Health of Elderly Parents and their Children's Labor Supply[†]

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Abstract

This paper leverages administrative social security and health records from Austria to investigate how a negative health shock to elderly parents affects their adult children's labor supply. To identify a causal effect, we exploit the timing of an unexpected health shock to one of the parents. First, we observe large negative effects of the health shock on parental health and labor market outcomes, combined with a strong increase in parental care dependency. Further, we find significant negative labor supply effects on the adult children after the parental health shock. This negative effect is gender-specific, being much more pronounced for daughters than for sons. For sub-populations who are more likely to engage in care-giving we find larger effects. Finally, we plan to exploit a policy reform to study whether additional supply of foreign care workers can help adult children to mitigate the negative impact of the parental health shock on their own labor market outcomes.

JEL Classification: J14, J22.
Keywords: Informal care, aging, labor supply, labor migration

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1 Introduction

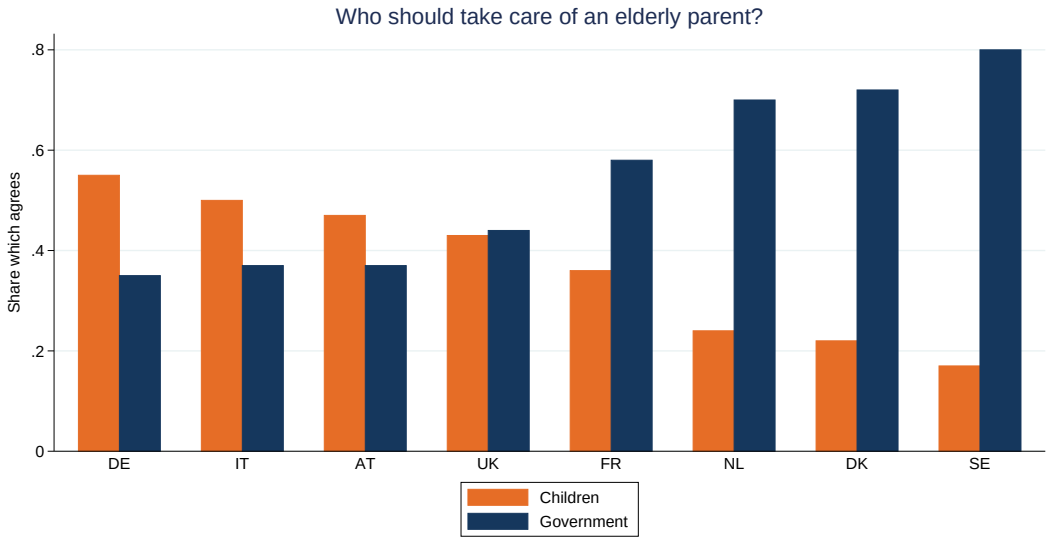
Many societies around the world are aging rapidly, facing the prospects of a population pyramid turning upside down. One of the key challenges of an aging population is the increasing need for care. This development already results in expanding long-term care (LTC) budgets in almost all OECD countries (OECD, 2017). However, not only public budgets are strongly affected, but also family members. Adult children are often important providers of care when parents develop care needs, which in turn may affect their labor market outcomes and well-being. The former might be especially important when adult children are at the beginning of their career. Understanding the impact of providing care to a sick relative is crucial when designing and evaluating long-term care policies, such as expansions of public LTC.

We investigate the effect of a parental health shock on the labor market outcomes of adult children. We focus on Austria; a typical example for a conservative continental European welfare state characterized by traditional family values and family-based assistance dynamics (Akerlof and Kranton, 2000; Esping-Andersen, 1999). These traditional norms and values also surface in the case of elderly care. Figure 1 shows the opinion of individuals regarding the question *"Who should take care of an elderly parent?"* for several countries. In Austria as well as in other more family-based welfare states such as Germany, around 50 percent of all respondents believe that it is the role of adult children to take care of their elderly parents. In Scandinavian and Benelux countries, only around 20 percent of all survey respondents agree with this statement. Previous literature has shown that family-based norms about welfare provision are associated with a low propensity of women to increase labor supply in order to cushion intra-family income shocks (see, for exmaple, Halla et al., 2018). Our analysis complements these findings by examining the degree of income losses adult children experience when an elderly parent needs care.

Estimating the causal effect of a parental health shock on children's labor market outcomes and well-being is difficultor several reasons. First of all, it is difficult to assign adequate counterfactual scenarios because health conditions are usually endogenous and often deteriorate gradually. Second, it is critical to employ rich longitudinal individual-level data on health and labor market outcomes for both parents and their children to credibly identify mid- and long-run effects. Using survey data on long-term care obligations of caregivers usually do not allow to study such effects, and may often be subject to justification bias.

We tackle these challenges by leveraging Austrian administrative data on health and labor market outcomes of parents and their children from 1998-2017. This data provides register-based information on health-care utilization, care allowance receipt as well as labor market outcomes. To identify causal effects we focus on sudden and unexpected

Figure 1: Social norm regarding who should take care of an elderly parent in selected countries



Notes: This figure is based on data from the Eurobarometer 67.3 (2007), which interviewed 28,660 citizens of the 25 countries in the European Union after the 2004 enlargement. All respondents were residents in the respective country, and aged 15 and over. The original survey questions is as follows 'Imagine an elderly father or mother who lives alone and can no longer manage to live without regular help because of her or his physical or mental health condition. In your opinion, what would be the best option for people in this situation?'. Respondents are given 5 options to choose from: 'They should live with one of their children' (1),'One of their children should regularly visit their home, in order to provide them with the necessary care' (2), 'Public or private service providers should visit their home and provide them with appropriate help and care' (3), to 'They should move to a nursing home' (4). The graph shows the share of respondents (by country) which gave answer (1) or (2) (in orange), or answer (3) or (4) (in blue), respectively.

health shocks, such as severe strokes and heart attacks (myocardial infarction).[1]

We employ a quasi-experimental event study design that is based on the comparison of children whose parents all suffer the same health shock, but at different points in time. Our identifying assumption is that the exact timing of the health shock is random.[2] We explore potential mechanisms, examining how the effect varies by child's gender, the parity of siblings, age, and access to formal care. Since informal care is often carried out by women, a parental health shock may have particularly negative consequences for women. Finally, we exploit a policy reform to study how the additional supply of formal care can help adult children to mitigate the negative effects of a parental health shock. In 2007, the Austrian government loosened restrictions for privately hired 24-hour care workers, resulting in a large increase of migrant care workers in private households (Österle and Bauer, 2016).

Our study contributes to the existing literature on the impact of negative health shocks on labor market outcomes. Most of these studies focus on the effects of a health

[1]The timing of strokes and heart attacks are usually said to be unpredictable within a short period of time (Doyle, 2011; WHO, 2014).

[2]Comparable scenarios are used in Druedahl and Martinello (2016); Fadlon and Nielsen (2017).

shock on *own* (i.e., of the affected person) labor market outcomes (see, for e. g., Halla and Zweimüller, 2013; Gupta et al., 2015; Dobkin et al., 2018). Only a few studies look at the effects of health shocks on *family* labor market outcomes. The major part of this work examines the labor market responses of *spouses* after a health shock of their partner. In this context, effects often depend on the severity of the health shock of the partner. Specifically, for non-fatal shocks, studies have found a reduction in employment and labor supply of the spouse (see, for e. g., Garcia-Gómez et al., 2013; Jeon and Pohl, 2017). When looking at fatal shocks instead, spousal labor supply sometimes even increases to compensate for the income losses caused by the death of a partner (Fadlon and Nielsen, 2017). The size of the effect often varies with the sex of the spouse and how well the institutional system insures against income losses.

In contrast to this literature, the effect of parental health shocks on the labor market outcomes of their *adult children* are much less understood. Some papers point to a negative association between parental health and children's labor market outcomes, which persists when controlling for individual fixed effects and care-giving effects (see, for e. g., Schmitz and Westphal, 2017). To the best of our knowledge, only two studies exploit exogenous variation to study the impact of parental health shocks on their adult children, with mixed results. Fevang et al. (2012) find that children of terminally ill parents reduce their labor supply temporarily. However, given that many of the parents in their sample have suffered from foreseeable terminal illnesses, it is difficult to rule out anticipatory effects (e.g. stemming from gifts or forthcoming bequests). In contrast to their results, Rellstab et al. (2018) find no effect of an unexpected parental hospitalization on their children's labor market outcomes.[3]

We extent these two studies in several important ways. First of all, both studies do not employ direct measures for the severity of the sudden health deterioration of the affected parent. In our study, we use a measure of the severity of the shock by exploiting information on parental medical conditions. More importantly, we have data on parental care dependency, which stems from official assessments by independent physicians. Second, we use a novel empirical strategy which exploits the exact timing of the health shock to identify how parental health affects their children's outcomes. Thus, we do not have to rely on matching procedures to assign treatment and control groups for comparisons. Third, in contrast to Fevang et al. (2012) and Rellstab et al. (2018), we do not only examine labor market but also health outcomes of the adult children. Having caring obligations for close relatives is often said to increase psychological stress as well as reduce mental well-being of the carer, which could then affect labor market outcomes. Thus, we are able to examine a potentially important channel and mechanism of how parental health

[3]It is important to note that Rellstab et al. (2018) use data from the Netherlands, a country with a very extensive public coverage of formal long-term care and one of the highest LTC expenditure per capita in the OECD (OECD, 2017). In contrast, Austria with its balance between informal and formal care arrangements is much more similar to the care provision of many other OECD countries.

shocks are transmitted into children's labor market outcomes. Fourth, by studying the effect of increased migration of foreign care workers on children's outcomes, we examine in which ways changes in public policies can mitigate the impact of a parent becoming care-dependent. To the best of our knowledge, this is the first paper which employs a quasi-experimental research design to study how migrant care workers can help adult children to better deal with the consequences of a severe parental health shocks.

2 Institutional Background and Data

2.1 Institutional setting

In Austria, long-term care for the elderly is characterised by a rather large share of informal care. Specifically, elderly care often falls under the responsibility of family members. For instance, a survey among Austrians with caring needs conducted in 2014 found that two-third of the respondents received care from close relatives (WIFO, 2017).[4]

The cornerstone of the Austrian long-term care policy is a comprehensive care allowance scheme which grants cash on a needs- but not means-tested basis (Firgo et al., 2018). This care allowance scheme is a legal entitlement for every citizen who is in need of care in order to provide funding for care-related expenses. Eligibility assessment is executed by SHI-accredited public doctors and based on individual requirements for personal services, assistance and care (Riedel and Kraus, 2010).

The law defines seven levels of care need, and monthly cash benefits of the allowance range from 150.30 at level one to 1,688.90 at level seven (for 2016). Level one is granted when care requirements exceed 65 hours per month, and level seven corresponds to more than 180 hours of needed care per month (see Table 1).[5]

[4] Around 30% of the care was provided by the spouse, 24% by the daughter and 12 % by the son.

[5] Additionally to the care requirement in hours, levels 5-7 have additional criteria to be met, e.g. when no goal-directed movements of the person's four extremities or equivalent conditions are met.

Table 1: Cash benefits of care allowance scheme

Level	Care requirements in hours*	Benefit in Euro*
1	$65 < x \leq 95$ hours	150.30
2	$95 < x \leq 120$ hours	290.00
3	$120 < x \leq 160$ hours	451.80
4	$160 < x \leq 180$ hours	677.60
5	>180 hours and †	920.30
6	>180 hours and ‡	1,285.20
7	>180 hours and #	1,688.90

* per month for year 2016. † Extraordinary high level of care required.‡ Timely unplannable care measures during day and night OR constant presence of carer required because person or others would be at risk. # No goal-directed movements of the person's four extremities or equivalent condition.

Overall, 5.3% of all Austrians received this care allowance in 2016. As noted above, the allowance is a cash (and not in-kind) benefit, which can be used freely. Thus, it can be used for informal and formal care arrangements alike. As in any other LTC system, formal arrangements range from institutional inpatient (stationary), semi-inpatient (day-care) and mobile/outpatient (i.e. at-home) care services. An especially popular care arrangement in Austria is the so-called '24-hour care' at home, where people in need of LTC are looked after by privately hired carers, especially from Slovakia and Romania (Österle and Bauer, 2016). In 2007, the Austrian government loosened restrictions for privately hired 24-hour care workers, offering the option of self-employment or dependent legal employment. This policy reform exclusively targeted the care industry, and resulted in a large inflow of foreign care workers in private households (Österle and Bauer, 2016).

2.2 Data

To study the effect of the health of elderly parents on their children's labor supply, we use several datasets. To be more precise, we combine the *Upper Austrian Health Insurance Fund* (UAHIF) database with the *Austrian Social Security Database* (ASSD) as well as with data from the *Austrian Ministry of Finance*. The UAHIF is the main statutory health insurance provider of the federal state of Upper Austria.[6] Around 75% of the Upper Austrian population is insured via the UAHIF. The remaining 25% are comprised of self-employed individuals, farmers, civil servants, and workers in the railway and mining

[6]Unfortunately, the health insurance data is only available from Upper Austria. Upper Austria has around 1.5m inhabitants, which makes it the third-largest federal state of Austria.

industries, which are insured with other institutions. Importantly, pensioners continue to be insured with the UAHIF when they have been insured prior their retirement. The UAHIF database comprises individual-level information on the universe of health care service utilization in both the inpatient and outpatient sector for its members. This data we combine with the ASSD, which provides information on labor market behavior, pension and unemployment spells as well as a range of demographic characteristics. Finally, the data from the *Austrian Ministry of Finance* comprises information of the level and cash benefit of all care allowance recipients of Upper Austria. The data we use is available from 1998 to 2017.

3 Research design

3.1 Identification & estimation strategy

In general, the health status of a person is endogenous and predictable, which makes the identification of causal effects challenging. For instance, if health is gradually deteriorating, individuals (both parents & their children) may anticipate future care requirements and start adjusting their labour supply already before the health deterioration takes place. We circumvent those issues by exploiting sudden and unpredictable health shocks. Specifically, our identification builds on a homogeneous group of parents who all suffer the same health shock but at different points in time. Thus, they differ only in the timing of this sudden deterioration of parental health. In other words, our research design exploits the randomness in the timing of the health shock, which is similar to that used by Druedahl and Martinello (2016).

We employ a specification where the outcome O in quarter t of individual i is shocked at time τ_i as follows:

$$O_{i,t} = \kappa_{<-12} I\{t-\tau_i < -12\} + \sum_{k=-12}^{-5} \cdot \kappa_k^{pre} \cdot I\{t-\tau_i = k\} + \sum_{k=-3}^{12} \kappa_k^{post} \cdot I\{t-\tau_i = k\} + \lambda_{i,t} + \psi_i + \varepsilon_{i,t} \tag{1}$$

κ_k^{pre} and κ_k^{post} comprise a set of event-time coefficients estimating the impact on the outcome variable before and after the parental health shock. As reference ('leave-out') category serves $\tau_i = -4$, which is 4 quarters before the respective health shock. In all estimations, we include individual and quarter-by-cohort fixed effects. In a nutshell, our identification strategy is based on an event study with separately identifiable quarter-by-cohort fixed effects. These quarter-by-cohort fixed effects control non-parametrically for underlying life-cycle trends, as well as for time trends such as wage inflation and business cycles (similar to, e. g., Kleven et al., 2019). We are able to identify effects because, conditional on quarter and cohort, there is variation in event time driven by variation in the

age at which parents suffer from the health shock. This approach maintains the identification argument and the assumptions (crucially, that of common trends) of a standard DiD, but exploits the ordered structure of dynamic effects. Thus, it allows us to include all available information in the same estimation, since the equation uses different τ-groups for identification (Druedahl and Martinello, 2016).

3.2 Analysis sample and descriptive statistics

In order to focus on sudden and unexpected parental health shocks, we identify strokes and heart attacks (myocardial infarction) in the UAHIF data using WHO's ICD-10 codes. We then restrict our analysis to parent-child pairs where at least one parent suffers a stroke or heart attack for the first time between 1998 and 2017. To estimate the effect of the parental health shock (and the potential care requirement) on children's outcomes, we focus on non-fatal shocks.[7] Furthermore, we only include children in our data who are older than 23 years, in order to ensure a certain level of attachment to the labor market. Thus, our main sample comprises of all individuals who experienced a health shock and who have at least one child above 23. Our sample also includes information on spouses when being married at the time of the health shock. Table 2 provides summary statistics of our sample. It reports the mean values four quarters (i.e. one year) before the respective health shock occurs. In total, we observe 2,763 individuals who experience a stroke and 3,430 individuals who experience a heart attack for the first time between 1998 and 2017.[8] Parents suffering from a stroke are somewhat older and more female than those with a heart attack. Their children are around 30 years old when the parental health shock occurs.[9] Around 40% (50%) of the parent suffering a stroke (heart attack) are employed one year prior to the health shock. The employment rate for the spouse of the affected parent are of similar magnitude. In contrast, the children of the affected parent are much more attached to the labor market one year prior the parental health shock, with employment rates well above 70%. Parental quarterly earnings equal 2,763 Euro (3,749 Euro) one year before the stroke (heart attack). In sum, we observe 9,397 children in our data where a parent suffers from either a stroke or heart attack.

[7] In our baseline sample, we define non-fatal shocks as shocks where the affected parent does not die within a week of the respective health shock. Using only parent-child pairs where the affected parent is alive over the entire time horizon of our analysis (survival $\geq$ 3 years) does not qualitatively change our results (less than 10% of the affected parents die within 3 years).

[8] Please note that we do only have data on care allowance recipiency until 2012.

[9] Please note that we cannot link parents to children when those are born prior 1971. This limitation combined with the fact that the UAHIF data is only available after 1998 makes our analysis sample relatively young.

Table 2: Descriptive statistics of analysis sample

	Parent has stroke ($N = 2,763$)			Parent has heart attack ($N = 3,430$)		
Variable	Treated	Spouse	Child	Treated	Spouse	Child
Age	60.83	58.60	29.88	58.43	56.30	28.87
Sex	0.32	0.70	0.48	0.24	0.77	0.48
Employed	0.38	0.38	0.72	0.51	0.46	0.73
Earnings (quarterly)	2,596	2,002.20	4,535	3,749	2,316	4,444
Observations	2,763	2,563	4,206	3,430	3,254	5,191

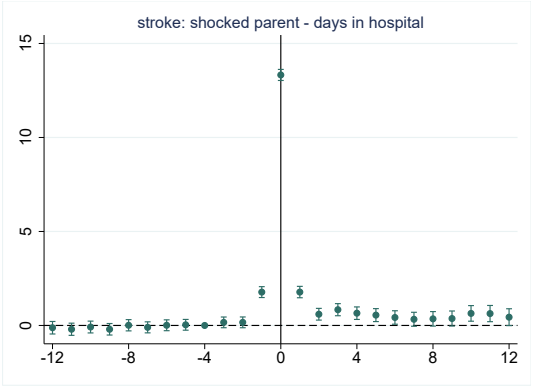
Notes: This table presents means of key variables in our analysis sample. The values reported in the table are based on data from four quarters (i.e. from period $t = -4$) before the health shock.

4 Estimation results: Parents

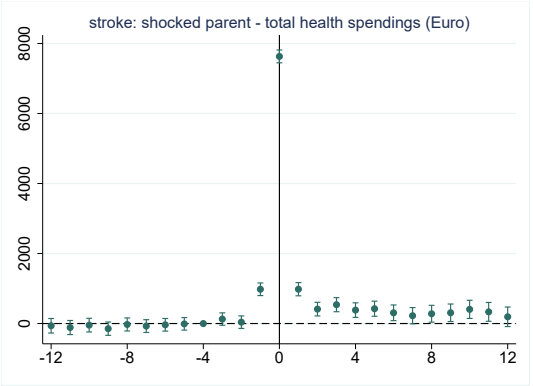
4.1 Parental stroke

First, we want to look at health as well as labor market outcomes of the affected parent around the time of the stroke. Figure 2 starts with depicting various health-related outcomes on a quarterly basis three years before and after the stroke. As defined above, we plot these outcomes at event time τ relative to the year before the health shock ($\tau = -4$), having controlled non-parametrically for cohort and time trends. The figure includes 95% confidence bands around the event coefficients, although these are not always clearly visible due to the high precision of our data. The panels of Figure 2 show the estimated effect of the stroke on days in hospital, total health care spendings, drug spendings, and a dummy for receiving care allowance. We find very severe, large and highly significant impacts of the stroke on all health-related outcomes. For instance, days spent in the hospital jump to 14 days at the time of the shock when compared to the control group (pre-shock mean equals 1.1 days per quarter). Furthermore, a dummy variable for receiving the care allowance increases by as much as 14 percentage points after the stroke, with more than 20% of the affected parents receiving the care allowance after the shock. We also find that receiving the care allowance is not just a temporary condition, but remains high even several quarters after the health shock. Importantly, the patterns observed in Figure 2 show no significant deviations in the respective outcome prior to the shock, with no indication for pre-trends. This underpins the exogeneity of the timing of the health shock, which occurs sudden and unexpected.

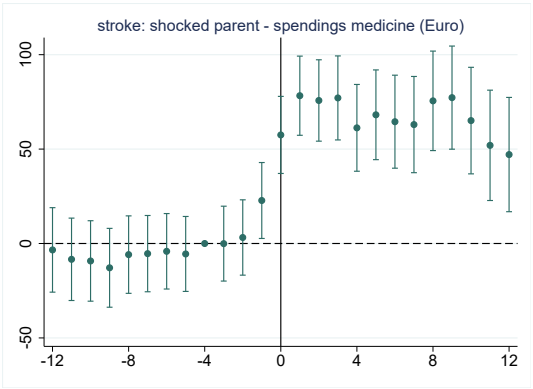
Figure 2: Impact of parental stroke on parental health



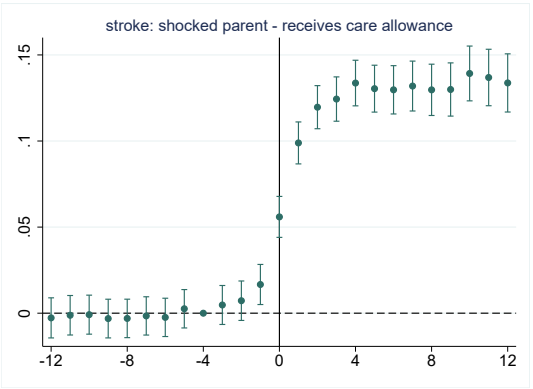
(a) Panel A



(b) Panel B



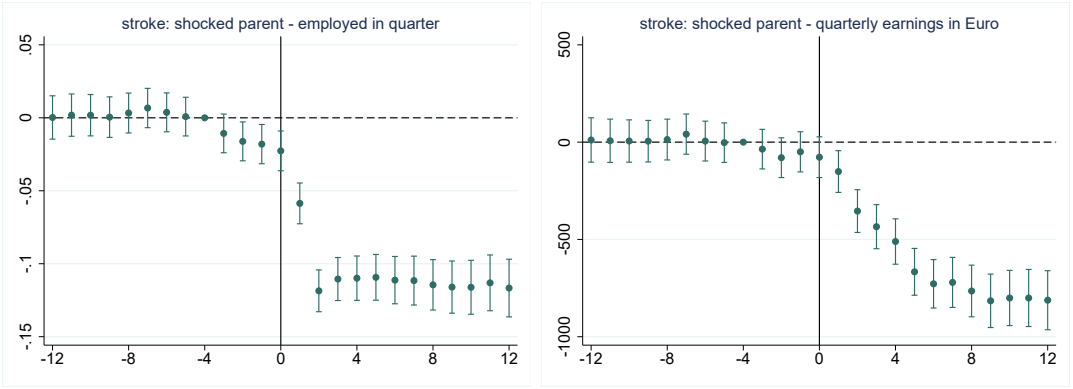
(c) Panel C



(d) Panel D

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental stroke on the respective parental health outcome.

Figure 3: Impact of parental stroke on parental labor market outcomes



(a) Panel A (b) Panel B

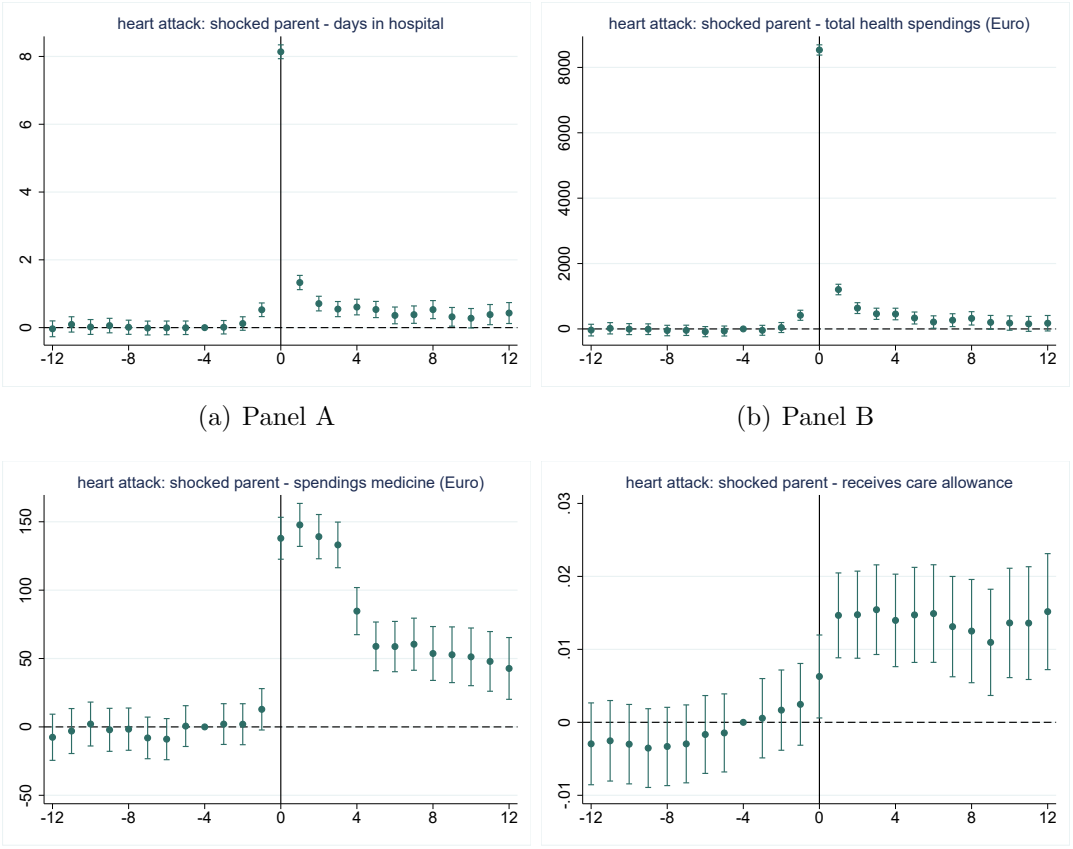
Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental stroke on the respective parental labor market outcome.

Next, we want to examine labor market outcomes of the affected parent around the time of the stroke. Figures 3 displays employment rates and quarterly earnings for the parent who experiences a stroke. We observe very strong impacts of this health shock on these labor market outcomes. For instance, the employment rate of the affected parent drops by around 12 percentage points right after the health shock. Given that the employment rate is 38 percent prior to the stroke (see Table 2), this constitutes a large reduction in employment of around 30 percent. The effect on quarterly earnings is more gradual but of a similar magnitude. Overall, the health shock severely and persistently affects the labor market outcomes of the parent. Again, the patterns observed in Figure 3 show no significant deviations in the respective outcome prior to the shock, emphasizing the non-existence of pre-trends.

4.2 Parental heart attack

In this section we examine health as well as labor market outcomes when the parent suffers from a heart attack. Specifically, Figure 4 depicts various health-related outcomes on a quarterly basis three years before and after this health shock. The panels of Figure 4 show the estimated effect of the heart attack (with a 95 percent confidence interval) on days in hospital, total healthcare spendings, drug spendings, and a dummy for receiving care allowance. We find severe, large and significant effects of the heart attack on all health-related outcomes. However, some important differences compared to when suffering from a stroke emerge. For instance, parents with a heart attack spend on average 8 days in hospital in the quarter of the health shock, which is about half of the length after a stroke (14 days, see Section **??**). Spendings on drugs are also somewhat less after a heart attack than after a stroke. Most importantly, parents suffering from a heart attack

Figure 4: Impact of parental heart attack on parental health



(a) Panel A (b) Panel B

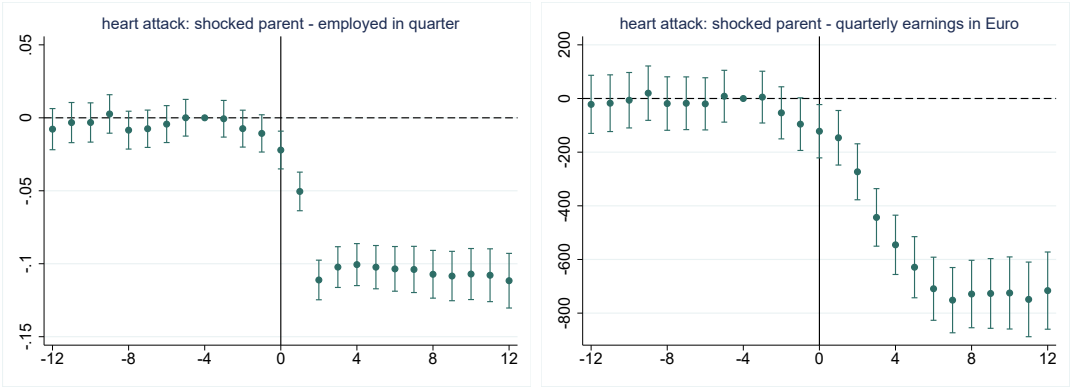
(c) Panel C (d) Panel D

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental heart attack on the respective parental health outcome.

do not develop such high rates of care dependency as parents do after a stroke. To be more precise, the share of parents who receive a care allowance does increase only very mildly by 1.4 percentage points, compared to 14 percentage points in the case of a stroke. In sum, only 4 percent of the parents with a heart attack receive a care allowance one year after the health shock, compared to 21 percent in the case of a stroke. This large differences in caring needs suggests that any potential negative repercussions on children due to care-giving should be much more pronounced after a parental stroke compared to a parental heart attack. As already mentioned above, being in a position to actually observe the shock-induced increase in care dependency is which sets our analysis apart from previous studies.

The picture of a substantial but less severe impact of a heart attack compared to a stroke is confirmed when looking at labor market outcomes of the affected parent. Figure 10 shows a significant reduction in employment rates of around 10 percentage points at the time of the heart attack. When compared to the employment effect after suffering from a stoke, this drop is smaller in both absolute and relative terms. Specifically, the

Figure 5: Impact of parental heart attack on parental labor market outcomes



(a) Panel A (b) Panel B

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental heart attack on the respective parental labor market outcome.

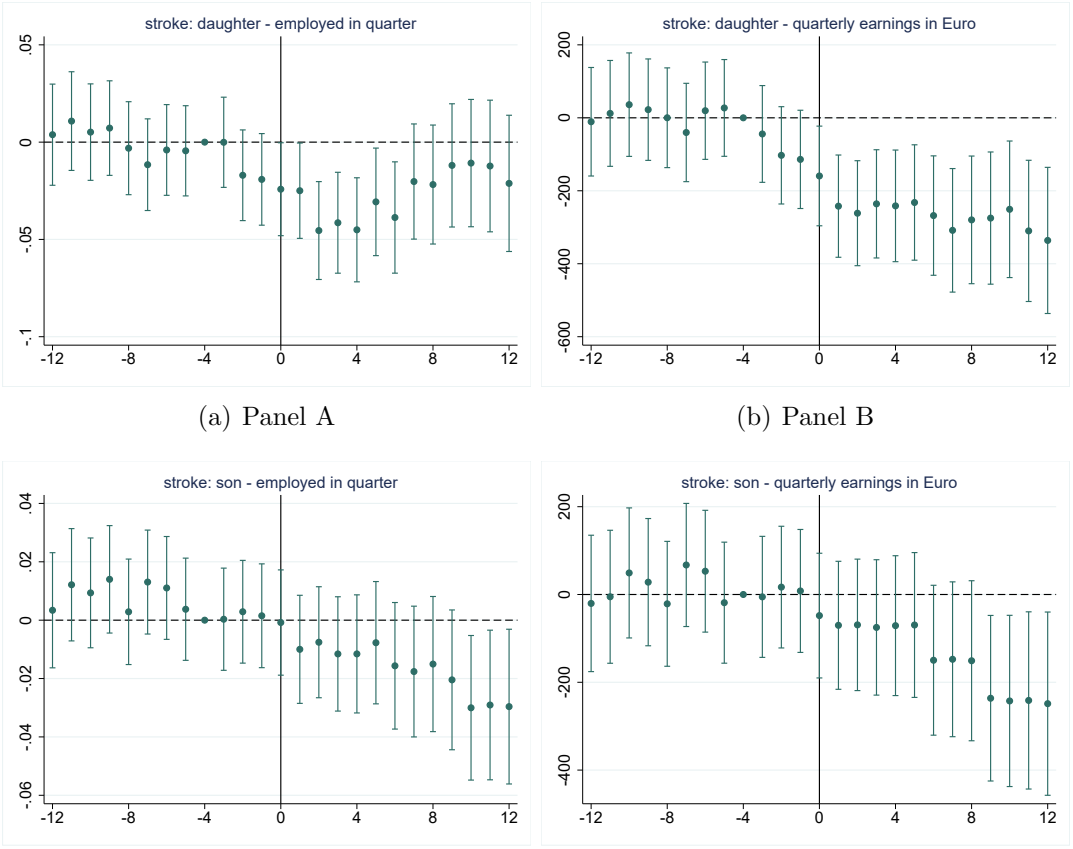
absolute change of 10 percentage points is equal to a reduction in employment of around 20 percent (pre-shock employment is 51%, see Table 2) which is smaller compared to the drop in employment after a stroke (30 percent). The effect on quarterly earnings is of similar magnitude. Again, we find no significant pre-trends prior to the shock. In sum, the labor market outcomes after the heart attack mirror the results obtained above regarding health outcomes, showing a substantial but less severe impact of a heart attack compared to a stroke.

5 Estimation results: Children

5.1 Children after parental stroke

We want to start by looking at the effect of a parental stroke on the labor supply of their children. Given that there is survey evidence that care-giving is disproportionally provided by women, we present the results for daughters and sons separately. The upper Panels of Figure 6 displays the labor market outcomes for daughters, the lower Panels for sons. In the case of daughters, we find negative significant effects of the parental stroke on both employment measures. Specifically, we find that quarterly earnings of daughters are reduced by around 250 Euro one year after the stroke. Relating this decrease to the average quarterly earnings prior the shock (ca. 3,200 Euro) gives a non-negligible reduction in quarterly earnings of around 7.5 percent. For daughters we also find a significant reduction in employment rates of around 5 percentage points. In the case of sons, we do only observe small and mostly insignificant employment and earnings effects after the parental stroke. As for the parents, we do not find any significant deviations in outcomes prior to the shock, suggesting that the health shock occurs suddenly and

Figure 6: Impact of parental stroke on children's labor market outcomes



(a) Panel A (b) Panel B

(c) Panel C (d) Panel D

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental stroke on the respective labor market outcome of the child.

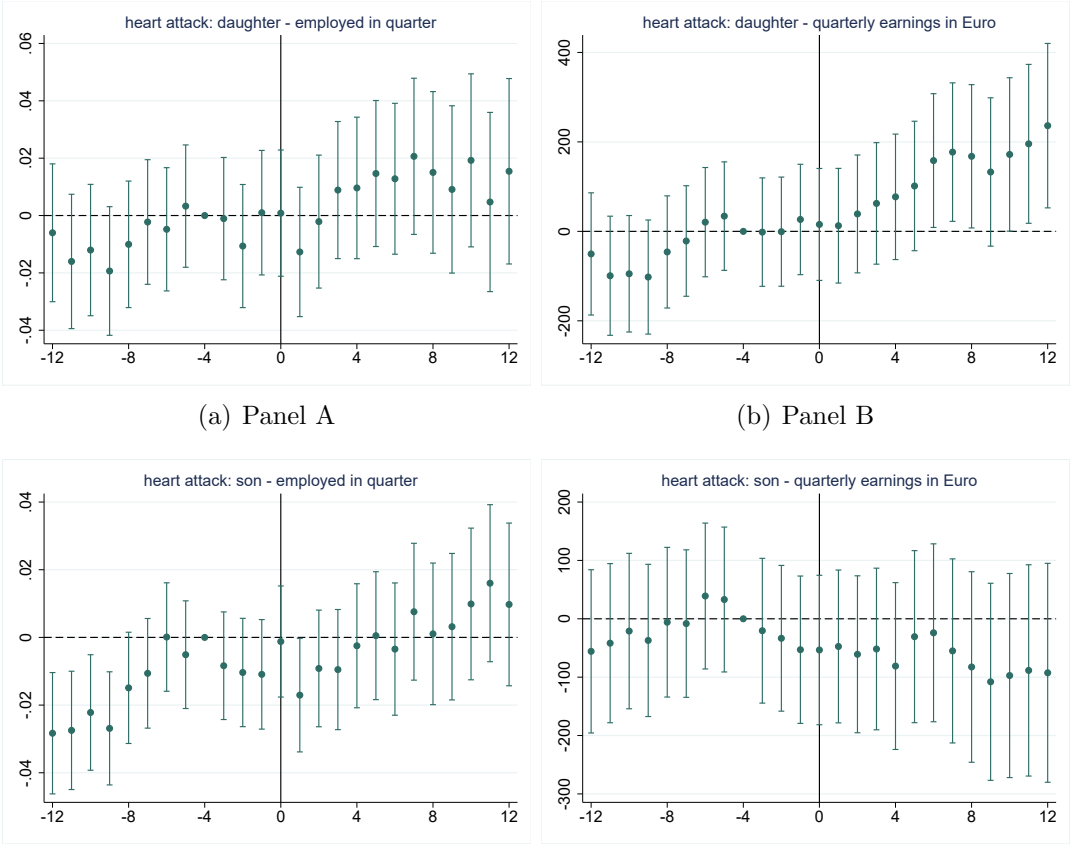
unexpectedly.

5.2 Children after parental heart attack

Next, we turn to the labor market outcomes of children when a parent suffers from a heart attack. The upper Panels of Figure 7 focus again on daughters, the lower Panels on sons. As it can be seen from the Figure, neither for sons nor for daughters we find significant labor market effects after the parental heart attack. This fits our results above, showing only very small increases in the care dependency of parents suffering from a heart attack. Thus, this null result is in line with our expectation that it requires a certain increase in care dependency to induce adult children to reduce their labor supply. This finding provides a potential explanation of why our results differ from those of Rellstab et al. (2018), who do not find an effect on adult children. They use 11 diagnoses (including heart attacks and strokes) considered as not foreseeable by expert physicians, but they cannot control for care dependency in their data. In the light of our results of Section **??**, heart attacks do constitute a severe health shock with considerable hospitalization days,

but do not cause care dependency on a comparable scale to strokes. Given that less than 15% of their diagnoses concern strokes, their findings seem less surprising, and are in line with our null result for adult children in the case of parental heart attack.

Figure 7: Impact of parental heart attack on children's labor market outcomes



(a) Panel A (b) Panel B

(c) Panel C (d) Panel D

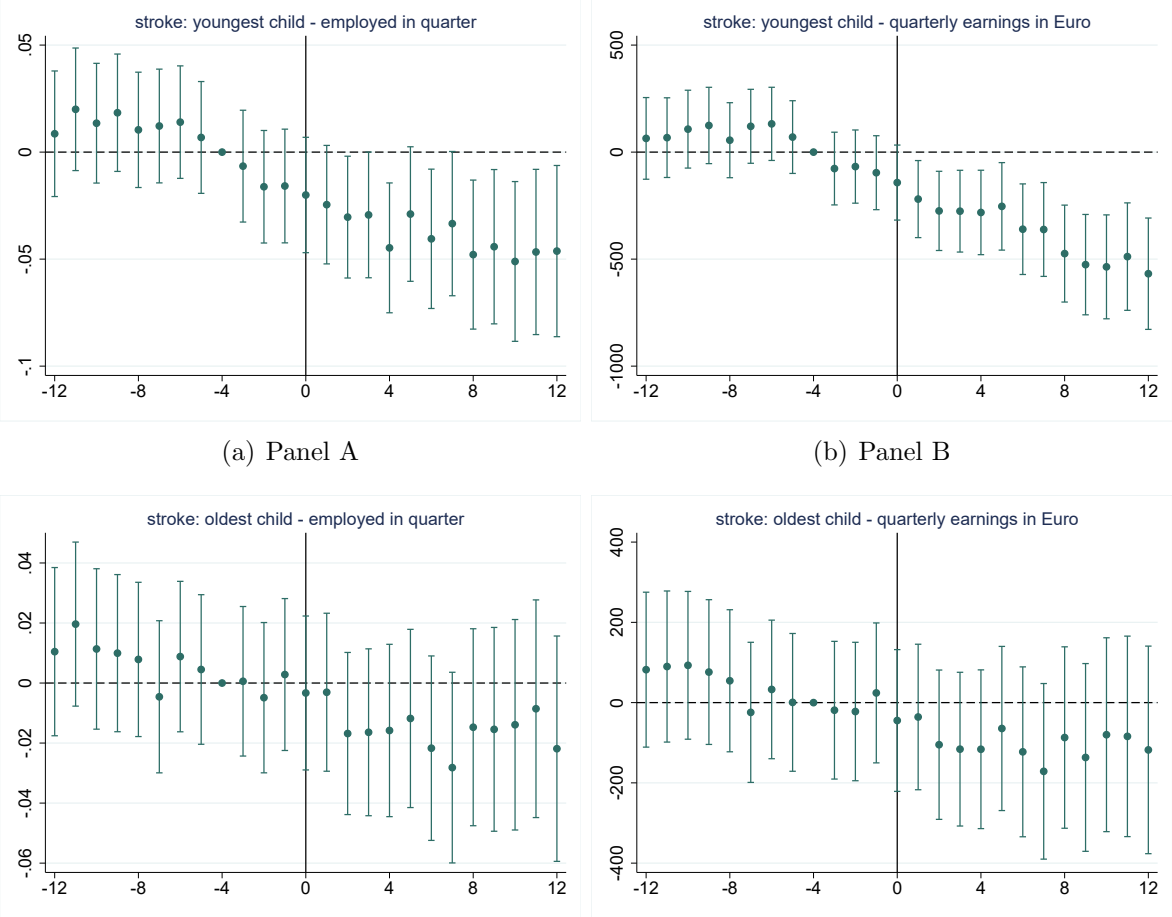
Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental heart attack on the respective labor market outcome of the child.

6 Who cares: Sub-population analysis of children after parental stroke

6.1 Youngest vs. oldest child after parental stroke

In this sub-population, we check for heterogeneous effects among children most likely to be care-givers based on their characteristics. First, we examine whether the parity of children matters. There exists case study evidence suggesting that especially the youngest child of a multi-children family is most likely to perform caring tasks when parents become care-dependent. Therefore, we construct two sub-samples of children with parents suffering from a stroke, one that only contains the oldest child of the parent (i.e. first-born), and

Figure 8: Impact of parental stroke on youngest vs. oldest child



(a) Panel A

(b) Panel B

(c) Panel C

(d) Panel D

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental stroke on the respective labor market outcome of the child.

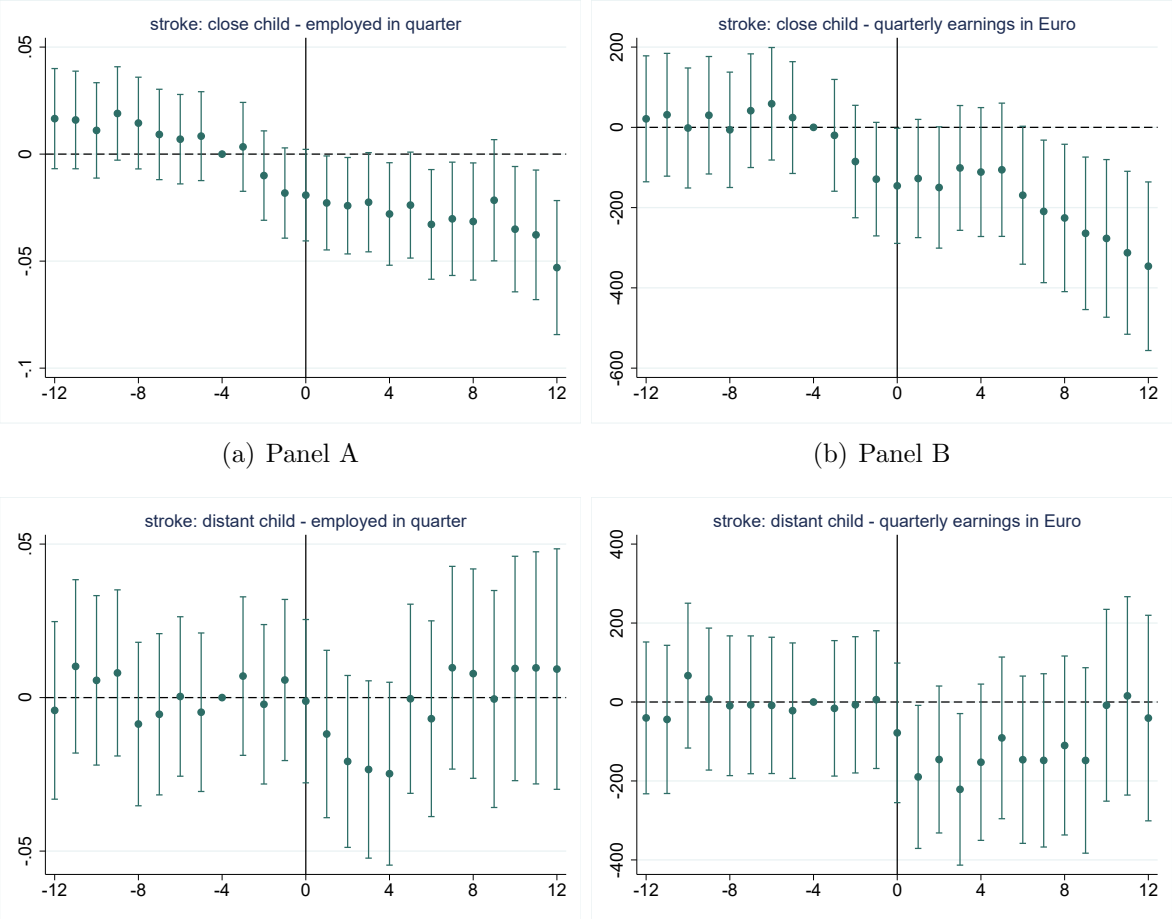
one which comprises only of the youngest child (last-born). Figure 8 depicts employment outcomes for the youngest and oldest child, respectively. We find the negative impact of a parental stroke to be much larger for the last-born compared to the first-born. Specifically, for the first-born the effect is not significantly different from zero in none of the post-shock quarters. This confirms the hypothesis that the parity of children matters when the question arises who in the family can provide care for an elderly parent.[10]

6.2 Local vs. distant child after parental stroke

Next, we study whether the geographical distance between the child and the parent suffering from a stroke matters. Thus, we construct two sub-samples of children with parents

[10]Please note that the effect of parity cannot be explained by differences in parent-child distance between youngest and oldest child (see, e.g., Konrad et al. (2002)). Specifically, we find that first-born and last-born in our sample do barely differ in their proximity to the affected parent at the time of the shock.

Figure 9: Impact of parental stroke on local vs. distant child



(a) Panel A

(b) Panel B

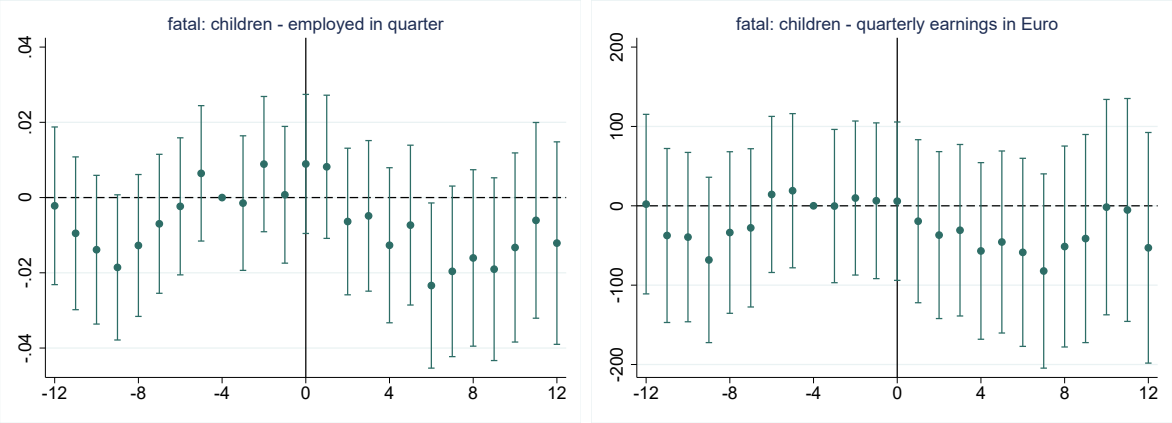
(c) Panel C

(d) Panel D

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of the parental stroke on the respective labor market outcome of the child.

suffering from a stroke, one that only contains children who live in the same zip-code as the affected parent ('local children'), and those who live further away ('distant children'). Figure 9 depicts employment outcomes for the local and distant children, respectively. We find the negative impact of a parental stroke to be larger for the children living close to their parents. In contrast, for children living further away from the affected parent the point estimate is often not significantly different from zero after the health shock. This underpins that the geographical distance between the affected parent and the children matters with respect to providing care.

Figure 10: Impact of fatal parental shock on children's labor market outcomes



(a) Panel A (b) Panel B

Notes: Each panel of the figure shows the event-time coefficients estimated from equation 1 (including 95 percent confidence intervals) of a fatal parental shock on the labor market outcome of the child.

7 Plausabilitity/Robustness check: Children outcomes after fatal strokes

In this section we examine potential consequences of a fatal health shock on children's labor market outcomes. We define fatal shocks as health shocks following a stroke or heart attack where the parent dies within a week of the shock. Due to our data availability (see Section 3.2), the affected parent in our sample are relatively young at the time of the health shock and thus, only XX % of health shocks are terminal (N= XX). This is why we pool all children with fatal parental shocks, and present our results for sons and daughters together.

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