The Career Costs of Children's Health Shocks

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Abstract

I provide novel evidence on the impact of a child's severe health shock on parental labor market outcomes. To identify the causal effect, I leverage long panels of high-quality Finnish administrative data and exploit variation in the exact timing of the health shock. I do this by comparing parents across families in similar parental and child age cohorts whose children experienced a health shock at different ages. Following their child's adverse health event, parental earnings suffer a decline that is both substantial and persistent: five years after a child's severe hospitalization, maternal earnings remain over 7.5% lower, while fathers' earnings are 2.5% lower. Notably, the shock also impacts parents' mental well-being.

Keywords: Children, health, mortality, parents, earnings, labor supply, mental health.

JEL Codes: I10, I12.

1 Introduction

Economists have long been interested in understanding the relationship between income and health (Deaton, 2013). The detrimental effect of health shocks on an individual's own labor market outcomes is well documented.[1] However, we know much less about the potential spillover effects that health shocks have on other family members.

In particular, the illness of a child is a stressful event that can have major implications for the well-being of the whole household. Families can incur substantial costs when deciding how to best cope with these health shocks and their associated long-term burden. Parents may need to increase the time spent caring for their child and decrease their labor supply. However, they may also face direct treatment costs, resulting instead in an increase in their labor supply.

Suffering a hospitalization during childhood is a situation dealt with by a relatively large number of families. For example, the rate of hospital admissions in 2009 in the United States among children aged one to seventeen was 30 per 1,000 children (Wier et al., 2011). Looking at the cumulative incidence of hospitalization, 36% of children born in Finland in 1990 suffered a hospitalization between ages one and eighteen, while 9.9% needed a long inpatient stay (over four days). Although child mortality rates are very low across European countries,[2] the death of a child can lead to significant emotional distress and can have enormous impacts on parents' well-being and labor market outcomes. However, our knowledge on how children's health shocks (both non-fatal and fatal) impact the economic well-being of families is surprisingly limited.

This paper contributes to bridging this gap by providing new evidence on the causal impact of a child's health shock on parental outcomes. I examine the effects of both severe

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[1]This includes, among others, papers by Bound et al. (1999); Cai et al. (2014); Dobkin et al. (2018); García-Gómez (2011); García-Gómez et al. (2013); Jones et al. (2019); Lindeboom et al. (2016); Lenhart (2019); Maczulskij and Böckerman (2019); Meyer and Mok (2019); Trevisan and Zantomio (2016); Wagstaff (2007)

[2]On average, fewer than 1.25 deaths per 1,000 children between ages 5 and 14. United Nations data for 2018, available at: https://childmortality.org/data. Accessed September 2019.

hospitalizations and fatal health shocks on parents by leveraging long panels of high-quality administrative data from Finland on families' health and labor market trajectories. I exploit variation in the timing of health shocks among families whose child had a first severe health shock after school-starting age. Identification comes from comparisons of parents and children in the same respective age cohorts, but whose children experienced the health shock at different ages. I show that these families have very similar characteristics and were following very similar trends before the shock.

With this data and design, I provide precise causal estimates of parents' labor supply responses to children's health shocks or mortality. Using an event study approach, I first show that there is no indication that parents' outcomes deviate from the trend prior to the health shock of the child. For all outcomes, sharp breaks in the trajectories become visible just after the event. Overall, I find that the earnings of both mothers and fathers suffer a substantial and persistent drop after a serious health shock or the death of their child. Five years after a severe hospitalization, maternal earnings are 7.5% lower compared to the period prior to the shock. For fathers, earnings drop by 2.5%. At the extensive margin, these shocks also impact a mother's probability of being employed. In contrast, I do not find evidence of any effect on the probability of a father continuing to work. I also show that the effect is driven by health shocks that require persistent care, as measured by the number of hospital visits in the year after the shock. Furthermore, I find that three years after the death of a child, a mother's earnings have dropped by 23%. For fathers, the estimated coefficients are negative and large in magnitude, but imprecise, suggesting that fatal shocks may also have an impact on their earnings.

I exploit the richness of the data to explore several potential mechanisms. I do not find evidence that mothers switch jobs to more family-friendly firms after the shock. Nor do I find changes in the risk of marital dissolution. However, I do find that children's health shocks affect the mental well-being of parents, as measured by the number of visits to a specialist or hospital admissions with a primary mental health diagnosis. My results suggest

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that the impact of a child's severe hospitalization on parents' earnings might result from the combination of the increased time needed to care for the child and worsening of parents' mental health.

This paper contributes to several strands of the literature, including that on the effects of adverse health shocks on labor market outcomes. Numerous studies have analyzed the relationship between health shocks and income, though most focus on the impact of health shocks on the individual's own labor market outcomes (e.g, Bound et al., 1999; Cai et al., 2014; Dobkin et al., 2018; García-Gómez, 2011; García-Gómez et al., 2013; Jones et al., 2019; Lindeboom et al., 2016; Lenhart, 2019; Meyer and Mok, 2019; Trevisan and Zantomio, 2016; Wagstaff, 2007). Using an event study approach, Dobkin et al. (2018) examine the economic consequences of hospitalizations for adults in the US. They find that earnings drop by 20% three years after a hospitalization. Meyer and Mok (2019) use survey data from the US and estimate a similar drop in earnings ten years after the onset of a disability.

Other studies have examined the spillover effects of health shocks, with particular attention paid to how one spouse's health shock affects the other spouse's employment and earnings.[3] Fadlon and Nielsen (2017) analyze the impact of a spouse experiencing a fatal or severe non-fatal shock on household labor supply. Using administrative data from Denmark and exploiting event studies together with a dynamic difference-in-differences approach, they find that fatal health shocks lead to an increase in the labor supply of the surviving spouse. In contrast, they do not find any significant response following a non-fatal health shock.[4] García-Gómez et al. (2013) explore the spillover effects of an acute hospitalization using data from the Netherlands. They find gender asymmetries in the response to a spouse's health shock: while wives are more likely to continue—or even start—working when their husbands fall ill, husbands are more likely to withdraw from the labor force when their wives fall ill.

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[3]See, for example, García-Gómez et al. (2013); Fadlon and Nielsen (2017); Jeon and Pohl (2017); Jiménez-Martín et al. (1999)

[4]They use heart attacks and strokes as severe non-fatal health shocks.

Jeon and Pohl (2017) use administrative data from Canada and observe a significant decline in the employment and earnings of individuals whose spouses are diagnosed with cancer.

Rellstab et al. (2019) instead examine the spillover effects of an older parent's unexpected hospitalization[5] on their children's labor supply. Utilizing a difference-in-differences model and administrative data from the Netherlands, they do not find significant effects on either employment or earnings. Black et al. (2017) exploit a difference-in-differences approach and show that having a sibling with a disability has a negative spillover effect on children's test scores.

I build on this literature by providing the first causal evidence of the spillover effects of a child's health shock on the labor supply and mental well-being of the family. Several previous studies find a negative association between childhood disability or illness and maternal employment (e.g, Wasi et al., 2012; Wolfe and Hill, 1995).[6] A few papers make use of panel data and try to control for previous employment situation (Baydar et al., 2007; Burton et al., 2017; Kvist et al., 2013; Powers, 2003; van den Berg et al., 2017)[7]. However, children's health status is unlikely to be randomly distributed across families, meaning that families whose children have worse health are likely to be different from other families. This makes it difficult to distinguish between the effect of having a child with an illness and that of other confounding characteristics on maternal employment.

This paper advances existing knowledge by using high-quality administrative data combined with a research design that allows me to exploit precisely and objectively identified-health shocks, as well as to focus on a sample of families that are similar, differing only in the age at which their child suffered the health shock. Moreover, I show that the effect is only visible if the health shock imposes a substantial and persistent care burden on the parents.

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[5]They exploit diagnoses classified by physical expert opinion as being unexpected hospitalisations, and thus plausibly exogenous.

[6]Stabile and Allin (2012) review previous research and conclude that, taken together, the studies suggest that having a child with disabilities is associated with a higher likelihood that the mother (and less often the father) will either reduce their working hours or stop working altogether.

[7]van den Berg et al. (2017) make use of longitudinal data and match parents whose child died in a non-intentional accident to parents who did not lose a child. They find that mothers' annual earnings decrease by 12.5% on average, while fathers' earnings decrease by 8.8%.

My study also speaks to the literature that investigates the impact of parenthood on family labor supply, which shows sizeable effects on mothers' labor supply and earnings.[8] The most recent studies estimate that women's earnings decrease considerably following the birth of the first child, an effect that is persistent. The so-called child penalty[9] amounts to around 20% over the long run in Nordic countries (Kleven et al., 2019b; Sieppi and Pehkonen, 2019), between 30% and 45% in the United Kingdom and the United States, and as high as 50%-60% in Germany and Austria (Kleven et al., 2019a). Snaebjorn and Steingrimsdottir (2019) find that the child penalty is larger in families in which a child is born with a disability: affected mothers earn 13% less in the long run, while affected fathers earn 3% less.

I show here that beyond the costs of having a child, health shocks during middle childhood to teenage years also have a substantial impact on parents' labor market outcomes. In line with studies on the impact of children, my results suggest that the negative impact of children's health shocks is greater on women's earnings than on men's.

The paper is structured as follows: Section 2 lays out the empirical strategy and Section 3 provides background information about the institutional context and introduces the data. Section 4 reports the main results. Section 6 presents additional evidence to support the main conclusions. Section 7 explores the mechanisms of the effects. The final section concludes.

2   Empirical Strategy

I aim to analyze the impact of a child's health shock on parents' labor market outcomes and well-being. Child hospitalizations are unlikely to be randomly distributed, meaning that the characteristics and trajectories of families whose child suffers a health shock may be different from other families. Figure A1 plots the coefficients of regressing different family and child characteristics on a dummy equal to 1 if the child suffered a severe hospitalization. Having a

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[8]This includes, among others, papers by Adda et al. (2017); Angrist and Evans (1998); Angelov et al. (2016); Benard et al. (2007); Bertrand et al. (2010); Bronars and Grogger (1994); Bütikofer et al. (2018); Fernández-Kranz et al. (2013); Hotz et al. (2005); Lundberg and Rose (2000); Lundborg et al. (2017); Paull (2008); Miller (2011); Sigle-Rushton and Waldfogel (2007); Waldfogel (1998)

[9]Defined as the percentage by which women fall behind relative to men due to having children.

child who was hospitalized predicts almost all characteristics, suggesting that these families are different from others. Therefore, comparisons between these groups of families are likely to yield biased estimates of the causal impact of children's health shocks.

In order to overcome the potential endogeneity of children's health shocks, I exploit variation in their timing. Focusing on parents who have been exposed to a child's health shock at some point, I exploit variation in the age at which the child experienced the shock, conditional on the age of the parents and children. I focus on families whose child experienced a first shock after school-starting age to ensure that the mother's earnings follow parallel trends.[10]

I provide visually clear results of my estimation by utilizing an event study approach with a specification that follows recent work by Kleven et al. (2019b) and Nix and Andresen (2019), among others. In particular, I estimate the coefficients of indicator variables for years relative to the event ("event time"). For each parent in the dataset, the year of the shock is normalized to t=0 and all years are indexed relative to it. I construct a balanced panel of parents with observations dating from five years before and after the health shock. I run the following regressions for mothers and fathers:

$$Y_{is} = \alpha + \sum_{t \neq -1, t=-5}^{t=5} \gamma_t \times I_t + \lambda A_{is} + \phi CBY_i + \omega_s + \epsilon_{is} \tag{1}$$

where Y_{is} is the outcome of interest for individual i in calendar year s, which is regressed on event time dummies (I_t), parental age dummies (A_{is}), child's year of birth dummies (CBY_i), and calendar year dummies (ω_s). The event time dummy at $t = -1$ is the omitted category, meaning that the event time coefficients measure the impact of a child's health shock relative to the year prior to the event. Event time t runs from -5 to +5 years. The inclusion of the full

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[10]Given that mothers experience a sharp drop in their earnings and the probability that they work after childbirth, their earnings trajectories follow different trends during the first years after having had a child. Sieppi and Pehkonen (2019) replicate the analysis of Kleven et al. (2019b) for Finland and find that the child penalty stabilizes from age 6 onwards, which is also the school-starting age in Finland (Finnish National Agency for Education, 2018). In Figure A4, I show that families whose child suffers a severe hospitalization after school-starting age have very similar earnings trajectories prior to the health event.

set of age dummies controls non-parametrically for underlying life-cycle trends in parental outcomes, the calendar year dummies take into account time trends, while the child's birth year dummies control for cohort-specific effects.

Note that the variation in exposure to the health shock, or event time, arises from the age at which the child suffers the health shock, conditional on their year of birth, calendar year, and parents' age. Therefore, if the exact timing of the health shock is uncorrelated with the counterfactual outcome, conditional on parents' age profiles, the child's year of birth, and calendar-year fixed effects, the estimates can be given a causal interpretation as the impact of a child's health shock on earnings. Examples of scenarios that would violate this assumption are hospital admissions caused by a worsening of parents' earnings or simultaneous shocks that impact both parents' earnings and children's health.

One might expect the timing of the child's hospitalization to be related to their parents' earnings trajectories. I provide evidence to support that the change in maternal earnings is driven by children's health shocks. First, I demonstrate that comparisons between affected families eliminate most differences in observable pre-health shock characteristics, in contrast to comparisons between affected and unaffected families. Figure 1 plots the coefficients of regressing different maternal and child characteristics on children's age at hospital admission, controlling for child's year of birth fixed effects. The results indicate that families whose children experience a severe hospitalization at different ages have very similar observable characteristics prior to the health shock.[11] This is true for both non-fatal and fatal shocks.[12]

Second, in Figure A4, I show that families whose child suffered a severe hospitalization at different ages have very similar earnings trajectories prior to the health event, and that earnings did not decrease during the year prior to the event.[13] Moreover, the main advantage of using a non-parametric event study is that it allows a visual inspection of whether there

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[11]Although boys and girls differ in their average age at hospital admission, columns (3) and (4) in Table A2 show that my results are robust to controlling for the child's gender.

[12]Results for fatal shocks can be found in Figure A2 and Figure A3.

[13]Figure A4 plots the different pre-health shock earnings trajectories for families whose child suffered an adverse health event at various ages. Families whose child suffered the shock after school-starting age follow very similar trajectories. However, this is not the case if the child experienced the shock at younger ages.

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Figure 1: Differences in characteristics: within affected families
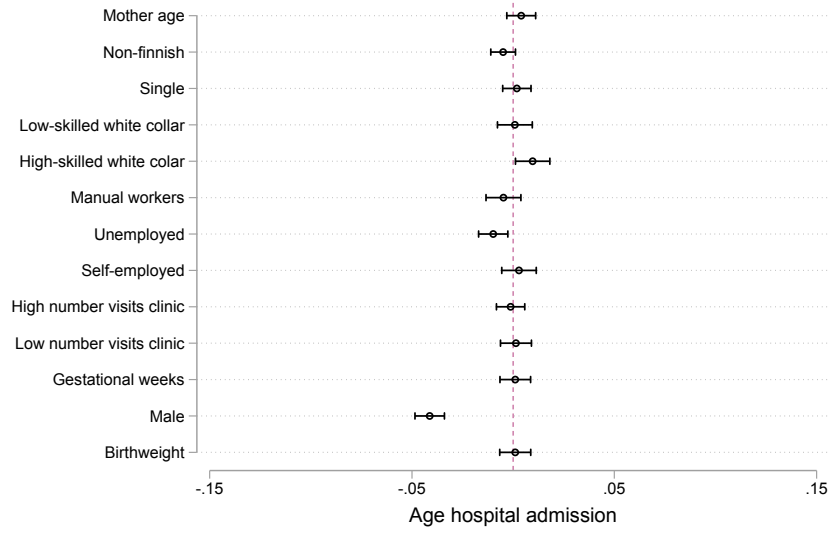
Notes: The figure shows the coefficients and 95% CI from separate regressions of each (standardized) variable with respect to children's age at hospital admission. All specifications include year of birth fixed effects. Standard errors are clustered at the mother level.

was a trend in the outcome variable prior to the event. I do not find any evidence of an anticipatory drop in earnings (or in any other outcomes) before the event. Third, in Section 5, I show that the effect of a health shock is only visible if the child requires substantial and persistent care subsequent to hospitalization, as measured by the number of specialist visits and later hospital admissions. Finally, in Section 7, I explore two plausibly exogenous health shocks that have very different implications in terms of the care burden imposed on parents. I show that parental earnings do not respond to a severe health shock that, in general, does not require additional treatment (appendicitis), while there is a substantial drop following a severe hospitalization due to a more serious condition (cancer).

3 Institutional Setting and Data

3.1 Institutional Setting

Finland has universal public health coverage. While primary health care is provided by local authorities in health centers, specialized medical care, consisting of specialist examinations and treatment, usually requires a physician's referral and is mainly provided in hospitals.[14] Emergency medical services, which involve treating acute illnesses or injuries, are also provided by hospitals.

There are twenty hospital districts in Finland, each of which has a central hospital. Hospital districts must provide a 24-hour emergency medical service for dealing with urgent cases. Hospitals also offer specialized medical care on a 24-hour emergency basis. In many municipalities, hospitals also cover the emergency duties of health centers at night and during weekends (Ministry of Social Affairs and Health, 2013).

The private healthcare sector in Finland is relatively small, but has gained importance in recent years. There are only a few such hospitals, but private provision of specialist outpatient care is much more common (OECD, 2017). Although the use of private services is mainly financed through out-of-pocket payments, patients are eligible for a reimbursement from the National Health Insurance scheme. However, the effective reimbursement rate is only around 30% of the costs (Tynkkynen et al., 2016). In 2013, around one fifth of the Finnish population was covered by voluntary private health insurance, with children making up almost half of insured individuals (Tynkkynen et al., 2016).

In Finland, parents of ill children are entitled to different types of financial aid. First, during hospital treatment and subsequent care at home, parents can be granted the Special Care Allowance.[15] This aid is intended to compensate for lost income during the time that the child is undergoing medical treatment. Second, for disabled or chronically ill children,

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[14]The most common specialized medical care services are also available at some health centers.

[15]For a parent to be granted the Special Care Allowance, the attending physician must issue an statement confirming the seriousness of the illness and the need for the parent to participate in the child's care and treatment.

parents can be granted a disability allowance. The entitlement and the amount of the allowance are determined on the basis of the care, attention, and rehabilitation that the child requires. The payment period also depends on the assessment of how long care will be needed due to the illness or disability. Finally, family members can also be granted an informal care allowance if they take care of a severely disabled or chronically ill child at home.[16]

Families who face the death of a child are not entitled to receive any allowance. Survivors' pension only replaces lost income when a family wage earner dies.

3.2   Data

I use rich individual-level administrative data from several sources to link family members. In particular, I merge employer-employee data from the Finnish Longitudinal Survey (FLEED-FOLK) with birth register data to identify families. I focus on the first child in each family.

The Finnish Medical Birth Register includes data on all live births from 1987 to 2014. The FLEED-FOLK records provide information for the entire population (aged between 16 and 70) from 1988 to 2015, with information on year of birth, education level, annual labor earnings, and employment status.

For health data, I use two different sources. The first is the Finnish Hospital Discharge Register, which contains information on diagnosed medical conditions and the exact date of diagnoses. This register contains all inpatient consultations in Finland from 1988 to 2015. From 1998 onwards, it also includes all outpatient visits to hospitals. All diagnoses are recoded using the International Classification of Diseases (ICD) system.[17] The second dataset is the Cause of Death Registry, which includes information on all death dates and causes between 1990 and 2015.[18]

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[16]Information available at: https://www.kela.fi/web/en/if-a-child-gets-ill.

[17]Diagnoses from between 1987 and 1995 are recorded using the ICD-9 classification. Those from 1996 onwards are recorded using ICD-10 classification.

[18]The statistics on causes of death are compiled based on the 10th revision of the International Classification of Diseases (ICD-10)

I analyze two different health shocks: severe hospitalizations and fatal health shocks. Severe hospitalizations are defined as admissions resulting in a stay that lasts longer than 75% of all hospital stays,[19] which is equivalent to a four-day stay or longer.[20] For severe hospitalizations, the sample includes families whose first-born child suffered a first inpatient stay in an acute care hospital between ages six and eighteen. For fatal shocks, the sample consists of all families whose first-born child died between ages six and eighteen.[21]

Subsequently, I analyze parents' earnings and employment status five years before and after their child's health shock. In particular, my outcome variables are annual earnings in euros and the probability of being employed during each year. I also explore post-transfer earnings, which include any transfers from public or private sources. In order to explore the mechanisms behind changes in earnings, I further investigate the number of visits to a hospital or mental health specialist, the probability of divorce, the probability of working in a state-owned, and the probability of the mother changing employers in a given year.

I do not impose any restrictions in terms of parents' relationship status. They may be separated, divorced, or not in a relationship. In the latter case, I do not observe the father, meaning that my sample contains more mothers than fathers.

Table A1 shows summary statistics for the final samples used in the analysis. In Finland, 25,960 children were admitted to the hospital between ages six and eighteen during the period 1996 to 2008. Of these, 8,546 were severe hospitalizations. During these years, there were 358 child deaths in Finland. In Figure A7, I show some additional descriptive statistics for a specific cohort that can be followed until adulthood (children born in 1990); almost 6% of these children suffered a severe hospitalization between ages 6 and 18, while 0.2% suffered a fatal shock.

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[19]Figure A5 shows the distribution of the length of hospital stays.

[20]In Section 6.2, I show that my results are robust to using different definitions for severe hospitalizations.

[21]Figure A6 shows the number of observations for each age between six and eighteen years. Severe hospitalizations and fatalities show considerable variation in terms of the age at which they occur.

4 Results

4.1 Severe Hospitalizations

Figure 2 presents the event study estimates of the impact of a child's severe hospitalization on maternal labor market outcomes (Table A2 provides further detail about the estimates).[22] There is no indication that maternal earnings or probability of employment follow a different trend before the child's hospital admission. For all outcomes, a sharp break in the trajectories becomes visible just after the event. This lends support to the identifying assumption that the timing of the child's hospital admission is uncorrelated with the counterfactual outcomes.

Panel (a) in Figure 2 shows the results for maternal labor earnings in euros.[23] A child's severe hospitalization causes a significant and persistent drop in maternal earnings. Five years after the shock, mothers earn about €1,200 less than one year before the event. Compared to mean earnings the year before the event, the magnitude of the effect is substantial: the loss in income amounts to a 7.5% decrease in maternal earnings. Panel (b) plots the results for probability of employment. There is a drop in the probability of working, which is only significant at the time of the shock and one and three years after. Three years after the shock, the probability of working is 1.8 percentage points lower. This amounts to a 2.5% decrease in a mother's working probability with respect to the mean level of employment prior to the event.

Figure A9 compares the estimated effects on maternal labor earnings with the impact on maternal post-transfer income. Both outcomes are expressed as a percentage of the mean value of the respective variable in the year prior to the shock. Compared to the impact on labor earnings, all estimates for periods after the shock are smaller (though this difference is only significant in the period of the event). This reveals that the impact of a shock on

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[22]Figure A8 shows the results for any hospital admission. I do not find that hospital admissions in general have a significant impact on maternal labor market outcomes.

[23]Labor earnings consist of wage and salary earnings.

Figure 2: Impact of a child's severe hospitalization on maternal labor market outcomes
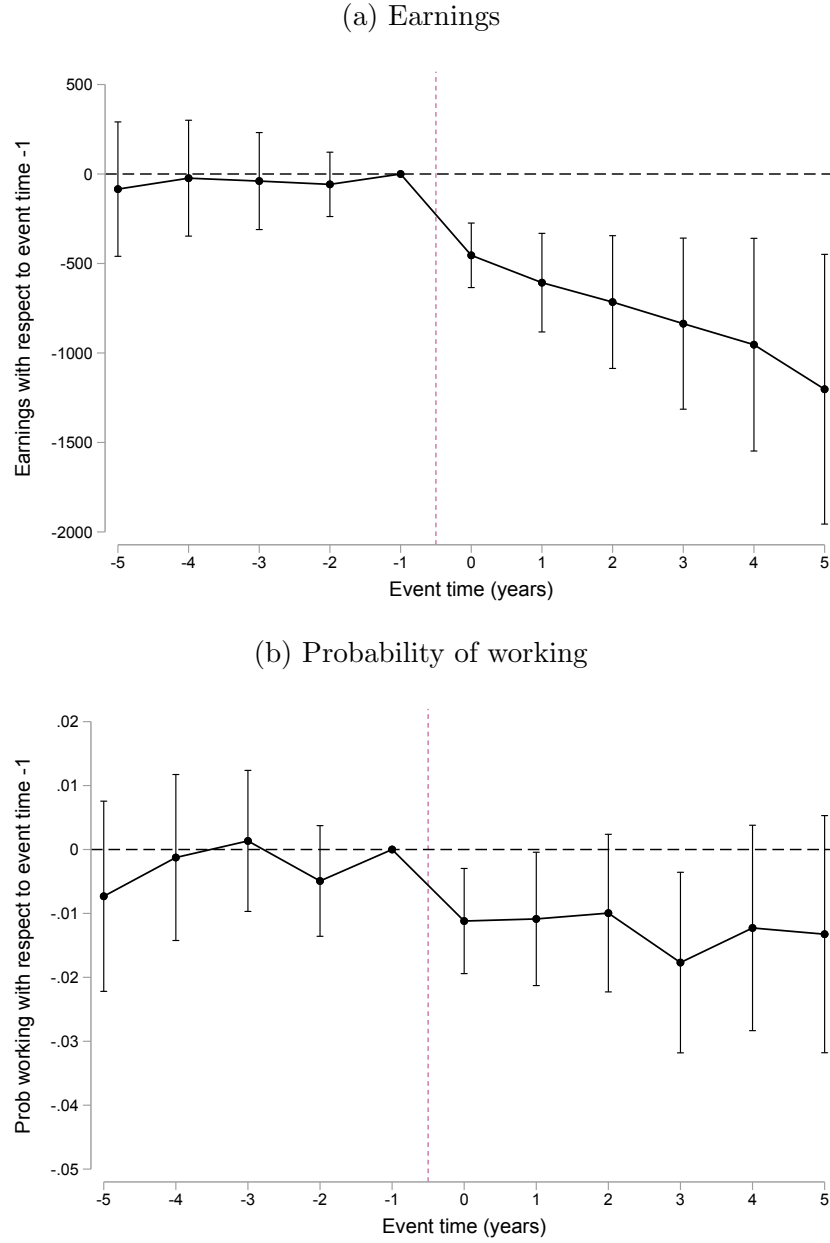
(a) Earnings

(b) Probability of working

Notes: This figure shows the event study graphs of the impact of a child's severe hospitalization on maternal labor market outcomes. Each figure shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. Panel (a) plots the results for annual earnings. Panel (b) plots the results for the probability of working. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the mother level.

labor earnings is partly offset through transfers. However, the drop in mothers' income still remains large: five years after the shock, their post-transfer income is around 5% lower.

Figure A10 shows the estimated coefficients for fathers and mothers as a percentage of the respective variable in the period prior to the shock. Table A2 also shows the estimated effects for fathers. Given the smaller sample, the estimates for fathers are less precise, though they do face a drop in their labor earnings. Two years after the severe hospitalization of their child, their earnings are 2.5% lower than average earnings in the year before the shock. For the two first years after the shock, the drop is similar to the estimated effect for mothers in absolute terms. However, the coefficients become relatively smaller and not significant after this period. In contrast to the result for mothers, there is no evidence of a significant drop in fathers' probability of employment. There is only a marginally significant decrease in their working probability in the year of the shock.

4.2   Mortality

Figure 3 presents the results for the impact of a child's fatal health shock on maternal earnings and labor supply. Again, there is no evidence of trends predating the event for any of the outcomes analyzed. A child's death has an enormous and long-lasting impact on maternal earnings, as shown in Panel (a). The effect is much larger than the estimated impact of a severe hospitalization. Results can be found in Table A3. Three years after the death of a child, mothers' earnings are 23% lower compared to mean earnings in the period before the event. Moreover, mothers also have a higher probability of not being employed, with a drop of 13% in their working probability three years after the event.

Following the death of a child, the drop in post-transfer income is very similar to the estimated effect on labor earnings. Results can be found in Figure A9. This finding is consistent with the lack of bereavement support for parents who face the death of a child.
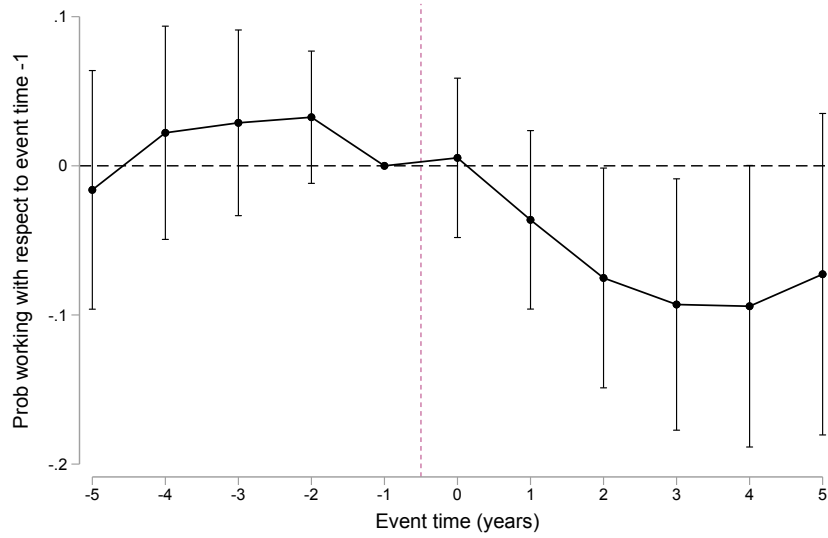
Figure A11 shows the results for fathers' and mothers' labor earnings as a percentage of mean earnings in the period prior to the event. For the first two years, the absolute drop

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Figure 3: Impact of a child's fatal health shock on maternal labor market outcomes
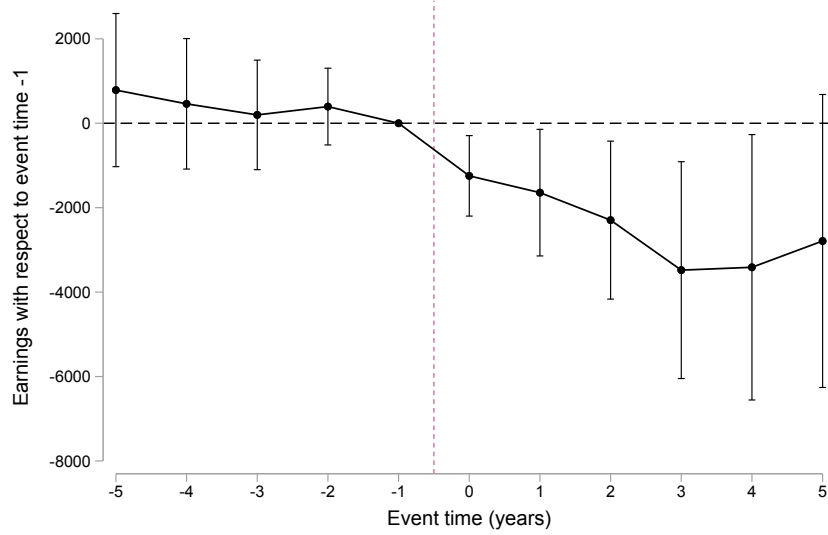
(a) Earnings

(b) Probability of working

Notes: This figure shows the event study graphs of the impact of a child's fatal health shock on maternal labor market outcomes. Each figure shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. Panel (a) plots the results for annual earnings. Panel (b) plots the results for the probability of working. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the mother level.

in earnings is similar to the estimated effect for mothers. However, none of the estimates is significant (in Table A3). Fatal shocks also have a sizeable impact on fathers' probability of employment. Three years after the event, their working probability is 11% lower.

5   Dynamic Difference-in-Differences Approach

The impact of health shocks can also be examined using a simple differences-in-differences framework, by constructing counterfactuals for treated households with families who experience the shock a few years later. This quasi-experimental design exploits the potential randomness of the timing of a shock within a short period of time, a strategy that has been laid out by Fadlon and Nielsen (2017, 2019). The main difference with respect to the previous approach is that the control group is limited to households that experience the same shock at a specified later date.

Thus, the treatment group is composed of families whose child experiences the shock at a given year τ. The control group comprises households from the same age cohorts[24] whose child experienced the same shock in $\tau + \Delta$. The treatment effect is identified from the change in the difference in outcomes between the two groups over time. Crucially, there is a trade-off when choosing Δ, since a larger Δ increases the horizon over which the effect can be observed. However, a smaller Δ is likely to capture more similar households.

In my main specification, Δ is equal to 4 years, allowing me to identify effects up to three years after the shock. After this period, the control group also undergoes a shock. In Table A4 I show that my results are robust to alternative choices of Δ.[25]

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[24]Families of the treatment and control groups are matched based on the child's and parents' years of birth. For control households, I assign a placebo "shock" at the age at which the children in the matched treatment group undergo their respective shocks.

[25]Table A4 shows the results of running the same specification for different choices of Δ: Δ=3 in the first column, Δ=4 in the second column, and Δ=5 in the last column.

The estimating equation is a dynamic (period-by-period) difference-in-differences specification that takes the following form:

$$Y_{is} = \alpha + \beta treat_i + \sum_{t\neq-1,t=-5}^{t=3} \gamma_t \times I_t + \sum_{t\neq-1,t=-5}^{t=3} \delta_t \times I_t \times treat_i + \lambda A_{is} + \phi CBY_i + \omega_s + \epsilon_{is} \quad (2)$$

Where Y_{is} denotes the outcome for parent i in calendar year s, $treat_i$ is an indicator for whether a family belongs to the treatment group, and I_t is an indicator variable for the time relative to the assigned treatment year (event time). This is the actual treatment year for the treatment group and a placebo treatment year for the control group. The parameters of interest are δ_t, which estimate the period t treatment effects relative to the period -1. I also include dummies for the age of the parent and the child's year of birth, as well as calendar-year fixed effects.

Figure 4a illustrates this approach for families whose children experience the shock when they are nine years old. This plot shows the raw data on maternal earnings five years before the shock and three years after the shock. The control group is made up of families whose child experienced the shock at the age of thirteen and whose family members belong to the same cohorts as the treated group. In this setting, the identifying assumption is that in the absence of the shock, the outcomes of the treatment and control groups would run parallel. As shown in the graph, maternal earnings follow strikingly similar trajectories before the shock. A gap then emerges in their earnings just after the treatment group experiences the shock.

Figure 4b plots the coefficients and confidence intervals from the estimation of equation 2. There is no evidence that the trajectories of the treatment and control groups are different prior to the shock. This figure corroborates the results of the event study: the drop in maternal earnings after their child suffers a severe hospitalization is substantial and persistent. The estimated coefficients are fairly similar: three years after the shock, maternal earnings are over €1,000 lower.

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Figure 4: Dynamic difference-in-differences: impact of a severe hospitalization on maternal earnings

(a) Example of treatment and control group
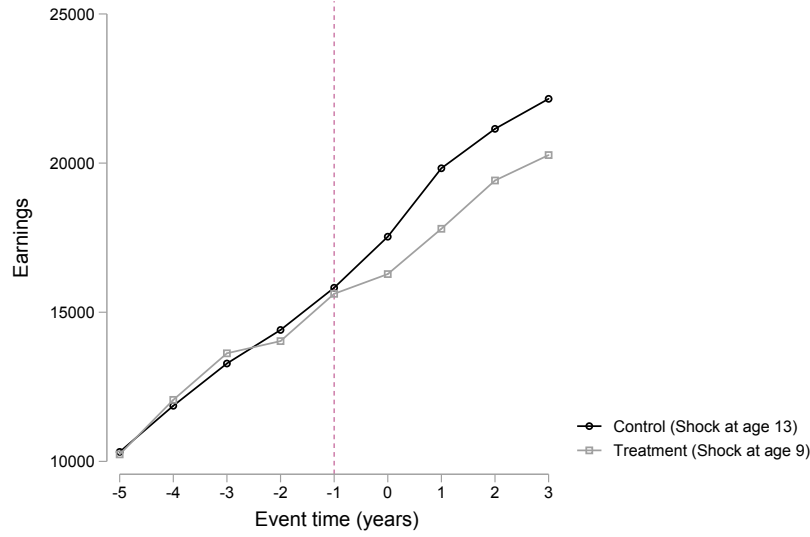
(b) Impact of a severe hospitalization on maternal earnings
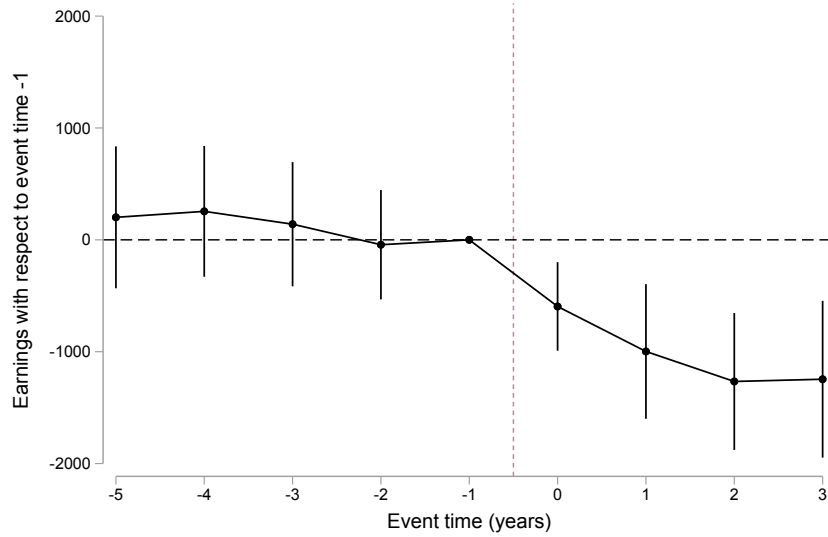
Notes: The first panel shows the raw maternal earnings data five years before and three years after the shock. The treatment group is composed of families whose child experienced the shock at age nine. The control group suffered the shock four years later. The second panel shows the coefficients and the 95 percent confidence intervals of the impact of a severe hospitalization on maternal earnings. The treatment group is composed of families whose child experiences the shock at a given year τ. The control group comprises households from the same cohorts but whose child experienced the shock at $\tau + 4$. Controls for calendar year, child's year of birth, and age of the parent are included. Standard errors are clustered at the parent level.

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6   Heterogeneity Analysis

In this section, I conduct different heterogeneity analyses to shed light on the type of hospital admissions driving the impact on parental earnings. In addition, I provide further evidence to support the main results discussed in Section 4.1.
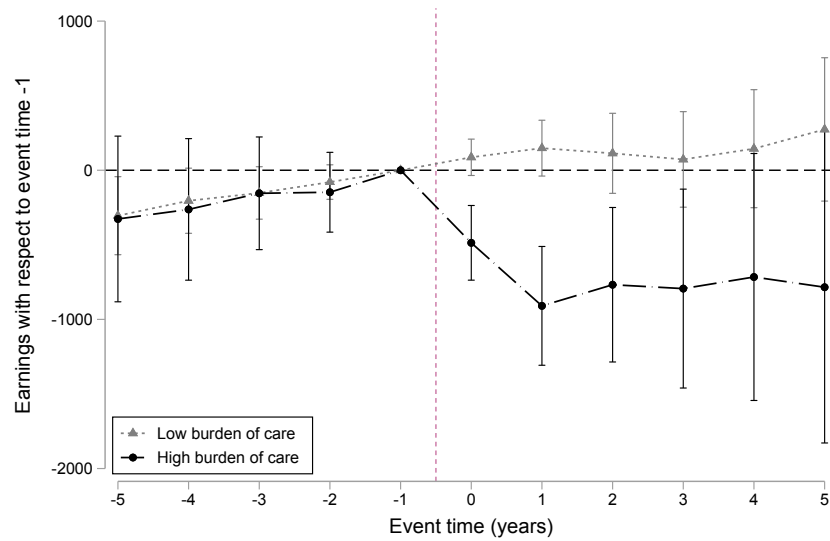
6.1   Burden of Care

If the reduction in labor earnings is partly due to the child's need for care, we would expect to find that the effect is driven by hospitalizations that impose a substantial and persistent burden of care on family members. In order to investigate this question, I empirically estimate a child's need for care one year after the shock, as measured by inpatient and outpatient visits to the hospital. I then split all hospitalizations by this measure. Figure A12 plots the average number of hospital admissions or specialist visits between one and five years after a child's hospitalization. The number of visits jumps to six visits in the year directly following the shock.

I define high burden of care hospitalizations as those requiring a number of visits one year after the shock that is greater than the average over the entire sample. Hospital admissions that require fewer visits one year after the event are defined as low burden of care hospitalizations. I apply equation 1 separately for these two different samples.

Figure 5 presents the results for maternal earnings. I do not find evidence that health shocks with a low burden of care have a significant impact on maternal earnings. In contrast, following a hospitalization that imposes a substantial burden of care, maternal earnings suffer a large and persistent decline. These results suggest that my findings are not driven by differences between families with children who suffer health shocks at different ages. Additionally, this result also suggests that the reduction in maternal labor earnings is at least partly due to the child's need for care.

Figure 5: Impact of a child's hospitalization on maternal earnings by burden of care

Notes: This figure shows the event study graph of the impact of a child's hospitalization on maternal earnings by burden of care. The plot shows the point estimates of the event time dummies, with the corresponding 95 percent confidence intervals. Low burden of care is defined as the sample of children with a lower number of hospital visits one year after the shock than the mean for the group as a whole. High burden of care indicates the sample of children with a higher number of hospital visits one year after the shock than the mean value. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the mother level.

6.2 Definition of Severe Hospitalizations

Severe hospitalizations have been defined as admissions that involve a stay longer than 75% of all hospital stays. In this section, I check that my results are robust to different definitions of severe hospitalization. I then estimate the impact on maternal earnings following Equation 1, but for different samples of children's health shocks.

Figure 6 shows the results for health shocks resulting in stays longer than three days (p65), four days (p70 & p75), five days (p80), and seven days (p85). The estimated effects are robust to alternative percentile selections. All of the different definitions result in a sharp break in maternal earnings trajectories directly following the event.

Interestingly, the drop in earnings becomes more pronounced as the severity of the shock increases. Five years after a health shock resulting in a stay longer than seven days, a mother's earnings are €2,000 lower. In contrast, the maternal earnings drop following a health shock resulting in a stay of longer than three days is less than €1,000. This pattern provides further evidence that the drop is driven by health shocks and not by differences due to the age at which the child experienced the shock. In the latter case, we would not expect the results to be so responsive to the degree of health shock severity.

6.3 Appendicitis vs. Cancer

As discussed in Section 2, for the estimated effects on parental earnings to be caused by a child's health shock, the identifying assumption is that the child's hospitalization is uncorrelated with the counterfactual outcome, conditional on the included controls. For example, an admission caused by a deterioration of maternal earnings would violate this assumption.

I examine the validity of this identifying assumption by looking at two plausibly exogenous health shocks that are unlikely to be affected by a mother's earnings trajectory and cannot be the result of a simultaneous shock to the mother's earnings and the child's health: appendicitis and cancer. Cancer diagnoses have previously been used in the literature as exogenous health shocks (Gupta et al., 2017; Jeon and Pohl, 2017). Meanwhile, the causes

Figure 6: Impact of a child's hospitalization on maternal earnings for different definitions of severity
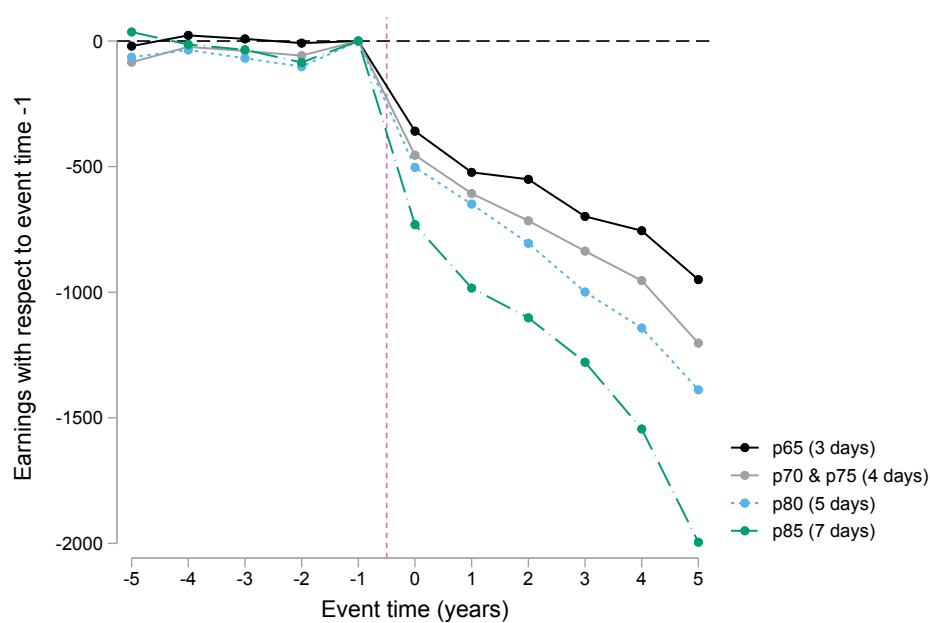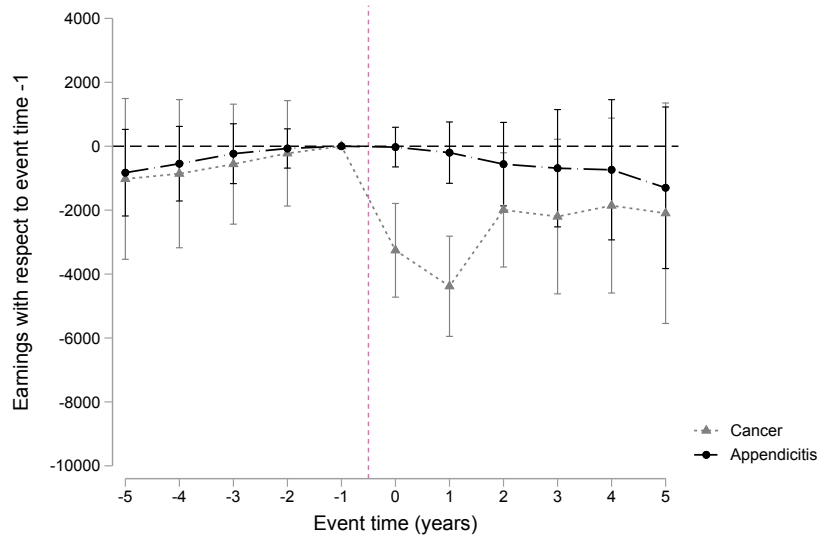

Notes: This figure shows the event study graph of the impact of a child's severe hospitalization on maternal earnings for different definitions of severe hospitalization. The 65th percentile includes all hospitalizations resulting in a stay longer than three days. Percentiles 70 and 75 correspond to stays of over 4 days, while the 80th percentile involves stays longer than than five days and the 85th percentile, longer than seven days. All specifications include controls for calendar year, child's year of birth, and age of the parent.

and the epidemiology of appendicitis remain largely unknown (Bhangu et al., 2015; Gauderer et al., 2001).

While appendicitis is expected to generate a need for timely care, cancer is a condition with a much more complicated prognosis. In the case of cancer, involvement of family caregivers is very important in order to ensure compliance with treatments, continuity of care, and social support (Glajchen, 2004).

Figure 7 shows the impact of a child's hospitalization due to a diagnosis of cancer or appendicitis on maternal earnings. As expected, mothers' earnings suffer a large drop following a cancer diagnosis, while no such drop is observed following a child's hospitalization with acute appendicitis. The results of this exercise support the identifying assumption, suggesting that the observed drop in maternal earnings is not explained by mutual shocks or hospitalizations brought about due to a deterioration in maternal earnings.

Figure 7: Impact of a child's hospitalization on maternal earnings for two diagnoses: cancer and appendicitis
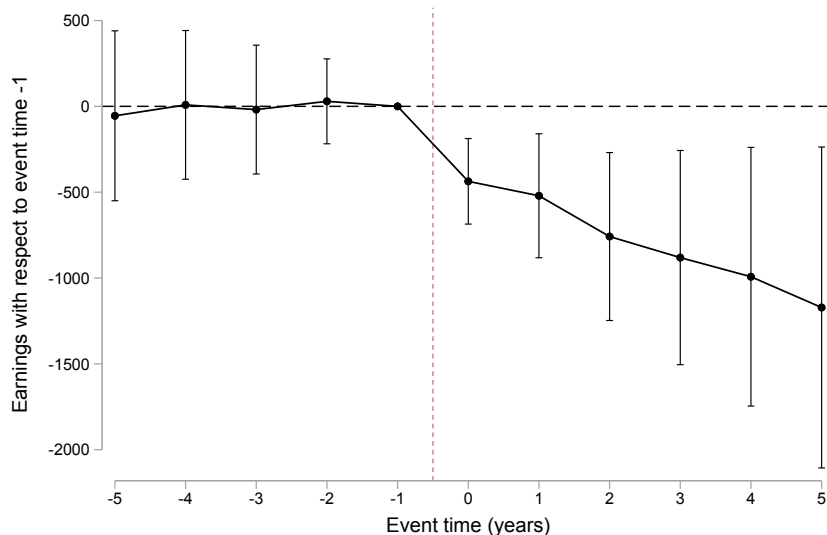

Notes: This figure shows the event study graph of the impact of a child's severe hospitalization on maternal earnings for two different diagnoses: cancer and appendicitis. The plot shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the mother level.

6.4 Excluding Mental Health Diagnoses

Figure A13 shows the number of severe hospital admissions broken down by diagnosis group.[26] The category[27] with the highest number of observations is mental and behavioral disorders. In order to ensure that the results are not uniquely driven by children that were admitted due to a mental health condition, I estimate Equation 1 once more, excluding all hospital admissions with a mental health diagnosis.

The results can be found in Figure 8. The estimates are very similar to the main results, suggesting that the impact is not solely driven by severe hospital admissions due to mental and behavioral disorders.

Figure 8: Impact of a child's severe hospitalization on maternal earnings excluding hospitalizations with a mental health diagnosis

Notes: This figure shows the event study graph of the impact of a child's severe hospitalization on maternal earnings, excluding hospitalizations due to a mental health diagnosis. The plot shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the mother level.

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[26]Figure A14 shows the number of child fatalities broken down by cause.

[27]Classification using the chapters from the international version of the ICD-10.

7   Mechanisms

This section investigates potential mechanisms underpinning the observed impact of severe hospitalizations on maternal earnings. I exploit the same variation, and present the results using event studies, following the estimation of Equation 1.

Mental health Some studies find that parents of children with poor health or disabilities report higher stress levels and worse sleep quality (Stabile and Allin, 2012). Mental health has also been found to impact labor market outcomes (Biasi et al., 2018). In order to explore the impact of a child's severe hospitalization on parents' mental well-being, I look at the number of parental visits, with a mental health diagnosis, to a specialist or hospital.

The results presented in Figure 9 show that, with respect to the period before the shock, mothers visit specialists or hospitals at a higher rate for issues related to mental health conditions, although the effect is only significant one year after the event. The effect is much bigger for fathers, with visits increasing by nearly one and a half one year after the event. However, it becomes negative from the third year after the event. This could be driven by fathers substituting inpatient and specialist care with primary care or occupational health care doctors once they have been diagnosed.

The gender differences in number of visits for mental health conditions after the shock could be explained by the data available for the analysis. The World Health Organization[28] observes that gender differences exist in patterns of help-seeking for mental health care. While women are more likely to visit a primary health care physician, men are more likely to seek a mental health specialist, and are the principal users of inpatient care.

In Figure 10, I plot the increase in the probability of receiving a diagnosis of a mental health condition, or a diagnosis of depression or anxiety, in the years immediately before and after the health shock. After their child's hospitalization, mothers are about 1 percentage point more likely to be diagnosed with a mental health condition, while this increases to

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[28]WHO, Gender and women's mental health.
https://www.who.int/mental_health/prevention/genderwomen/en/. Accessed September 2019

7 percentage points for fathers. Overall, my results suggest that parents' mental health is affected by children's health shocks. This may, in turn, impact their labor market outcomes.

Figure 9: Impact of a child's severe hospitalization on parents' mental health
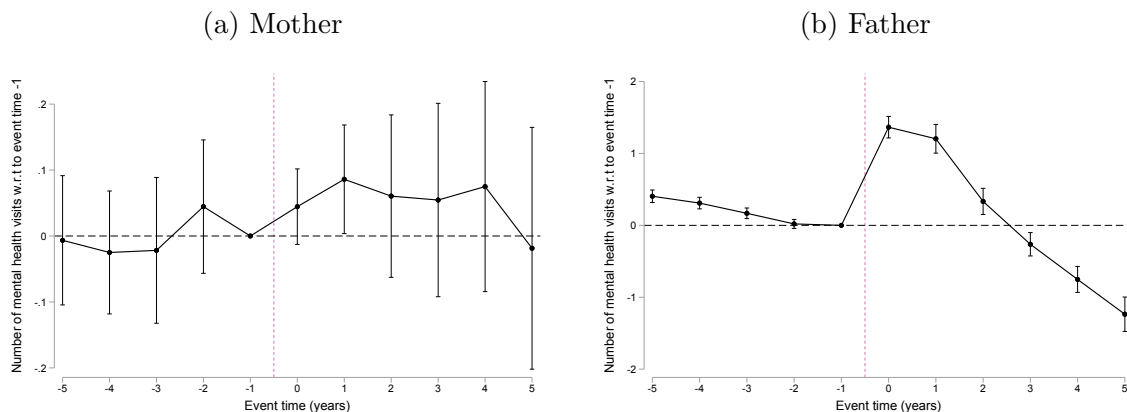
(a) Mother   (b) Father

Notes: This figure shows the event study graphs of the impact of a child's severe hospitalization on the number of hospital visits by parents for mental health care. Each figure shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. Panel (a) plots the results for mothers and panel (b) for fathers. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level.

Figure 10: Impact of a child's severe hospitalization on parents' mental health
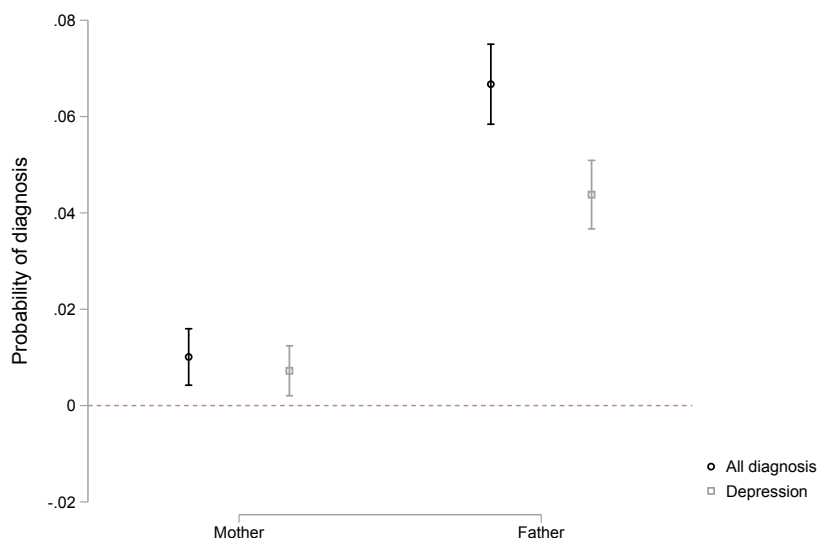
Notes: This figure shows the probability of parents receiving a diagnosis of a mental health condition, or a diagnosis of depression or anxiety, in the years immediately preceding and following their child's health shock. The plot shows the point estimates of the event time dummy for one year after the shock with the corresponding 95 percent confidence intervals. Standard errors are clustered at the parent level.

Family stability Previous papers find that having a child with a disability is associated with a higher probability of relationship dissolution (Stabile and Allin, 2012). While marital dissolution is an outcome in itself, it may also affect parents' labor supply decisions (e.g, Ananat and Michaels, 2008; Bargain et al., 2012; Leopold, 2018; Page and Stevens, 2004).
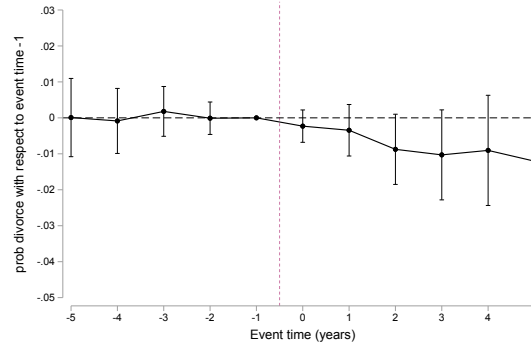
Panel (a) in Figure 11 shows the event study graph of the impact of a child's severe hospitalization on the probability of marital dissolution. I do not find evidence of an increased risk of divorce after the hospitalization of a child.

Choice of work environment Other studies have indicated that women prefer jobs that are more "family friendly" after childbirth (e.g, Goldin and Katz, 2016; Lundborg et al., 2017). In particular, Pertold-Gebicka et al. (2016) and Kleven et al. (2019b) find that mothers have a higher probability of moving to an occupation in the public sector following parenthood, which is known to have more flexible working conditions.

Similarly, after a severe hospitalization of a child, mothers may also seek a more family-friendly job in order to take care of their child. In panel (b) in Figure 11, I examine whether mothers have a higher probability of working in the public sector after their child undergoes a health shock. I do not find that this is the case, suggesting that mothers do not adjust their labor supply in this manner. More generally, panel (c) in Figure 11 looks at whether mothers have a higher probability of moving to a different job after a child's health shock. For each year, I define an indicator variable equal to one if the mother is not working in the same enterprise as in the previous period. I do not find evidence that mothers have a higher probability of switching to a different job after the health shock.

Figure 11: Mechanisms: impact of a child's severe hospitalization on family stability and choice of working environment
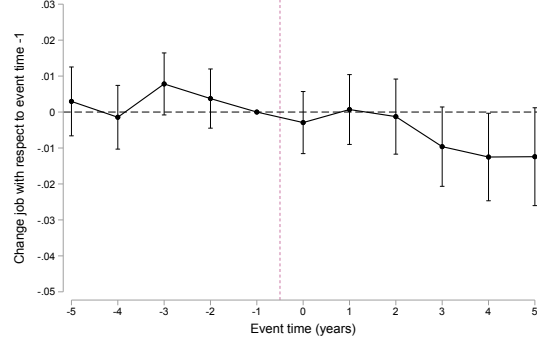
(a) Probability of divorce

(b) Probability of working in the public sector
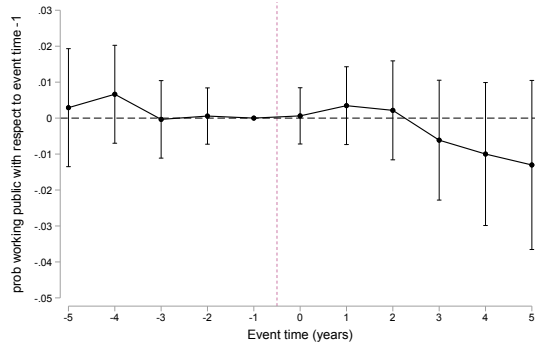
(c) Probability of switching jobs

Notes: This figure shows the event study graphs of the impact of a child's severe hospitalization on the probability of relationship dissolution (panel (a)), the probability of working in the public sector (panel (b)), and the probability of switching jobs (panel (c)). Each figure shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. $\overline{Y}_{t-1}$ is 0.185 for probability of divorce, 0.331 for probability of working in a public enterprise and 0.156 for probability of switching jobs. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level.

8 Conclusions

This paper provides new evidence on the impact of children's health shocks on parental labor market outcomes. To identify the causal effect, I compare families whose children are exposed to health shocks at varying ages, conditional on the parents' and children's ages. This allows me to abstract from differences across families who suffer the illness or death of a child and those who do not.

I use long panels of high-quality administrative data from Finland on family income and health trajectories. This enables me to exploit precisely and objectively identified health shocks and provide visually clear evidence using an event study approach. In particular, I look at the impact of severe hospitalizations, focusing on children who had not been hospitalized by school-starting age, and the impact of fatal health shocks.

The results show that children's health shocks have a detrimental and persistent impact on both parents' labor market trajectories. Three years after a severe hospitalization, mothers' earnings are 5% lower, while fathers' earnings drop by 2.5%. Additionally, I show that the impact is driven by hospitalizations that require substantial and persistent care after the event.

To put the magnitude of the effects in context, the impact on maternal earnings is approximately one fourth of the estimated effect of a health shock on an individual's own earnings (Dobkin et al., 2018; Meyer and Mok, 2019; Fadlon and Nielsen, 2017), and more than one tenth of the estimated drop in maternal earnings three years after childbirth in Finland (Sieppi and Pehkonen, 2019).

For families that face the death of a child, the impact on labor earnings is much larger: three years after the death of a child, mothers' earnings are 23% lower. For fathers, the estimated coefficients are negative and large in magnitude, but imprecise, suggesting that fatal shocks could also impact their earnings.

Children's health shocks also have an impact on parents' mental well-being, which I document using data on hospital and specialist diagnoses. The effect seems to be stronger

for fathers, though this could be explained by gender differences in patterns of help-seeking for mental health issues. Assuming that the impact on earnings of a depression diagnosis is similar to the effect estimated by Biasi et al. (2018) , the increased risk of depression after a child's severe hospitalization would explain around 60% of the observed drop in earnings for fathers.

Taken together, the results point to the importance of providing assistance, and especially mental health support, to families whose child experiences a health shock. My findings also show that while the loss in earnings for parents whose child undergoes a severe hospitalization is partly offset through transfers, this is not the case for fatal shocks. This opens debate over whether the existing situation is optimal or there is room for public intervention. My study also provides useful inputs for cost-benefit studies of policies aimed at preventing children's diseases or deaths, which may wish to incorporate these indirect costs in their estimations. Finally, further research is needed in order to understand the potential spillover effects of these shocks on siblings' development and well-being.

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Appendix

Table A1: Summary statistics

	All hospitalizations		Severe hospitalizations		Mortality	
	mean	sd	mean	sd	mean	sd
Child characteristics						
Age at event time	10.162	3.251	11.064	3.366	11.659	4.205
Male	0.529	0.499	0.558	0.497	0.592	0.492
Mother characteristics						
Age at event time	37.046	5.760	37.772	6.101	38.260	6.162
Finnish	0.981	0.137	0.982	0.132	0.966	0.180
Single	0.035	0.185	0.047	0.211	0.036	0.186
Married	0.421	0.494	0.450	0.498	0.469	0.500
Earnings t=-1	16308.076	14062.552	16002.080	15054.742	15370.709	14372.881
Prob. working t=-1	0.740	0.439	0.713	0.452	0.729	0.445
N visits mental health t-1	0.217	2.704	0.417	3.740	0.031	0.247
Father characteristics						
Age at event time	39.619	6.278	40.534	6.574	41.064	6.457
Earnings t=-1	28670.480	50617.576	26531.112	24060.421	26826.926	20571.113
Prob. working t=-1	0.868	0.338	0.820	0.384	0.840	0.367
N visits mental health t-1	0.084	1.315	0.360	2.759	0.004	0.061
Observations	25960		8546		358	

This table shows summary statistics for the different samples included in the analysis. Columns 1 and 2 includes all children who suffered a hospitalization after age 6 (and had not been hospitalized previously), while columns 3 and 4 include all children who suffered their first severe hospitalization after age 6, and the final two columns include all children who suffered a fatal health shock after age 6.

Table A2: Impact of a child's severe hospitalization on parents' labor market outcomes

	(1) Mother earnings	(2) Father earnings	(3) Mother earnings	(4) Father earnings	(5) Mother log earnings	(6) Father log earnings	(7) Mother working	(8) Father working
Time to shock:								
-5	-84.380	273.561	-67.102	262.401	-0.042	0.034	-0.007	0.003
	(191.568)	(357.110)	(192.872)	(358.578)	(0.065)	(0.062)	(0.008)	(0.007)
-4	-23.309	281.386	-10.063	272.755	0.030	0.020	-0.001	0.002
	(165.157)	(315.166)	(165.945)	(315.569)	(0.055)	(0.051)	(0.007)	(0.006)
-3	-39.503	-26.097	-30.715	-32.045	-0.034	-0.020	0.001	-0.005
	(138.270)	(225.781)	(138.747)	(226.965)	(0.045)	(0.041)	(0.006)	(0.005)
-2	-57.869	165.399	-53.386	162.322	0.045	0.032	-0.005	0.001
	(91.723)	(166.339)	(91.640)	(167.047)	(0.032)	(0.029)	(0.004)	(0.004)
0	-454.374***	-408.386**	-458.822***	-405.127**	-0.086***	-0.051*	-0.011***	-0.006*
	(91.959)	(181.605)	(92.332)	(180.781)	(0.031)	(0.030)	(0.004)	(0.004)
1	-607.091***	-675.999**	-616.087***	-669.780**	-0.101**	-0.044	-0.011**	-0.006
	(140.516)	(264.774)	(140.698)	(263.288)	(0.043)	(0.041)	(0.005)	(0.005)
2	-715.565***	-673.930**	-729.418***	-664.589**	-0.101*	-0.064	-0.010	-0.004
	(189.240)	(339.520)	(190.436)	(337.810)	(0.052)	(0.053)	(0.006)	(0.006)
3	-836.169***	-693.665	-854.654***	-681.169	-0.158***	-0.048	-0.018**	-0.005
	(243.870)	(426.426)	(245.551)	(424.161)	(0.061)	(0.065)	(0.007)	(0.007)
4	-953.614***	-695.030	-976.50***	-679.388	-0.148**	-0.033	-0.012	-0.004
	(303.165)	(527.297)	(304.583)	(525.275)	(0.072)	(0.078)	(0.008)	(0.008)
5	-1202.544***	-787.144	-1229.833***	-768.261	-0.197**	-0.011	-0.013	-0.000
	(384.453)	(667.298)	(385.592)	(663.390)	(0.084)	(0.095)	(0.009)	(0.010)
Observations	90889	75200	90889	75200	90889	75200	90889	75200
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Additional controls	NO	NO	YES	YES	NO	NO	NO	NO
$\overline{Y}_{t-1}$	16002.080	26531.112	16002.080	26531.112	7.693	8.678	0.713	0.820

This table shows the estimates of the impact of a child's severe hospitalization on parents' labor market outcomes. All specifications include controls for calendar year, child's year of birth, and age of the parent. The first two columns show earnings in euros. Columns (3) and (4) shows the same results but controlling for the child's gender. In columns (5) and (6), earnings are expressed as logarithms. The last two columns show the probability of a parent being employed. Standard errors are clustered at the parent level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Impact of a child's fatal health shock on parents' labor market outcomes

|	(1) Mother earnings	(2) Father earnings	(3) Mother log earnings	(4) Father log earnings	(5) Mother working	(6) Father working
Time to shock:						
-5	785.306	-743.666	-0.326	0.276	-0.016	0.035
	(925.454)	(1472.948)	(0.343)	(0.329)	(0.041)	(0.034)
-4	459.479	-467.880	-0.128	0.228	0.022	0.011
	(788.348)	(1327.571)	(0.294)	(0.272)	(0.036)	(0.030)
-3	197.646	-37.249	0.107	0.017	0.029	0.009
	(661.928)	(1003.941)	(0.240)	(0.230)	(0.032)	(0.026)
-2	394.744	372.507	0.062	0.182	0.033	0.020
	(463.736)	(668.561)	(0.176)	(0.153)	(0.023)	(0.021)
0	-1246.349**	-230.906	-0.175	-0.242	0.005	-0.005
	(486.161)	(752.163)	(0.214)	(0.174)	(0.027)	(0.021)
1	-1643.673**	-1849.579	-0.242	-0.680***	-0.036	-0.074***
	(765.151)	(1265.472)	(0.288)	(0.247)	(0.031)	(0.027)
2	-2295.207**	-2054.675	-0.590*	-1.008***	-0.075**	-0.075**
	(954.504)	(1687.604)	(0.352)	(0.316)	(0.038)	(0.035)
3	-3479.772***	-2187.651	-0.900**	-1.109***	-0.093**	-0.088**
	(1310.418)	(2221.702)	(0.407)	(0.395)	(0.043)	(0.041)
4	-3412.421**	-1665.007	-0.924*	-1.157**	-0.094*	-0.083*
	(1603.756)	(2817.436)	(0.473)	(0.480)	(0.048)	(0.048)
5	-2789.245	-1543.083	-0.911*	-1.270**	-0.073	-0.103*
	(1770.657)	(3163.789)	(0.548)	(0.581)	(0.055)	(0.057)
Observations	3126	2743	3126	2743	3126	2743
Controls	YES	YES	YES	YES	YES	YES
$\overline{Y}_{t-1}$	14744.982	25069.911	7.418	8.100	0.707	0.757

This table shows the estimates of the impact of a fatal health shock on parents' earnings, expressed in euros and as a logarithm, and working probability. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Dynamic differences-in-differences: Choice of Δ–Coefficients

	(1) $\Delta = 3$	(2) $\Delta = 4$	(3) $\Delta = 5$
event time -5* treat	60.822	201.141	283.636
	(313.267)	(323.677)	(343.432)
event time -4* treat	77.134	254.501	454.932
	(320.463)	(298.332)	(326.045)
event time -3* treat	-53.353	139.822	120.111
	(290.405)	(283.309)	(322.221)
event time -2* treat	-59.654	-43.648	112.606
	(207.239)	(249.614)	(234.165)
event time 0* treat	-582.327**	-595.670***	-526.590***
	(269.223)	(202.105)	(256.658)
event time 1* treat	-496.220*	-997.970***	-742.260***
	(296.181)	(306.989)	(301.296)
event time 2* treat	-1107.263***	-1266.167***	-1103.960***
	(389.381)	(312.216)	(315.412)
event time 3* treat		-1246.082***	-988.627***
		(357.562)	(369.392)
event time 4* treat			-1114.424***
			(406.475)
Observations	53948	61341	69049
Controls	YES	YES	YES

This table shows the estimates of the impact of a severe hospital admission on maternal labor earnings. The treatment group is composed of families whose child experience the shock at a given year τ. The control group comprises households from the same parental and child age cohorts whose child experienced the shock in $\tau + \Delta$. Each column shows the results for different selections of Δ. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

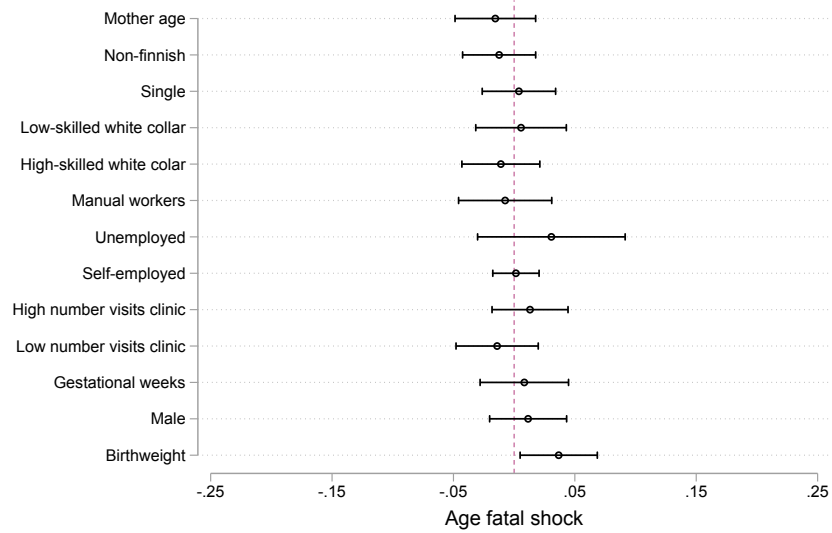Figure A1: Differences in characteristics: across families
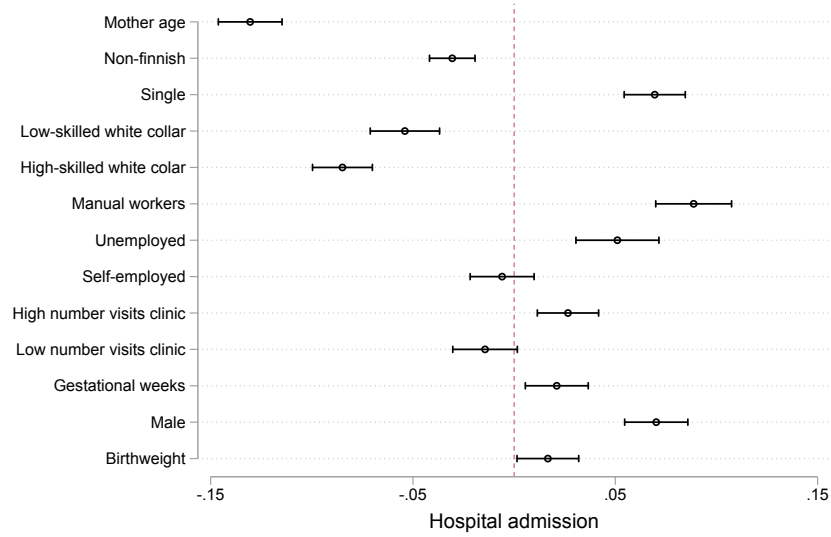
Notes: The figure shows the coefficients and 95% CI from separate regressions of each (standardized) variable on an indicator that takes a value of 1 if the child suffered a hospitalization. All specifications include year-of-birth fixed effects. Standard errors are clustered at the mother level.

Figure A2: Differences in characteristics (mortality sample): across families
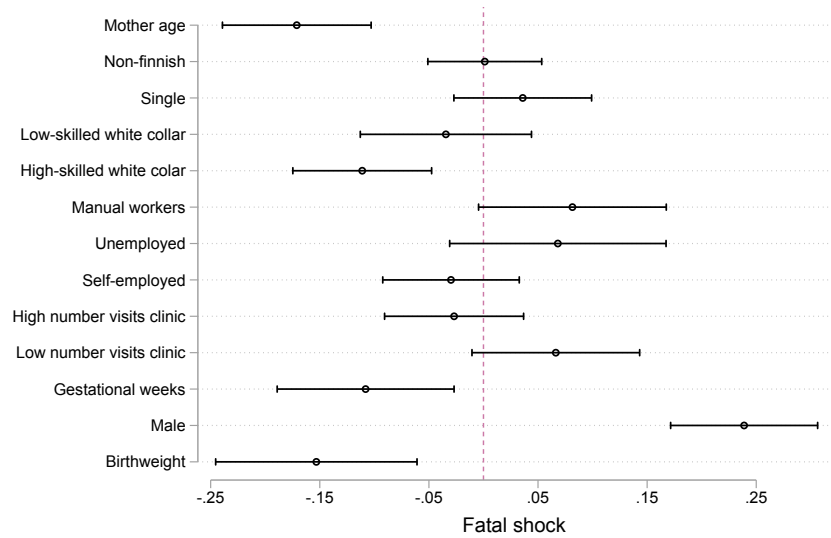
Notes: The figure shows the coefficients and 95% CI from separate regressions of each (standardized) variable on an indicator that takes a value of 1 if the child suffered a fatal shock. All specifications include year-of-birth fixed effects. Standard errors are clustered at the mother level.

Figure A3: Differences in characteristics (mortality sample): within affected families

Notes: The figure shows the coefficients and 95% CI from separate regressions of each (standardized) variable on children's age at death. All specifications include year-of-birth fixed effects. Standard errors are clustered at the mother level.

Figure A4: Raw maternal earnings trajectories before the event by children's age at hospital admission

(a) Severe hospitalizations: by age at hospital admission

(b) Mortality: by age
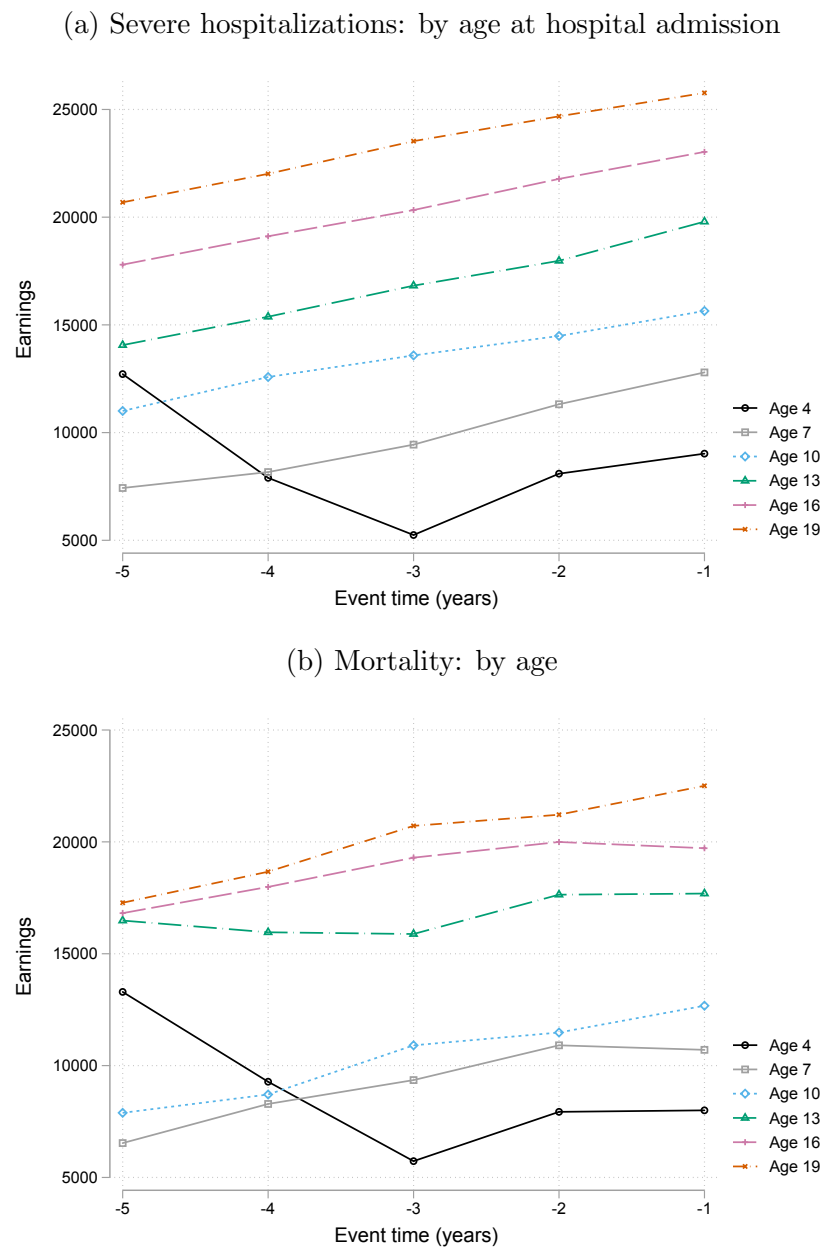
Notes: This figure shows the raw maternal earnings trajectories by event time for each age group. Panel (a) shows the yearly average earnings for the years leading up to a severe hospitalization, by the children's age at admission. Panel (b) shows the analogous graph but for mortality.

Figure A5: Distribution of length of hospitalization
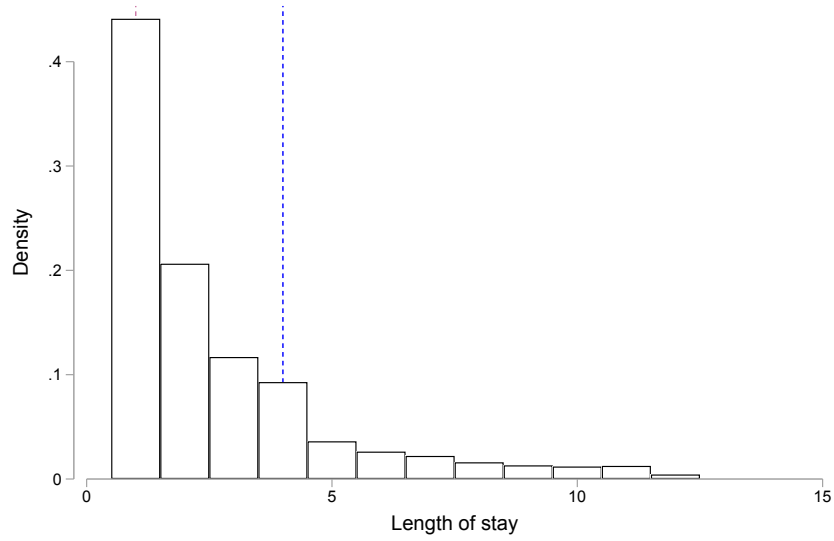
Notes: This figure shows the distribution of the length of hospitalizations. The blue dashed line shows the 75th percentile value, which corresponds to four days.

Figure A6: Number of observations by age at event time

(a) Severe hospitalizations

(b) Mortality
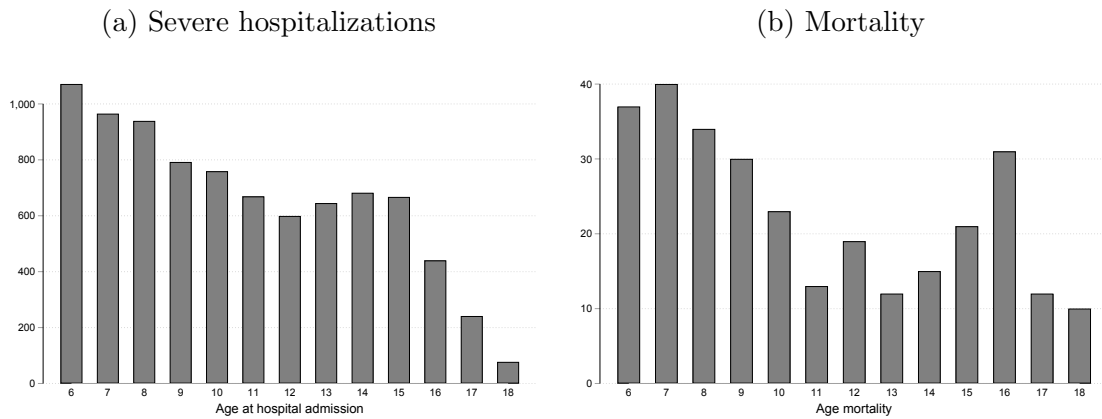
Notes: This figure shows the number of observations by the age of the child at hospital admission, in panel (a), and the number of observations by the age of the child at the time of the fatal shock, panel (b).

Figure A7: Descriptive: children born in 1990
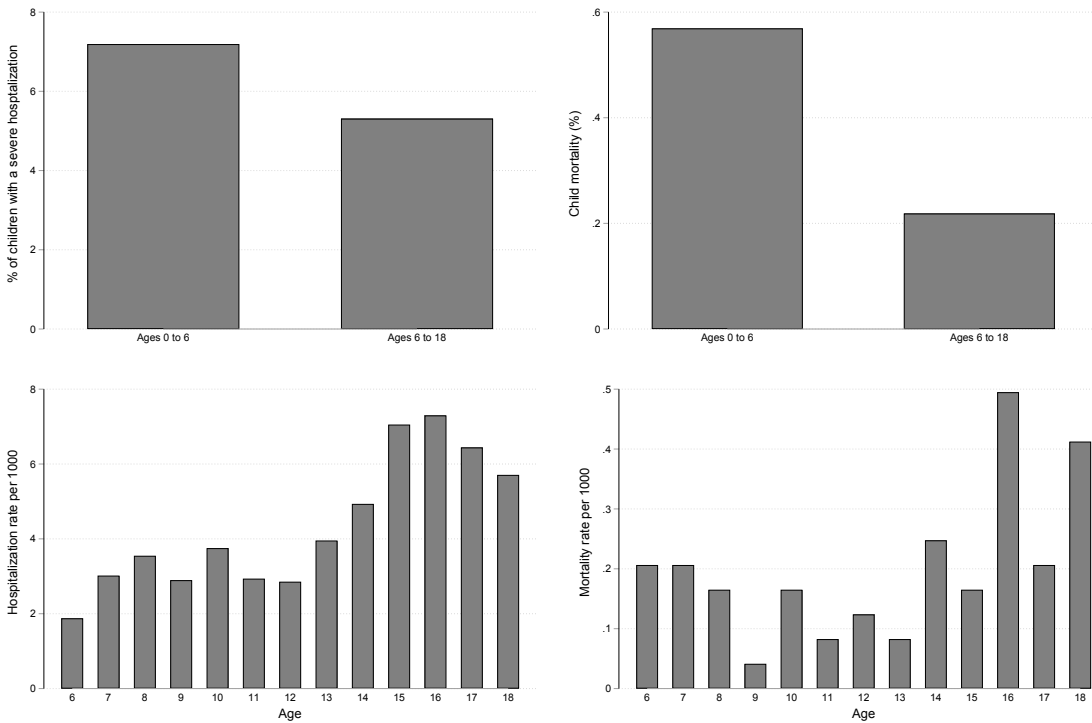
Notes: This figure provides different descriptive graphs for the sample of children born in 1990. The upper-left figure shows the percentage of children in two age groups (0-6 and 6-18) that suffered a severe hospitalization. The upper-right figure shows child mortality for the same age groups. The figure in the lower left shows the severe hospitalization rate per 1000 children by age, while the figure in the lower right shows the same figures for child mortality.

Figure A8: Impact of any hospitalization on maternal labor market outcomes

(a) Earnings

(b) Probability of working
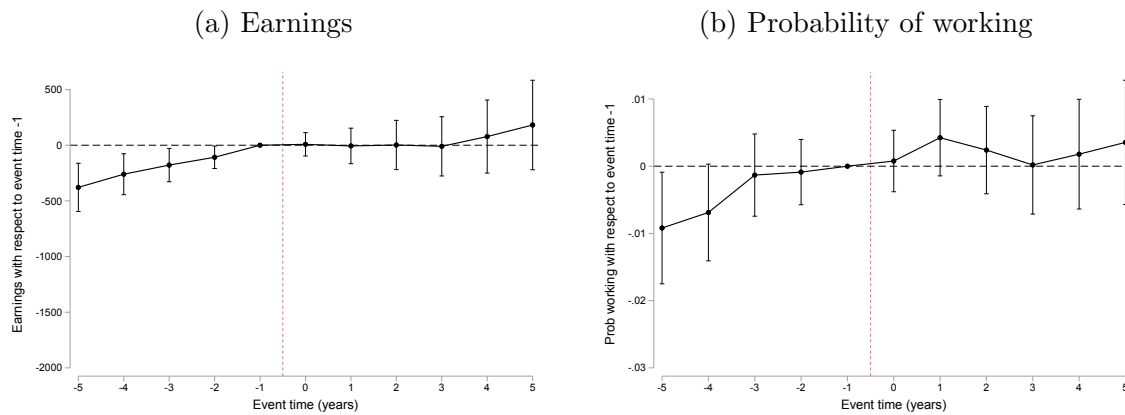
Notes: This figure shows the event study graphs of the impact of hospitalization of a child of any duration on maternal labor market outcomes. The plot shows the point estimates of the event time dummies with the corresponding 95 percent confidence intervals. Panel (a) plots the coefficients on earnings for mothers and panel (b) plots the coefficients on the probability of working. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level.

Figure A9: Impact of a child's health shock on parents' post-transfer income
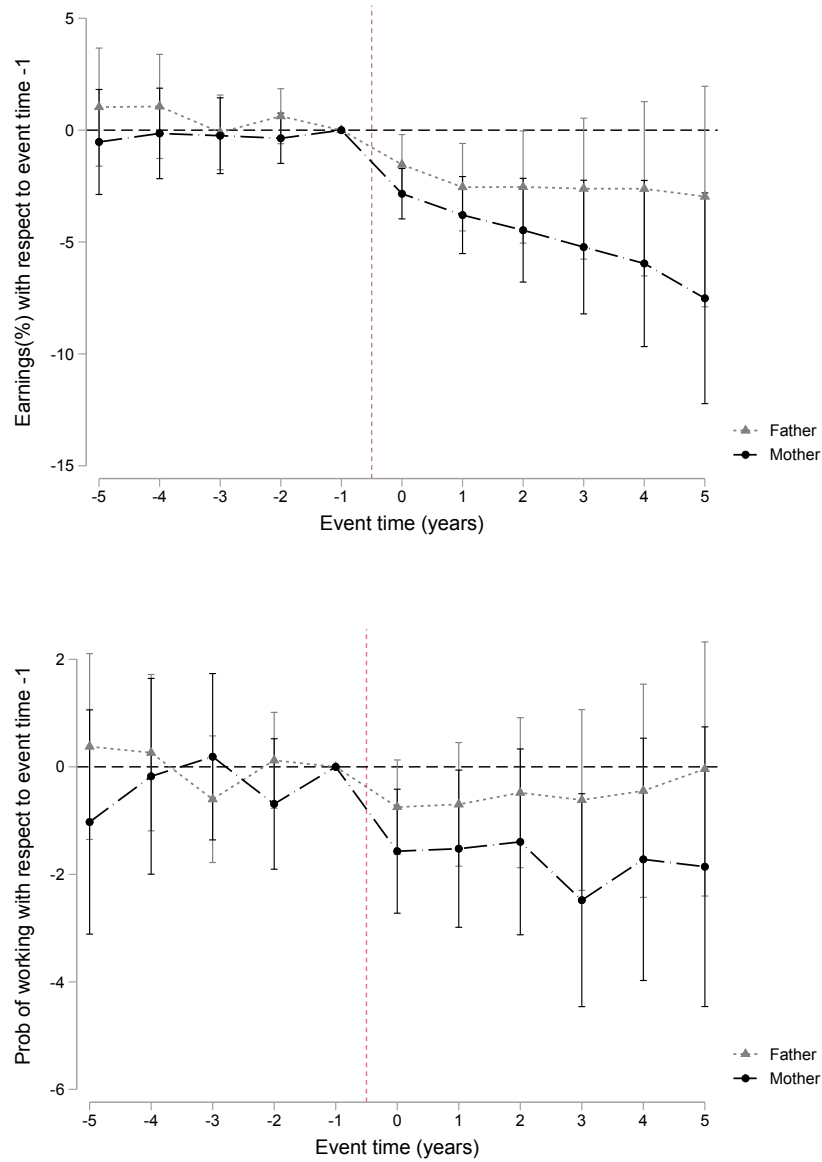
(a) Severe hospital admissions
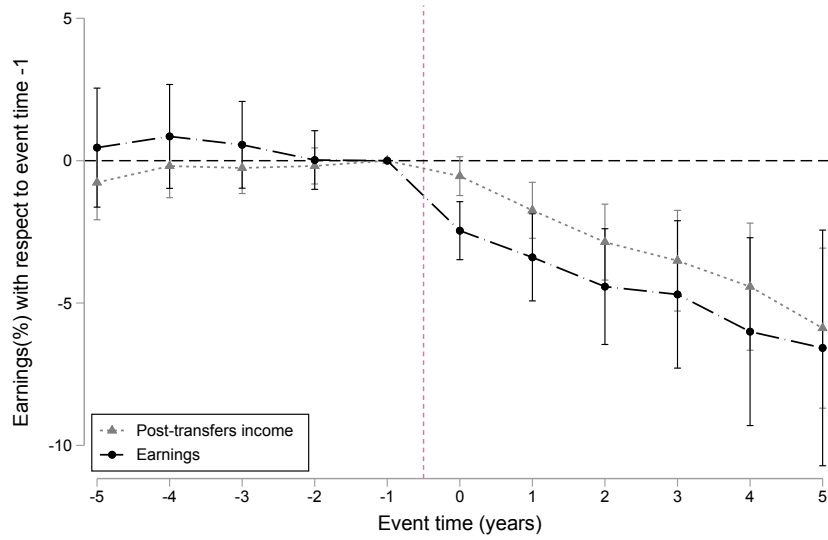
(b) Fatal shocks
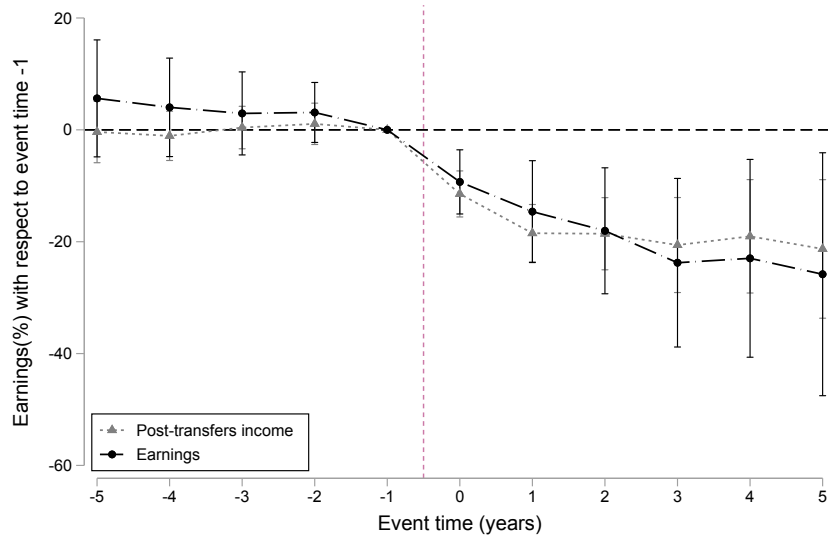
Notes: This figure shows the event study graphs of the impact of a child's severe hospitalization on post-transfer maternal income (grey line) and labor earnings (black line) for severe hospitalizations (panel (a)) and for mortality (panel (b)). Each figure shows the point estimates of the event time dummies as a percentage of the period prior to the shock with the corresponding 95 percent confidence intervals. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level.

Figure A10: Impact of a child's severe hospitalization on parental labor market outcomes

Notes: This figure shows the event study graphs of the impact of a child's severe hospitalization on labor market outcomes for both parents. Each figure shows the point estimates of the event time dummies, as a percentage of the period prior to the shock, with the corresponding 95 percent confidence intervals. Panel (a) plots the results for annual earnings. Panel (b) plots the results for the probability of working. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level.

Figure A11: Impact of a child's fatal health shock on parental labor market outcomes
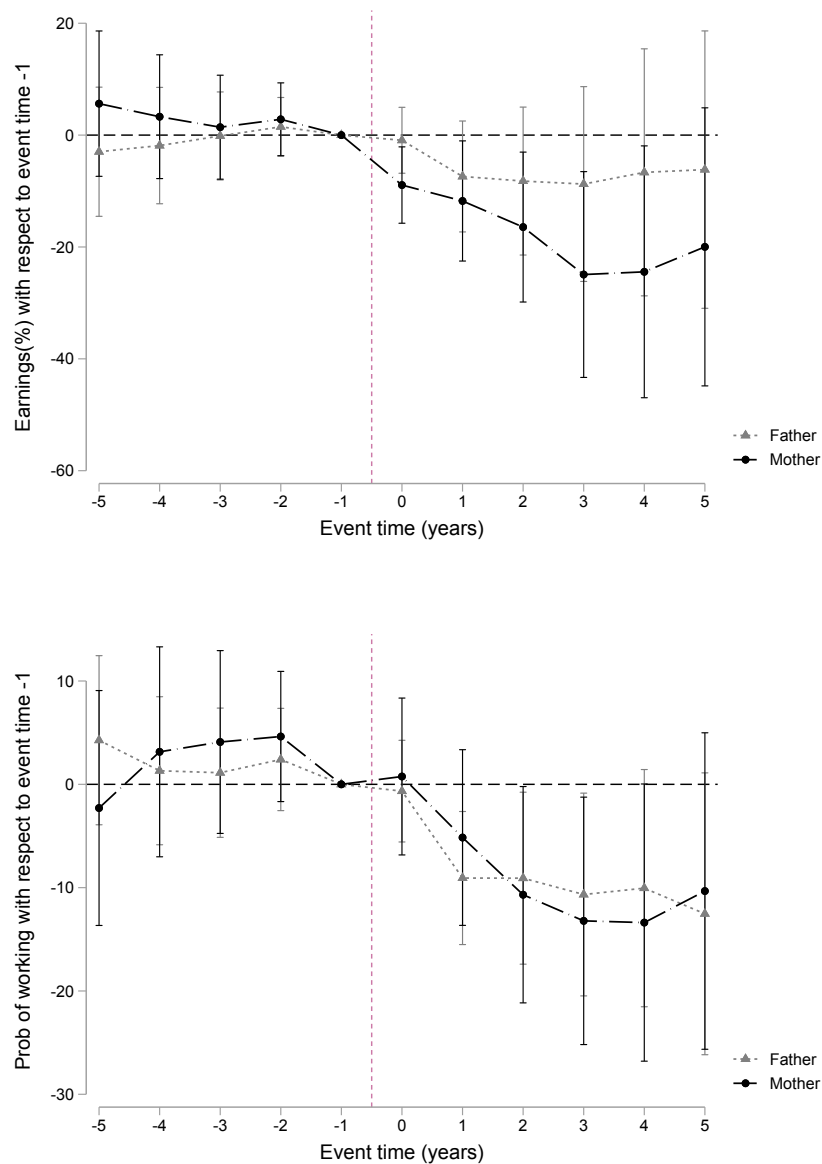

Notes: This figure shows the event study graphs of the impact of a child's death on labor market outcomes for both parents. Each figure shows the point estimates of the event time dummies, as a percentage of the period prior to the shock, with the corresponding 95 percent confidence intervals. Panel (a) shows the results for earnings and panel (b) for the probability of working. All specifications include controls for calendar year, child's year of birth, and age of the parent. Standard errors are clustered at the parent level.

Figure A12: Children's number of visits before and after a hospital admission
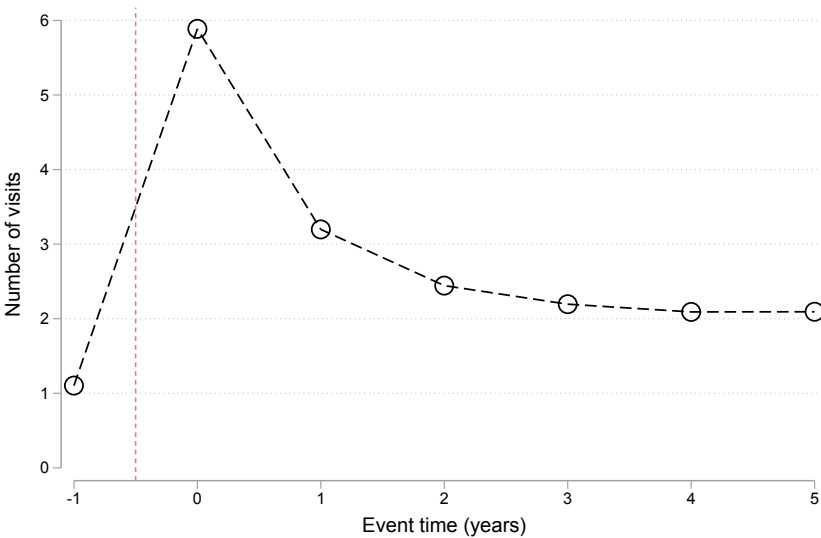
Notes: The figure shows children's average number of specialist or hospital visits one year before and five years after a hospital admission.

Figure A13: Severe hospitalizations: by main diagnosis group
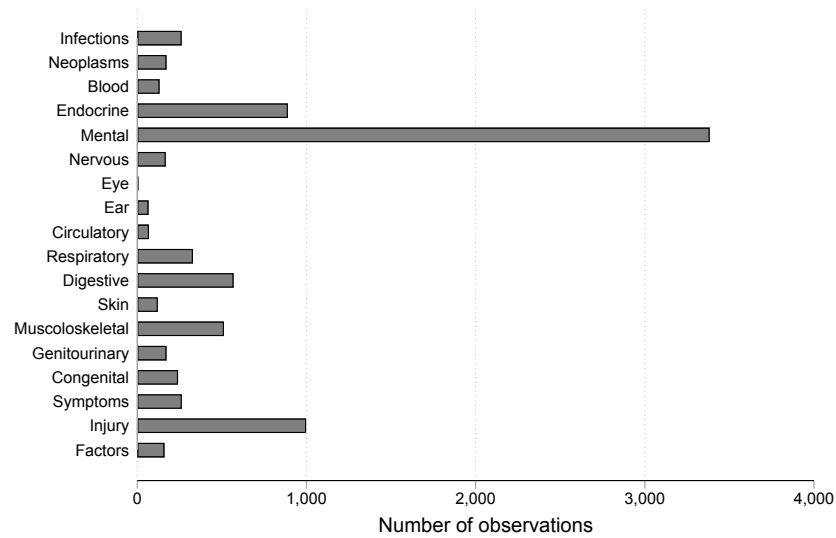
Notes: This figure shows the number of children who suffered a severe hospitalization by main diagnosis group (ICD-10 Chapters). Categories include: Certain infectious and parasitic diseases, Neoplasms, Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism, Endocrine, nutritional and metabolic diseases, Mental and behavioural disorders, Diseases of the nervous system, Diseases of the eye and adnexa, Diseases of the ear and mastoid process, Diseases of the circulatory system, Diseases of the respiratory system, Diseases of the digestive system, Diseases of the skin and subcutaneous tissue,Diseases of the musculoskeletal system and connective tissue, Diseases of the genitourinary system, Congenital malformations, deformations and chromosomal abnormalities, Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified, Injury, poisoning and certain other consequences of external causes, and Factors influencing health status and contact with health services.

Figure A14: Mortality: by main cause
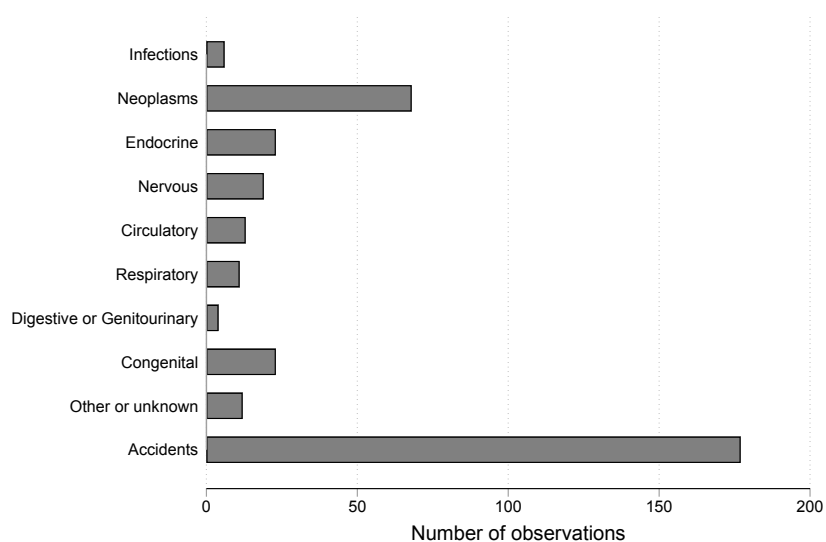
Notes: This figure shows the number of children who suffered a fatal health shocks by main cause of death. Categories include: Certain infectious and parasitic diseases, Neoplasms, Endocrine, nutritional and metabolic diseases, Diseases of the circulatory system excl. alcohol-related, Diseases of the respiratory system, Diseases of the digestive system, Diseases of the genitourinary system, Congenital malformations, Other diseases excl. alcohol-related, Ill-defined and unknown causes of mortality, Alcohol-related diseases and accidental poisoning by alcohol, Accidents and violence excl. accidental poisoning by alcohol.