

The Career Costs of Children's Health Shocks

Ana Costa-Ramón*

Job Market Paper

December 16, 2019

[Click here for latest version](#)

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. Identification comes from comparisons of same-aged parents with same-aged children, whose children experienced the health shock at different ages. The results show that parental earnings suffer a substantial decline following their child adverse health event, and that the fall is persistent: five years after a child's severe hospitalization, maternal earnings have dropped by more than 7.5%, 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.

*Department of Economics, Universitat Pompeu Fabra. Contact: anamaria.costa@upf.edu. I am especially grateful to Libertad González for her guidance and support, as well as to Albrecht Glitz, Fernando Fernández, Christian Fons-Rosen, Guillem López-Casasnovas, Ana Rodríguez-González, Miquel Serra-Burriel, Alessandro Tarozzi, Ana Tur-Prats and participants at the UPF Applied Lunch Seminar for their comments and suggestions. I also thank Lauri Sääksvuori for giving me the opportunity to work with the data.

1 Introduction

Economists have long been interested in understanding the relationship between income and health (Deaton, 2013). It is well established by now that health shocks have a detrimental effect on own labor market outcomes.¹ However, we know much less about potential spillover effects of health shocks to other family members.

In particular, the illness of a child is a stressful event that can have important 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 might decrease their labor supply given the time required to care for the child. However, they might also face direct treatment costs, resulting in an increase of their labor supply.

Suffering a hospitalization during childhood is not a rare event, and thus a relatively large number of families have to deal with this situation. For example, in 2009 there were 30 hospital admissions for every 1000 children aged 1 to 17 years old in the US (Wier et al., 2011). If we follow a particular cohort and look at children’s cumulative incidence of hospitalization, in Finland, 36% of children born in 1990 suffered a hospitalization from ages 1 to 18, and 9.9% suffered a long inpatient spell (of more than 4 days). Child mortality rates, in turn, are very low across European countries², yet the death of a child can lead to significant emotional distress and can have enormous impacts on well-being and labor market outcomes of parents. 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 fill 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 hospitalizations and fatal health shocks. In order to do so, I leverage long panels of high quality administrative data from Finland on families’ health and labor market trajectories. I exploit

¹This 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); Meyer and Mok (2019); Trevisan and Zantomio (2016); Wagstaff (2007)

²On average less than 1.25 deaths from ages 5 to 14 per 1000 children. Data for 2018 from United Nations. Available here: <https://childmortality.org/data>. Accessed September 2019.

variation in the timing of health shocks for families whose child experienced a first severe health shock after school starting age. More specifically, focusing on parents that experience the shock at some point, and thus have similar characteristics and follow similar trends, identification comes from comparisons of same-aged parents with same-aged children, whose children experienced the health shock at different ages.

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 trend prior to the health shock of the child. For all outcomes, the sharp breaks in the trajectories become visible just after the event. Overall, I find that earnings of both mothers and fathers suffer a substantial drop after a severe health shock or the death of a child, and that the fall is persistent. 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 mother's probability of being employed. In contrast, I do not find evidence of an effect on father's working probability. I also show that the effect is driven by health shocks that require persistent care, as measured by number of hospital visits in the year after the shock. Regarding mortality, I find that three years after the death of a child, mother's earnings have dropped by 23%. For fathers, the estimated coefficients are negative and large in magnitude, but imprecise, suggesting that fatal shocks could also impact their earnings.

I exploit the richness of the data and explore several potential mechanisms. I do not find evidence that mothers switch jobs to more family-friendly firms after the shock. And neither do I find changes in the risk of marital dissolution. However, I 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 that the impact of a child's severe hospitalization on parents' earnings might result

from a combination of increased time required to care for the child and worsening of parents' mental health.

This paper adds to two different strands of literature. I contribute to the literature that analyzes the effects of adverse health shocks on labor market outcomes. A large number of studies have analyzed the relationship between health shocks and income. Most of these studies focus on estimating the impact of health shocks on 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 hospital admissions for adults in the US. They find that three years after a hospital admission earnings have dropped by 20%. Meyer and Mok (2019) use survey data from the US and estimate a similar drop in earnings ten years after onset of a disability.

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

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

⁴They exploit heart attacks and strokes as severe non-fatal health shocks.

and Pohl (2017) use administrative data from Canada and find an important decline in employment and earnings of individuals whose spouses are diagnosed with cancer.

One study examines the spillover effects of parents unexpected hospitalizations⁵ on sons and daughter’s labor supply (Rellstab et al., 2019). 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) also exploit a difference-in-difference and show that having a sibling with a disability has a negative spillover effect on children’s test scores.

This paper contributes to this literature by providing the first causal evidence on the spillover effects of a child’s health shock on family labor supply and mental well-being. 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. Nevertheless, children’s health status is unlikely to be randomly distributed across families, and thus families whose children have worse health are likely to be different and follow different trends compared to the rest of families. This makes it difficult to distinguish between the effect of having a child with an illness and the effect of other confounding characteristics on maternal employment.

This paper advances the 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 when children suffered the health shock. I also show that the effect is only visible if health shocks impose a substantial and persistent burden of care to parents.

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

⁶Stabile and Allin (2012) review previous research available 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 curtail hours of work or stop working altogether.

⁷van den Berg et al. (2017) exploit longitudinal data and compare parents whose child died in a non-intentional accident to parents who did not experience child loss. For mothers, they find that annual loss in earnings amounts to 12.5% on average. For fathers, the corresponding loss is 8.8%.

This paper also speaks to the literature that investigates the role of parenthood on family labor supply. Most papers have investigated the effect of children and find sizeable effects on mothers' labor supply and earnings.⁸ The most recent studies estimate that after the birth of the first child, women earn considerably less and the effect is persistent: the female child penalty⁹ in the long run is around 20% in Nordic countries (Kleven et al., 2019; 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., 2019). Snaebjorn and Steingrimsdottir (2019) show that the child penalty is larger in families where a child is born with a disability: affected mothers earn 13% less in the long run, and affected fathers 3% less.

This paper shows that beyond the costs of having a child, health shocks during middle childhood to teenage years also have a substantial impact on parent's labor market outcomes. In line with the findings of papers studying the impact of children, my results suggest that children's health shocks also have a larger negative impact on women's earnings compared to 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 5 presents additional evidence to support the main conclusions. Section 6 explores mechanisms of the effects. The last section concludes.

2 Empirical Strategy

My aim is 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, and thus families whose child suffers a health shock might have different characteristics and follow

⁸This includes, among others, papers by Adda et al. (2017); Angrist and Evans (1998); Angelov et al. (2016); Bertrand et al. (2010); Bronars and Grogger (1994); Benard et al. (2007); 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)

⁹The child penalty is defined as the percentage by which women fall behind men due to children.

distinct trajectories compared to the rest of 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 child who was hospitalized predicts almost all characteristics, suggesting that these families are different to the rest of families. Therefore, comparisons across families are likely to yield biased estimates of the causal impact.

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

I provide visually clear results of my estimation by utilizing an event study approach. My specification is fairly close to that followed in recent work by Kleven et al.(Forthcoming) 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 data, the year of the shock is normalized to $t=0$ and all years are indexed relative to that year. I construct a balanced panel of parents observed five years before the health shock and five years after it. I run the following regressions for mothers and fathers:

$$Y_{ist} = \sum_{j \neq -1} \alpha_j \times \mathbb{1}[j = t] + \sum_k \beta_k \times \mathbb{1}[k = age_{is}] + \sum_l \beta_l \times \mathbb{1}[l = childbirthyear_i] + \sum_y \gamma_y \times \mathbb{1}[y = s] + v_{ist} \quad (1)$$

where Y_{ist} is the outcome of interest for individual i in calendar year s and event time t , which is regressed on event time dummies, age of the parent dummies, childbirth year dummies and calendar year dummies. The event time dummy at $t = -1$ is the omitted category, and thus the event time coefficients measure the impact of a child’s health shock relative to the

¹⁰Given that mothers experience a sharp drop in earnings and working probability after childbirth, their earnings trajectories follow different trends during the first years after having a child. Sieppi and Pehkonen (2019) replicate the analysis of Kleven et al.(Forthcoming) for Finland and find that the child penalty stabilizes from age 6 onwards. Furthermore, this coincides with the school starting age in Finland (Finnish National Agency for Education, 2018). In Figure A4 I show that families whose child suffered a severe hospitalization after school starting age have very similar earnings trajectories prior to the health event

year prior to the event. Event time t runs from -5 to +5 years. The inclusion of the full set of age dummies controls non-parametrically for underlying life-cycle trends in parents outcomes, the calendar year dummies take into account time trends, and the child birth year dummies controls for cohort-specific effects.

Notice that the variation in exposure to the treatment, 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 as good as randomly assigned conditional on parents' age profiles, childbirth 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 admissions caused by a worsening of parents' earnings or simultaneous shocks that impact both parents' earnings and children's health.

A priori, one could expect the timing of the child's hospital admission to be related to parents' earnings trajectories. I provide different pieces of evidence to support that the estimated effect on maternal earnings is driven by children's health shocks. First, I show that, in contrast to naive comparisons across families, comparisons within affected families eliminate most differences in observable characteristics. Figure 1 plots the coefficients of regressing different maternal and child characteristics on children's age at hospital admission, controlling for childbirth year fixed effects. Almost all characteristics are balanced, suggesting that families whose children experienced the hospitalization at different ages are very similar in observable characteristics.¹¹ This is true for both non-fatal and fatal shocks.¹²

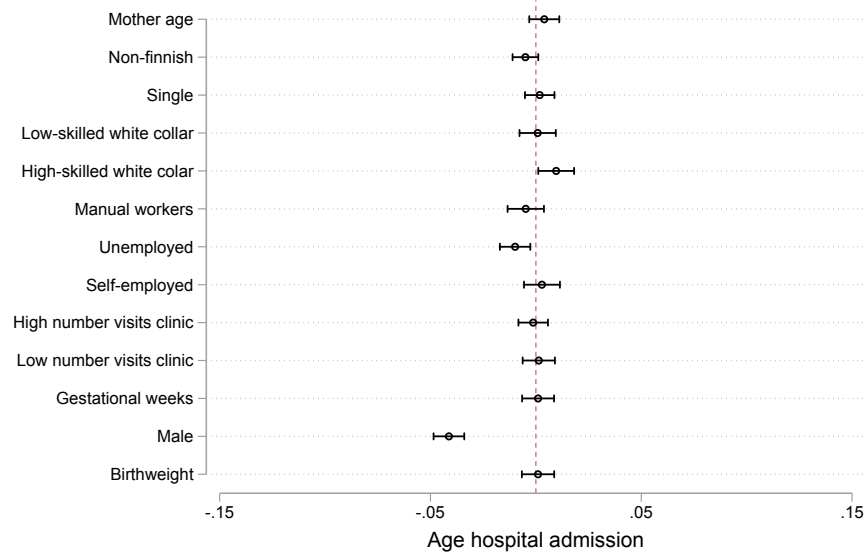
Second, in Figure A4 I show that families whose child suffered a severe hospitalization at different ages have very similar earnings trajectories prior to the health event, and that earnings did not decrease the year previous to the event.¹³ Moreover, the main advantage of

¹¹Age at hospital admission clearly predicts the gender of the child. Column (3) and (4) in Table A2 show that my results are robust to controlling for child's gender.

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

¹³Figure A4 shows the plots of raw earnings trajectories for families whose child suffered an adverse health shock by age of the shock, for the periods before the event. Families for children aged 6 or older follow very similar trajectories. This is not the case for families with younger aged children.

Figure 1: Differences in characteristics: within affected families



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

using a non-parametric event study is that it allows to visually inspect whether there was a pre-trend in the outcome variable analyzed 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 4 I also show that the effect is only visible if the child's hospitalization requires substantial and persistent care after the health shock, as measured by number of specialist visits and hospital admissions after the event. Finally, in Section 6 I also explore two plausibly exogenous health shocks that have very different implications in terms of burden of care 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 a substantial drop is observed after a severe hospital admission with a diagnosis with worse prognosis (cancer).

3 Institutional Setting and Data

3.1 Institutional Setting

Finland has universal public health coverage. Primary health care is provided by local authorities in health centers. Specialized medical care comprises specialist examinations and treatment and usually requires a physician's referrals. It is mainly provided in hospitals.¹⁴ Emergency medical services, which involves 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 take care of the emergency duties of health centres 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 during the last years. There are only a few private 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 National Health Insurance reimbursement. 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, and almost half of those were children (Tynkkynen et al., 2016).

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

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

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

ill children, parents can be granted a disability allowance. The entitlement and the amount of the allowance are determined on the basis of the need of care, attention and rehabilitation that the child requires. The payment period also depends on the assessment of how long the need of care due to illness or disability will be. 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 administrative data at the individual level from several registers to link family members. In particular, I merge employer-employee data from the Finnish Longitudinal Survey (FLEED-FOLK) together 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 Register provides information for the full population (aged between 16 and 70) over the period 1988 to 2015. This register contains information on year of birth, education level, annual labor earnings and employment status.

For the health data, I exploit two different registers. My first dataset is the Finnish Hospital Discharge Register, which contains information about the 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 includes all outpatient visits to hospitals. All diagnoses are recoded using the International Classification of Diseases (ICD) system.¹⁷ My

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

¹⁷ Diagnoses for years from 1987 to 1995 are recorded using ICD-9 classification. Diagnoses from 1996 onwards are recorded using ICD-10 classification.

second dataset is the Cause of Death Registry, which includes information on all death dates and causes (from 1990 to 2015).¹⁸

I will analyze two different health shocks: severe hospitalizations and fatal health shocks. Severe hospitalizations are defined as admissions with a length of stay longer than the 75th percentile value in the distribution of hospital admission's length of stay.¹⁹ This is equivalent to four days of stay.²⁰ For severe hospitalizations, the sample includes families whose first child suffered a first inpatient stay in an acute care hospital from ages six to eighteen. For fatal shocks, the sample consists of all families whose first-born died between ages six to eighteen.²¹

I analyze parents' earnings and employment status five years before their first child's health shock and up to five years of follow-up. In particular, my outcome variables are annual earnings in euros and the probability of being employed in each period. I also explore post-transfer earnings, which include any transfers from social or private sources. In order to explore the mechanisms, I further investigate the number of visits to hospital or mental health specialist, the probability of divorce, the probability of working in a public enterprise, and the probability that in a given year, the mother is working in a different enterprise than the previous year.

I do not impose any restriction on the relationship status of parents. They can be separated or divorced, or have not yet formed a couple. In the latter case, I do not observe the father identifier. Therefore, I have more mothers than fathers in my sample.

Table A1 shows summary statistics for the final samples used in the analysis. In Finland, 25960 children suffered a hospital admission from ages six to eighteen, from 1996 to 2008. From those, 8546 were severe hospital admissions. During these years, there were 358 child deaths in Finland. In Figure A7 I show some additional descriptive statistics for a specific

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

¹⁹Figure A5 shows the distribution of hospital admissions' length of stay.

²⁰In Section 5.2 I show that my results are robust to using different definitions for severe hospitalizations

²¹Figure A6 shows the number of observations by children's age at event time. There is large variation in the age at which the health shock occurs for both, severe hospital admissions and fatal shocks.

cohort that can be followed until adulthood (children born in 1990). Almost 6% of this children suffered a severe hospital admission from ages 6 to 18, and 0.2% suffered a fatal shock.

4 Results

4.1 Severe hospitalizations

Figure 2 presents the event study estimates of the impact of a child severe hospital admission on maternal labor market outcomes (Table A2 provides more 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, the sharp breaks in the trajectories become 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.

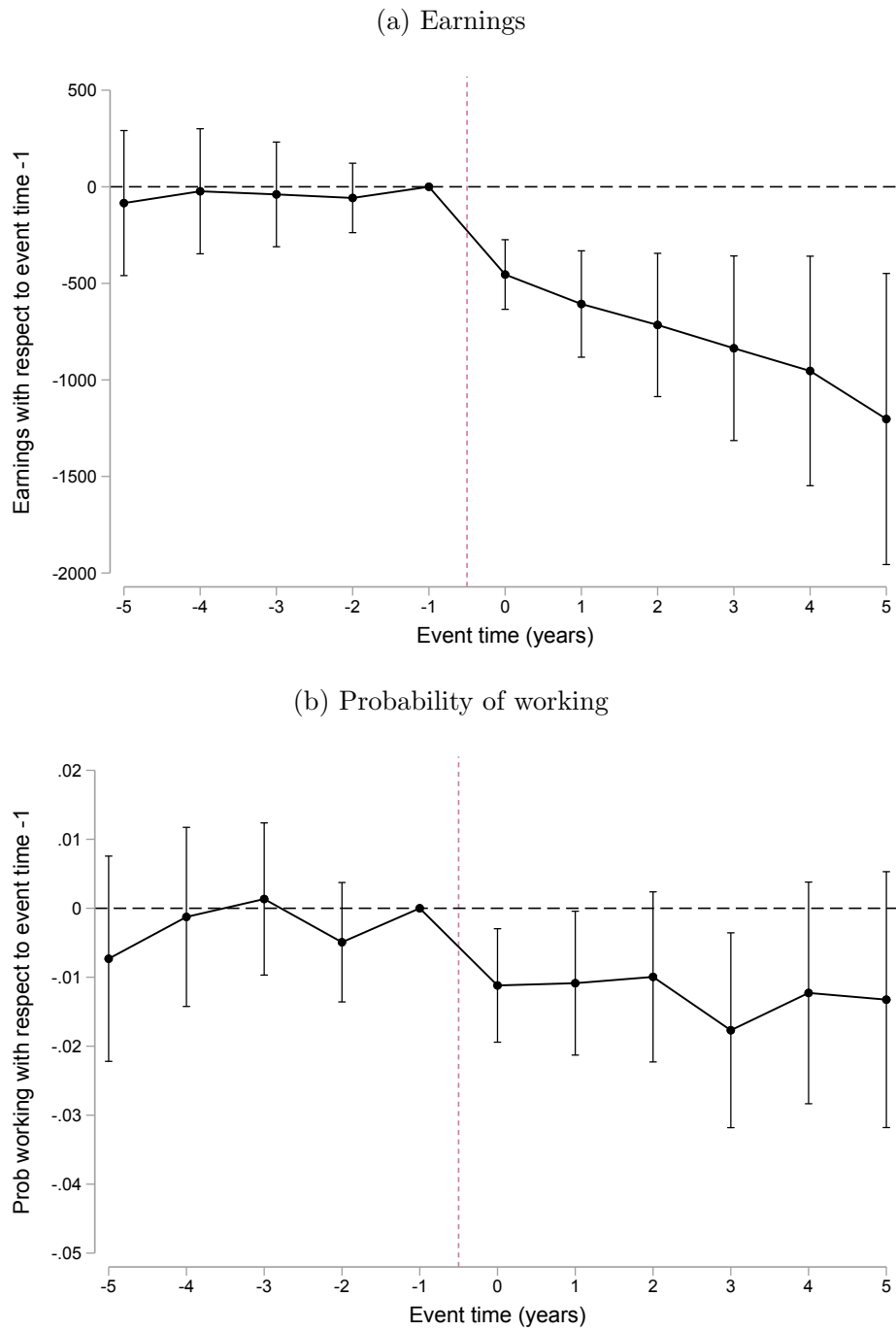
Panel (a) in Figure 2 shows the results for maternal labor earnings in euros.²³ A child’s severe hospital admission causes a significant and persistent drop in maternal earnings. Five years after the shock, mothers earn about €1200 less than one year before the event. Compared to mean earnings the year 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, 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 pp lower. This amounts to a 2.5% decrease in mother’s working probability with respect to mean level of employment prior to the event.

Figure A9 compares the estimated effects on maternal labor earnings with the impact on maternal post-transfers income. Both outcomes are expressed as a percentage of the

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

²³Labor earnings consists of wage and salary earnings.

Figure 2: Impact of a child severe hospital admission on maternal labor market outcomes



Notes: This figure shows the event study graphs of the impact of a child severe hospital admission 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 year of birth and age of the parent. Standard errors are clustered at the mother level.

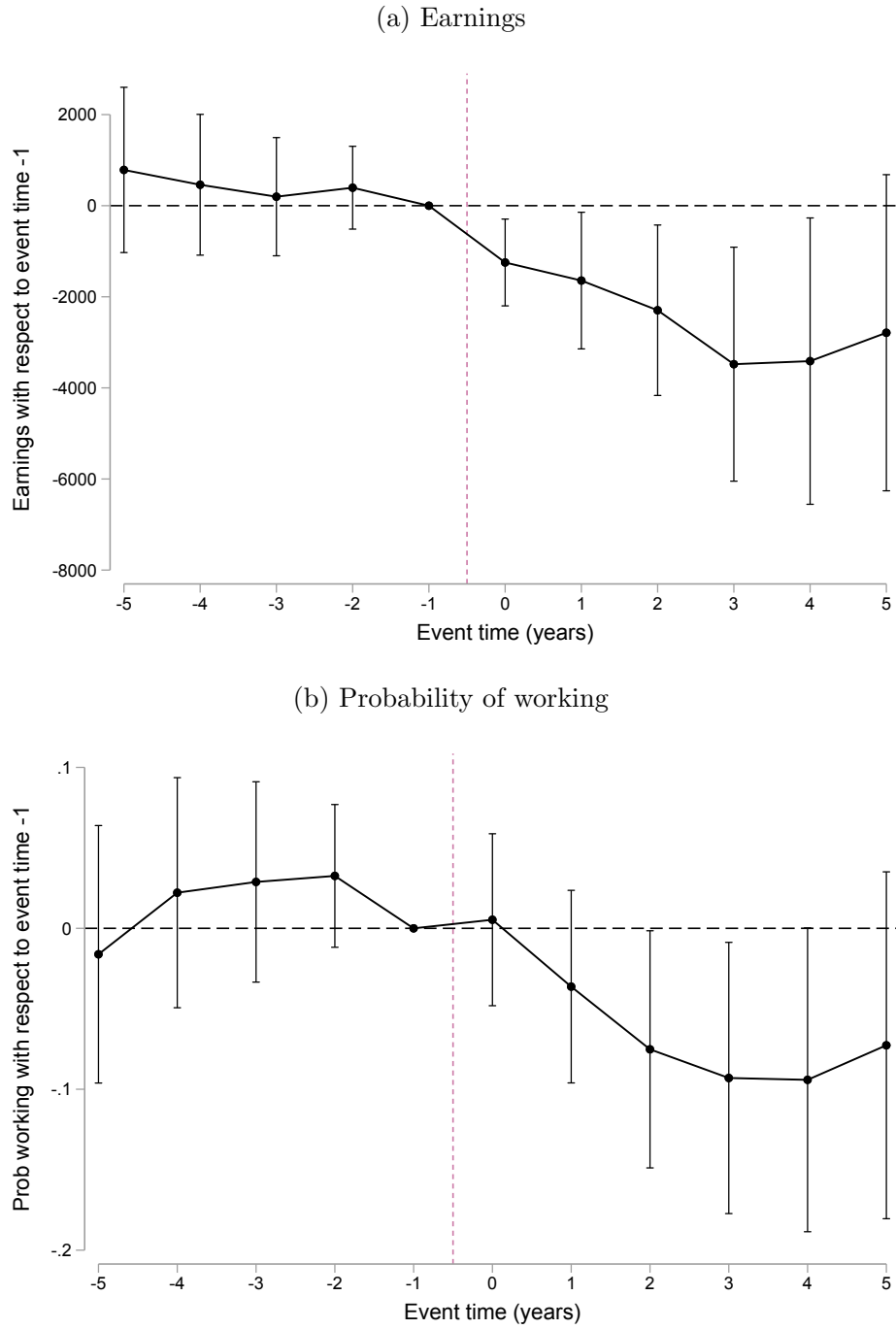
mean value of the variable in the year prior to the shock. Post-transfers income includes any transfers from social or private sources. Compared to the impact on labor earnings, all estimates for periods after the shock are smaller (although only significantly different in the period of the event). This reveals that the impact of a shock on labor earnings is partly insured through transfers. However, the drop in mother’s income still remains large: five years after the shock, mother’s post-transfer income has gone down by around 5%.

Figure A10 shows the estimated coefficients for fathers and mothers, as a percentage of the outcome 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. Fathers also face a drop in their labor earnings. Two years after the severe hospitalization of their child, their earnings are 2.5% lower compared to their previous mean earnings. For the two first years after the shock, the drop in absolute terms is similar to the estimated effect for mothers. 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. I only observe 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 shock on maternal earnings and labor supply. Again, there is no evidence of pre-trends in any of the outcomes analyzed. A child’s death has an enormous and long-lasting impact on maternal earnings (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 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.

Figure 3: Impact of a child fatal health shock on maternal labor market outcomes



Notes: This figure shows the event study graphs of the impact of a child 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 year of birth and age of the parent. Standard errors are clustered at the mother level.

Following the death of a child, the drop in post-transfers 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' labor earnings and mothers' labor earnings as a percentage of mean earnings in the period prior to the event. For the first two years, the drop in earnings in absolute terms 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 has decreased by 11%.

5 Heterogeneity analysis

In this section I conduct different heterogeneity analyses to shed some light on the type of hospital admissions driving the effect and provide additional evidence to support the main results discussed in section 4.1.

5.1 Burden of care

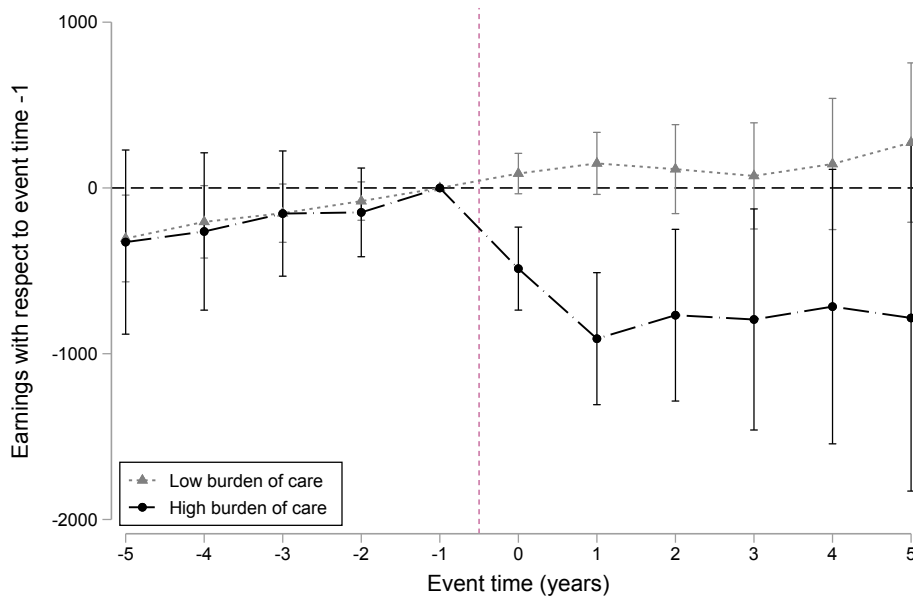
If the reduction on labor earnings is partly due to children's need of care, we would expect to find that the effect is driven by hospital admissions that impose a substantial and persistent burden of care to family members. In order to investigate this question, I empirically estimate children's need of 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 one year and up to five years after a child's hospital admission. The number of visits clearly jumps after the event, reaching up to six visits just after the shock.

Starting from the sample of all children that suffered their first hospital admission after age 6, I define high burden of care hospitalizations as those with number of visits one

year after the shock above the mean. Low burden of care includes the sample of hospital admissions with number of visits one year after the event below the mean. I estimate again equation 1 separately for these two different samples.

Figure 4 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 whose children suffered the health shock at different ages. Additionally, this result also suggests that the reduction on maternal labor earnings is at least partly due to children's need of care.

Figure 4: Impact of a child's hospital admission on maternal earnings by burden of care

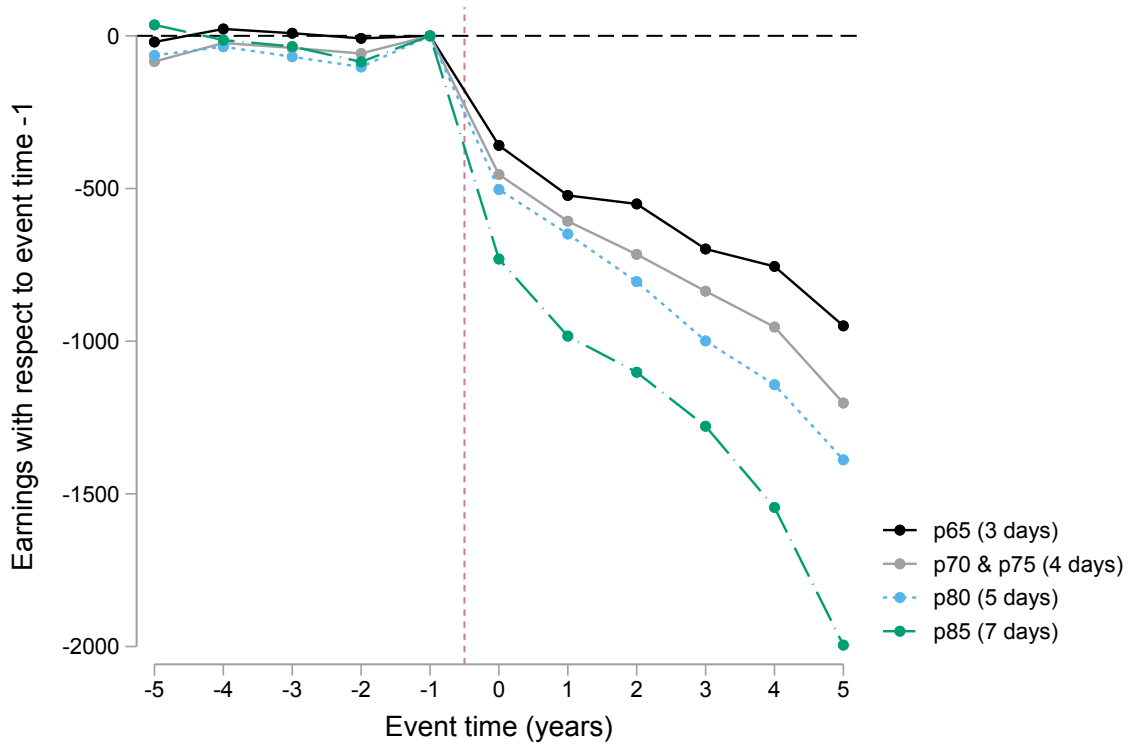


Notes: This figure shows the event study graph of the impact of a child's hospitalization on maternal earnings by burden of care. The plot shows the point estimates of the event time dummies, with the corresponding 95 percent confidence intervals. Low burden of care includes the sample of children with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

5.2 Definition of severe hospitalizations

Severe hospitalizations were defined as admissions with a length of stay longer than the 75th percentile value in the distribution of hospital admission's length of stay. I check that my results are robust to different percentile selections. I estimate again the impact on maternal earnings following equation 1, but for different samples of children's health shocks.

Figure 5: Impact of a child's hospital admission on maternal earnings for different definitions of severity



Notes: This figure shows the event study graph of the impact of a child severe hospitalization on maternal earnings for different definitions of severe hospitalizations. The 65th percentile includes severe hospitalizations with a length of stay longer than 3 days, the percentiles 70 and 75 longer than 4 days, the 80th percentile longer than 5 days, and the 85th percentile, longer than 7 days. All specifications include controls for calendar year, child year of birth and age of the parent.

Figure 5 shows the results for health shocks with a length of stay longer than 3 days (p55), 4 days (p70 & p75), 5 days (p80) and 7 days (p85). The estimated effects are robust

to alternative percentile selections. As before, for all different definitions the sharp breaks in maternal earnings trajectories are visible just after the event.

Interestingly, the drop in earnings gets more pronounced as the severity of the shock increases. Five years after a health shock with a length of stay longer than seven days mother’s earnings are €2000 lower. In contrast, following a health shock with a length of stay of more than three days, the drop in maternal earnings is smaller than €1000. This clear pattern provides further evidence that the drop is driven by health shocks and not by differences within children that experienced the shock at different ages. In that case, we would not expect the results to be so responsive to the degree of severity of health shocks.

5.3 Appendicitis vs cancer

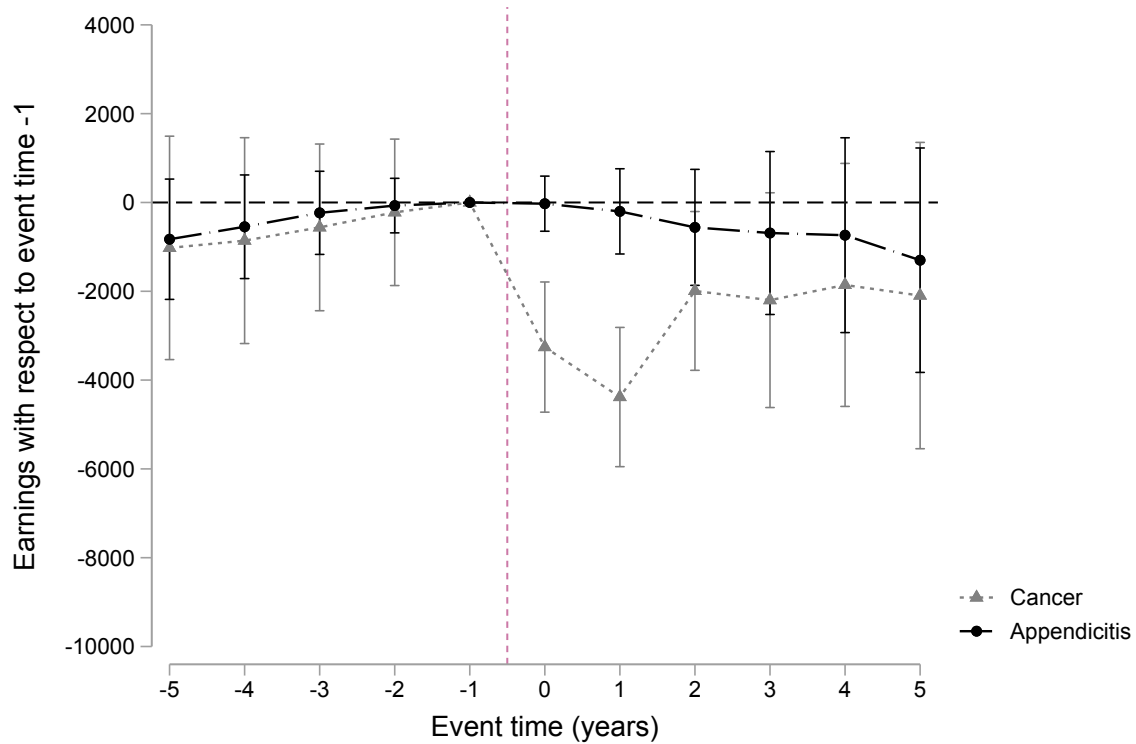
As discussed in Section 2, to interpret the estimated effects as the causal impact of a child’s health shock, the identifying assumption is that, conditional on having a hospitalization and the included controls, the timing of the child’s hospital admission is uncorrelated with the counterfactual outcome. For example, an admission caused by a deterioration of maternal earnings would violate this assumption.

To give some suggestive evidence on the validity of the identifying assumption, I examine two plausibly exogenous health shocks that are unlikely to be affected by maternal earnings’s trajectory, and cannot be the result of a simultaneous shock to mother’s earnings and children’s health: appendicitis and cancer. Cancer diagnosis have been previously used in the literature as exogenous health shocks (Gupta et al., 2017; Jeon and Pohl, 2017). The causes and the epidemiology of appendicitis remains largely unknown (Bhangu et al., 2015; Gauderer et al., 2001).

While appendicitis is expected to generate a timely need of 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 treatment compliance, continuity of care, and social support (Glajchen, 2004).

Figure 6 shows the impact of a child's hospitalization with a cancer or an appendicitis diagnosis, on maternal earnings. As expected, mother's earnings suffer a large drop following a health shock with a cancer diagnosis, while this is not the case if the child was hospitalized due to an acute appendicitis. The results of this exercise yield support to the identifying assumption, suggesting that the observed drop in maternal earnings is not explained by mutual shocks neither by hospitalizations caused by a deterioration in maternal earnings.

Figure 6: Impact of a child's hospital admission on maternal earnings for two diagnosis: cancer and appendicitis



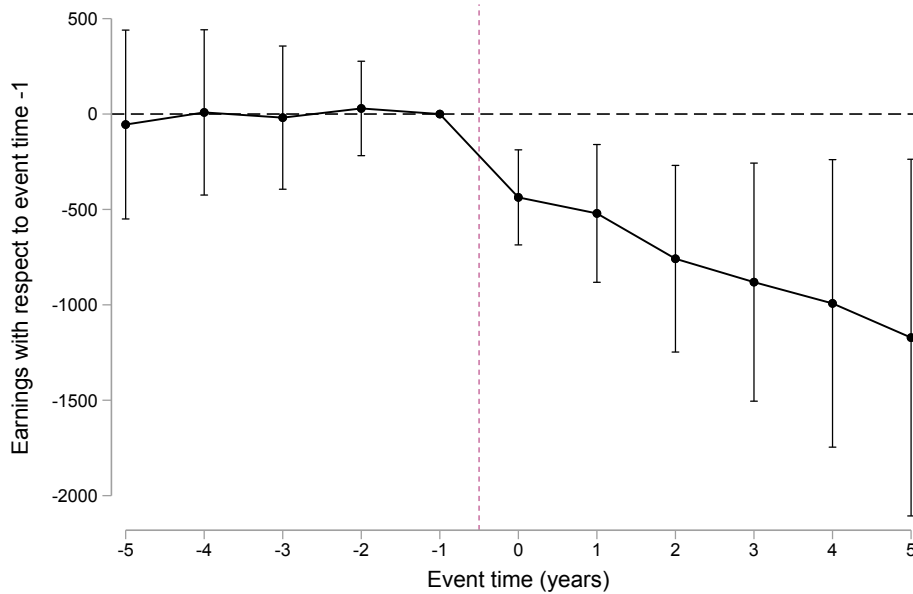
Notes: This figure shows the event study graph of the impact of a child severe hospitalization on maternal earnings for two different diagnosis: cancer and appendicitis. The plot shows the point estimates of the event time dummies, with the corresponding 95 percent confidence intervals. All specifications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

5.4 Excluding mental health diagnoses

Figure A13 shows the number of severe hospital admissions by diagnosis group.²⁴ The category²⁵ 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 again equation 1 but excluding all hospital admissions with a mental health diagnosis.

Results can be found in Figure 7. The estimates are very similar to the main results, suggesting that the impact is not only driven by severe hospital admissions due to mental and behavioral disorders.

Figure 7: Impact of a child severe hospital admission on maternal earnings excluding hospitalizations with a mental health diagnosis



Notes: This figure shows the event study graph of the impact of a child severe hospitalization on maternal earnings, excluding children hospital admissions with 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 year of birth and age of the parent. Standard errors are clustered at the mother level.

²⁴Figure A14 shows the number of child's death by cause.

²⁵Classification using the chapter's from the international version of the ICD-10.

6 Mechanisms

This section investigates potential mechanisms underpinning the observed impact of severe hospitalizations on maternal earnings. I will 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 been found to impact labor market outcomes (Biasi et al., 2018). I explore if the severe hospitalization of a child impacts parents mental well-being, as measured by the number of visits to specialist or hospital with a mental health diagnosis.

Results can be found in Figure 8. With respect to the period before the shock, mothers increase their number of visits due to a mental health condition, although the effect is only significant one year after the event. For fathers, the effect is much bigger (an increase of almost 1.5 visits one year after the event), but the effect becomes negative from period three on-wards. This could be driven by father’s substituting inpatient and specialist care with primary care or occupational health care doctors once they have been diagnosed.

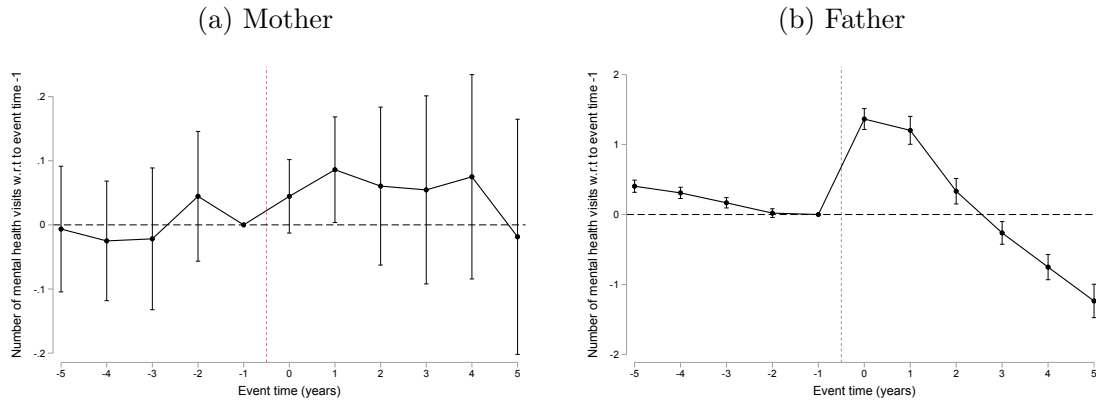
The gender differences in number of visits for mental health conditions after the shock could be explained by the data available for the analysis. The World Health Organization²⁶ discusses that gender differences exist in patterns of help seeking for mental health care. While women are more likely to visit a primary health care physicians, men are more likely to seek a mental health specialist, and in particular, are the principal users of inpatient care.

In Figure 9 I plot the increase in probability of having a mental health diagnosis, or a depression or anxiety diagnosis one year after the event, compared to the year prior to the shock. After their child’s hospital admission, mothers are about 1 percentage points more likely to be diagnosed with a mental health condition, while for fathers the increase amounts

²⁶WHO, Gender and women’s mental health.
https://www.who.int/mental_health/prevention/genderwomen/en/. Accessed September 2019

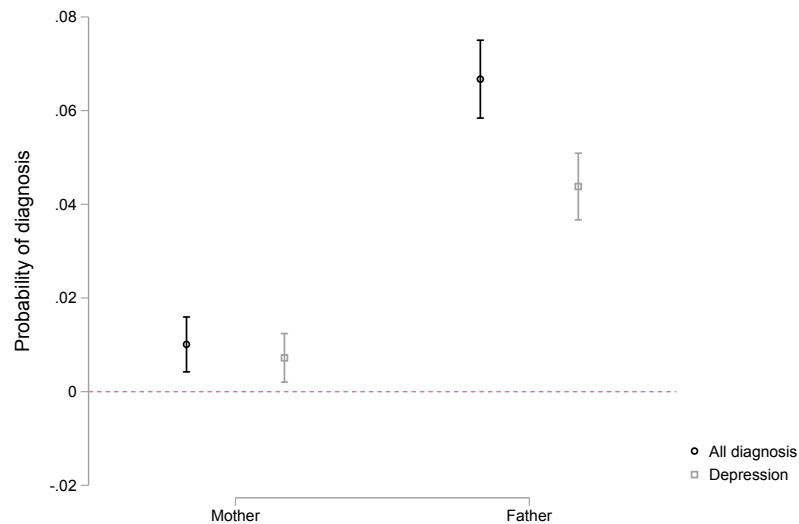
to 7 percentage points. Overall, my results suggest that parents' mental health is affected by children's health shocks. This in turn, could impact their labor market outcomes.

Figure 8: Impact of a child severe hospital admission on parents mental health



Notes: This figure shows the event study graphs of the impact of a child severe hospital admission on parents number of visits to hospital 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 year of birth and age of the parent. Standard errors are clustered at the parent level.

Figure 9: Impact of a child's severe hospitalization on parents' mental health



Notes: This figure shows parents' probability of having a mental health diagnosis, or a depression or anxiety diagnosis one year after the event with respect to the year prior to the event. 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.

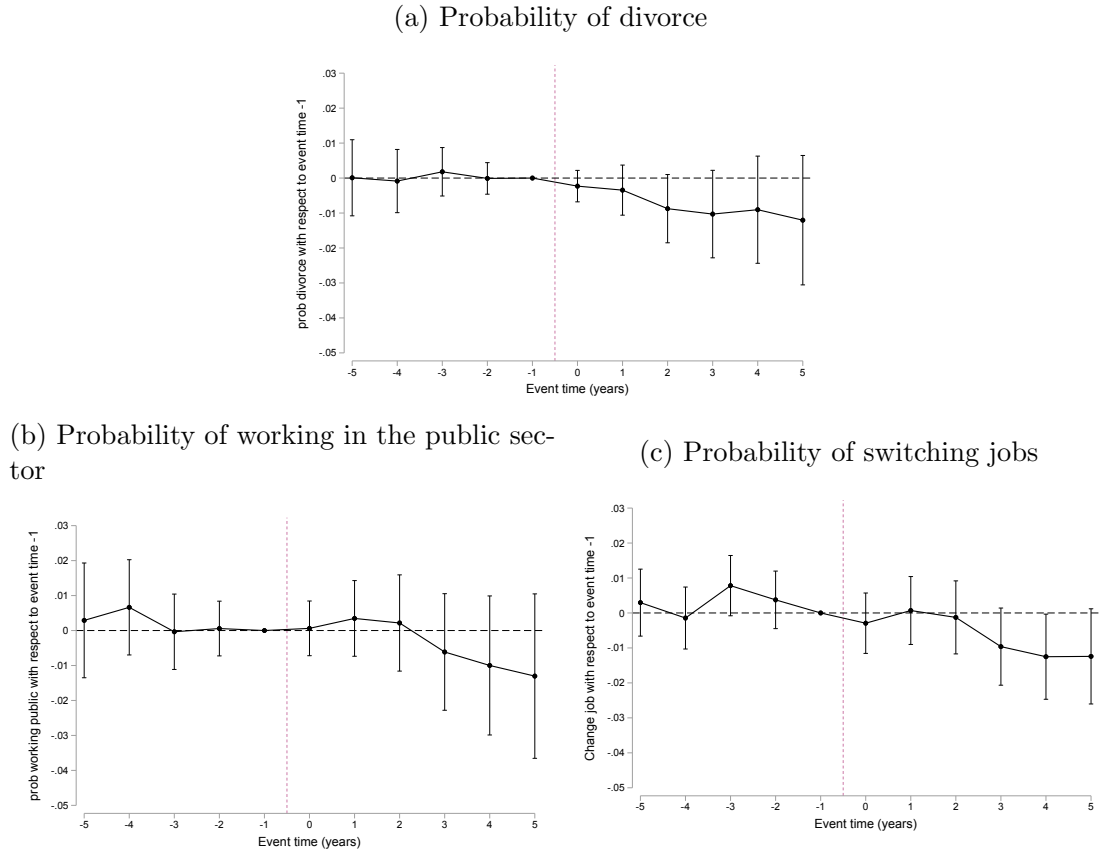
Family stability Previous papers find that having a child with a disability is associated with a higher probability of relationship dissolution (Stabile and Allin, 2012). Partly an outcome itself, marital dissolution could also affect parents' labor supply decisions (e.g, Ananat and Michaels, 2008; Bargain et al., 2012; Leopold, 2018; Page and Stevens, 2004).

Panel (a) in Figure 10 shows the event study graph of the impact of a child severe hospital admission 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 Some papers discuss that after childbirth, women have a preference for jobs that are more "family friendly" (e.g, Goldin and Katz, 2016; Lundborg et al., 2017). In particular, Pertold-Gebicka et al. (2016) and Kleven et al.(Forthcoming) 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 could also seek a more family-friendly job in order to take care of their child. In panel (b) in Figure 10 I examine if mothers have a higher probability of working in a public enterprise after a child's health shock. I do not find that this is the case, suggesting that mothers do not adjust their labor supply through this margin. More in general, in panel (c) in Figure 10 I investigate if 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 previous period. I do not find evidence that mothers have a higher probability of switching to a different job after the health shock.

Figure 10: Mechanisms: impact of a child severe hospital admission on family stability and choice of working environment



Notes: This figure shows the event study graphs of the impact of a child severe hospital admission 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. \bar{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 year of birth and age of the parent. Standard errors are clustered at the parent level.

7 Conclusions

This paper provides new evidence on the impact of children’s health shocks on parents’ labor market outcomes. To identify the causal effect, I exploit variation in the age at which children experience the health shock for families exposed to the same event, conditional on parents and children’s age. This allows me to abstract from differences across families who suffer the illness or the 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 from estimating an event study specification. In particular, I examine the impact of severe hospital admissions, focusing on children that 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 hospital admission, mother earnings are 5% lower, while father earnings have dropped by 2.6%. Additionally, I make use of the detailed data and 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 own earnings (Dobkin et al., 2018; Meyer and Mok, 2019; Fadlon and Nielsen, 2017), and more than one tenth 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, mother 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.

Exploiting hospital and specialist diagnosis data, I document that a child’s health shock also impacts parents mental well-being. The effect seems to be stronger for fathers. However,

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

Taken together, the results point to the importance of providing assistance, and specially mental health support, to families that experience a child's health shock. My findings also show that while the loss in earnings for parents who suffer a child severe hospitalization is partly insured through transfers, this is not the case for fatal shocks. This opens the debate on whether this 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, that want to incorporate these indirect costs in their estimation. Finally, further research is needed in order to understand the potential spillover effects of these shocks on siblings' development and well-being.

References

- Adda, J., Dustmann, C., and Stevens, K. (2017). The career costs of children. *Journal of Political Economy*, 125(2):293–337. 6
- Ananat, E. O. and Michaels, G. (2008). The effect of marital breakup on the income distribution of women with children. *Journal of Human Resources*, 43(3):611–629. 25
- Angelov, N., Johansson, P., and Lindahl, E. (2016). Parenthood and the gender gap in pay. *Journal of Labor Economics*, 34(3):545–579. 6
- Angrist, J. D. and Evans, W. N. (1998). Children and their parents’ labor supply: Evidence from exogenous variation in family size. *The American Economic Review*, 88(3):450–477. 6
- Bargain, O., González, L., Keane, C., and Özcan, B. (2012). Female labor supply and divorce: New evidence from ireland. *European Economic Review*, 56(8):1675 – 1691. 25
- Baydar, N., Joesch, J. M., Kieckhefer, G., Kim, H., and Greek, A. (2007). Employment behaviors of mothers who have a child with asthma. *Journal of Family and Economic Issues*, 28(3):337–355. 5
- Benard, S., Correll, S., and Paik, I. (2007). Getting a job: Is there a motherhood penalty? Technical report. 6
- Bertrand, M., Goldin, C., and Katz, L. F. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American Economic Journal: Applied Economics*, 2(3):228–55. 6
- Bhangu, A., Søreide, K., Di Saverio, S., Assarsson, J. H., and Drake, F. T. (2015). Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. *The Lancet*, 386(10000):1278–1287. 20

- Biasi, B., S.Dahl, M., and Moser, P. (2018). Carrer effects of mental health. Available at SSRN: <https://ssrn.com/abstract=2544251>. 23, 28
- Black, S. E., Breining, S., Figlio, D. N., Guryan, J., Karbownik, K., Nielsen, H. S., Roth, J., and Simonsen, M. (2017). Sibling spillovers. Working Paper 23062, National Bureau of Economic Research. 5
- Bound, J., Schoenbaum, M., Stinebrickner, T. R., and Waidmann, T. (1999). The dynamic effects of health on the labor force transitions of older workers. *Labour Economics*, 6(2):179–202. 2, 4
- Bronars, S. G. and Grogger, J. (1994). The economic consequences of unwed motherhood: Using twin births as a natural experiment. *The American Economic Review*, 84(5):1141–1156. 6
- Burton, P., Chen, K., Lethbridge, L., and Phipps, S. (2017). Child health and parental paid work. *Review of Economics of the Household*, 15(2):597–620. 5
- Cai, L., Mavromaras, K., and Oguzoglu, U. (2014). The effects of health status and health shocks on hours worked. *Health Economics*, 23(5):516–528. 2, 4
- Deaton, A. (2013). *The Great Escape: Health, Wealth, and the Origins of Inequality*. Princeton University Press. 2
- Dobkin, C., Finkelstein, A., Kluender, R., and Notowidigdo, M. J. (2018). The Economic Consequences of Hospital Admissions. *American Economic Review*, 108(2):308–352. 2, 4, 27
- Fadlon, I. and Nielsen, T. H. (2017). Family Labor Supply Responses to Severe Health Shocks. 4, 27

- Fernández-Kranz, Lacuesta, A., and Rodríguez-Planas, N. (2013). The Motherhood Earnings Dip: Evidence from Administrative Records. *Journal of Human Resources*, 48(1):169–197. 6
- Finnish National Agency for Education (2018). Compulsory education in finland. <https://www.oph.fi/en/statistics-and-publications/publications/compulsory-education-finland> Accessed: 13-08-2019. 7
- García-Gómez, P. (2011). Institutions, health shocks and labour market outcomes across europe. *Journal of Health Economics*, 30(1):200 – 213. 2, 4
- García-Gómez, P., van Kippersluis, H., O'Donnell, O., and van Doorslaer, E. (2013). Long-term and spillover effects of health shocks on employment and income. *Journal of Human Resources*, 48(4):873–909. 2, 4
- Gauderer, M. W., Crane, M. M., Green, J. A., DeCou, J. M., and Abrams, R. S. (2001). Acute appendicitis in children: The importance of family history. *Journal of Pediatric Surgery*, 36(8):1214 – 1217. 20
- Glaichen, M. (2004). The emerging role and needs of family caregivers in cancer care. *J Support Oncol*, 2(2):145–155. 20
- Goldin, C. and Katz, L. F. (2016). A most egalitarian profession: Pharmacy and the evolution of a family-friendly occupation. *Journal of Labor Economics*, 34(3):705–746. 25
- Gupta, A., Morrison, E. R., Fedorenko, C., and Ramsey, S. (2017). Leverage, default, and mortality: Evidence from cancer diagnoses. *Columbia Law and Economics Working Paper*, (514):15–35. 20
- Hotz, V. J., McElroy, S. W., and Sanders, S. G. (2005). Teenage childbearing and its life cycle consequences: Exploiting a natural experiment. *The Journal of Human Resources*, 40(3):683–715. 6

- Jeon, S.-H. and Pohl, R. V. (2017). Health and work in the family: Evidence from spouses' cancer diagnoses. *Journal of Health Economics*, 52:1 – 18. 4, 20
- Jiménez-Martín, S., Labeaga, J. M., and Martínez Granado, M. (1999). Health status and retirement decisions for older European couples. IRISS Working Paper Series 1999-01, IRISS at CEPS/INSTEAD. 4
- Jones, A. M., Rice, N., and Zantomio, F. (2019). Acute health shocks and labour market outcomes: Evidence from the post crash era. *Economics Human Biology*, page 100811. 2, 4
- Kleven, H., Landais, C., Posch, J., Steinhauer, A., and Zweimüller, J. (2019). Child Penalties Across Countries: Evidence and Explanations. 6
- Kleven, H., Landais, C., and Søgaaard, J. E. (Forthcoming). Children and Gender Inequality: Evidence from Denmark. *American Economic Journal: Applied Economics*, pages 1–34. 7, 25
- Kvist, A. P., Nielsen, H. S., and Simonsen, M. (2013). The importance of children's adhd for parents' relationship stability and labor supply. *Social Science Medicine*, 88:30 – 38. 5
- Lenhart, O. (2019). The effects of health shocks on labor market outcomes: evidence from uk panel data. *The European Journal of Health Economics*, 20(1):83–98. 2, 4
- Leopold, T. (2018). Gender differences in the consequences of divorce: A study of multiple outcomes. *Demography*, 55(3):769–797. 29654601[pmid]. 25
- Lindeboom, M., Llena-Nozal, A., and van der Klaauw, B. (2016). Health shocks, disability and work. *Labour Economics*, 43:186 – 200. Health and the Labour Market. 2, 4
- Lundberg, S. and Rose, E. (2000). Parenthood and the earnings of married men and women. *Labour Economics*, 7(6):689 – 710. 6

- Lundborg, P., Plug, E., and Rasmussen, A. W. (2017). Can Women Have Children and a Career? IV Evidence from IVF Treatments. *American Economic Review*, 107(6):1611–1637. 6, 25
- Meyer, B. D. and Mok, W. K. (2019). Disability, earnings, income and consumption. *Journal of Public Economics*, 171:51 – 69. Trans-Atlantic Public Economics Seminar 2016. 2, 4, 27
- Miller, A. R. (2011). The effects of motherhood timing on career path. *Journal of Population Economics*, 24(3):1071–1100. 6
- Ministry of Social Affairs and Health (2013). Health Care in Finland. Ministry of Social Affairs and Health. 10
- Nix, E. and Andresen, M. E. (2019). What Causes the Child Penalty? Evidence from Same Sex Couples and Policy Reforms. Discussion Papers 902, Statistics Norway, Research Department. 7
- OECD (2017). *Finland: Country Health Profile 2017*. 10
- Page, M. E. and Stevens, A. H. (2004). The economic consequences of absent parents. *The Journal of Human Resources*, 39(1):80–107. 25
- Paull, G. (2008). Children and women’s hours of work*. *The Economic Journal*, 118(526):F8–F27. 6
- Pertold-Gebicka, B., Pertold, F., and Datta Gupta, N. (2016). Employment adjustments around childbirth. 25
- Powers, E. T. (2003). Children’s Health and Maternal Work Activity: Estimates under Alternative Disability Definitions . *Journal of Human Resources*, XXXVIII(3):522–556. 5

- Rellstab, S., Bakx, P., García-Gómez, P., and van Doorslaer, E. (2019). The kids are alright - labour market effects of unexpected parental hospitalisations in the netherlands. *Journal of Health Economics*, page 102275. 5
- Sieppi, A. and Pehkonen, J. (2019). Parenthood and gender inequality: Population-based evidence on the child penalty in finland. *Economics Letters*, 182:5 – 9. 6, 7, 27
- Sigle-Rushton, W. and Waldfogel, J. (2007). Motherhood and women’s earnings in anglo-american, continental european, and nordic countries. *Feminist Economics*, 13(2):55–91. 6
- Snaebjorn, G. and Steingrimsdottir, H. (2019). The Long-Term Impact of Children’s Disabilities on Families. 6
- Stabile, M. E. and Allin, S. (2012). The economic costs of childhood disability. *The Future of children*, 22 1:65–96. 5, 23, 25
- Trevisan, E. and Zantomio, F. (2016). The impact of acute health shocks on the labour supply of older workers: Evidence from sixteen european countries. *Labour Economics*, 43:171 – 185. Health and the Labour Market. 2, 4
- Tynkkynen, L.-K., Chydenius, M., Saloranta, A., and Keskimäki, I. (2016). Expanding choice of primary care in finland: much debate but little change so far. *Health Policy*, 120(3):227 – 234. 10
- van den Berg, G. J., Lundborg, P., and Vikström, J. (2017). The economics of grief. *The Economic Journal*, 127(604):1794–1832. 5
- Wagstaff, A. (2007). The economic consequences of health shocks: Evidence from vietnam. *Journal of Health Economics*, 26(1):82 – 100. 2, 4
- Waldfogel, J. (1998). Understanding the ”family gap” in pay for women with children. *The Journal of Economic Perspectives*, 12(1):137–156. 6

- Wasi, N., van den Berg, B., and Buchmueller, T. C. (2012). Heterogeneous effects of child disability on maternal labor supply: Evidence from the 2000 us census. *Labour Economics*, 19(1):139 – 154. 5
- Wier, L., Pfuntner, A., Maeda, J., Stranges, E., Ryan, K., Jagadish, P., Collins Sharp, B., and Elixhauser, A. (2011). Hcup facts and figures: statistics on hospital-based care in the united states, 2009. *Rockville, MD: Agency for Healthcare Research and Quality*. 2
- Wolfe, B. L. and Hill, S. C. (1995). The effect of health on the work effort of single mothers. *The Journal of Human Resources*, 30(1):42–62. 5

Appendix

Table A1: Summary statistics

	All hospitalizations		Severe hospitalizations		Mortality	
	mean	sd	mean	sd	mean	sd
<i>Child characteristics</i>						
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
<i>Mother characteristics</i>						
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
<i>Father characteristics</i>						
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 different samples used in the analysis. Columns 1 and 2 includes all children who suffered a hospitalization after age 6 (and were not hospitalized previously) columns 3 and 4, all children who suffered their first severe hospitalization after age 6, and in the last columns all children who suffered a fatal health shock after age 6.

Table A2: Impact of a child severe hospital admission 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 (191.568)	273.561 (357.110)	-67.102 (192.872)	262.401 (358.578)	-0.042 (0.065)	0.034 (0.062)	-0.007 (0.008)	0.003 (0.007)
-4	-23.309 (165.157)	281.386 (315.166)	-10.063 (165.945)	272.755 (315.569)	0.030 (0.055)	0.020 (0.051)	-0.001 (0.007)	0.002 (0.006)
-3	-39.503 (138.270)	-26.097 (225.781)	-30.715 (138.747)	-32.045 (226.965)	-0.034 (0.045)	-0.020 (0.041)	0.001 (0.006)	-0.005 (0.005)
-2	-57.869 (91.723)	165.399 (166.339)	-53.386 (91.640)	162.322 (167.047)	0.045 (0.032)	0.032 (0.029)	-0.005 (0.004)	0.001 (0.004)
0	-454.374*** (91.959)	-408.386** (181.605)	-458.822*** (92.332)	-405.127** (180.781)	-0.086*** (0.031)	-0.051* (0.030)	-0.011*** (0.004)	-0.006* (0.004)
1	-607.091*** (140.516)	-675.999** (264.774)	-616.087*** (140.698)	-669.780** (263.288)	-0.101** (0.043)	-0.044 (0.041)	-0.011** (0.005)	-0.006 (0.005)
2	-715.565*** (189.240)	-673.930** (339.520)	-729.418*** (190.436)	-664.589** (337.810)	-0.101* (0.052)	-0.064 (0.053)	-0.010 (0.006)	-0.004 (0.006)
3	-836.169*** (243.870)	-693.665 (426.426)	-854.654*** (245.551)	-681.169 (424.161)	-0.158*** (0.061)	-0.048 (0.065)	-0.018** (0.007)	-0.005 (0.007)
4	-953.614*** (303.165)	-695.030 (527.297)	-976.50*** (304.583)	-679.388 (525.275)	-0.148** (0.072)	-0.033 (0.078)	-0.012 (0.008)	-0.004 (0.008)
5	-1202.544*** (384.453)	-787.144 (667.298)	-1229.833*** (385.592)	-768.261 (663.390)	-0.197** (0.084)	-0.011 (0.095)	-0.013 (0.009)	-0.000 (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
\bar{Y}_{t-1}	16002.080	26531.112	16002.080	26531.112	7.693	8.678	0.713	0.820

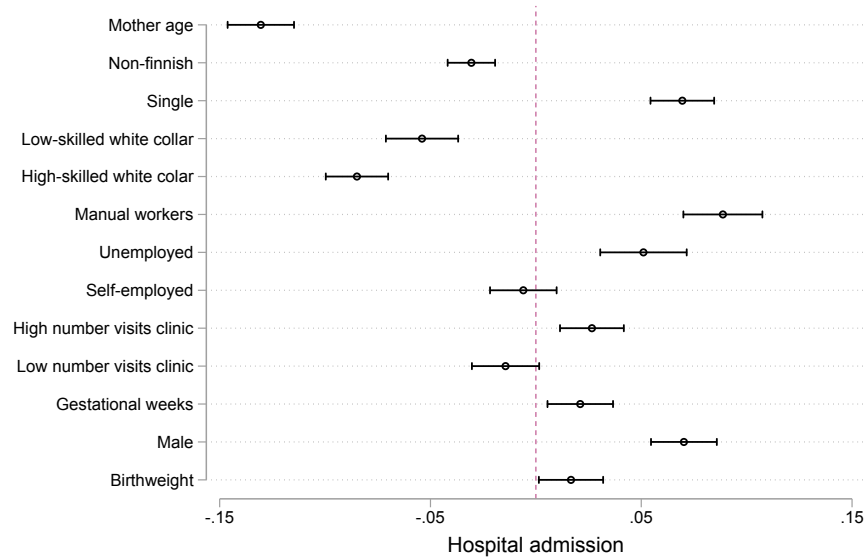
This table shows the estimates of the impact of a severe hospital admissions on parents labor market outcomes. All specifications include controls for calendar year, child year of birth and age of the parent. The first two columns show the results for earnings in euros. Column (3) and (4) shows the same results but controlling for child's gender. In column (5) and (6) earnings are in logarithms. The last two columns show the results for working probability. Standard errors are clustered at the parent level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

Table A3: Impact of a child 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 (925.454)	-743.666 (1472.948)	-0.326 (0.343)	0.276 (0.329)	-0.016 (0.041)	0.035 (0.034)
-4	459.479 (788.348)	-467.880 (1327.571)	-0.128 (0.294)	0.228 (0.272)	0.022 (0.036)	0.011 (0.030)
-3	197.646 (661.928)	-37.249 (1003.941)	0.107 (0.240)	0.017 (0.230)	0.029 (0.032)	0.009 (0.026)
-2	394.744 (463.736)	372.507 (668.561)	0.062 (0.176)	0.182 (0.153)	0.033 (0.023)	0.020 (0.021)
0	-1246.349** (486.161)	-230.906 (752.163)	-0.175 (0.214)	-0.242 (0.174)	0.005 (0.027)	-0.005 (0.021)
1	-1643.673** (765.151)	-1849.579 (1265.472)	-0.242 (0.288)	-0.680*** (0.247)	-0.036 (0.031)	-0.074*** (0.027)
2	-2295.207** (954.504)	-2054.675 (1687.604)	-0.590* (0.352)	-1.008*** (0.316)	-0.075** (0.038)	-0.075** (0.035)
3	-3479.772*** (1310.418)	-2187.651 (2221.702)	-0.900** (0.407)	-1.109*** (0.395)	-0.093** (0.043)	-0.088** (0.041)
4	-3412.421** (1603.756)	-1665.007 (2817.436)	-0.924* (0.473)	-1.157** (0.480)	-0.094* (0.048)	-0.083* (0.048)
5	-2789.245 (1770.657)	-1543.083 (3163.789)	-0.911* (0.548)	-1.270** (0.581)	-0.073 (0.055)	-0.103* (0.057)
Observations	3126	2743	3126	2743	3126	2743
Controls	YES	YES	YES	YES	YES	YES
\bar{Y}_{t-1}	14744.982	25069.911	7.418	8.100	0.707	0.757

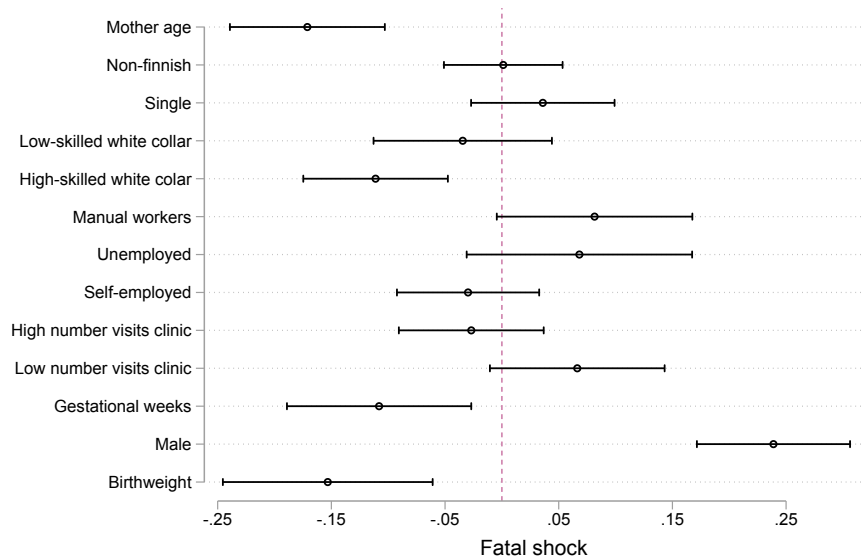
This table shows the estimates of the impact of a fatal health shock on parents' earnings, earnings in logarithms and working probability. All specifications include controls for calendar year, child year of birth and age of the parent. Standard errors are clustered at the parent level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

Figure A1: Differences in characteristics: across families



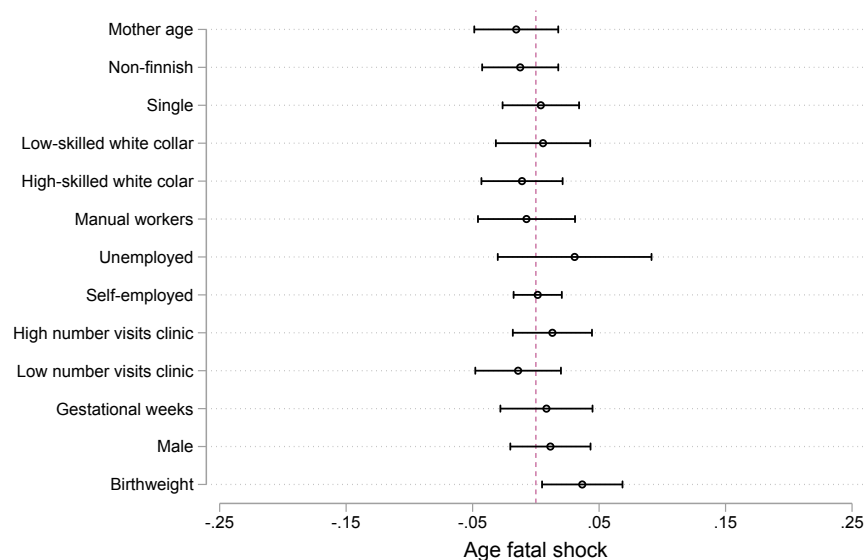
Notes: The figure shows the coefficients and 95% CI from separate regressions of each (standardized) variable on an indicator taking value 1 if the child suffered a hospitalization. All specifications include year of birth fixed effects. Standard errors are clustered at the mother level.

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 taking value 1 if the child suffered a fatal shock. All specifications include year of birth fixed effects. Standard errors are clustered at the mother level.

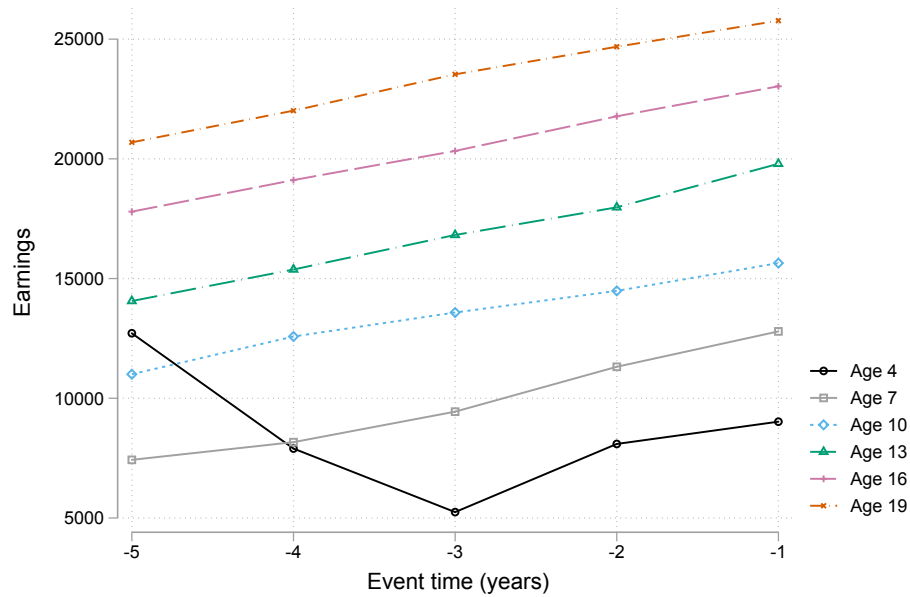
Figure A3: Differences in characteristics (mortality sample): within affected families



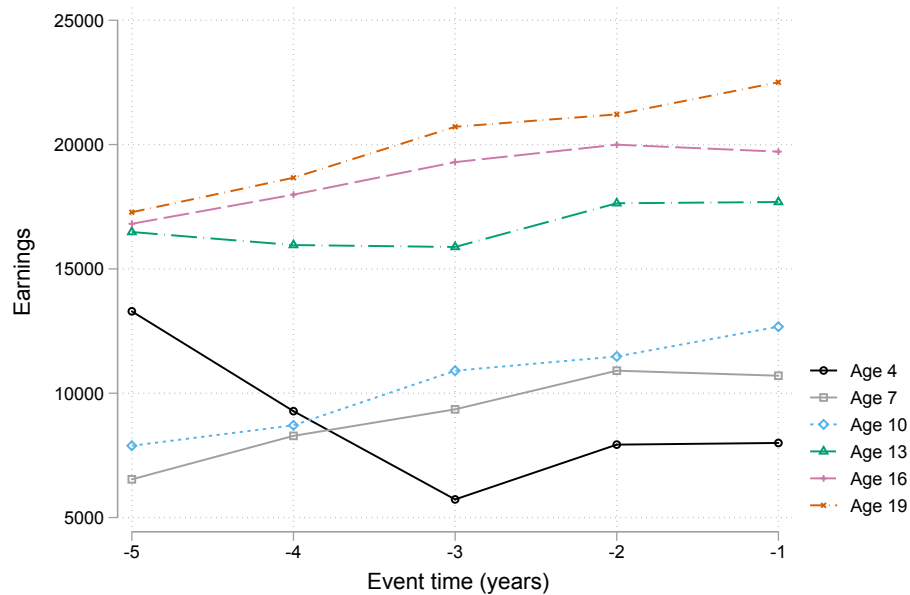
Notes: The figure shows the coefficients and 95% CI from separate regressions of each (standardized) variable on children's age at death. All specifications include year of birth fixed effects. Standard errors are clustered at the mother level.

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

(a) Severe hospitalizations: by age at hospital admission

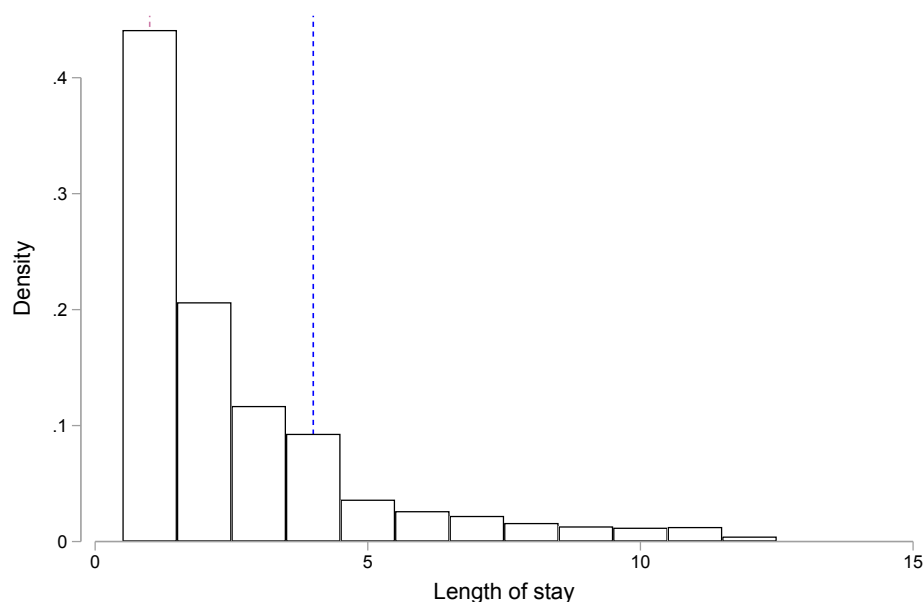


(b) Mortality: by age



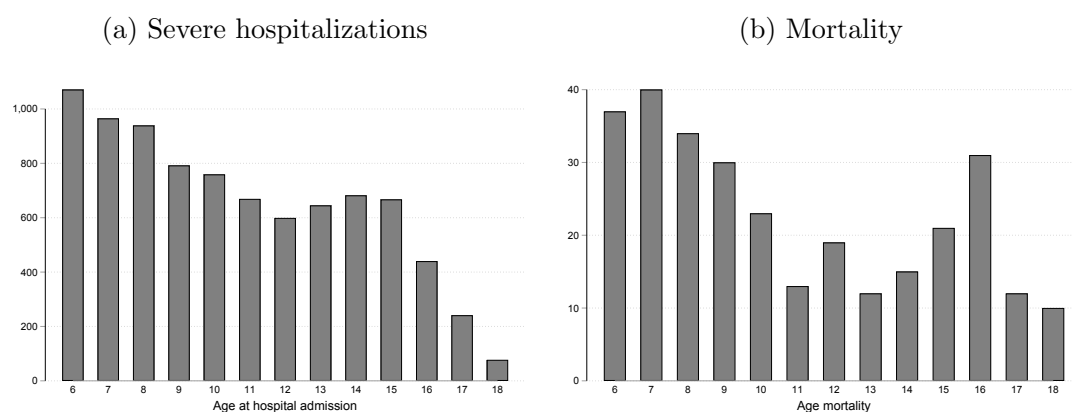
Notes: This figure shows the raw maternal earnings trajectories by event time for each age group. Panel (a) shows the yearly average earnings for years relative to a severe hospitalization, by children's age of admission. Panel (b) shows the analogous graph but for mortality.

Figure A5: Distribution of hospital admissions' length of stay



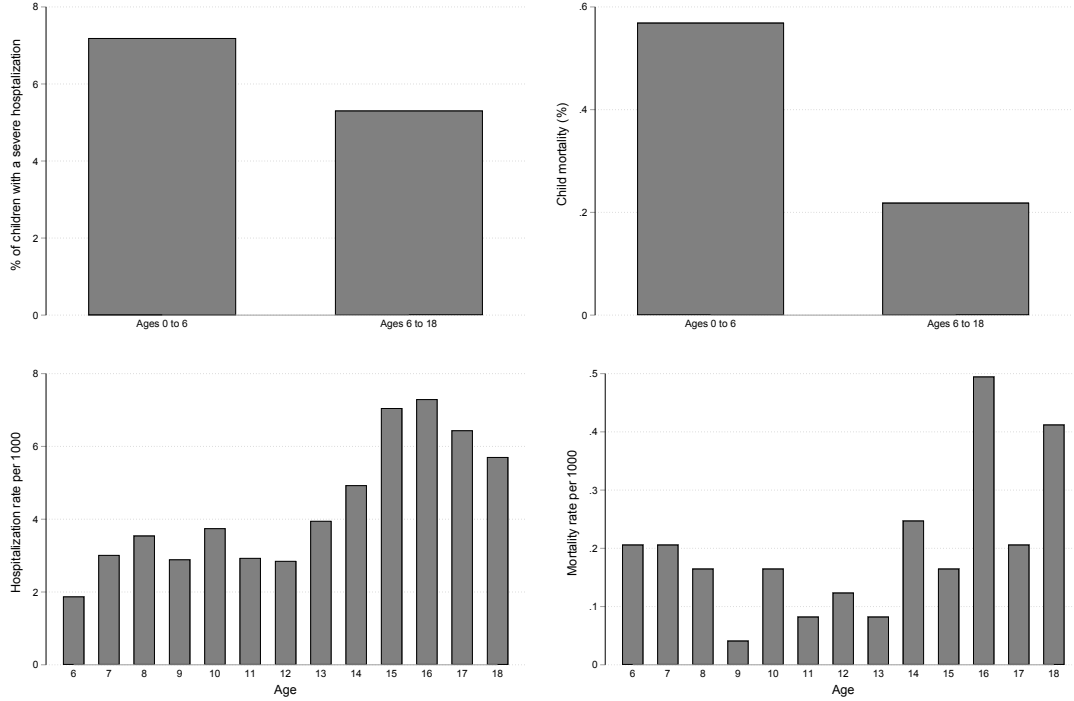
Notes: This figure shows the distribution of hospital admissions' length of stay. The blue dashed line shows the 75h percentile value, which corresponds to four days.

Figure A6: Number of observations by age at event time



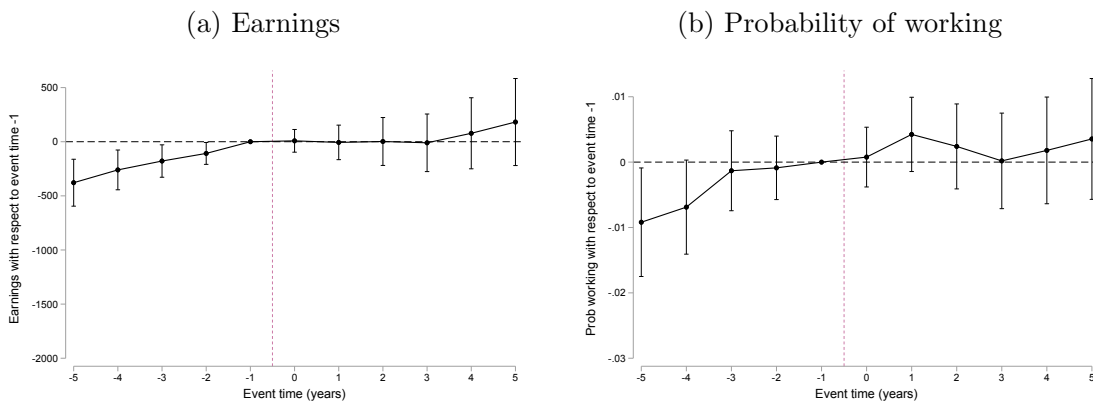
Notes: This figure shows the number of observations by child age at hospital admission, in panel (a), and the number of observations by child age at the time of the fatal shock, panel (b).

Figure A7: Descriptive: children born in 1990



Notes: This figure provides different descriptive graphs for the sample of children born in 1990. The first figure shows the percentage of children that suffered a severe hospitalization by two age-groups (0-6 and 6-18). The second figure is the analogous for mortality. The first figure in the inferior panel shows the severe hospitalization rate per 1000 children by age. The last figure is the analogous for mortality.

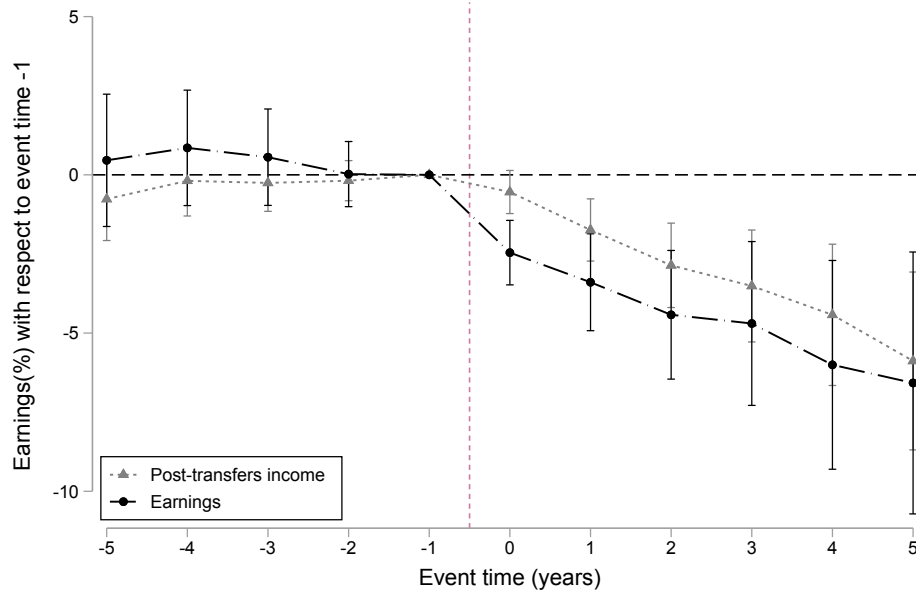
Figure A8: Impact of any hospital admission on maternal labor market outcomes



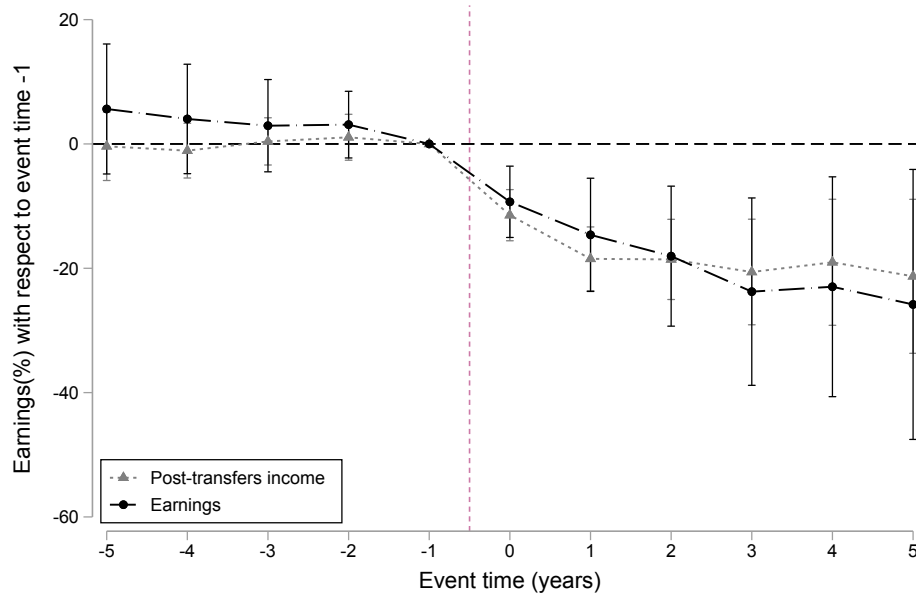
Notes: This figure shows the event study graphs of the impact of any child's hospitalization on maternal labor market outcomes. The plot shows the point estimates of the event time dummies, with the corresponding 95 percent confidence intervals. Panel (a) plots the coefficients on earnings for mothers and panel (b) plots the coefficients on the probability of working. All specifications include controls for calendar year, child 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-transfers income

(a) Severe hospital admissions

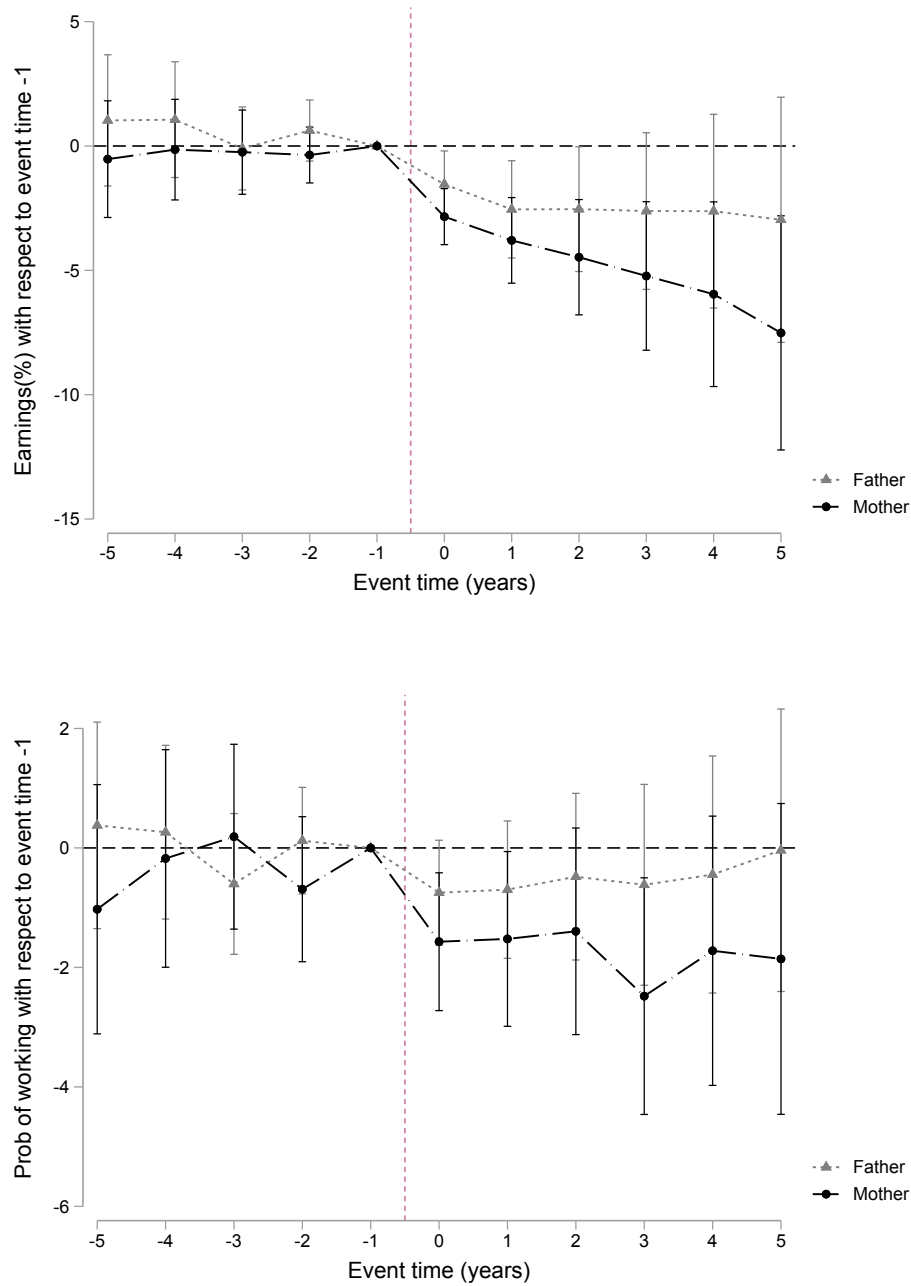


(b) Fatal shocks



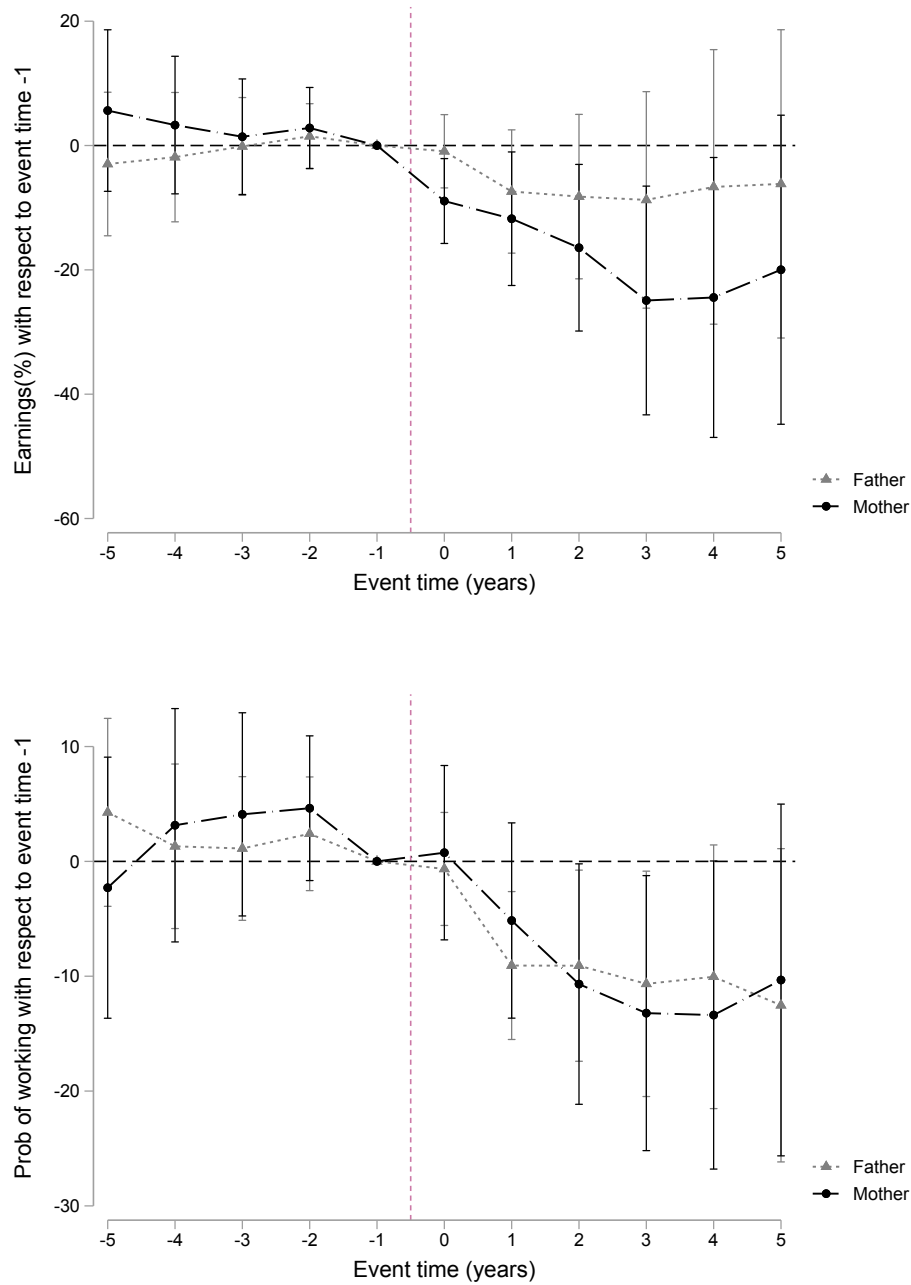
Notes: This figure shows the event study graphs of the impact of a child severe hospital admission on post-transfer maternal income (grey line) and labor earnings (black line) for severe hospitalizations (panel (a)) and for mortality (panel (b)). Each figure shows the point estimates of the event time 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 year of birth and age of the parent. Standard errors are clustered at the parent level.

Figure A10: Impact of a child severe hospital admission on parents labor market outcomes



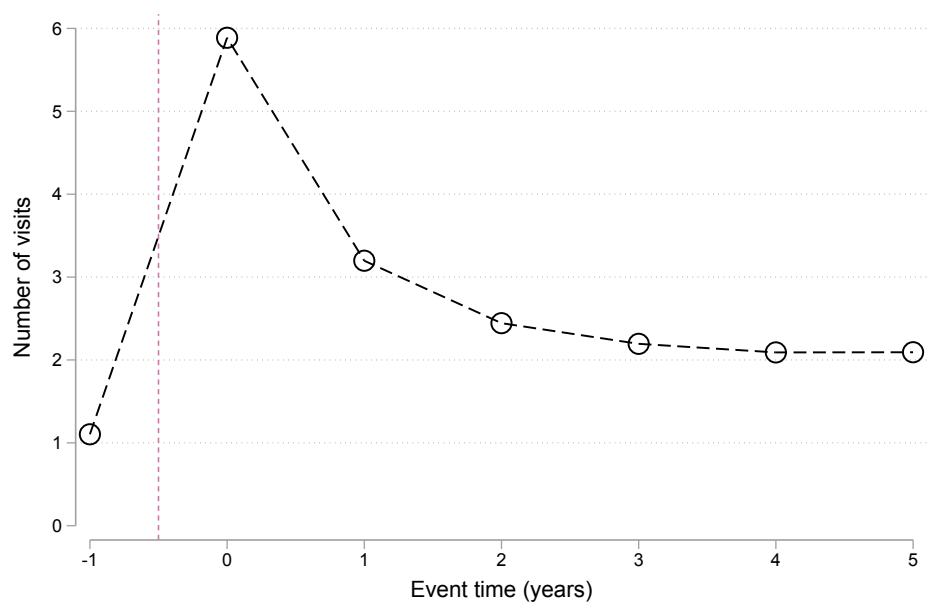
Notes: This figure shows the event study graphs of the impact of a child severe hospital admission on labor market outcomes for both parents. Each figure shows the point estimates of the event time dummies, as a percentage of the period prior to the shock, with the corresponding 95 percent confidence 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 year of birth and age of the parent. Standard errors are clustered at the parent level.

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



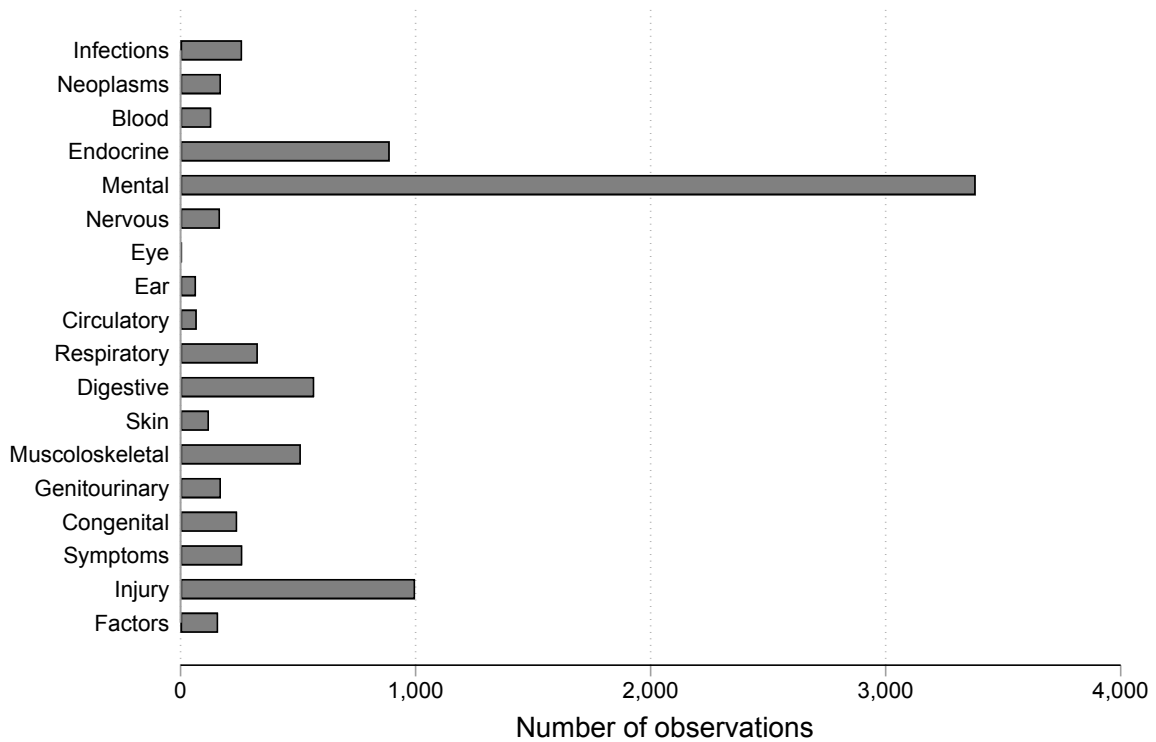
Notes: This figure shows the event study graphs of the impact of a child death on labor market outcomes for both parents. Each figure shows the point estimates of the event time dummies, as a percentage of the period prior to the shock, with the corresponding 95 percent confidence intervals. Panel (a)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



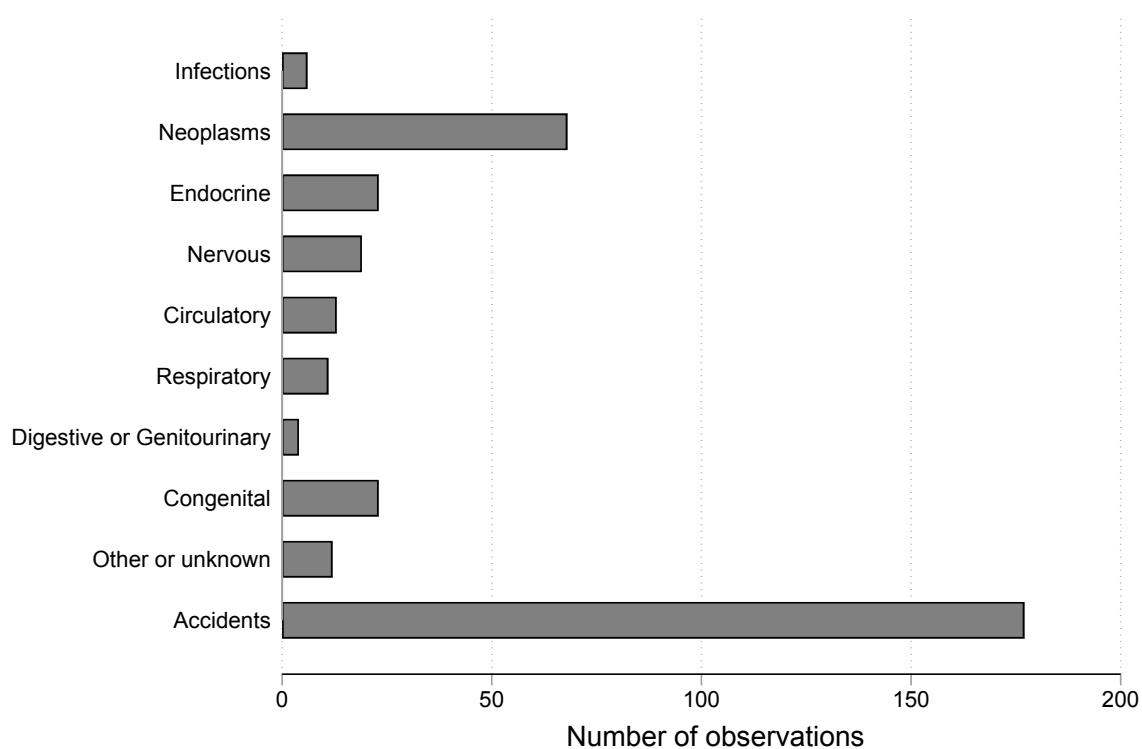
Notes: The figure shows children’s average number of specialist or hospital visits one year before and five years after a hospital admission.

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, 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.