The Impacts of Health Shocks on Household Labor Supply and Domestic Production

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This paper investigates the impact of severe health shocks on labor supply decisions and domestic production within German households. We draw from the German Socio-Economic Panel (SOEP), focusing on individuals aged 25 to 50 at the time of their first observed health shock. After the health shock, we find that affected individuals suffer a persistent loss in annual gross labor income of around 3,300 Euros. This effect results mostly from adjustments at the extensive margin, with labor market participation declining by about 13%. We observe a reduction in full-time employment, but no significant effect on part-time employment. At the household level, a combination of public transfers and added worker effect effectively compensates for the income loss. Finally, individuals experiencing a health shock, in particular women, spend more time on domestic production.

JEL: I10, J21, J22, D13, H51

Keywords: health shocks, labor supply, added worker effect, event study, gender, domestic production

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1. Introduction

Severe health shocks during prime working years can pose a major income and employment risk. Reintegration into the labor market may be limited due to changes in productivity or a permanently deteriorated health state. While public transfers provide some insurance against this risk, another crucial safety net lies within the labor supply of an affected person's spouse. When faced with a health shock, both the affected individual and their spouse are likely to jointly re-optimize their labor supply and domestic production. These adjustments unfold over time, requiring an empirical analysis that accounts for the evolving dynamics. Moreover, gender roles may significantly shape the response to health shocks. Understanding these changes is critical for designing efficient social security programs that adequately address the challenges posed by health shocks.

In this paper, we use an event study approach to investigate the impact of health shocks on labor supply and domestic production. Our data come from the German Socio-Economic Panel (SOEP), a representative panel study of the German resident population. We use data on $2,311$ individuals aged 25-50 at the time of their shock, and on their households, from 1984 to 2020. Our sample includes individuals who take 6 weeks or more of sick leave, which we use as a proxy for a health shock. We find that our treatment definition is a good predictor of reductions in subjective health measures and the number of overnight hospital stays. In addition, we link treated individuals to their spouses, and investigate their response. As spouses do not experience a health shock in our sample by construction, any change in their observed outcomes is attributable to their partner's shock. We depart from traditional event study designs by using the estimator provided by Callaway and Sant'Anna (2021), thus avoiding common pitfalls associated with a two-way fixed effects (TWFE) regression. Coefficients estimated by traditional TWFE estimators are generally biased with staggered treatment adoption. The estimator provided by Callaway and Sant'Anna (2021) provides a solution by being more selective in the comparisons between treatment and control cohorts.

We find that a health shock leads to a persistent decline in pre-tax labor income of about $3,300$ Euros. The changes appear immediately upon the year of the treatment and worsen over time. The results are driven by changes in labor supply at the extensive margin, with almost 13% of our treatment group leaving the labor force after the shock. We find no evidence of reintegration into the labor market in the time window we analyze. This reduction is mainly observed in full-time employment, with no significant changes detected in part-time employment. Our findings indicate that a significant fraction of individuals leave the labor force following the health shock.

At the household level, we observe that households can mitigate the income loss through two forms of insurance. First, we find that public transfers can almost completely close the gap between the household pre- and post-treatment financial resources. Public transfers mitigate, but do not fully compensate, for the household losses. Second, spousal labor supply plays an important role in closing the remaining gap through moderate increases in full-time employment. Overall, taking into account equivalent household income, we do not find convincing evidence that the financial well-being of households is significantly affected over the entire period of our analysis.

Our results show that affected individuals spend more time on domestic production, in particular for general household chores and childcare. Time spent on childcare increases by 22.9%, while time spent on household chores increases by 13.9%. Spouses do not change their time use dramatically, although we observe a downward trend in time spent on household chores.

To explore whether gender roles influence the response in labor supply and domestic production, we reanalyze our data, splitting it by gender. Treated women are significantly more likely to leave the labor market after a health shock, with a

18.8% reduction in labor force participation, as opposed to 7.8% for treated men. Most women who remain in the labor market after their health shock are likely engaged in part-time jobs. In contrast, men tend to remain in full-time positions. Moreover, treated women significantly increase their childcare hours, averaging nearly an extra hour per weekday – an increase of 33%. Conversely, treated men report no significant change in childcare hours.

Our paper contributes to several strands of the empirical literature addressing the consequences of health shocks. Despite variations in methodologies for defining health shocks, there is a unanimous finding in the literature about their detrimental effects on labor supply (Coile, 2004; Cai, Mavromaras and Oguzoglu, 2014; Trevisan and Zantomio, 2016). Several studies highlight their adverse effect on individual income (García Gómez and López Nicolás, 2006; García-Gómez et al., 2013; Lenhart, 2019; Jones, Rice and Zantomio, 2020; Simonetti et al., 2022). We contribute to this literature with a rigorous event study approach, corroborating previous causal estimates on the effects on individual labor supply and income. Moreover, we focus on Germany, a country with a strong social security system, to document changes in the household financial well-being. Past research on this subject from Germany is largely based on disability shocks or chronic conditions, and has generally disregarded the household dimension. Riphahn (1999) uses health satisfaction as a proxy for health shocks. She finds a marked decline in labor force participation, and an increase in unemployment risk. Lechner and Vazquez-Alvarez (2011) investigate the impact of disability on labor market outcomes, finding a significant decrease in employment chances, but no reduction in available individual income thanks to public transfers. Poor health (Haan and Myck, 2009) and chronic pain (Piper, Blanchflower and Bryson, 2021) also negatively correlate with labor supply. A working paper by Beckmannshagen and Koenig (2023) employs a similar approach to ours, yet it focuses on the heterogeneity at the individual level. The authors touch upon the household dimension, finding no adjustments in the partner's income and a modest decline in the household income. In contrast, our work provides a more careful and comprehensive analysis of intra-household dynamics. We emphasize the coordination in the responses of the affected individual and their spouse, contextualizing the changes in employment with the adjustments in the domestic production. We show how the financial well-being of households remains stable thanks to a combination of state transfers and increased partner's income. Finally, to the best of our knowledge, we are the first to document significant changes in the domestic production of German workers due to a health shock.

Economic theory suggests that spouses provide a form of insurance against income shocks through changes in their labor supply (Stephens, 2002; Attanasio, Low and Sánchez-Marcos, 2005; Mankart and Oikonomou, 2017; García-Pérez and Rendon, 2020). This mechanism is known as Added Worker Effect (AWE). So far, empirical studies find mixed evidence, with the AWE depending on the institutional and cultural setting, as well as on gender and family composition. In the context of a health shock within a household, both a general presence of the AWE (Coile, 2004; Jeon and Pohl, 2017; Acuna, Acuna and Carrasco, 2019), and a lack thereof (Fadlon and Nielsen, 2021; Macchioni Giaquinto et al., 2022) are documented. With regard to Germany, Braakmann (2014) finds that healthy spouses do not significantly change their labor supply after a disability shock, neither at the intensive nor at the extensive margin. Our paper contributes to this literature by providing robust evidence for an AWE in the case of more general health shocks. We also highlight heterogeneity in the spousal response with respect to gender.

Increase in domestic production following periods of unemployed are documented only in relation to macroeconomic shocks, such as the Great Recession or the COVID-19 pandemic (Burda and Hamermesh, 2010; Aguiar, Hurst and Karabarbounis, 2013; Hupkau and Petrongolo, 2020). The closest paper in this context is Macchioni Giaquinto et al. (2022), which provides causal evidence on the trade-off between working hours in the labor market and time spent on informal care provision for the affected partner. Our work provides first insights on the effects of health shocks on more general dimensions of domestic production, such as household chores.

The paper is organized as follows. Section 2 outlines the institutional environment in Germany and our dataset. In Section 3, we present our empirical strategy for estimating the impacts of health shocks on labor supply. We present our main results in Section 4, followed by robustness checks in Section 5. Section 6 concludes.

2. Institutional Setting and Data

1. *Institutional Setting*

The German social security system is known for its comprehensive coverage, and provides forms of income replacement in case of labor income shocks. In the event of illness or injury, an employee may go on paid sick leave, during which they continue to receive their full income from their employer for up to 6 weeks under the Continued Payment of Remuneration Act (*Entgeltfortzahlungsgesetz*). Individuals may use these 6 weeks in a single stretch or across multiple periods of the same illness or injury. After the initial 6-week period, the employer's obligation ends, and the employee transitions to the statutory sickness benefits (*Krankengeld*), funded by the mandatory health insurance scheme. This benefit provides a substantial portion of the employee's income: 70% of the person's regular gross salary, but no more than 90% of their net salary. Individuals may receive sickness benefits until they are deemed fit to return to work, or for a maximum of 72 additional weeks within 3 years.[1]

[1] The provisions of the Continued Payment of Remuneration Act are more comprehensive but not immediately relevant for our research question. The right to continued remuneration is independent of the workload and covers marginal and short-term employment. Employees are entitled to paid sick leaves conditional on not being at

The German system protects employees from unfair termination, but there is no specific protection for employees on sick leave. An employee can be terminated at any time during the 78 weeks of continued remuneration or statutory sickness benefits. In fact, the illness itself may justify termination if the employee can be expected to experience similar health shocks in the future. Employees exhausting the full 78 weeks are entitled to unemployment benefits or, if a full recovery is not expected, may apply for a reduced earning capacity pension.[2]

Overall, the individual labor income of German workers is partially insured against severe health shocks. The average net replacement rate over time (1984-2019) for the entire 78 weeks is about 74% for a household with one income earner, a spouse, and two children (Scruggs, Jahn and Kuitto, 2017).[3] This is less than in Sweden (85%) but significantly more than in the United Kingdom (29%) (Scruggs, Jahn and Kuitto, 2017).

2. *Data*

We use the German Socio-Economic Panel (SOEP), which provides annual, representative data for the German population from 1984 to 2020 (see Goebel et al., 2019, for a detailed description). Its longitudinal design allow us to identify the timing of the health shock, and subsequent changes in the labor supply, financial well-being, and domestic production of the affected person and their spouse.

We identify health shocks based on the following question: *Were you on sick leave from work for more than 6 weeks at one time last year?* We do not attempt to characterize the type of health shock in greater detail. Note, however, that

fault for their illness or injury, having a medical certificate, and having been employed for more than four weeks at the time of their sick leave. The length of the sick leave is determined solely by a medical doctor, based on the results of an examination. An employer must consider the accumulation of sick days separately for each health condition. Hence, an employee may receive their full income for more than 6 weeks, if their sick leaves are due to different conditions. Statutory sickness benefits were reduced from 80% to 70% of gross income in 1997.

[2]The requirements for obtaining the reduced changed earning capacity pension changed in 2001. We briefly explore the consequences of this reform in Section A.A1 of the appendix. If the requirements are met, an individual can receive a disability pension until the statutory retirement age, at which point it is replaced by the old-age pension.

[3]This includes family or children benefits. These estimated rates should be interpreted with some caution, as they vary somewhat between 1971 and 2011, but are generally in the range of 85% to 96%. See (Scruggs, Jahn and Kuitto, 2017) for methodology.

this question effectively selects individuals with a severe health shock, as it asks about uninterrupted sick leaves with a duration of 6 weeks or longer.[4] Panel A of Figure 1 substantiates this point: Overnight hospital stays suddenly increase on average from 0.86 nights in the year before the shock to an average of 9.65 nights in the year of the shock. This is evidence in favor of the precision of our treatment variable in identifying severe health shocks. In addition, we show in appendix A.A2 that our treatment definition is correlated with other health-related outcomes.

Panel B in Figure 1 shows the distribution of days spent on sick leave for individuals in our sample in the year they report a sick leave of 6 weeks or longer. Most sick leaves last between 6 weeks and 6 months (180 days), and only a handful of individuals are absent from work for even longer periods.

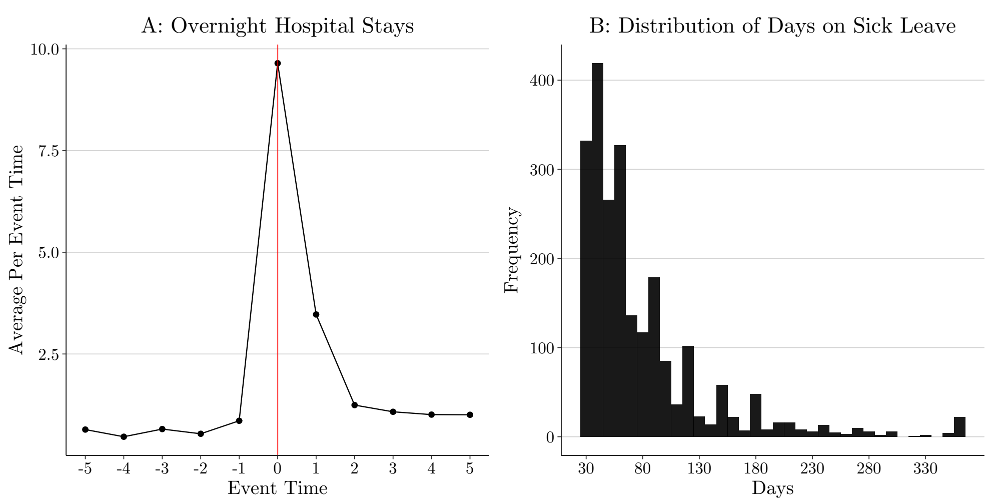

Figure 1. Measuring Health Shocks

Note: The data are from the SOEP (1984-2020).

Our main sample includes individuals drawn from the SOEP who were between the ages of 25 and 50 at the time of their first observed health shock. The upper age limit prevents individuals in our sample from entering early retirement. We

[4]We cross-check this information against the number of days spent on sick leave.

only retain individuals who report living in the same household as their partner in the calendar year prior to the shock, as we are interested in the adjustments that may occur within a household. We exclude individuals who are in education, military service, or are not clear on their employment status. We also exclude the self-employed, who are covered by special provisions in the German Social Code. Finally, we exclude individuals with multiple shocks, unless we can identify this as the same shock crossing into the next calendar year. The exclusion of this group does not significantly affect our results. While we do not explicitly condition on employment status, the fact that individuals report a sick leave implies that they were working at the time of the shock. Our approach leaves us with $2,311$ treated individuals or $34,995$ individual-year observations between 1984 and 2020.

Using the household structure of the SOEP, we generate a spousal sample linking the treated individuals to their spouses, where possible. In order to be included in our spousal sample, both the individual and their partner must live together in the calendar year before the shock and agree on their relationship status. We follow these spouses as long as we observe the couple remaining together. We exclude spouses younger than 25 and older than 50 at the moment of their spouse's shock. We exclude spouses for whom we also observe a health shock after their partner's shock. This leaves us with a sample of $1,738$ spouses.

Column 1 of Table 1 presents summary statistics for the full sample, in the calendar year before an individual suffers the health shock. Note that individuals are asked retrospectively whether they were in the labor force or received any benefits in the previous year. As labor force and benefits status may change at different points within the same calendar year, these responses are not mutually exclusive. In the year before the shock, 97% of treated individuals are in the labor force, defined as reporting at least 52 working hours in a year. With respect to the type of employment, 70% work in full-time positions, and 27% in part-time positions. A few treated individuals receive public transfers, in the form of disability pension (1%) or unemployment benefits (6%). Finally 2% of the treated individuals are not in the labor force nor do they receive public transfers.

Table 1— Descriptive statistics

	Treated			Spouses			
	(1) Full sample	(2) Female	(3) Male	(4) Full sample	(5) Female	(6) Male	(7) SOEP
Socioeconomic characteristics							
Age	38.92	38.25	39.56	38.35	38.00	38.94	37.45
Female	0.48			0.63			0.49
Days of sick leave	8.83	8.34	9.29	3.69	2.98	4.87	8.97
Nr. of children	1.28	1.09	1.46	1.34	1.42	1.19	1.18
Income and labor supply							
Gross labor income	24248.72	18616.08	29569.77	18183.37	11003.82	30446.10	28225.78
In labor force	0.97	0.96	0.98	0.78	0.70	0.92	0.93
Full-time employment	0.70	0.50	0.88	0.43	0.21	0.79	0.63
Part-time employment	0.27	0.46	0.09	0.35	0.49	0.12	0.29
Weekly working hrs	36.64	30.91	42.00	25.66	17.73	38.99	34.40
Unemployment benefits	0.06	0.06	0.06	0.08	0.08	0.09	0.06
Unemployment w/o benefits	0.02	0.02	0.01	0.17	0.25	0.04	0.06
Disability pension	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Household income							
Household pre-government income	47202.92	50836.46	43820.38	48393.90	45442.39	53365.11	53304.17
Household post-government income	36673.20	38522.08	34942.74	37707.19	36159.23	40310.57	38888.16
Domestic production							
Childcare (hrs/weekday)	2.13	3.00	1.30	3.26	4.44	1.30	2.20
Household chores (hrs/weekday)	1.55	2.43	0.69	2.49	3.39	0.94	1.51
Informal care (hrs/weekday)	0.11	0.16	0.05	0.12	0.18	0.04	0.10
Leisure activities (hrs/weekday)	1.31	1.31	1.31	1.37	1.34	1.42	1.38
Unique observations	2311	1117	1194	1738	1090	648	27547

Note: Data refer to the calendar year before an individual suffers a health shock. Monetary values in 2020 euro. We trim the bottom and top 1% of the distribution for income variables. Household pre-government income includes labor earnings of all household members of age 16 or older, asset income, private transfers such as alimony payments, and private retirement income. Household post-government income includes public transfers, social security pensions in addition to household pre-government income, after taxes. For variables related to domestic production, days refer to weekdays, excluding weekends. Disability pensions include both disability pensions and reduced working capacity pension.

Columns 2 and 3 show that the main difference between treated men and women[5] is a substantial earnings gap, driven by a lower labor force participation of women and higher share of part-time labor. 46% of women have part-time jobs, compared to only 9% of men. Compared to men, treated women spend more time on childcare (3 hours per weekday, vs. 1.30 for men) and on household chores (2.43 hours per weekday, vs. 0.69 for men).

[5]We use the self-reported gender to identify women and men.

Columns 4 to 6 of Table 1 present descriptive statistics for the group of spouses. We observe a higher proportion of women in the spouse sample compared to the treated sample (63% against 48% in the treated group), along with lower rate of labor force participation, higher share of part-time labor and lower labor earnings. In the treated sample, the employment rate is high as individuals can report sick leave only if they are regularly employed. We do not condition on spousal employment, and the low employment share of female spouses (column 5) broadly reflects the German average, with a markedly gendered division of labor.

To assess how representative our sample is, we compare it with the broader SOEP population by selecting all untreated individuals in the same age range who were in the labor force at least one year, and report at least one sick day in any available year (column 7). This population's statistics are close to our treated sample's, with some differences. Compared to the treated sample, the labor force participation of the broader population is marginally lower (93% vs. 97% for the treated population), though the gross labor income is higher ($28,225.78$ Euros vs. $24,248.72$ Euros). Nonetheless, the number of sick days is similar for both groups (8.97 for the broader population vs. 8.83 for the treated population). This is reassuring evidence, that we did not select a treatment group with an unrepresentative likelihood to receive a health shock. Overall, we believe that our sample is representative of the German working population.

3. Empirical Strategy

Our objective is to identify the causal impact of health shocks on the financial well-being and labor supply decisions of affected households. In an ideal but infeasible scenario, we could assign health shocks randomly and compare the evolution in incomes and labor supply decisions of affected individuals against those not affected. With observational data, however, identifying such a causal parameter is not straightforward, as health shocks may not be random. Some groups in the population may be much more likely to suffer from a health shock than others. Comparisons between such groups are unlikely to converge against parameters that have a clear causal interpretation.

We overcome this challenge with a quasi-experimental design. First, we assign every individual in our sample to a cohort, which is defined based on the calendar year in which an individual experiences the shock. We then compare the ex-post evolution in outcomes of interest for a given cohort against the evolution in the same outcomes of later cohorts. By restricting the control group to individuals who are not-yet-treated, we control for selection on characteristics that are correlated with the likelihood to experience the shock by design. In addition, this comparison allows us to capture the dynamic effects of health shocks, providing insights into how individuals and households adjust to such events. Hence, we exploit the temporal variation in the timing of the health shock, which is assumed to be random conditional on a set of control variables. Our identifying assumption is that individuals used as treatment units would have experienced the same trend in outcomes, had they not received the shock at that time. By restricting our sample to individuals who receive the shock, we estimate the causal impacts of health shocks on the working population instead of the general population.

Traditional difference-in-differences or event studies implemented with TWFE may introduce a significant bias in our application, as our treatments are rolled out in a staggered fashion and treatment effect heterogeneity is to be expected (Goodman-Bacon, 2021; Callaway and Sant'Anna, 2021; De Chaisemartin and d'Haultfoeuille, 2020). This problem arises as TWFE compares already-treated cohorts with other already-treated cohorts. This *forbidden* comparison may assign negative weights to some units and time periods, resulting in an estimate that is both hard to interpret and biased.[6] We address this challenge by using a dynamic difference-in-differences estimator provided by Callaway and Sant'Anna (2021):

[6] In appendix A.A3 we compare the performance of the estimators by Callaway and Sant'Anna (2021) and De Chaisemartin and d'Haultfoeuille (2024) with a conventional TWFE approach.

$$\widehat{ATT}_{(g,t)} = \mathbb{E}_n \left[\left(\frac{G_g}{\mathbb{E}_n\left[G_g\right]} - \frac{\frac{\widehat{p}_{g,t}(X)(1-D_t)(1-G_g)}{1-\widehat{p}_{g,t}(X)}}{\mathbb{E}_n\left[\frac{\widehat{p}_{g,t}(X)(1-D_t)(1-G_g)}{1-\widehat{p}_{g,t}(X)}\right]} \right) (Y_t - Y_{g-1}) \right] \tag{1}$$

where $\widehat{ATT}(g,t)$ are the cohort-specific average treatment effects in calendar year t for cohort g. Cohort membership is defined based on the calendar year in which an individual first experienced the shock. G_g is an indicator variable equal to 1 if an individual is treated in that calendar year, 0 otherwise. D_t is a binary variable equal to 1 starting from the calendar year in which the unit receives the health shock, and 0 in the years before the treatment. X denotes a vector of control variables. $\widehat{p}_{g,t}(X)$ are estimated, generalized propensity scores measuring the likelihood of treatment in period g, conditional on X. We control for age, age squared and gender. Y_t and Y_{g-1} are the outcomes of interest at period t and $g-1$, the last calendar year before treatment for a given unit. We bootstrap simultaneous confidence bands, that cover the entire path of $\widehat{ATT}_{(g,t)}$. This corrects for multiple testing.

In order to interpret the potential effects of health shocks on the outcomes of interest, we aggregate the different $\widehat{ATT}_{(g,t)}$ into event study coefficients following the schemes provided in Callaway and Sant'Anna (2021):

$$\widehat{\delta}_{es} = \sum_{g \in \mathcal{G}} w^{es}(g,e)\widehat{ATT}(g,g+e) \tag{2}$$

Where $\widehat{\delta}_{es}$ is the average treatment effect across all g cohorts, observed $e = t-g$ calendar years after the shock. Note, that e does not refer to the calendar year, but to the time in calendar years that has passed after a cohort experienced the health shock. We refer to e as event time. This aggregation scheme weights the cohort-specific $\widehat{ATT}_{(g,t)}$, by the size of the respective cohorts, $w^{es}(g,e)$. We present our results for event times -5 to 5. For an easier interpretation, we also provide estimates of the overall effect of the treatment, $\widehat{\delta}_{es}^{O}$, which is the average of $\widehat{\delta}_{es}$ across event times 0 to 5.

4. Results

In this section, we present our main analysis of the effect of the health shock on household labor supply decisions and domestic production using the empirical strategy described in Section 3. We divide our analysis as follows. First, we discuss the effects of the health shock on the income and labor supply of the treated individual (subsection 4.1). Then, we provide evidence on the pass-through of these changes to the household total income (subsection 4.2). We then focus on the spouses' responses to the shock, with respect to their income and labor supply (subsection 4.3). Changes in domestic production for both treated and their spouses are described in subsection 4.4. Finally, we provide complementary evidence on heterogeneous treatment effects by gender (subsection 4.5). We present our event study plots in the main text, while the corresponding regression table for each figure can be found in the appendix A.A4.

1. Income and Labor Supply at the Individual Level

We estimate the effects of the health shock on the income and labor supply of the treated individuals and present our results in Figure 2[7]. The x-axis denotes time in calendar years relative to the year in which an individual receives the health shock. We refer to the calendar year in which the shock occurred as event time 0. All coefficients are normalized with respect to event time -1, the calendar year preceding the year of the shock. Hence, they report the change in an outcome variable relative to the event time -1. All figures display 95 percent confidence bands, and report the overall ATT, which gives the effect of receiving a health shock across post-treatment event times and treatment cohorts.

[7]see Table A1 in the appendix for a table of the coefficients

The overall treatment effect for annual labor income across all post-treatment event times, is statistically significant. The coefficient predicts an average decrease of $3,313.74$ Euros (-13.7%), compared to the not-yet-treated control group, and relative to the calendar year before the shock. We observe a statistically significant decrease in labor force participation of 13 percentage points (from 97% in the calendar year before the shock to 84%, a 13.4% decline).

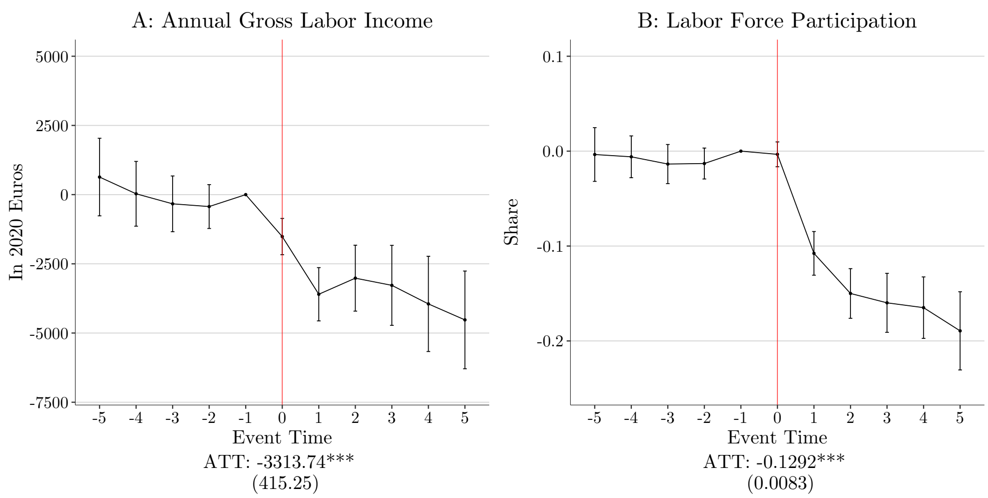

FIGURE 2. EVOLUTION OF ANNUAL GROSS LABOR INCOME

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A1. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Figure 2 plots the evolution of both outcome variables over time. In panel A, gross labor income decreases instantaneously. The effect size for the decline at event time 0 is about half of the overall treatment effect. This contained decline is plausible for two reasons. First, the closer the health shock is to the end of the year, the smaller the impact on annual income. Second, continued remuneration and sick leave replace a large part of the foregone income in the 78 weeks following the shock. The reductions in gross annual labor earnings are amplified from the second year of the shock onward, reaching $-4,525.34$ Euros 5 years after the shock.

In panel B, we also observe a delayed response in labor force participation at event time 0. Due to the definition of the variable, individuals are not considered to be out of the labor force unless they work less than 52 working hours per year. In the following years, the decline in participation is more pronounced. The 5-year coefficient shows a reduction of 19 percentage points (about -20%) in the share of the population in the labor force, relative to the calendar year just before individuals experience a health shock.

The reduction of labor income may be a combination of intensive and extensive margins. We cannot definitively infer whether this is driven by changes in the number of individuals in the labor force, changes in earnings, or both. It is difficult to distinguish between these competing hypotheses without introducing post-treatment or collider bias, for example, by estimating treatment effects only for those individuals who remain in the labor force. Given a 13.4% decline in labor force participation, and assuming that individuals lose the pre-treatment average gross labor income of $24,248.72$ Euros, we would observe an average decline of about $3,249$ Euros, which is very close to the overall decline of $3,313.74$ Euros. We infer from our results that most of the change in gross labor income occurs at the extensive rather than at the intensive margin.

Figure 3 provides additional insight into the labor supply dynamics. The share of treated individuals working in full-time employment is reduced by 16pp (-23%) overall, and by 21pp (-30%) after 5 years. In contrast, the share of treated individuals working part-time remains stable over time with the overall coefficient not statistically different from 0. Note, that the increase in the year of the shock and the following year is mechanical, since the outcome variable classifies employment as part-time if working hours in a year are above 52 but below $1,820$. The employment of some individuals who experience the shock and stop working, either permanently or temporarily, may end up in this category, without actually switching to part-time. The results for full- and part-time employment together

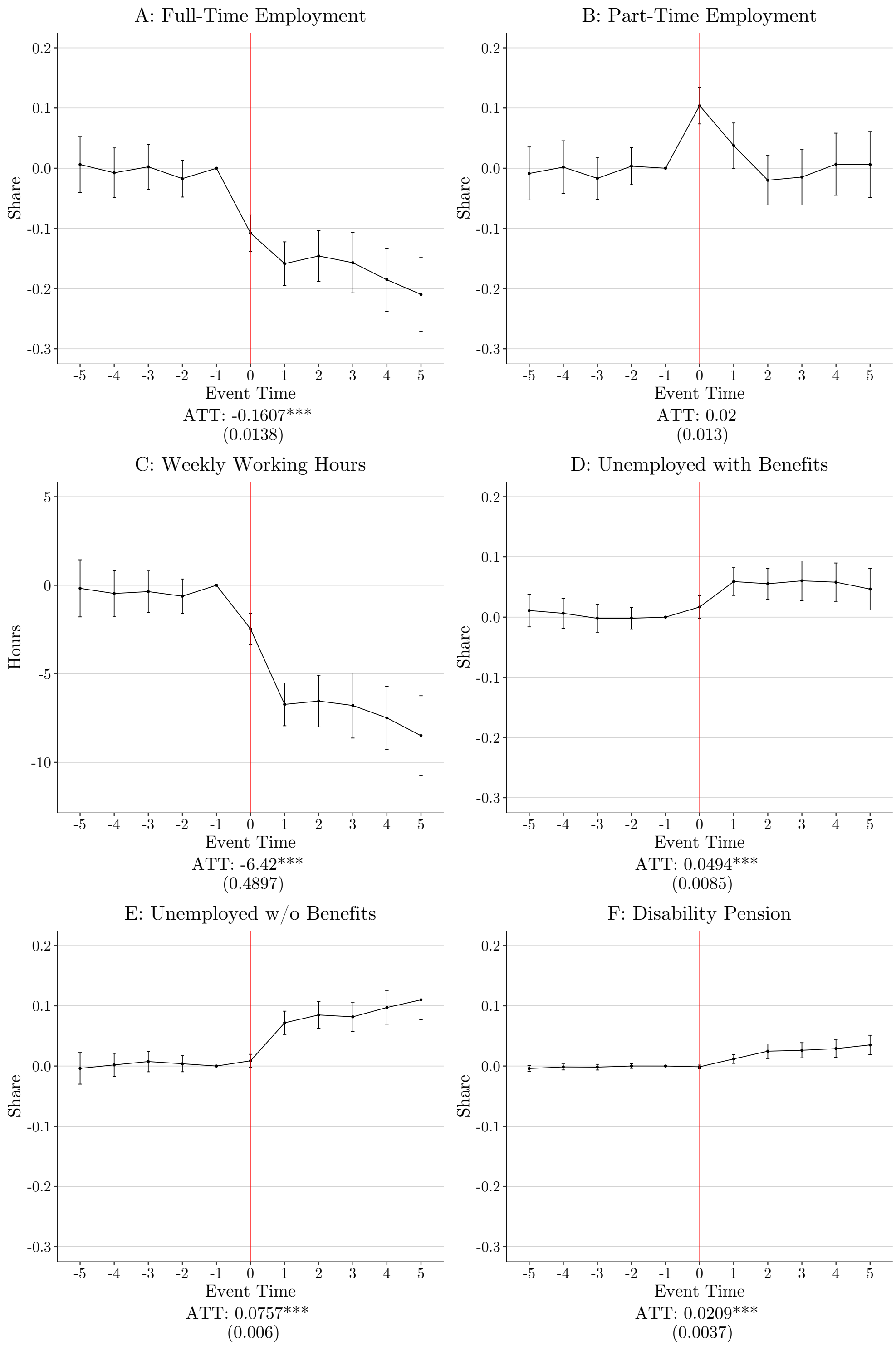

Figure 3. Labor Supply Decisions

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A1. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

imply that part-time employment becomes more common among those still in the labor force. While 72% of those in the labor force were working full-time before the shock, the estimates suggest that after the shock this share is reduced to about 64%.

Panel C of Figure 3 shows that weekly working hours decrease by 6.42 (-17.5%) overall, and by 8.49 hours (-23.2%) 5 years after the shock. This mirrors the downward trend observed for labor force participation in panel B of Figure 2. The remaining panels of Figure 3 show more specific unemployment outcomes following the shock. Based on the overall coefficient, there is a 5pp increase in receiving unemployment benefits (panel D). This corresponds to an increase of 83%, relative to the calendar year prior to the shock. As the 5-year coefficient shows an increase of 4.66pp, the share of individuals receiving unemployment benefits remains stable over time. We also analyze the evolution of the share of the unemployed not receiving any unemployment or disability pension benefits (panel E). Here we see an increase by 8pp, or four times the pre-shock level, reaching +11pp after 5 years. As for the share of individuals receiving a disability pension (panel F), we find an increase of 2pp overall and 4pp after 5 years, from a pre-shock average of 1%.

Our results establish that, while some individuals leaving the labor market after a health shock do receive social security benefits in the form of unemployment payments or disability pensions, a large share leaves the labor market without being eligible for these benefits. The increase in individuals in this group occurs soon after the shock, suggesting that this is not due to individuals exhausting their social security claims.

2. Income at the Household Level

In a next step, we investigate the impact of the individual income shock on household income. We find a statistically significant reduction of household pre-

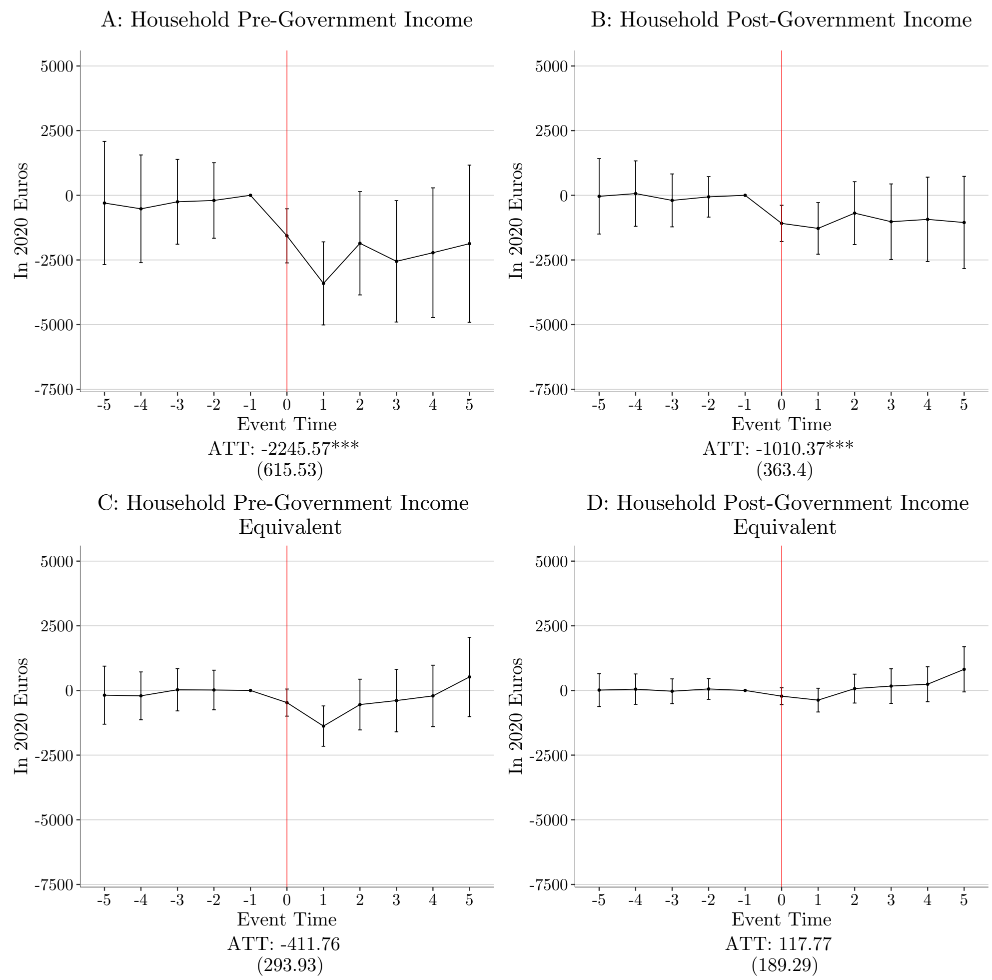

FIGURE 4. EVOLUTION OF TOTAL NET HOUSEHOLD INCOME

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A1. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

government income of $2,245.57$ Euros (-4.8%). This corresponds to about 68% of the decrease we observe for individual labor income. The imperfect pass-through of the individual effects hints at the role of changes in spousal labor supply in maintaining the household income. Panel A of Figure 4 shows that the household total pre-government income follows the decline in individual labor income almost exactly in the year of the shock and in the following year. We observe a slight recovery and leveling-off at event times 2 to 5.

Panel B shows that public transfers absorb most of the health shock's impact on income, highlighting their role as an insurance mechanism. The income loss is statistically significant and reduced to 1010.37 (-2.8%). Thus, public transfers reduce financial losses by approximately half. We do not observe statistically significant effects after event time 2. Panels C and D take into account OECD equivalent scales, and enable a more nuanced comparison of the household financial well-being, taking into account differences in household composition. We construct equivalent incomes by assigning a weight of 1 to the first adult, 0.7 to each additional adult, and 0.5 to each child under age 14. The results in panels C and D show that the financial well-being of the household is not meaningfully affected by the health shock. For both specifications, the overall income reduction is not statistically significant.

3. Labor Supply and Income at the Spousal Level

Next, we focus on responses in spousal labor supply following the health shock of a partner. In principle, spousal labor supply may increase to compensate for lost income or decrease to provide informal care for the sick partner. To analyze spousal outcomes, we use the sample of spouses described in Section 2.

Our results support the assumption that spousal labor supply changes after the shock of their spouse, and plays an important role in stabilizing the household income. Panel A of Figure 5 documents a positive trend for annual gross labor income.[8] We find a statistically significant overall increases of $2,340.13$ Euros ($+12.9\%$), and of $4,670.29$ Euros ($+25.7\%$) after 5 years. Thus, a large part of the income loss at the individual level is compensated by an increase in spousal labor income.[9]

[8]See Table A2

[9]With respect to household income, the sum of changes in individual labor income for the treated and their spouse appears to be higher than the results shown in Figure 4. This is due to the differences in sample sizes described in Section 2. In unreported results, we repeat the analysis for the treated group conditional on

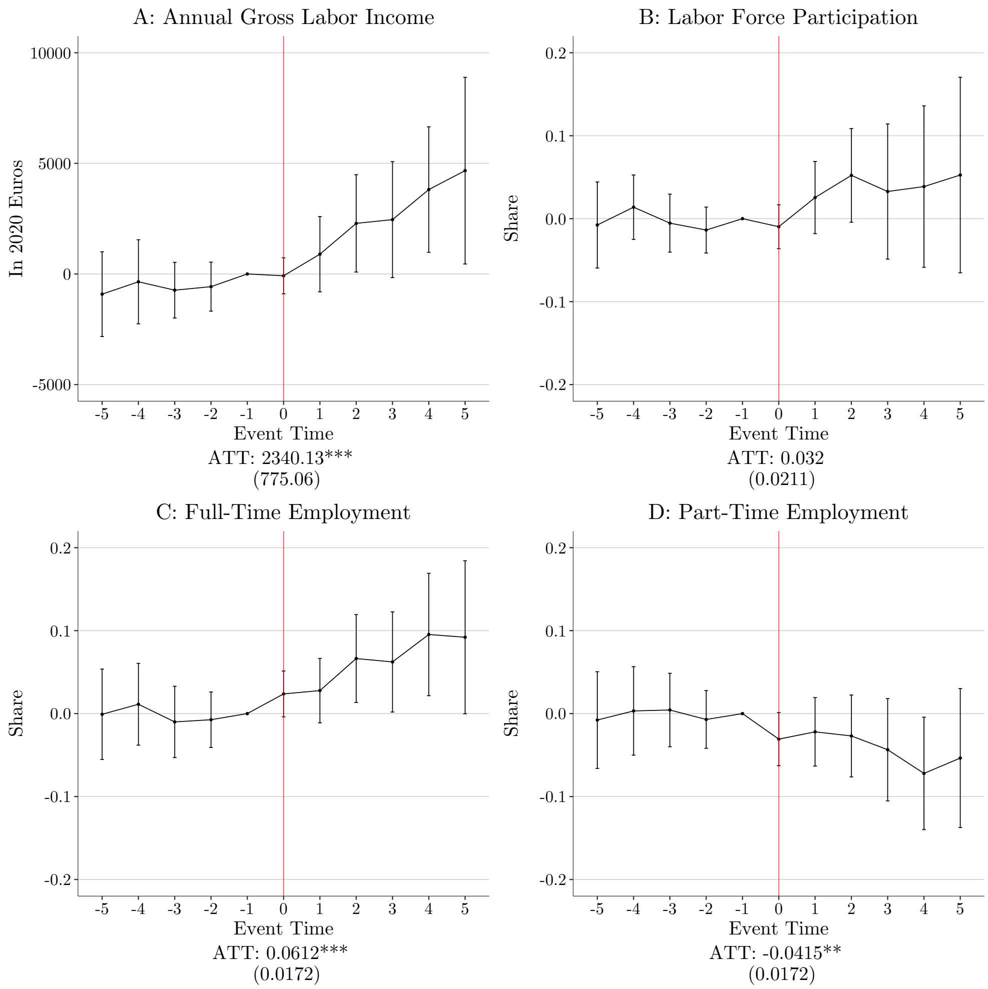

FIGURE 5. LABOR SUPPLY OF SPOUSE

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A2. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

In panel B, although there is an upward trend in line with the increases in panel A, the overall ATT is not statistically significant at conventional levels. Full-time employment (panel C) increases by 6pp (+14.2%) overall, and by 9pp (+21.4%) after 5 years. With respect tot part-time employment (panel D), we find

observing their partner in the data, confirming that changes in individual incomes for the treated person and their spouse are consistent with changes in household pre-government income. We do not report results using this restricted sample due to its small size.

a statistically significant decrease of 4pp (-11.4%), though the single coefficients are never significant at conventional levels, except for event time 4. The upward trend for full-time employment and the downward trend for part-time employment suggest that, on average, spouses tend to increase their labor supply following their spouse's health shock. Thus, in contrast to the treated individuals, changes for spouses most likely occur at the intensive margin.

Our results suggest that the income losses induced by the health shock are absorbed by a combination of government transfers, and adjustments in the spousal labor supply.

4. Domestic Production

We next examine time spent on domestic production. Not only does it compete with time spent in the labor market, it is also part of the household real income and thus an important metric for its welfare (Apps and Rees, 2020). Moreover, leaving the labor force may be the result of a joint decision at the household level.

Figure 6 plots the changes in weekly hours spent on childcare and general household chores for both the treated person and their spouse. For the treated person, we confirm our hypothesis and find a statistically significant overall increase of around half an hour (+22.9%) for childcare, and less than 15 minutes (+13.9%) for household chores, although the effects reach almost half an hour after 5 years. For the spouse, we find no significant changes for either specification, but the downward trend for household chores mirrors the increases observed for the treated individuals. We present solid evidence that the treated person in the household takes on more housework. However, we remain more agnostic about their spouses. There is some evidence that they may reduce their share by the same amount, leaving total domestic production unchanged.

In Figure A7 in the appendix, we also explore changes in time spent on leisure activities and informal care provided to family members. While we find a modest

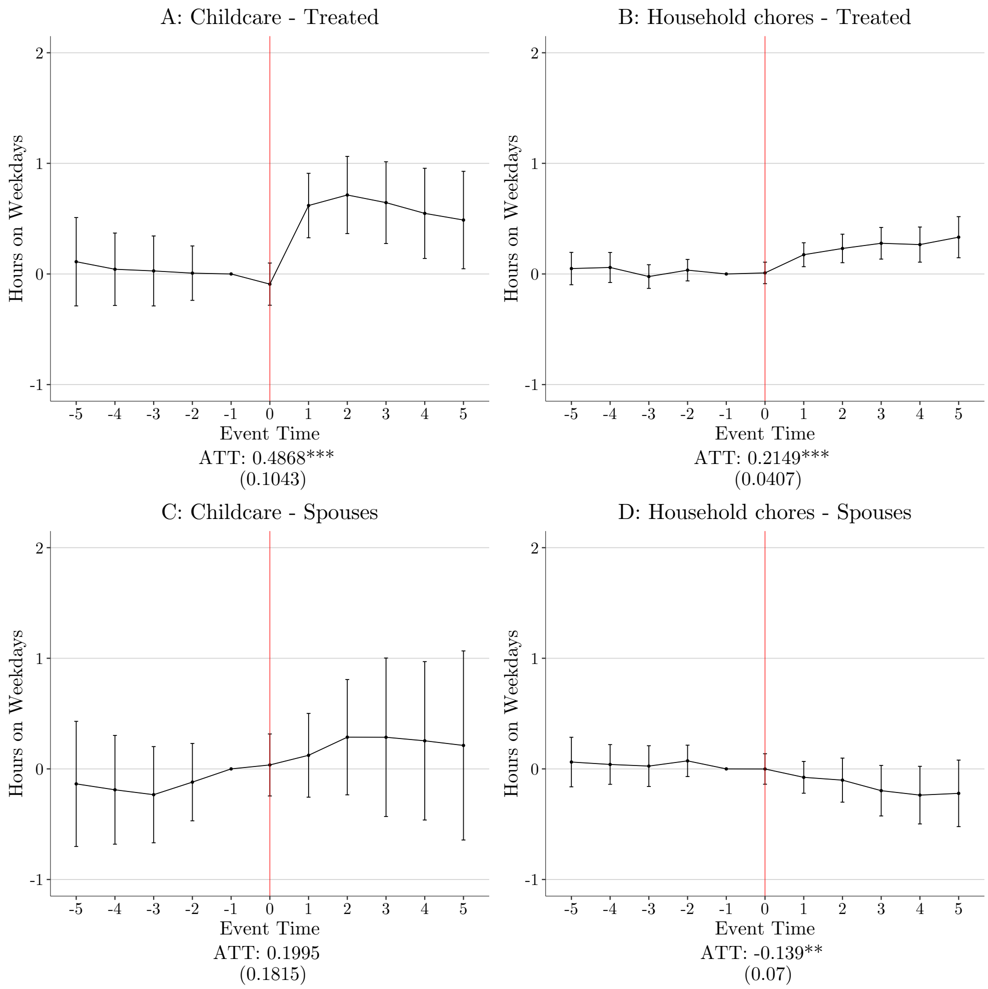

Figure 6. Domestic Production

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A1. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

increase in time spent on leisure activities for the treated person, we do not find any such changes for their spouse. Moreover, we reject the hypothesis that spouses increase the amount of time they spend caring for their affected partner.

5. Gender Differences

Gender roles may play an important role in determining the impact of a health shock on labor supply and domestic production. Therefore, we repeat the analysis, dividing our samples by gender.

Figure 7 plots the effects for the treated men and women separately, and shows considerable heterogeneity in our results.[10] For women, we find an overall average decrease in annual gross labor income of $3,796.93$ Euros (-20.4%), and $2,249.07$ Euros (-7.6%) for men (panel A). Both results are statistically significant and statistically different from each other. As in our main results, the decrease in labor income is driven by changes in labor force participation. Panel B shows that women are more than twice as likely to leave the labor market after the shock. Women's overall labor force participation is reduced by 18pp (-18.8%), compared to 8pp (-7.8%) for men. Women are also more likely than men to leave full-time employment (panel C). Women's full-time employment decreases overall by 18pp (-36%), while men's by 12pp (-13.6%). In contrast, the overall coefficient for part-time employment (panel D) is significant only for women. Note, however, that the significance of this overall coefficient may be contaminated from the mechanical effect in the fist calendar year after the shock. Therefore, we conclude that, for both genders, the decline in labor force participation is driven by a decline in full-time employment . After the shock, the majority of women still in the labor market work in part-time positions. Treated men, on the other hand, are still more likely to work in full-time jobs.

In terms of domestic production, women completely drive the results for hours spent on childcare (panel E). We find an average increase of almost 1 additional hour per weekday, or an increase of 33%. The effect remains stable over time, with a comparable effect size after 5 years. We do not find significant changes in time spent on childcare for men. As for the hours spent on household chores

[10] See Table A3 in the appendix for a table of coefficients.

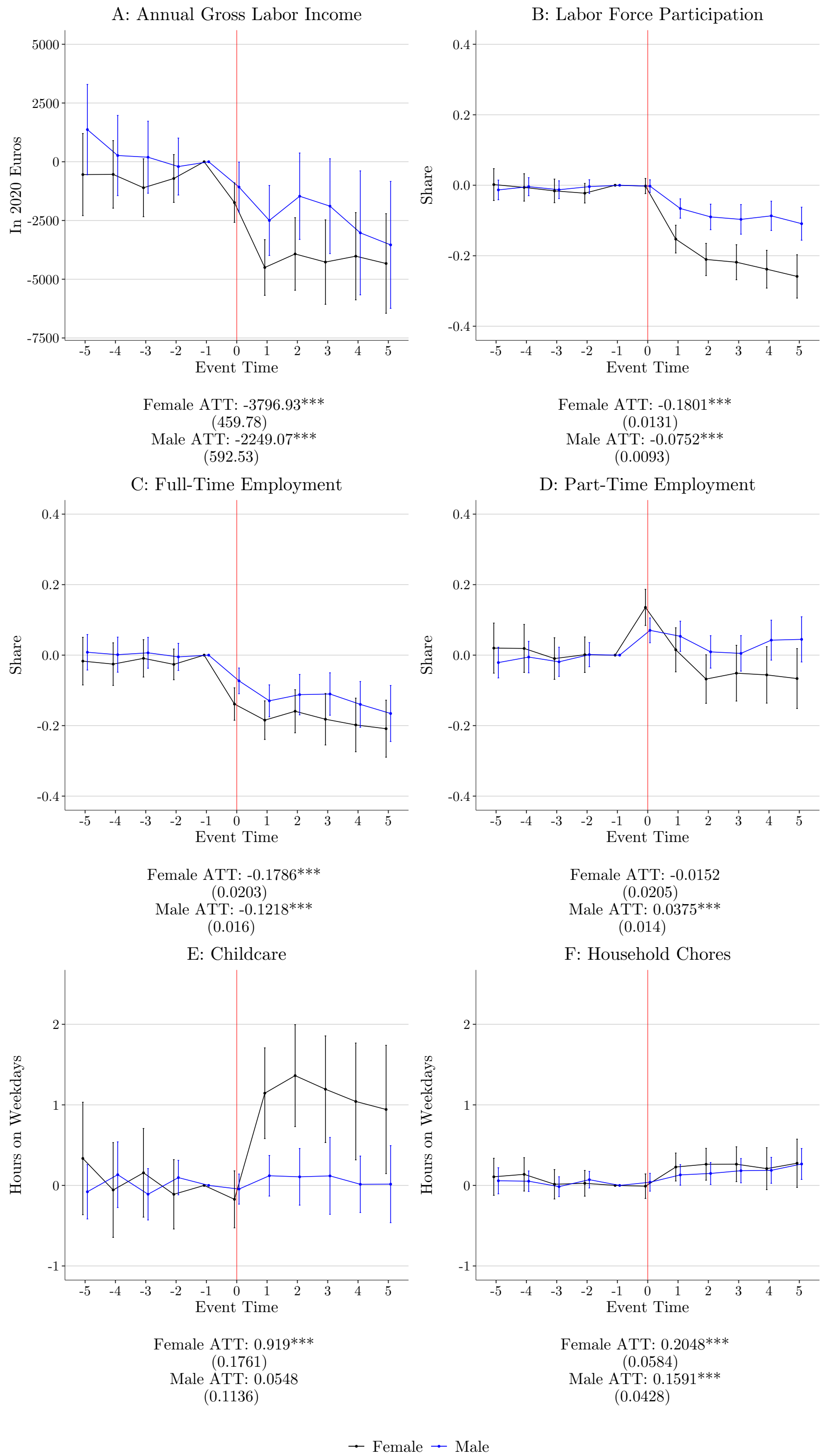

Figure 7. Labor Supply and Time Use by Gender - Treated

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A3. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

(panel F), we do not find statistically significant differences between the absolute responses of women and men. Based on the overall coefficients, both genders spend around 10 minutes more per weekday on household chores. However, since men spend less time on household chores before the shock, their increase is relatively larger (+8.4% for women and +23% for men). We infer from these results that women are more likely than men to stop working after a health shock. Women also spend significantly more time in caring for children relative to the last calendar year before the shock.

Finally, we investigate whether there are gender differences in the spousal responses. We report the estimates in the appendix, in Figure A5 and Table A4. Given the small sample sizes, the confidence bands are too wide to make precise statements, and results should be interpreted with caution. Annual gross labor income increases overall by 2513.22 Euros (+8.3%) for men and by 866.88 Euros (+7.9%) for women (panel A), though the overall coefficient for female spouses is significant only at the 10%. We do not find evidence of changes in labor force participation for either gender (panel B). The overall coefficients for female full-time (panel C, +5.6pp) and part-time (panel D, −6.2pp) spousal employment are statistically significant and almost symmetrical. For male spouses we do not find significant changes on either employment type. Our preferred interpretation is that female spouses adjust their labor supply more readily than their male counterparts, with a propensity to switch from part-time to full-time employment. With respect to domestic production, we do not find consistence evidence of changes in time spent for childcare (panel E). In panel F, the reduction in time spent on housework is significant, and more pronounced, only for male spouses (-10 minutes per day, −18.9%).

5. Robustness Checks

1. *Pregnancy-Related Illnesses*

A potential concern with our results regarding changes in domestic production is that some of the sick leaves we measure may be pregnancy-related illnesses. However, this scenario is unlikely in the context of German labor law. First, pregnancy-related leaves are not classified as sick leaves. Moreover, the Maternity Protection Act (*Mutterschutzgesetz*) in Germany provides comprehensive support for pregnant women and mothers, making cases of strategic behavior by women to sort into sick leave improbable. The Maternity Protection Act ensures protection during the last 6 weeks of pregnancy and the first 8 weeks postpartum, guaranteeing full net income without the obligation to work. Moreover, illnesses or injuries during the pregnancy may result in a medical Employment Ban, which offers continuous remuneration similar to sick leave but is not constrained by the 6-week limitation. Hence, the replacement rate is not decreased after this period. Still, instances of non-pregnancy-related health issues leading to sick leaves exceeding 6 weeks are possible. These may be covered under the Maternity Protection Act if they are likely to affect the pregnancy.[11] Therefore, if pregnant women in our sample were to engage in strategic behavior to receive payment without working, avoiding sick leave would be a more advantageous approach. We repeat the analysis for time spent on childcare and household chores, excluding women reporting childbirth at event times 0 and 1. The overall result in Figure A6 and Table A6 in the appendix still shows a significant increase of time spent on childcare of around 40 minutes per day, hence somewhat lower than in the main result (55 minutes for all treated women, see Table A3). The difference

[11]Employment Bans are not the only tool available to protect pregnant women, but they are reported to be the most common measure employed (BMFSFJ, 2022). In addition, pregnant women are largely protected against dismissal from the start of their pregnancy until four months postpartum, with exceptions being extremely rare and typically associated with severe financial distress of the employer. The Maternity Protection Act has remained largely unchanged since its inception in 1952 (BMFSFJ, 2022). See also Nebe (2020) for an excellent overview.

between the two overall coefficients is not statistically significant at conventional levels. Moreover, the lower overall coefficient for the subgroup of women without childbirths is likely the result of a lower take-up of the effect. The increase for event time 5, for example, is of 54 minutes for this group and of 56 minutes for the full women's sample. Overall, we can conclude that our results are not driven by pregnancy-related sickness leaves.

2. Parallel Trends Assumption

The coefficients in the pre-treatment event times are statistically insignificant and their point estimates are generally centered around zero for our main results. We interpret this as supporting evidence in favor of the validity of our conditional parallel trends assumption. Evaluating the credibility of the parallel trends assumption by testing for differences in pre-trends is common practice in applied work. However, a recent literature has shown that such tests may suffer from low power (Freyaldenhoven, Hansen and Shapiro, 2019; Roth, 2022). Rambachan and Roth (2023) provide a methodological framework that allows us to further probe the robustness of our conditional parallel trends assumption. In principle, point identification of the event study parameters, δ_{es}, requires that parallel trends hold exactly. However, using the framework of Rambachan and Roth (2023), we may relax this requirement by explicitly setting restrictions on how much the parallel trends assumption may be violated. The causal parameters we are interested in are then partially identified, giving us a lower and upper bound within which our results are still valid.

Specifically, we investigate whether the coefficients continue to be significantly different from zero, if we were to assume that the violation of parallel trends in the post-treatment period is no more than a factor $\bar{M}$ of the maximum violation of parallel trends in the pre-treatment period (see Rambachan and Roth (2023) for other options). Figure A8 in the appendix illustrates this exercise for two central variables in our research design. In each panel, we plot the original confidence interval followed by the conditional least-favorable scenario times a parameter $\bar{M}$.

In panel A, we plot the results for annual gross labor income for $\bar{M}$ values of 0, 0.5, 1, 1.5, and 2, where 0 denotes the original outcome. We observe that our estimated effect remains statistically significant throughout all event times when we assume a $\bar{M}$ value of 0.5, and is significant for the first two years of the shock with a value of 1. As can be seen in Panel B of Figure A8, the decline of labor force participation is particularly robust. Even when assuming that the post-treatment violation of parallel trends is equal to the largest violation before the treatment, our coefficients remain statistically significant at the 95% level. Taken together, these exercises confirm the credibility of the identifying assumption.

6. Conclusion

In this paper, we examine the impact of health shocks on the labor supply decisions and financial well-being of households in Germany. We find compelling evidence that health shocks lead to persistent declines in the labor supply of affected individuals, mainly through labor market exits. These exits point to the limited capacity of the German labor market to facilitate downward adjustments, such as transitions from full-time to part-time employment.

Following these exits, we observe a significant negative impact on household financial well-being. However, our results also demonstrate that households compensate for these financial losses through a combination of public transfers and increased spousal labor supply.

Our analysis reveals significant gender differences in the labor supply response to health shocks. Female labor supply responds more sensitively than male labor supply, either when women become sick themselves or when they respond to their partner's health shock. This gender-specific response to health shocks extends beyond the labor market into the realm of domestic production. Affected women assume an even greater share of childcare responsibilities than their male counterparts – further entrenching traditional gender roles.

Our findings may have implications for policies aimed at incentivizing female labor supply. Future work should explicitly consider the role of gender norms and tax systems in the household response to health shocks.

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Appendix

A1. 2001 Reform of the Occupational Disability Insurance

Prior to 2001, a person could receive a disability pension if it became physically impossible for them to continue working in the same occupation. In 2001, a reform was passed that limited access to disability pensions by introducing Reduced Working Capacity Pensions (RWCP, *Erwerbsminderungsrente*) for cases in which a person cannot perform *any* work activity for at least 3 hours per working day. If a person is able to work between 3 and 6 hours per workday, they are entitled to half of the RWCP, although such cases remain rare, and a full pension is usually granted. The reform applied to all individuals born after 1960, even retroactively.[12] In this section, we examine whether and how the reform may have affected the behavior of individuals following the health shock. To do so, we split our sample into two groups, one composed by treated individuals born before 1960, and the other composed by individuals born after 1960 and experiencing the shock after 2001. Thus, we exclude the notch cohorts, i.e. those individuals born after 1960, who also experienced the shock before the implementation of the reform. Some of these individuals may have lost their disability pension, as they did not meet the new requirements for a RWCP pension.

Figure A1 shows the results for some of our main outcomes. See Table A5 for the point estimates. In general, we observe similar dynamics between the two groups. The reform seems to have lowered the probability of dropping out of the labor market (panel B, −8.6pp for the post-reform group vs. −17.3pp for the pre-reform group), which is reflected in a smaller decline of labor income (panel A, −2001.73 Euros for the post-reform group, and −3261.38 for the pre-reform group). Although one might expect that the stricter eligibility rules for disability pensions would have forced more people to leave the labor market without com-

[12] See Seibold, Seitz and Siegloch (2022) and Fischer, Geyer and Ziebarth (2023) for more extensive studies on the topic.

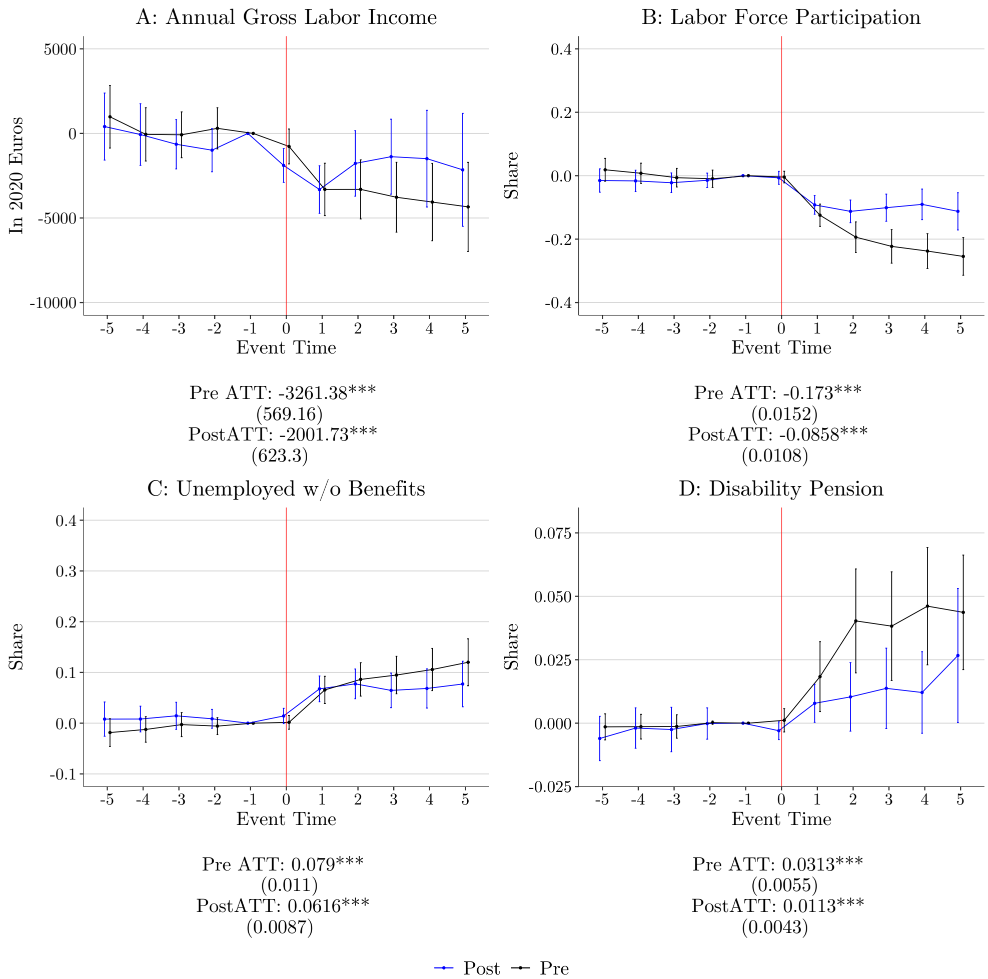

Figure A1. Labor Supply: Reform

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A5. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

pensation, this does not seem to be the case. The overall coefficients for panel C are +6pp for the post-reform and +8pp for the pre-reform cohort. As expected, fewer treated individuals gain access to the disability pensions after the implementation of the reform (panel D, +1.1pp for the post-reform group vs. +3.1pp for the pre-reform group).

These results suggest that the reform was successful in reducing the number of people leaving the labor force and benefiting from the relatively more generous disability pension before 2001. However, we still find a propensity for sick individuals to leave the labor market without being reintegrated in the medium term.

A2. Correlation between treatment and health outcomes

Although general questions about a person's health status and illnesses may not be reliable proxies for identifying prolonged sick leaves on their own, we can still use them to validate our treatment variable. As a reference, Figure A2 shows the most common causes for a prolonged sick leave in 2019. The vast majority are represented by mental and behavioral disorders, and by musculoskeletal disorders, with little difference between genders.

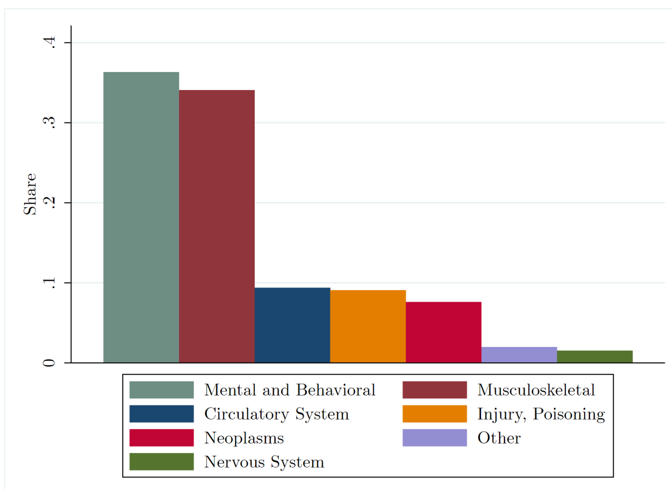

Figure A2. Most common causes for a prolonged sick leave (> 6 weeks) in 2019

Note: Own calculations based on data by the German Health Ministry.

Figure A3 shows that several health-related measures are affected by instantaneous changes at the time of the health shock, based on specification 1. We observe that individuals are significantly more likely to spend nights in the hospital. For the average affected individual in our sample, we observe an increase of almost 8.5 nights spend at the hospital, which returns to its pre-treatment level two years after the shock. We also find that these individuals are significantly less satisfied with their health, are much more likely to worry about it, and report worse health in the year they report spending at least 6 weeks on sick leave. We do not see a recovery of these changes until 3 to 4 calendar years after the shock.

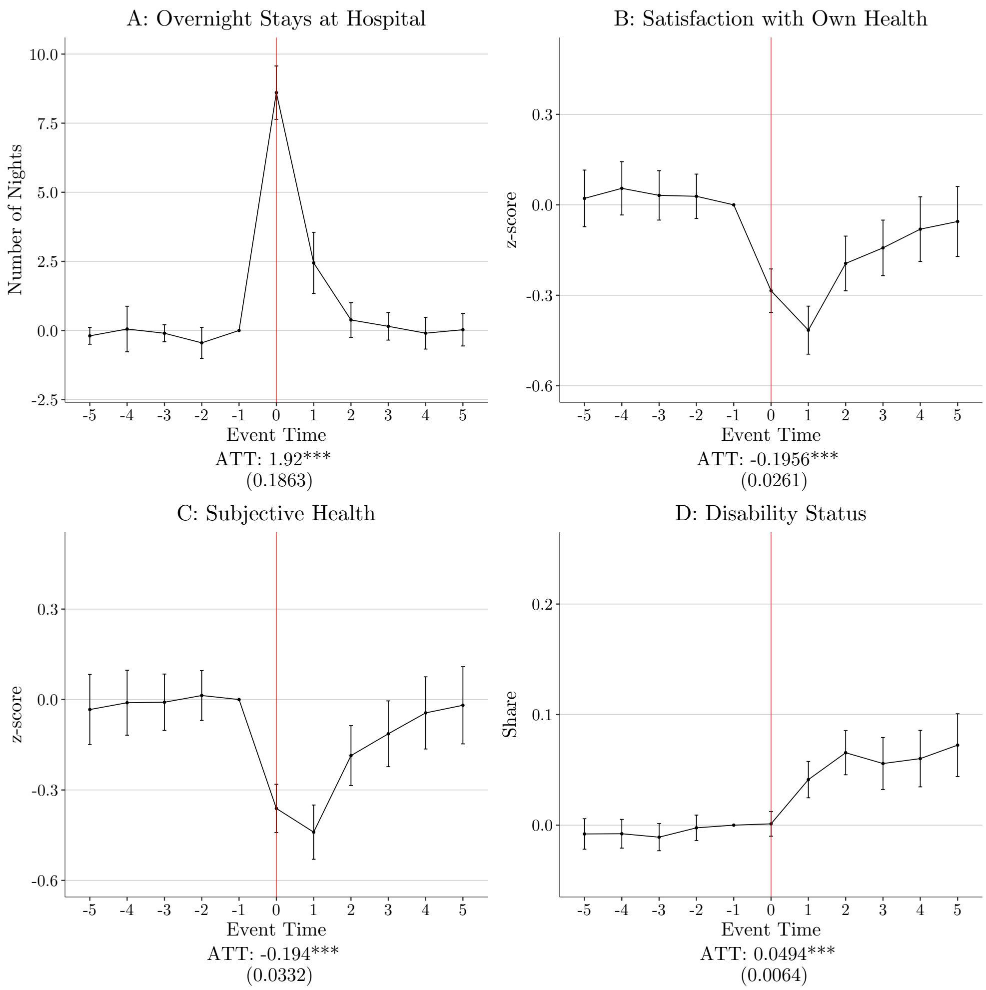

FIGURE A3. DEVELOPMENT OF HEALTH OUTCOMES

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are relative to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

A3. Alternative Estimators

We test further estimators to validate our empirical strategy. Figure A4 compares the estimator by Callaway and Sant'Anna (2021) with the one proposed by De Chaisemartin and d'Haultfoeuille (2020), as well as with a standard TWFE regression, for annual gross labor income and labor force participation. As expected, the TWFE results are biased. This is due to the staggered fashion and the heterogeneity of the treatment effects. TWFE also rejects the hypothesis of parallel trends before the treatment. Both Callaway and Sant'Anna (2021) and De Chaisemartin and d'Haultfoeuille (2020) are better at accounting for the staggered nature of our treatment, thus outperforming the standard TWFE approach.

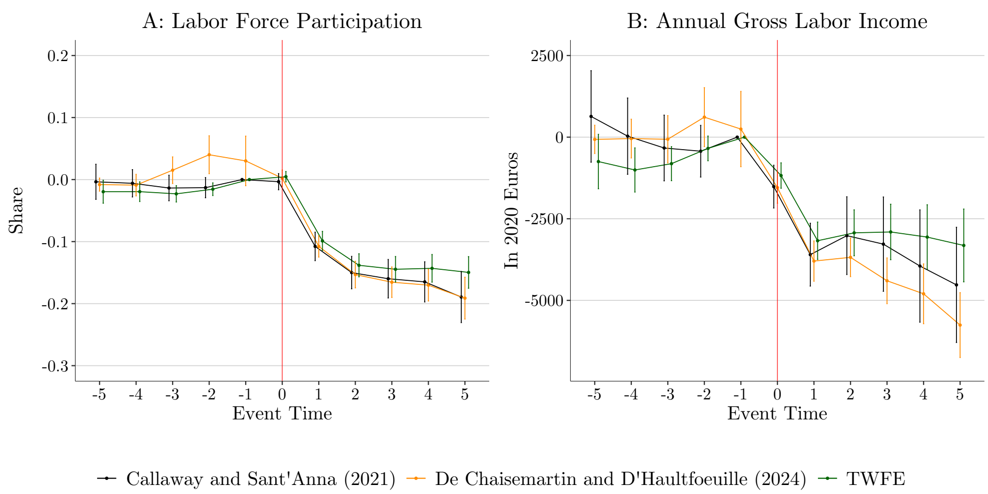

Figure A4. Robustness Test: Alternative estimators

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). For the results based on specification 1 and TWFE, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group.

A4. Tables and Additional Results

Table A1— Event study coefficients: Treated individuals

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
Income and labor supply											
Annual gross labor income	634.64	30.49	-332.3	-430.81	-1515.24***	-3599.16***	-3017.51***	-3277.17***	-3948.03***	-4525.34***	-3313.74***
	(512.93)	(428.04)	(368.61)	(289.84)	(239.82)	(352.45)	(436.07)	(528.85)	(629.78)	(646.18)	(415.25)
Labor force participation	-0.0036	-0.006	-0.0136	-0.013	-0.0034	-0.1077***	-0.15***	-0.1598***	-0.1649***	-0.1894***	-0.1292***
	(0.0105)	(0.0082)	(0.0077)	(0.0061)	(0.0049)	(0.0085)	(0.0097)	(0.0115)	(0.012)	(0.0153)	(0.0083)
Full-time employment	0.0062	-0.0076	0.0024	-0.0173	-0.1078***	-0.1585***	-0.1458***	-0.157***	-0.1853***	-0.2095***	-0.1607***
	(0.0165)	(0.0147)	(0.0133)	(0.0109)	(0.0108)	(0.0129)	(0.0149)	(0.0178)	(0.0186)	(0.0217)	(0.0138)
Part-time employment	-0.0087	0.0018	-0.0168	0.0034	0.104***	0.0376*	-0.0199	-0.0147	0.0067	0.0061	0.02
	(0.0159)	(0.0158)	(0.0126)	(0.0111)	(0.011)	(0.0136)	(0.0148)	(0.0167)	(0.0186)	(0.0198)	(0.013)
Weekly hours	-0.1751	-0.4652	-0.3581	-0.6172	-2.47***	-6.73***	-6.54***	-6.79***	-7.49***	-8.49***	-6.43***
	(0.591)	(0.4826)	(0.4358)	(0.3556)	(0.3242)	(0.4431)	(0.5354)	(0.6734)	(0.6571)	(0.8265)	(0.4897)
Unemployment with benefits	0.011	0.0064	-0.002	-0.0019	0.0169*	0.0591***	0.0554***	0.0603***	0.058***	0.0466***	0.0494***
	(0.0098)	(0.009)	(0.0084)	(0.0066)	(0.0068)	(0.0083)	(0.0093)	(0.012)	(0.0115)	(0.0126)	(0.0085)
Unemployment w/o benefits	-0.0039	0.0019	0.0074	0.0038	0.0087	0.0718***	0.0848***	0.0817***	0.0972***	0.11***	0.0757***
	(0.0093)	(0.0068)	(0.006)	(0.0047)	(0.0038)	(0.0068)	(0.0078)	(0.0086)	(0.0098)	(0.0117)	(0.006)
Disability pension	-0.0041	-0.0015	-0.0018	0	-0.0013	0.0118***	0.0246***	0.0262***	0.0289***	0.0351***	0.0209***
	(0.002)	(0.0019)	(0.0018)	(0.0015)	(0.0011)	(0.0028)	(0.0047)	(0.0049)	(0.0056)	(0.0062)	(0.0037)
Household income											
HH pre-government income	-299.87	-523.26	-251.56	-199.57	-1568.3***	-3406.2***	-1855.4*	-2553.21**	-2220.13	-1870.2	-2245.57***
	(895.12)	(783.1)	(615.67)	(548.43)	(393.15)	(603.67)	(750.41)	(881.66)	(942.42)	(1141.84)	(615.53)
HH post-government income	-40.02	65.97	-197.44	-61.12	-1086.28***	-1279.9***	-690.19	-1021.77	-931.15	-1052.96	-1010.37***
	(510.13)	(442.82)	(358.11)	(273.55)	(245.6)	(348.81)	(425.35)	(511.5)	(571.52)	(624.55)	(363.4)
HH pre-government income equivalent	-182.74	-207.43	27.06	18.48	-469.38	-1377.82***	-545.41	-390.81	-209.99	522.86	-411.76
	(415.57)	(342.08)	(302.75)	(283.24)	(193.92)	(288.77)	(363.13)	(447.39)	(439.28)	(567.91)	(293.93)
HH post-government income equivalent	15.2	50.68	-29.76	58.14	-220.38	-373.32	72.01	169.75	241.31	817.26*	117.77
	(235.07)	(217.14)	(176.55)	(148.41)	(120.08)	(169.7)	(206.47)	(247.53)	(249.68)	(322.92)	(189.29)
Domestic production											
Childcare (hrs/day)	0.1108	0.0426	0.0274	0.0075	-0.092	0.6187***	0.714***	0.6449***	0.5479***	0.4876**	0.4868***
	(0.1466)	(0.1201)	(0.1161)	(0.0903)	(0.0701)	(0.107)	(0.1282)	(0.1358)	(0.1497)	(0.1618)	(0.1043)
Household chores (hrs/day)	0.0489	0.0587	-0.0233	0.0345	0.0094	0.174***	0.2306***	0.2775***	0.2655***	0.3324***	0.2149***
	(0.0537)	(0.0498)	(0.0393)	(0.0357)	(0.0357)	(0.0397)	(0.0473)	(0.0526)	(0.0584)	(0.0682)	(0.0407)

Note: The data are from the SOEP (1984-2020). The table displays the event study coefficients and standard errors for the analyzed outcomes of the treated individuals. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column "Overall" contains the average treatment effects on the treated.
Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Table A2— Event study coefficients: Spouses

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
Income and labor supply											
Annual gross labor income	-912.51	-352.83	-732.16	-574.29	-82.52	894.15	2286.96**	2456.31*	3815.6***	4670.29**	2340.13***
	(717.28)	(711.9)	(471.1)	(414.76)	(304.62)	(636.56)	(824.08)	(981.8)	(1062.38)	(1579.98)	(775.06)
Labor force participation	-0.0077	0.0138	-0.0054	-0.0137	-0.0097	0.0255	0.0522*	0.0327	0.0387	0.0526	0.032
	(0.0189)	(0.0142)	(0.0128)	(0.0101)	(0.0097)	(0.0159)	(0.0206)	(0.0298)	(0.0355)	(0.043)	(0.0211)
Full-time employment	-8e-04	0.0112	-0.01	-0.0074	0.0237	0.0277	0.0664***	0.0623**	0.0953***	0.092*	0.0612***
	(0.0193)	(0.0175)	(0.0152)	(0.0119)	(0.0098)	(0.0138)	(0.0188)	(0.0214)	(0.0262)	(0.0327)	(0.0172)
Part-time employment	-0.0078	0.0032	0.0043	-0.0071	-0.0308*	-0.022	-0.0269	-0.0436	-0.0721**	-0.0536	-0.0415**
	(0.0216)	(0.0198)	(0.0164)	(0.0129)	(0.0119)	(0.0153)	(0.0183)	(0.0229)	(0.0251)	(0.0311)	(0.0172)
Domestic production											
Childcare (hrs/day)	-0.1355	-0.189	-0.2332	-0.1195	0.0357	0.1229	0.2867	0.2859	0.2539	0.212	0.1995
	(0.2143)	(0.1864)	(0.1647)	(0.1325)	(0.1062)	(0.1436)	(0.1975)	(0.2715)	(0.2713)	(0.324)	(0.1815)
Household chores (hrs/day)	0.062	0.0401	0.0254	0.0725	-8e-04	-0.0763	-0.1018	-0.1969	-0.2371	-0.2213	-0.139**
	(0.084)	(0.0674)	(0.0691)	(0.0533)	(0.0518)	(0.054)	(0.0747)	(0.0857)	(0.0977)	(0.1128)	(0.07)

Note: The data are from the SOEP (1984-2020). The table reports the event study coefficients and standard errors for the analyzed spousal outcomes. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column “Overall” contains the average treatment effects on the treated.
Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Table A3— Event study coefficients: Treated, by gender

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
						Female					
Income and labor supply											
Annual gross labor income	-545.05	-537.77	-1106.11	-711.91	-1738.08***	-4500.31***	-3924.28***	-4269.7***	-4019.76***	-4329.48***	-3796.93***
	(627.21)	(516.42)	(441.96)	(365.88)	(302.18)	(425.72)	(554.52)	(645.26)	(666.17)	(760.92)	(459.78)
Labor force participation	0.0019	-0.0061	-0.016	-0.0225	-0.0022	-0.1528***	-0.2105***	-0.2183***	-0.2382***	-0.2586***	-0.1801***
	(0.0165)	(0.0142)	(0.0122)	(0.0102)	(0.0079)	(0.0144)	(0.0167)	(0.0182)	(0.0196)	(0.0225)	(0.0131)
Full-time employment	-0.017	-0.0255	-0.0091	-0.0262	-0.1388***	-0.1845***	-0.1593***	-0.1819***	-0.1981***	-0.2087***	-0.1786***
	(0.0249)	(0.0223)	(0.0196)	(0.0161)	(0.017)	(0.0202)	(0.0226)	(0.027)	(0.0281)	(0.0299)	(0.0203)
Part-time employment	0.0199	0.019	-0.0097	0.0011	0.1354***	0.0151	-0.0679*	-0.0512	-0.0561	-0.0665	-0.0152
	(0.0258)	(0.0248)	(0.0215)	(0.0183)	(0.0186)	(0.0227)	(0.025)	(0.0287)	(0.0291)	(0.0309)	(0.0205)
Domestic production											
Childcare (hrs/day)	0.3347	-0.0568	0.1565	-0.1103	-0.1725	1.14***	1.36***	1.19***	1.04***	0.9429**	0.919***
	(0.25)	(0.2106)	(0.1969)	(0.1543)	(0.1267)	(0.2016)	(0.2267)	(0.237)	(0.2596)	(0.2851)	(0.1761)
Household chores (hrs/day)	0.1072	0.1375	0.0143	0.0264	-0.0095	0.2284***	0.2626***	0.2635***	0.2085	0.2752*	0.2048***
	(0.0833)	(0.0751)	(0.0661)	(0.0579)	(0.0551)	(0.0628)	(0.0716)	(0.0781)	(0.0942)	(0.1084)	(0.0584)
						Male					
Income and labor supply											
Annual gross labor income	1369.12	266.15	192.7	-204.24	-1075.72**	-2498***	-1466.76	-1889.94*	-3025.86**	-3538.16***	-2249.07***
	(713.42)	(633.11)	(569.02)	(449.78)	(393.69)	(552.48)	(682.25)	(748.96)	(978.75)	(1002.15)	(592.53)
Labor force participation	-0.0132	-0.004	-0.0127	-0.0039	-0.0024	-0.066***	-0.0898***	-0.0968***	-0.0868***	-0.1091***	-0.0752***
	(0.0099)	(0.0091)	(0.009)	(0.007)	(0.0064)	(0.0098)	(0.0129)	(0.0151)	(0.0149)	(0.0167)	(0.0093)
Full-time employment	0.0081	0.0013	0.0065	-0.005	-0.073***	-0.1297***	-0.1121***	-0.1103***	-0.1398***	-0.1656***	-0.1218***
	(0.0178)	(0.0176)	(0.0155)	(0.0136)	(0.0129)	(0.016)	(0.0202)	(0.0213)	(0.023)	(0.0281)	(0.016)
Part-time employment	-0.0211	-0.0055	-0.019	0.0014	0.0703***	0.0535***	0.0092	0.0049	0.0425	0.0447	0.0375***
	(0.0158)	(0.0162)	(0.015)	(0.0124)	(0.0128)	(0.0155)	(0.0167)	(0.0183)	(0.0205)	(0.0233)	(0.014)
Domestic production											
Childcare (hrs/day)	-0.0789	0.133	-0.1097	0.097	-0.0454	0.12	0.1065	0.1182	0.0139	0.0157	0.0548
	(0.1253)	(0.1517)	(0.1186)	(0.0795)	(0.0694)	(0.0936)	(0.1306)	(0.1772)	(0.1301)	(0.1776)	(0.1136)
Household chores (hrs/day)	0.0577	0.0523	-0.0154	0.0711	0.0394	0.1305**	0.1485**	0.1828***	0.1872**	0.266***	0.1591***
	(0.0572)	(0.0449)	(0.0435)	(0.0364)	(0.0391)	(0.0451)	(0.0482)	(0.0533)	(0.057)	(0.068)	(0.0428)

Note: The data are from the SOEP (1984-2020). The data are from the SOEP (1984-2020). The table displays the event study coefficients and standard errors for the analyzed outcomes of the treated individuals, by gender. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column "Overall" contains the average treatment effects on the treated.
Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

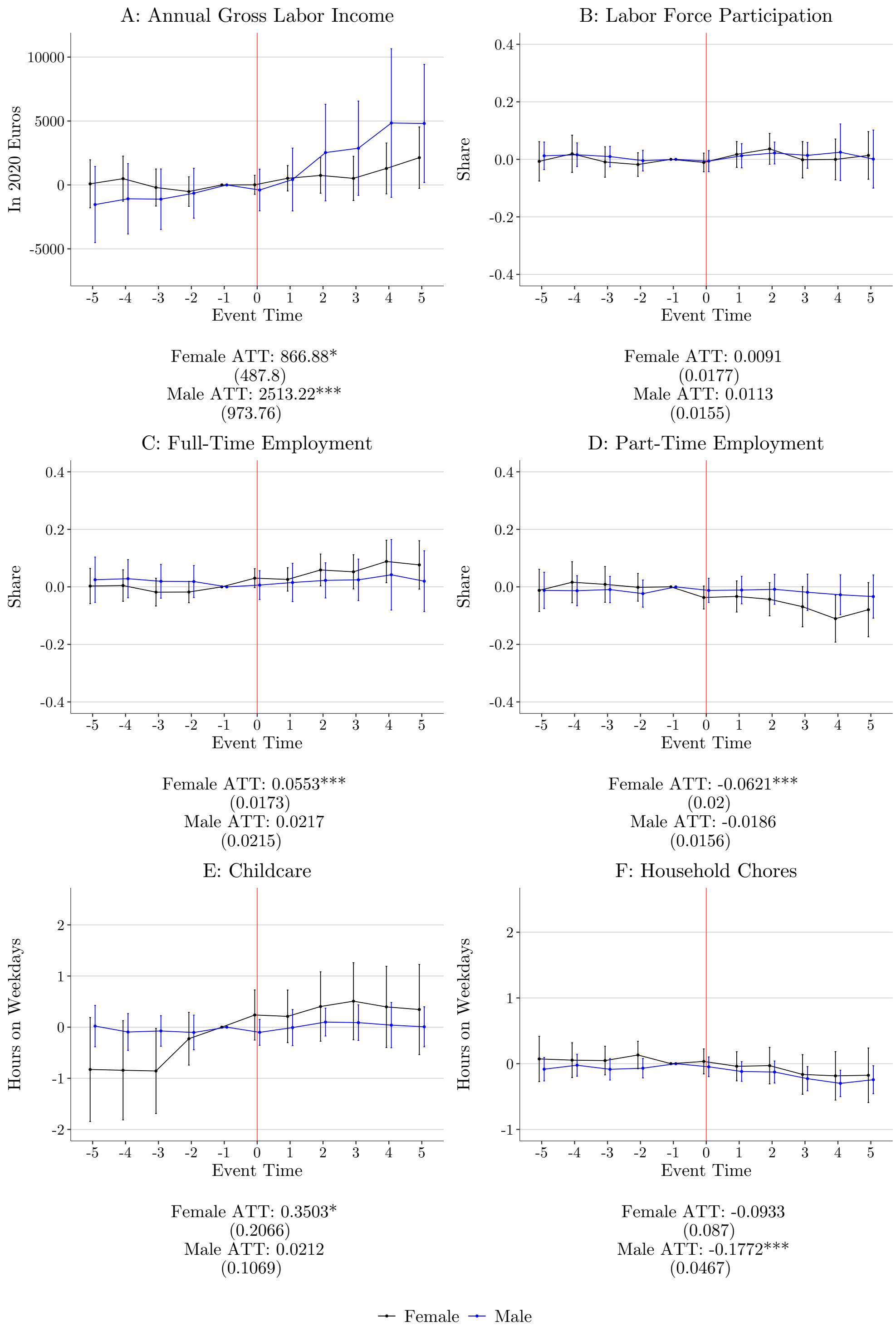

Figure A5. Labor Supply and Time Use by Gender - Spouses

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A4. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Table A4— Event study coefficients: Spouses, by gender

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
					Female						
Income and labor supply											
Annual gross labor income	84.36	489.82	-204.15	-518.31	8.8	518.15	741.97	511.77	1287.57	2133	866.88*
	(689.67)	(647.28)	(533.18)	(424.18)	(273.15)	(364.75)	(509.28)	(634.98)	(730.03)	(881.99)	(487.8)
Labor force participation	-0.007	0.0194	-0.0092	-0.018	-0.0107	0.0172	0.0364	-0.0015	-2e-04	0.0136	0.0091
	(0.026)	(0.0245)	(0.0201)	(0.0156)	(0.0123)	(0.017)	(0.0203)	(0.024)	(0.0269)	(0.0314)	(0.0177)
Full-time employment	0.0028	0.0046	-0.0184	-0.0179	0.0302*	0.0259	0.0588**	0.0523	0.0883***	0.0764*	0.0553***
	(0.023)	(0.0205)	(0.0181)	(0.0139)	(0.0123)	(0.0153)	(0.0208)	(0.0223)	(0.0277)	(0.0315)	(0.0173)
Part-time employment	-0.0122	0.0162	0.0087	-0.0016	-0.037*	-0.0333	-0.0431	-0.069*	-0.1106***	-0.0794	-0.0621***
	(0.0277)	(0.027)	(0.0235)	(0.0183)	(0.0151)	(0.0205)	(0.0219)	(0.0265)	(0.0308)	(0.0357)	(0.02)
Domestic production											
Childcare (hrs/day)	-0.828	-0.8428	-0.8566**	-0.2259	0.238	0.2108	0.4037	0.508	0.3963	0.3451	0.3503*
	(0.3722)	(0.3552)	(0.3049)	(0.1887)	(0.1796)	(0.1884)	(0.2481)	(0.2755)	(0.2908)	(0.3227)	(0.2066)
Household chores (hrs/day)	0.0722	0.0538	0.0472	0.1321	0.0345	-0.0396	-0.0297	-0.1634	-0.1851	-0.1764	-0.0933
	(0.1275)	(0.0978)	(0.0807)	(0.0774)	(0.0705)	(0.082)	(0.103)	(0.1115)	(0.1362)	(0.1536)	(0.087)
					Male						
Income and labor supply											
Annual gross labor income	-1537.34	-1083.37	-1116.18	-649.61	-398.21	422.39	2530.25	2872.12	4842.59	4810.2**	2513.22***
	(1122.8)	(1037.35)	(891.98)	(735.4)	(614.36)	(926.26)	(1423.6)	(1390.86)	(2189.43)	(1742.84)	(973.76)
Labor force participation	0.0123	0.0159	0.0097	-0.0045	-0.0062	0.0126	0.0221	0.0139	0.0248	0.001	0.0113
	(0.018)	(0.0154)	(0.0134)	(0.0135)	(0.0137)	(0.0158)	(0.0143)	(0.0169)	(0.037)	(0.0379)	(0.0155)
Full-time employment	0.0248	0.0284	0.0193	0.0185	0.0063	0.0152	0.0226	0.0245	0.042	0.0198	0.0217
	(0.0284)	(0.0239)	(0.0212)	(0.0201)	(0.018)	(0.024)	(0.0221)	(0.026)	(0.0442)	(0.0381)	(0.0215)
Part-time employment	-0.0122	-0.0133	-0.0093	-0.0234	-0.0123	-0.0111	-0.0084	-0.0187	-0.0275	-0.0336	-0.0186
	(0.0233)	(0.0193)	(0.0169)	(0.0174)	(0.0155)	(0.0177)	(0.0192)	(0.0233)	(0.0256)	(0.0278)	(0.0156)
Domestic production											
Childcare (hrs/day)	0.0214	-0.0948	-0.0742	-0.1036	-0.1011	-0.0075	0.0996	0.0892	0.0396	0.0076	0.0212
	(0.1532)	(0.1358)	(0.113)	(0.1281)	(0.0957)	(0.1332)	(0.1027)	(0.1314)	(0.1674)	(0.1479)	(0.1069)
Household chores (hrs/day)	-0.0835	-0.0232	-0.0853	-0.0687	-0.0471	-0.1187	-0.1265	-0.2278***	-0.2992***	-0.2437**	-0.1772***
	(0.063)	(0.0589)	(0.0575)	(0.052)	(0.0529)	(0.0527)	(0.059)	(0.065)	(0.0708)	(0.0749)	(0.0467)

Note: The data are from the SOEP (1984-2020). The data are from the SOEP (1984-2020). The data are from the SOEP (1984-2020). The table displays the event study coefficients and standard errors for the analyzed outcomes of the spouses, by gender. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column "Overall" contains the average treatment effects on the treated.
Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Table A5— Event study coefficients: Treated, pre- and post-reform

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
						Pre-reform					
Income and labor supply											
Annual gross labor income	982.38	-56.59	-81.8	300.59	-771.4	-3311.85***	-3308.23***	-3774.5***	-4059.12***	-4343.18***	-3261.38***
	(683.31)	(582.55)	(501.15)	(450.76)	(381.11)	(572.71)	(645.91)	(763.55)	(845.24)	(973.14)	(569.16)
Labor force participation	0.0186	0.0077	-0.0063	-0.0097	-0.0043	-0.1247***	-0.1939***	-0.2229***	-0.2376***	-0.2545***	-0.173***
	(0.0137)	(0.0121)	(0.0112)	(0.0104)	(0.007)	(0.0134)	(0.0184)	(0.0202)	(0.0209)	(0.0227)	(0.0152)
Unemployment w/o benefits	-0.0185	-0.0124	-0.0028	-0.0058	0.0016	0.0655***	0.0863***	0.0949***	0.1057***	0.12***	0.079***
	(0.0107)	(0.0098)	(0.0092)	(0.0065)	(0.0053)	(0.0105)	(0.0128)	(0.0144)	(0.0162)	(0.018)	(0.011)
Disability pension	-0.0014	-0.0014	-0.0013	2e-04	0.0011	0.0183***	0.0403***	0.0382***	0.0461***	0.0437***	0.0313***
	(0.0022)	(0.002)	(0.0019)	(3e-04)	(0.0019)	(0.0058)	(0.0086)	(0.009)	(0.0097)	(0.0095)	(0.0055)
						Post-reform					
Income and labor supply											
Annual gross labor income	404.47	-66.39	-640.56	-992.31	-1895.5***	-3318.45***	-1774.15*	-1375.89	-1492.58	-2153.83	-2001.73***
	(714.98)	(657.73)	(525.8)	(460.18)	(360.66)	(508.23)	(699.15)	(799.53)	(1031.08)	(1204.42)	(623.3)
Labor force participation	-0.0152	-0.0164	-0.0222	-0.0144	-0.0067	-0.0921***	-0.1125***	-0.1009***	-0.0904***	-0.1123***	-0.0858***
	(0.0135)	(0.0123)	(0.0113)	(0.0082)	(0.0075)	(0.0108)	(0.0131)	(0.0156)	(0.0176)	(0.0215)	(0.0108)
Unemployment w/o benefits	0.008	0.0081	0.0145	0.0086	0.0142*	0.0676***	0.0775***	0.0646***	0.0684***	0.0772***	0.0616***
	(0.0125)	(0.0094)	(0.0099)	(0.0069)	(0.0056)	(0.0094)	(0.0108)	(0.0126)	(0.0143)	(0.0166)	(0.0087)
Disability pension	-0.006	-0.0019	-0.0025	-1e-04	-0.003	0.0078**	0.0104	0.0137	0.0121	0.0267**	0.0113***
	(0.0034)	(0.0031)	(0.0034)	(0.0024)	(0.0014)	(0.003)	(0.0053)	(0.0062)	(0.0063)	(0.0104)	(0.0043)

Note: The data are from the SOEP (1984-2020). The table displays the event study coefficients and standard errors for the analyzed outcomes of the treated individuals, before and after the 2001 reform. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column "Overall" contains the average treatment effects on the treated. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

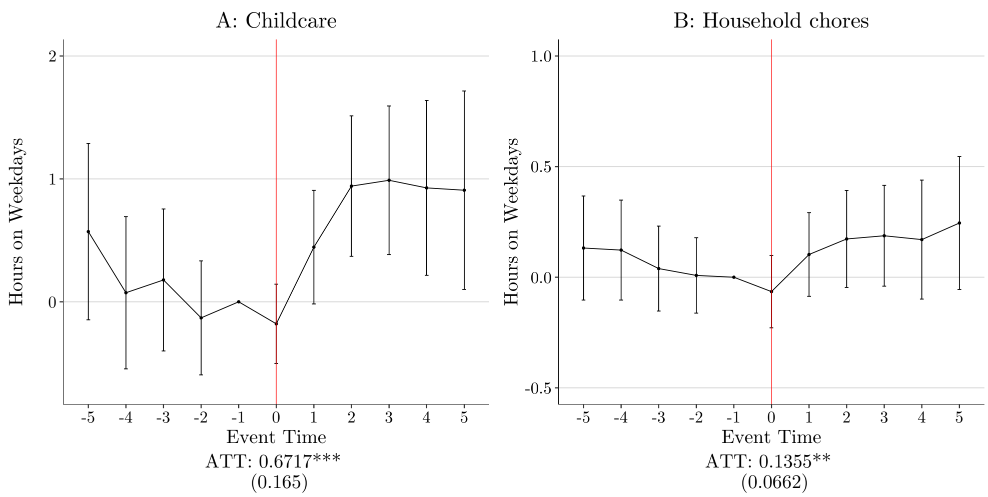

Figure A6. Domestic Production of Women Without Births Around Shock

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A6. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Table A6— Event study coefficients: Treated women without births around shock

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
Domestic production											
Childcare (hrs/day)	0.571	0.0737	0.1778	-0.1307	-0.1793	0.4447*	0.9415***	0.9888***	0.9268***	0.9079**	0.6717***
	(0.2668)	(0.2303)	(0.2148)	(0.1725)	(0.12)	(0.1718)	(0.2126)	(0.2249)	(0.2646)	(0.3003)	(0.165)
Household chores (hrs/day)	0.132	0.1227	0.0391	0.0082	-0.0651	0.1028	0.173	0.1874	0.1701	0.2451	0.1355**
	(0.0857)	(0.0823)	(0.0699)	(0.0621)	(0.0596)	(0.0689)	(0.0799)	(0.083)	(0.0979)	(0.1094)	(0.0662)

Note: The data are from the SOEP (1984-2020). The table displays the event study coefficients and standard errors for the analyzed outcomes of treated women excluding those reporting a childbirth at event times 0 and 1. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column "Overall" contains the average treatment effects on the treated.

Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

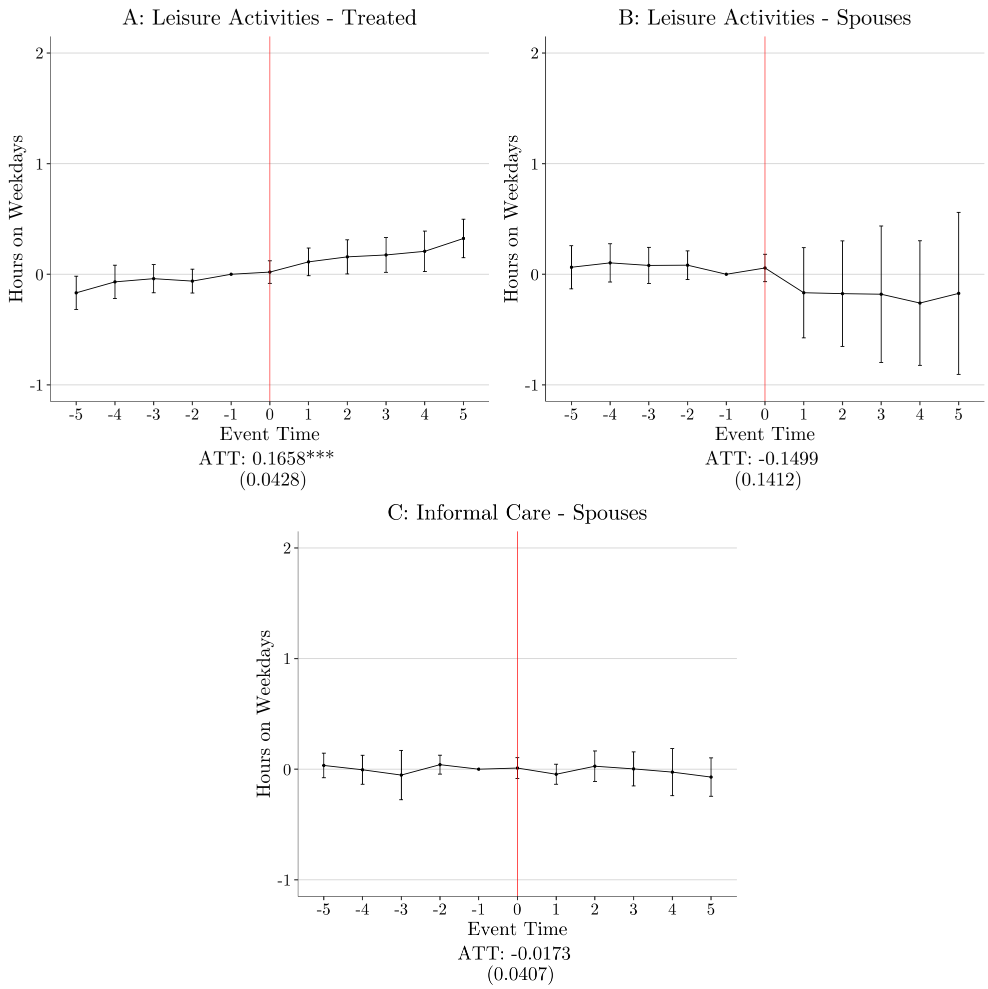

Figure A7. Domestic Production - Additional Outcomes

Note: The data are from the SOEP (1984-2020). The figure plots the event study coefficients (simultaneous 95% confidence bands). Changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The event study coefficients are also reported in Table A7. The overall coefficients (ATT) with standard errors for the post-treatment period are reported at the bottom of each plot. Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Table A7— Event study coefficients: Leisure and informal care

Dependent variable	Event time										Overall
	-5	-4	-3	-2	0	1	2	3	4	5	
					Treated						
Leisure activities (hrs/day)	-0.1679**	-0.0689	-0.0398	-0.0619	0.0197	0.1121	0.1573**	0.1745**	0.2073**	0.3237***	0.1658***
	(0.054)	(0.0541)	(0.0458)	(0.0387)	(0.0367)	(0.0449)	(0.0555)	(0.0565)	(0.0658)	(0.0625)	(0.0428)
					Spouse						
Leisure activities (hrs/day)	0.0633	0.103	0.0798	0.082	0.0568	-0.1671	-0.1753	-0.1805	-0.2604	-0.1729	-0.1499
	(0.0722)	(0.064)	(0.0604)	(0.0479)	(0.0458)	(0.1509)	(0.1765)	(0.2282)	(0.2084)	(0.2709)	(0.1412)
Informal care (hrs/day)	0.0338	-0.0054	-0.0532	0.0408	0.0103	-0.0458	0.0269	0.0026	-0.0264	-0.0714	-0.0173
	(0.0445)	(0.0526)	(0.0894)	(0.0343)	(0.0377)	(0.0364)	(0.0553)	(0.0617)	(0.0854)	(0.0697)	(0.0407)

Note: The data are from the SOEP (1984-2020). The table displays the event study coefficients and standard errors for the analyzed outcomes of treated individuals and spouses. For the pre- and post-treatment coefficient, changes are in relation to the status quo one calendar year before the health shock (i.e. at event time -1), and in comparison to the not-yet-treated control group. The column "Overall" contains the average treatment effects on the treated.
Stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

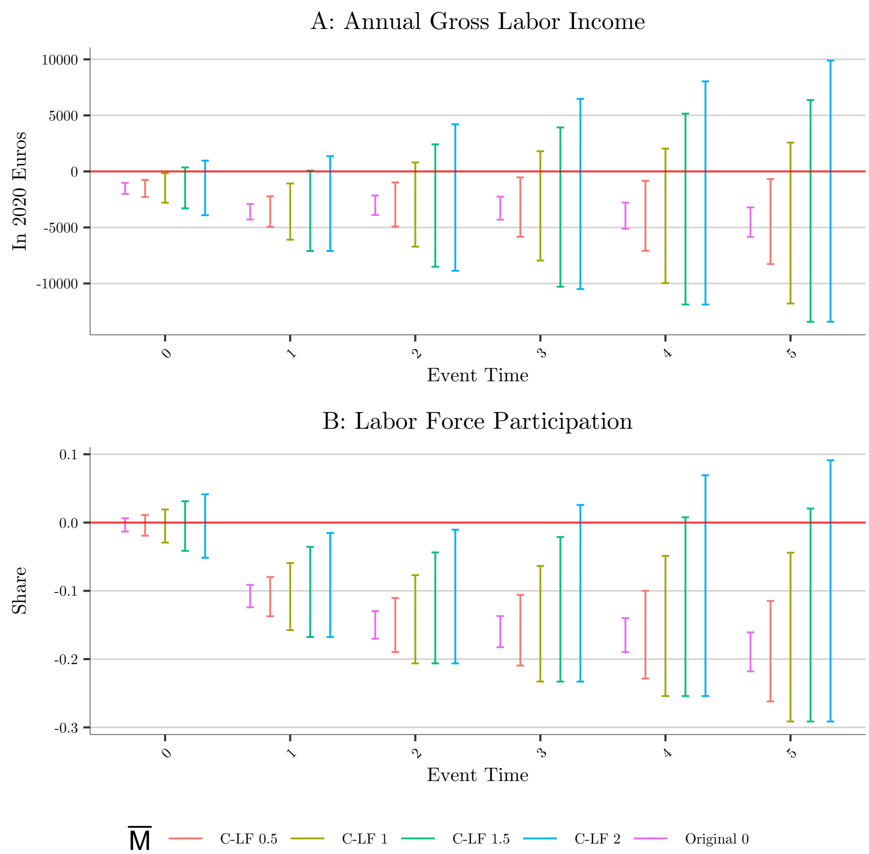

FIGURE A8. ROBUSTNESS TEST: CREDIBLE PARALLEL TRENDS

Note: The data are from the SOEP (1984-2020). The figure plots the coefficients (simultaneous 95% confidence bands) based on the robustness test detailed in Section 5.2. The original confidence intervals are reproduced without taking multiple hypothesis testing into account. In addition, for different values of $\bar{M}$, end points of successive confidence intervals may not change, as the **HonestDiD** packages constructs the confidence intervals by testing a discrete number of grid points, which can lead to imprecision if $\bar{M}$ values are too close to each other, given the number of grid points. We find that increasing the number of grid points does not affect this result visibly. The dependent variable for annual gross labor income is in 2020 Euros, and we trim its the top and bottom 1%.