women on average carry out most household and childcare-related tasks (Samtleben, 2019; Schäper et al., 2023).

However, as seen in Figure 5, when we consider only couples in which women worked less than full time and thus had the capacity for an extension of their labor supply, we find small indications for a temporary increase of desired working hours while actual

²¹For example, under the current regulations, former employees who were employed for at least 12 months receive unemployment benefits of 60% (67% in case of parenthood) of their prior gross earnings. The duration of entitlement depends on the duration of the prior employment and on age. For individuals aged less than 50, the maximum duration of entitlement is one year. After this benefit has expired, individuals will only receive a basic payment at subsistence level, which takes into account income and wealth of all household members. See Schmieder and Trenkle (2020) for a more detailed description of the German unemployment insurance system.

²²Note that the majority of our observation period is characterized by very good labor market conditions in Germany that are often described as the “German labor market miracle” (Burda and Hunt, 2011). Illing et al. (2021), who use German administrative data on involuntary job losses occurring between 2002 to 2012, also find a high propensity of swift re-employment.

working hours remain unchanged. Also, we obtained similar results when considering only couples in which the male partner was still unemployed in period 0 (see Figure 6). Thus, while the magnitude is small (between 1 and 2 hours), there exist certain cases in which women prefer an extension of working hours but are unable to adjust their actual working hours accordingly after their partners' job loss. This is consistent with Knaus and Otterbach (2019) and Euwals (2001) who find that adjusting working hours within an existing job is difficult for many employees, in particular for women. In addition, if adverse macroeconomic or regional labor market conditions lead to the male partner's dismissal or plant closure, these conditions may correlate with the female partner's perceived and actual chances of adjusting their working hours or finding a job. In fact, Halla et al. (2020) and Illing et al. (2021) argue that correlated shocks affecting both partners working in similar regions and industries are a potential explanation for the absence of an added worker effect. This idea is closely related to the literature on the so-called discouraged worker effect (see e.g. Benati, 2001; Van Ham et al., 2001).

As we only find small differences in women's desired and actual labor supply responses limited to specific sub-groups, we can draw from our analyses that household income shocks due to involuntary job loss are not a main driver of mismatches between desired and actual working hours. At the same time, these mismatches seem to be a pervasive characteristic of the German labor market that is well documented (Knaus and Otterbach, 2019; Beckmannshagen and Schröder, 2022). It is left for future research to systematically discover the drivers of mismatches between desired and actual working hours.

6 Conclusion

In this paper, we conduct an in-depth examination of the adjustments in actual labor supply and stated labor supply preferences of women after their partners suffered an involuntary job loss. In doing so, we shed light on the question of whether the absence of added worker effects is in line with women's labor supply preferences or whether it is due to an inability to realise their labor supply preferences.

Our event study analysis shows that neither the actual working hours nor the desired working hours of women change significantly after their partners' job loss. Thus, we provide evidence that the absence of the added worker effect in Germany is in line with the labor supply preferences of women and cannot be explained by labor market frictions preventing them from adjusting working hours according to their changed preferences. Instead, our results indicate that the household income shock caused by the involuntary job loss is only temporary as the majority of affected men find new jobs in the same year in which the job loss occurs. At the same time, in the short run, the German unemployment insurance system is rather generous and offers high replacement rates. The interplay of these two factors—many of the affected men finding new jobs relatively

quickly, and insurance through the tax and transfer system during the unemployment period— may alleviate the pressure on the female partner to quickly adjust labor supply and thus likely presents a reason for the absence of desired and actual added worker effects.

In general, our results imply the persistence of the intra-household division of paid and unpaid work—even if households face exogenous (income) shocks. This suggests that short-term changes in partners’ time availability do not suffice to achieve a more gender equal intra-household division of labor. To shed long-term habits as well as overcome workplace and societal expectations, substantial and permanent changes in the institutional setting (e.g. in the financial incentives through a reform of the joint taxation of married couples in Germany) and norms might be necessary.

Nonetheless, our sub-analyses provide suggestive evidence that under certain circumstances (e.g. high shock intensity, low level of pre-shock working hours), women wish to slightly extend their labor supply in the short run but are unable to do so. Against this background, by indicating the possible existence of a desired added worker effect, this study can be considered as a starting point for future research on this topic. For example, future studies could aim to examine whether the effect is more pronounced in local labor markets, industries or periods within the business cycle which are characterised by strong labor market frictions or monopsony power. Furthermore, it would be intriguing to analyze the mismatch between desired and actual labor supply responses to partners’ job loss for countries other than Germany with different tax and benefit systems, gender norms, and labor market conditions.

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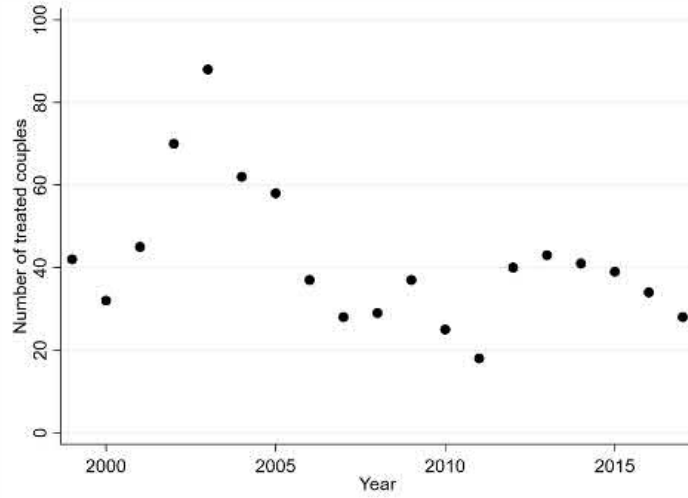
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Appendix

Descriptive statistics



Note: Shows yearly number of couples in which the male partner experiences an involuntary job loss. Refers to the total number of couples regardless of the employment status of the female partner. *Source:* SOEP v37.

Figure A.1. Number of treated couples by year

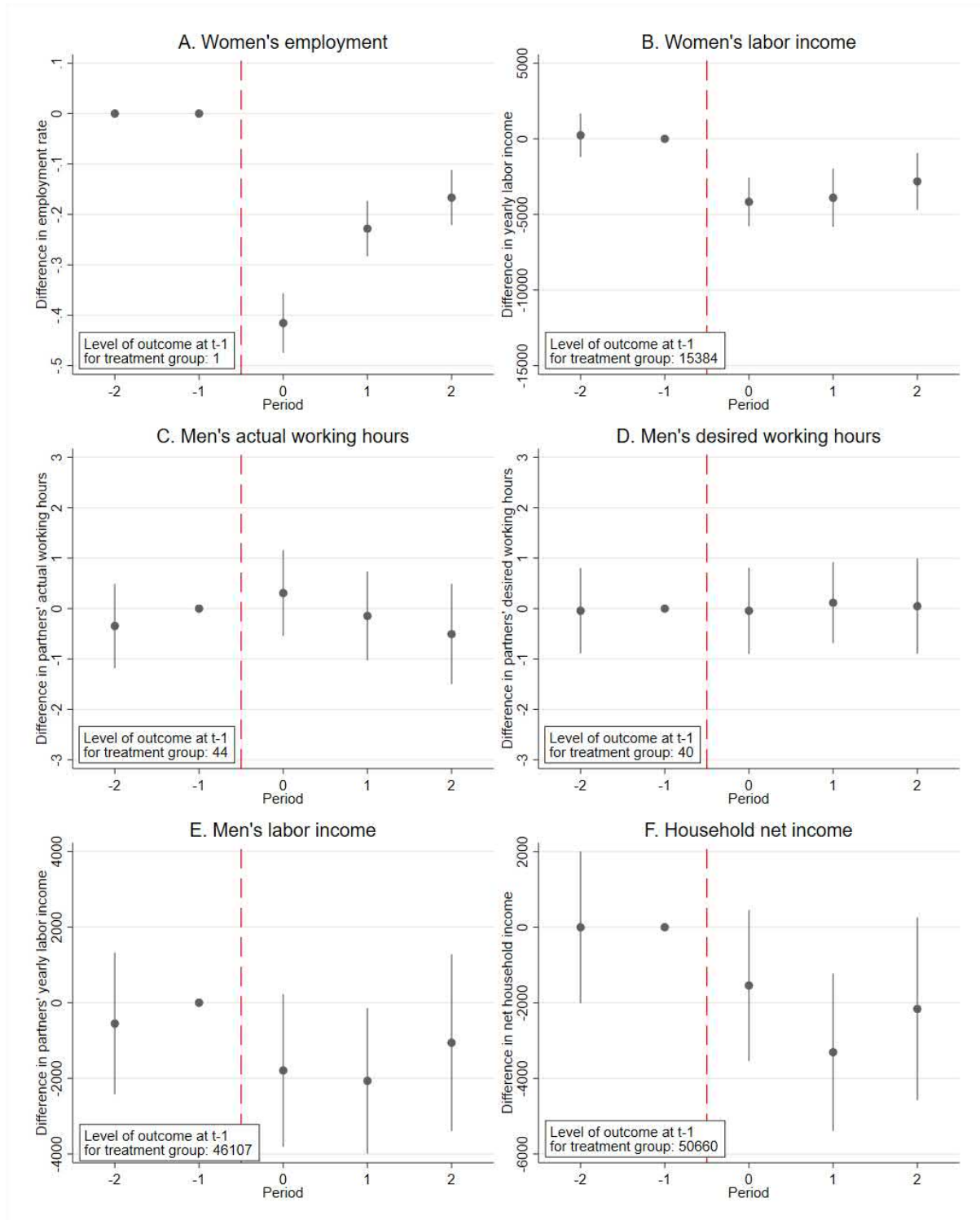
Regression Equation for Extensive Margin Outcomes The difference-in-difference approach applied for extensive margin outcomes follows

$$Y_{i,t} = \alpha B_{i,t} + \beta B_{i,t} \times T_i + \nu_i + \tau_t + \varepsilon_{i,t}, \quad (2)$$

where $B_{i,t}$ is a dummy variable that is 1 in any post-shock period, T_i is the respective treatment group dummy, ν_i is an individual fixed effect, τ_t is the year dummy, and $\varepsilon_{i,t}$ is an idiosyncratic error. In this setting the β coefficient of the interaction term between treatment indicator and the pre-/post-shock dummy is the coefficient of interest.

Men's labor supply reactions to female partners' involuntary job loss Our main analyses focus on women's labor supply preferences after their male partner is affected by an involuntary job loss. One of the main reasons for concentrating on women's labor supply preferences is the high share of male workers already working in full-time positions. Thus, there is little scope for male partners to increase labor supply and compensate for lost income due to their partners' job loss. However, for reasons of transparency and comprehensiveness, we also conducted a full analysis based on male labor supply preferences after female partners' involuntary job loss.

Figure A.2 shows the results of the main analyses considering households in which the female partner was affected by an involuntary job loss. Panel A shows that the employment rate among affected women drops by about 40% in period 0, while the effect



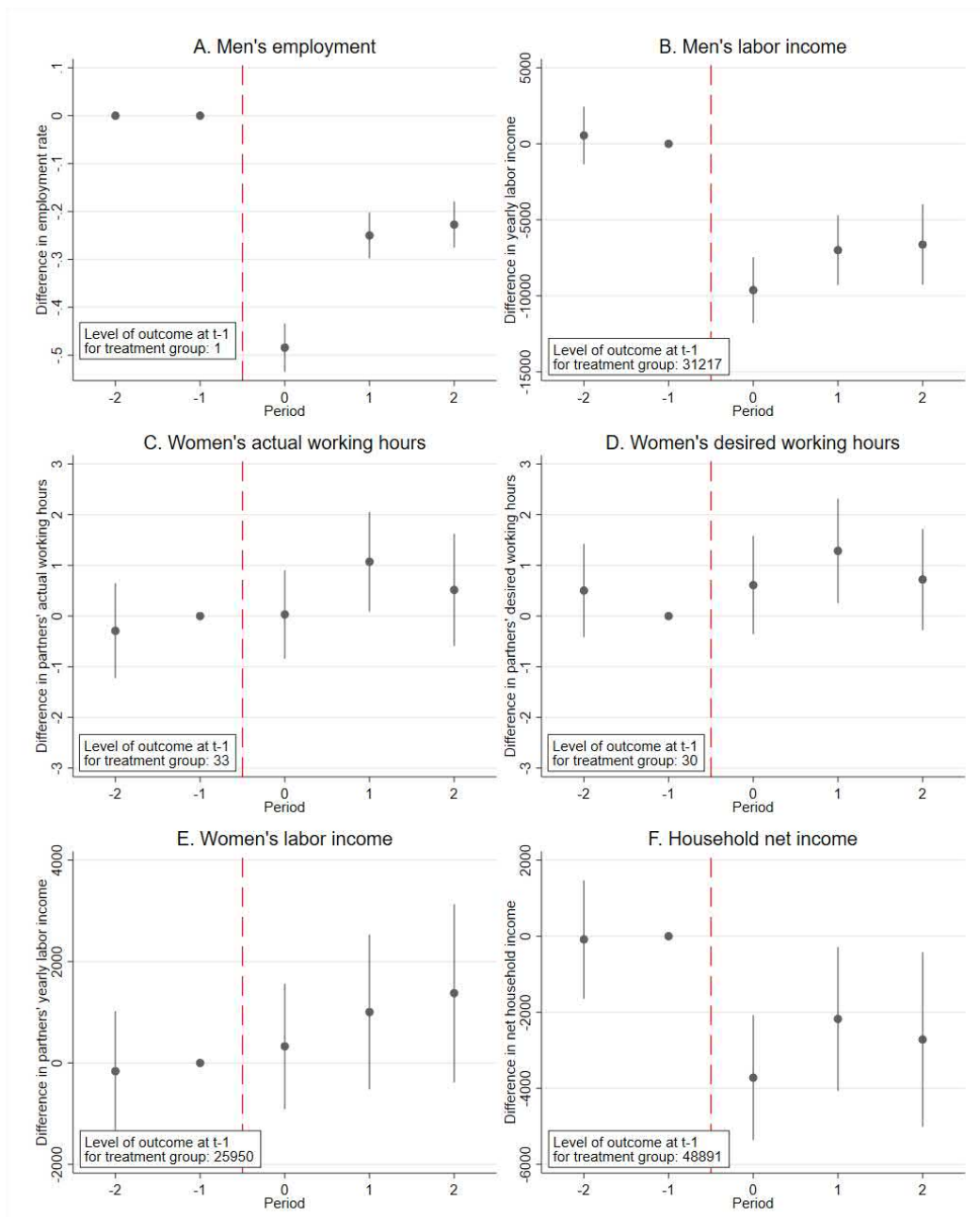
Note: Shows period-specific coefficients according to Eq.(1). All incomes are price-adjusted and presented in 2019 Euros. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 780 (390 treated, 390 control units). Source: SOEP v37.

Figure A.2. Main outcomes for men after female partners' job loss

is around -20% in periods 1 and 2. Accordingly, similarly to the findings for men affected by an involuntary job loss (see Figure 1), large parts of the affected population seem to find a new job rather quickly. Panel B depicts the effect on women's gross labor income.

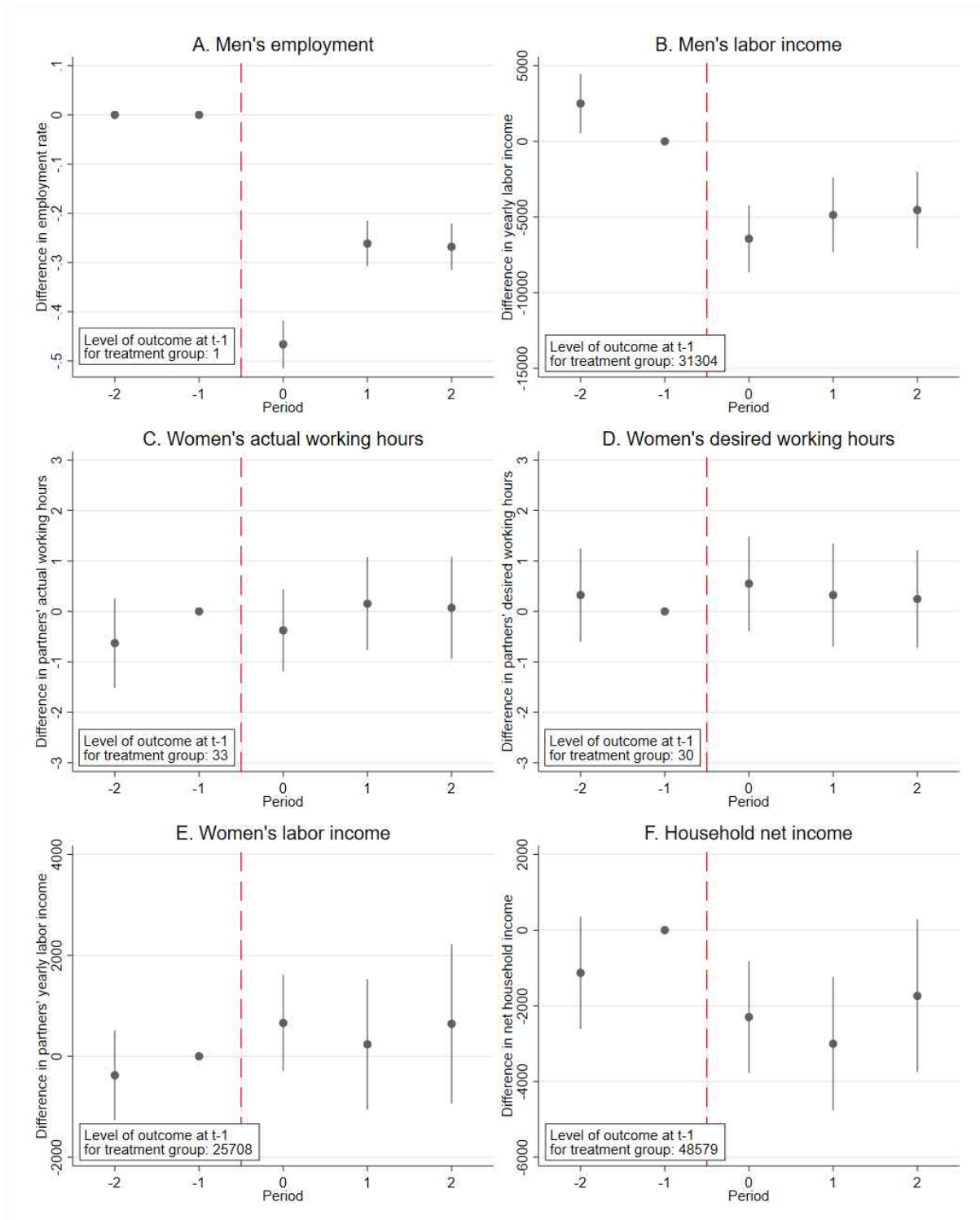
On average, it drops by almost 5,000€ in period 0 and partially recovers in the following periods. In terms of absolute values, the income shock for women is much smaller than for men. However, we also have to consider that women's pre-shock incomes are substantially lower (15,400€ compared to 31,527€ for men). When analysing the male partners' labor supply (Panel C and D), we find no significant effects for actual or desired working hours. Most strikingly, the estimate for desired hours is very precisely zero. Thus, as expected, our results indicate that male labor supply remains unchanged after female partners' involuntary job loss. As depicted in Panel F, the shock to household net income is small and only significantly different from zero in period 1.

Additional Figures



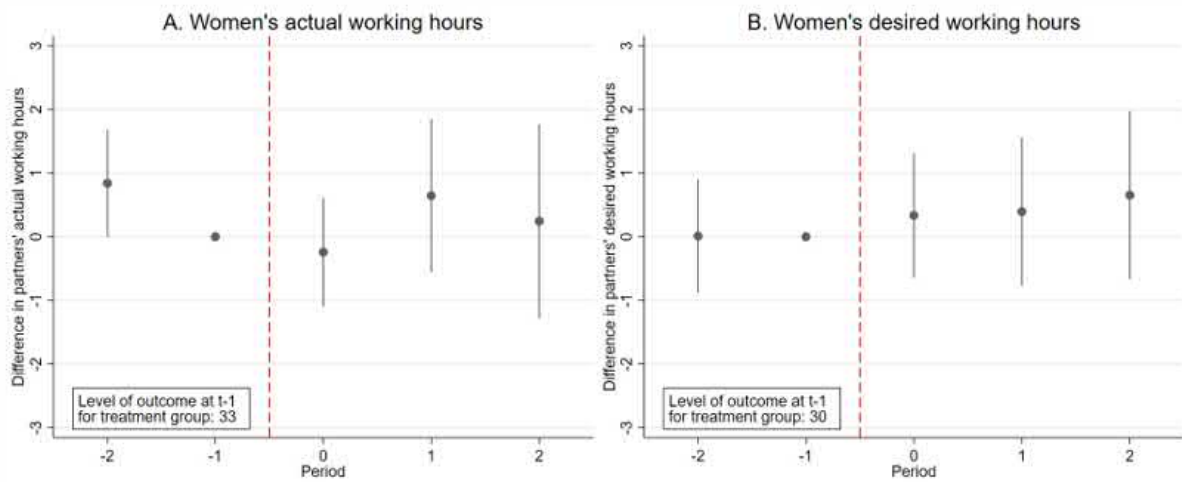
Note: Shows period-specific coefficients according to Eq.(1). All incomes are price-adjusted and presented in 2019 Euros. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 888 (444 treated, 444 control units). *Source:* SOEP v37.

Figure A.3. Main outcomes when considering only the last experienced job loss



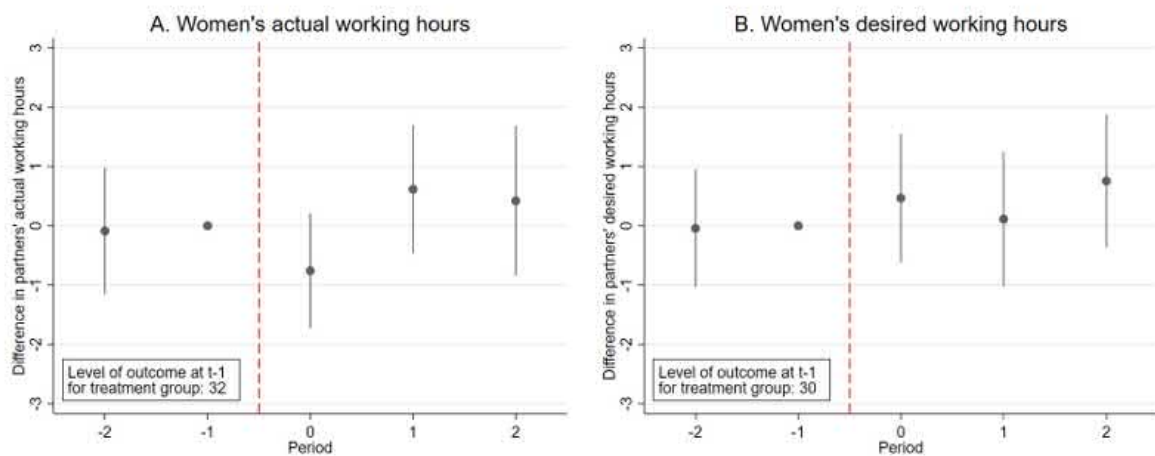
Note: Shows period-specific coefficients according to Eq.(1). All incomes are price-adjusted and presented in 2019 Euros. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 888 (444 treated, 444 control units). *Source:* SOEP v37.

Figure A.4. Estimates based on Mahalanobis distance matching



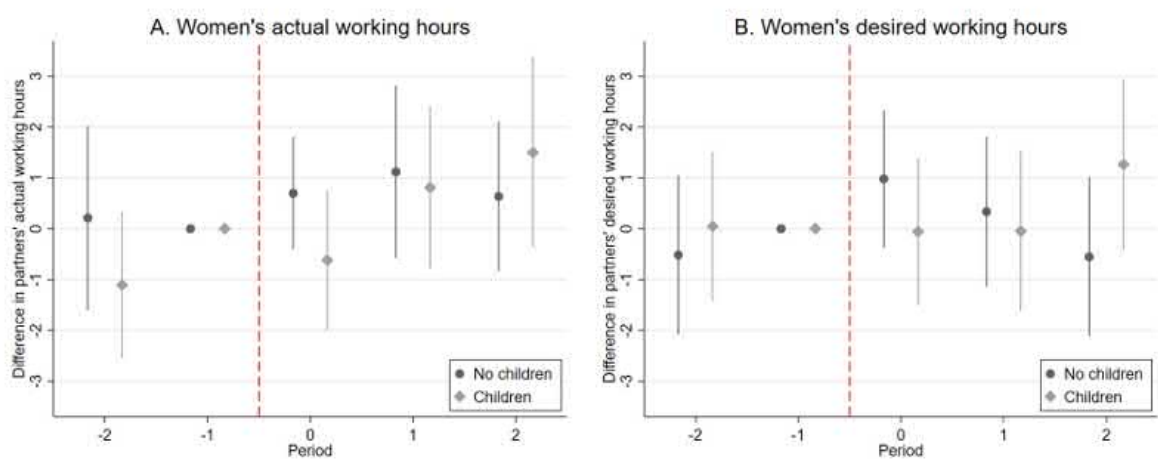
Note: Shows period-specific coefficients according to Eq.(1). Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 860 (430 treated, 430 control units). Source: SOEP v37.

Figure A.5. Results of Callaway and Sant'Anna (2021) Estimator



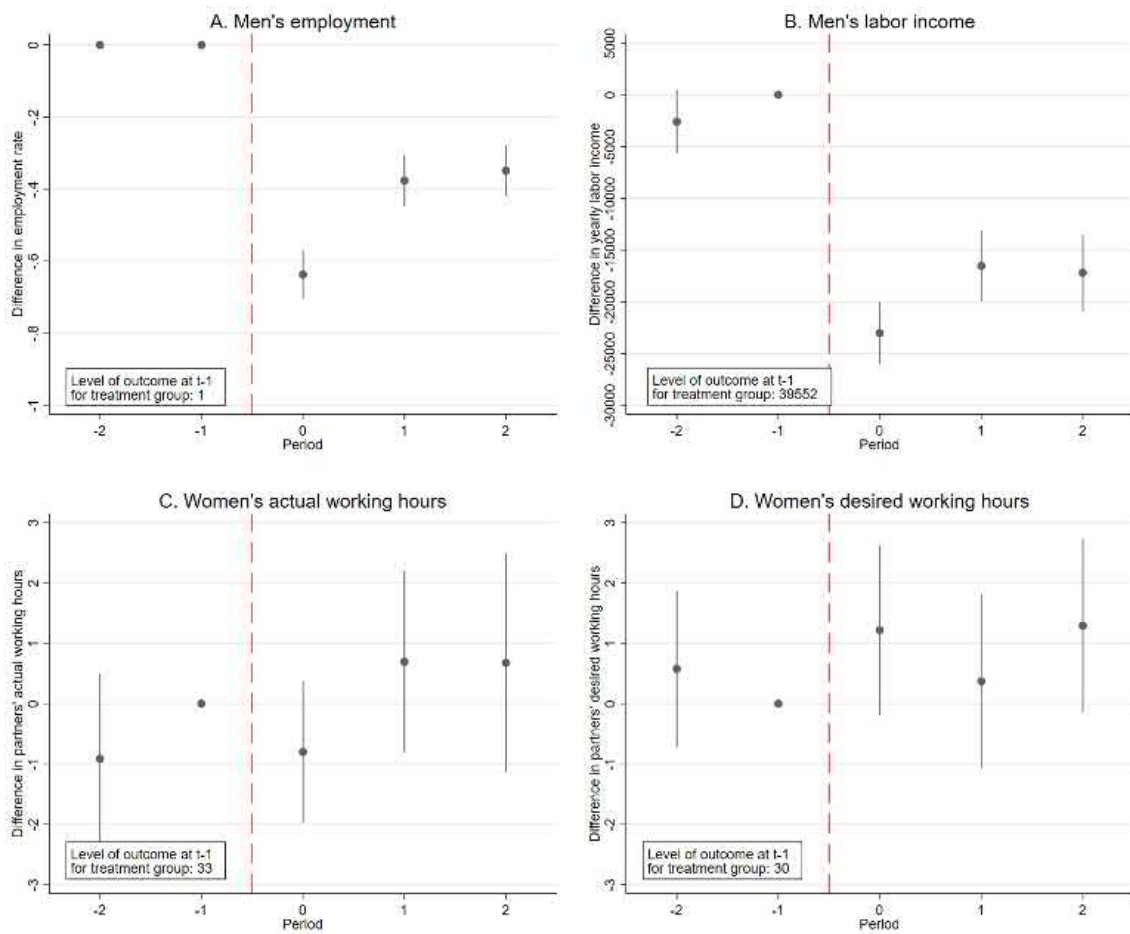
Note: Shows period-specific coefficients according to Eq.(1). Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 726 (363 treated, 363 control units). Source: SOEP v37.

Figure A.6. Results for married women



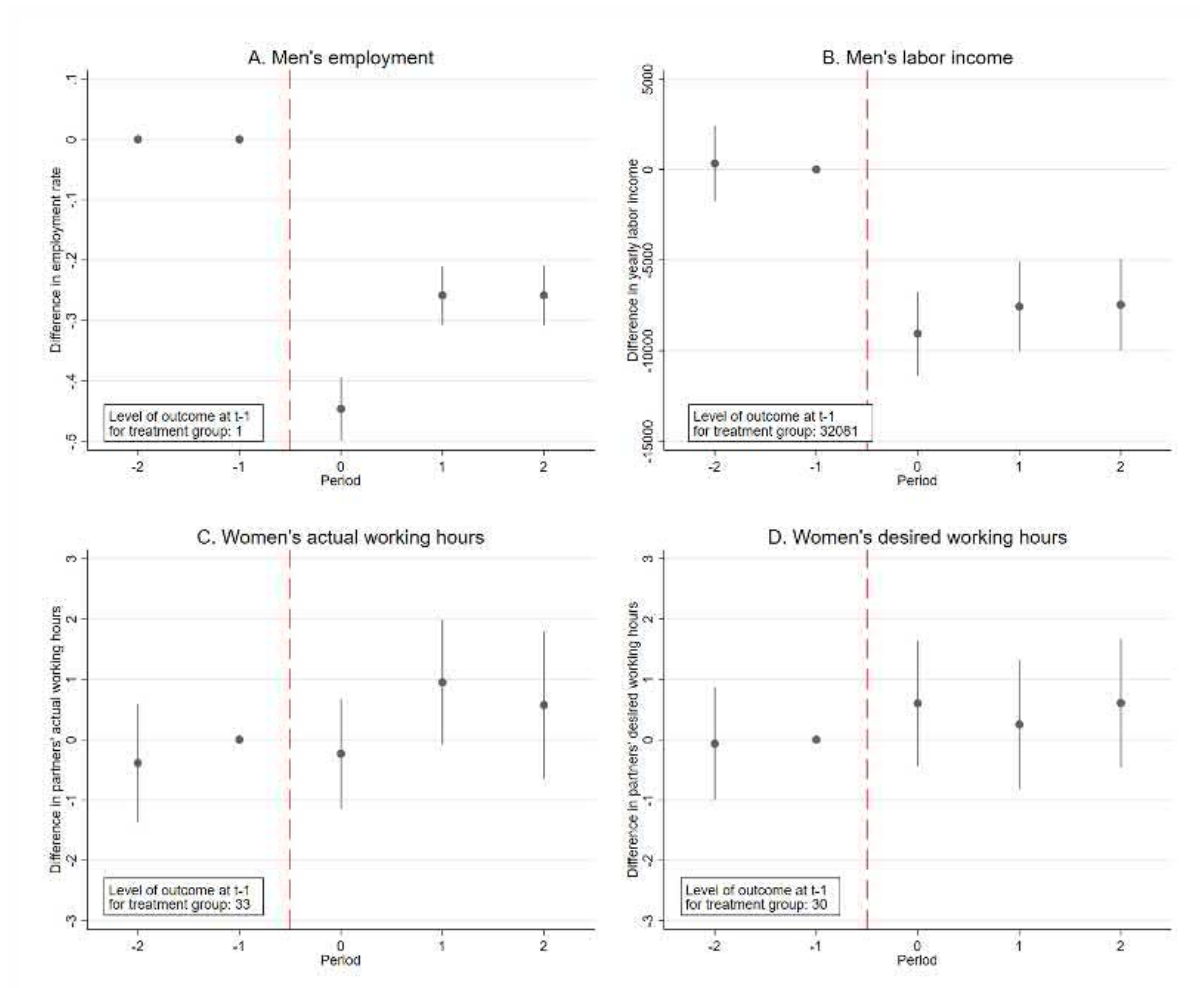
Note: Shows period-specific coefficients according to Eq.(1). Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: No children: 318 (159 treated, 159 control units), children: 422 (211 treated, 211 control units). Note that the overall number is lower than in our main specification because the underlying logit estimations of our year-by-year propensity score matching procedure do not converge in all years due to the small sample size after splitting the sample. *Source:* SOEP v37.

Figure A.7. Results for households with children vs. households without children



Note: Shows period-specific coefficients according to Eq.(1) after restricting the sample to only couples in the top half of the distribution of relative income loss from period -1 to 0. Gross labor income is price-adjusted and presented in 2019 Euros. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 430 (215 treated, 215 control units). *Source:* SOEP v37.

Figure A.8. Results for top half of income loss



Note: Shows period-specific coefficients according to Eq.(1) after restricting the sample to only couples in which the male partner works in full-time employment in period -1. Gross labor income is price-adjusted and presented in 2019 Euros. Bars give robust 95% confidence intervals of the respective coefficients. Number of individual observations: 820 (410 treated, 410 control units). *Source:* SOEP v37.

Figure A.9. Results when men were in full-time employment before job loss

77. If you could choose your own working hours, taking into account that your income would change according to the number of hours:
How many hours would you want to work?
 , hours per week

Note: Contains the question on desired working hours from the 2017 questionnaire. The questions was asked in the same way from 1997 onward.

Figure A.10. Survey question on desired working hours in the SOEP