

Caring to Work or Working to Care: The Intra-Family Dynamics of Health Shocks *

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Abstract

We seek to understand how the labor market decisions of the family adjust in response to plausibly exogenous health shocks. Family members might work less to provide caregiving, or work more in response to medical expenditures and loss of income by the ill individual. We use records of emergency department (ED) visits and hospitalizations to empirically determine the size of these effects. Using ED events we find evidence of intra-family insurance. By exploring how insurance varies by the severity of the health shock, we find that family labor supply responses decrease as the caregiving need increases. (JEL: D10, I10, I13, J22)

Keywords: Caregiving, Intra-family Insurance, Health Shocks

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Adverse health events produce significant economic risk not only for individuals, but also for their families. 44% of Americans with medical bills report that such bills have had a major impact on their family (Hamel et al., 2016). A quarter of workers state that they have taken time off in the past to care for an ill family member, and another quarter state they will likely do so in the future.¹ Support for Paid Family Leave policies is large and growing; more than two-thirds of Americans believe that workers should receive paid leave to care for a family member with a serious health condition (Horowitz et al., 2017). Analyzing how a household’s labor supply responds to medical events is crucial to the design of social insurance programs that effectively reduce the economic risk families face. However, there is little consensus about how medical events affect family labor supply.

In this paper, we present new evidence on the labor market consequences of health shocks for other members of the household, and shed light on the underlying mechanisms. To learn more about family’s labor supply responses, we use over two decades of data from the Medical Expenditure Panel Survey (MEPS). We focus on all emergency department (ED) visits to estimate overall health shock induced labor supply effects. In 2017 alone, approximately 20% of the U.S. population visited the ED.² While many hospitalizations are anticipated and pre-scheduled (Lundborg et al. 2011; Jeon and Pohl 2017; Rellstab et al. 2020), ED visits are more unplanned in nature (Dobkin et al., 2018) – thus providing a window into how families respond to unanticipated health shocks and lending a causal interpretation to our analysis. We then look at hospitalizations and heterogeneity in ED medical conditions to uncover caregiving as a driving mechanism behind a household’s overall labor supply response.

Given incomplete insurance for the consequences of health events, we study informal family insurance for income losses and special care needs. There are two primary forces guiding a household’s labor market response when a health shock occurs: an *income effect* and a *caregiving effect*. Upon the realization of a health shock, family members could adjust their labor supply and work more due to the out-of-pocket (OOP) medical spending or the ill individual’s uninsured labor earnings loss through an income effect. At the same time, to the extent that the impacted individual in the family may require additional care, family members might desire or need to provide caregiving, and thus take time away from work, through a caregiving effect channel.³ Substantial prior work in economics has focused on the

¹<https://www.pewresearch.org/fact-tank/2017/03/30/about-one-in-four-u-s-workers-have-taken-leave-to-care-for-a-seriously-ill-family-member/>

²<https://www.cdc.gov/nchs/data/hus/2017/fig13.pdf>

³The United States offers no federal family leave insurance, and only a select few states offer such coverage. While there is a federal law protecting workers’ rights to take unpaid leave from work, this legislation only ends up covering about 60% of the workforce (Klerman

income effect. Much less is known about the caregiving effect, including how it varies across gender and medical condition. The overall net effect these forces have on the family labor market outcomes is unclear and ultimately an empirical question.

To empirically quantify the labor supply response driven by health shocks, we use 21 panels of data from the MEPS, covering the 1996 to 2017 period. Among surveys in the United States, this data set is particularly well-suited to study family dynamics in that it tracks a panel of all members of a household for 2 years. MEPS is also appealing for studying the labor supply response to health events because it combines detailed event-level medical utilization with extensive labor supply information. In particular, this survey reports each instance the individual visits the ED or was hospitalized, together with the associated medical conditions and expenditures. Altogether, we end up with a panel of individuals in a family, where we track each individual's medical usage and labor supply over two years. We examine the effects health shocks have on four labor supply variables: wage income, hours worked, hourly wage and employment status.

Our main empirical specification utilizes an event study approach to estimate the effect of a health shock on the labor market outcomes of other working age family members. Our identification strategy relies on a differences-in-differences (DD) style approach around the medical event. We find evidence of intra-family insurance after an ED visit. Family members not directly affected by the health shock adjust their labor supply, with substantial heterogeneity by gender. Women are responsive on both the extensive and intensive margins, increasing employment by 1.5% and hours worked by 0.5%. Men are largely unresponsive on these margins, while they do suffer statistically significant wage decreases of almost 1%. Taken together, the income effect dominates the caregiving effect for female family members. For men, we find suggestive evidence that the decrease in wages is reflective of a loss in productivity due to caregiving.

After demonstrating the existence of intra-family insurance and asymmetric responses by gender, we focus on differences by medical conditions, which can arise from differential caregiving needs. We posited that the existence of a caregiving effect would induce family members to work less, and thus, greater caregiving ought to be associated with a decreased labor supply response. Consistent with our conceptual framework, we illustrate that events associated with a stronger caregiving effect, such as injury-related ED visits and hospitalizations, show smaller changes in weekly income. Our results not only demonstrate the existence of intra-family insurance channels, but also highlight the importance of the caregiving need in explaining family labor responses.

Our paper contributes to several distinct literatures. First, we contribute to research

et al., [2014](#))

on the labor supply consequences of adverse medical events for the ill individual. Previous studies have consistently found significant and prolonged loss of labor earnings, indicative of incomplete insurance for labor supply loss, even in the presence of disability insurance (e.g. Charles 2003, Lundborg et al. 2011, Pohl et al. 2013, Chung 2013, Meyer and Mok 2013, Dobkin et al. 2018, and Parro and Pohl 2019). An examination that solely focuses on the individual understates the full effect of a health event, given that effects ripple throughout the household. We account for the ability of family members to step in, to provide a more complete examination of the consequences of adverse events.

A more recent and growing literature takes intra-family dynamics into account, and follows a wide array of economic consequences.⁴ These papers typically focus on severe health events, such as cancer diagnosis and hospitalizations (or at an extreme, death) in a variety of countries, and study how families respond to them, with mixed results.⁵ Coile (2004), Dobkin et al. (2018) and Bom et al. (2019) find little or no spousal effect, while Fadlon and Nielsen (2020) find that widows significantly increase labor supply following the loss of their spouse, but also no effects on spousal labor supply in response to nonfatal health shocks. Meanwhile, Nahum et al. (2007), Hollenbeak et al. (2011), García-Gómez et al. (2013), Jeon and Pohl (2017) and Frimmel et al. (2020) see decreases in labor supply.

We contribute to the existing literature on family labor supply effects in two main ways. The first is that most countries provide more complete insurance to their citizens, and existing studies are typically set in countries with these generous social insurance networks. Therefore, these papers likely underestimate the extent of family informal insurance in countries like the United States.⁶ We focus on the US where the majority of individuals are not fully insured in the event of an adverse health event and therefore extend our understanding

⁴There is an older literature examining how household labor supply is affected by self-reported health status or disability (see Parsons 1976s, Berger 1983, Berger and Fleisher 1984, Charles 1999, Johnson and Favreault 2001, Siegel 2006, Jiménez-Martín et al. 1999, Gertler and Gruber 2002, Gallipoli and Turner 2009b and Gallipoli and Turner 2009a for some examples). These measures can be problematic. An individual’s assessment of health is subjective, inducing measurement error (see Gertler and Gruber 2002 and Coile 2004). In addition, given that these measures of health might be anticipated or chronic at the time of survey, they might under-estimate the family’s responses to medical events.

⁵Some papers have examined other margins of family responses, such as consumption and assets, including Altonji et al. (1989), Cochrane (1991), Eichner (1997), Dalton and LaFave (2017), Aouad (2020). Others have examined the consequences of health shocks in other settings, such as firm productivity (Jäger and Heining, 2019).

⁶Some examples include Fadlon and Nielsen (2020) who study Denmark, García-Gómez et al. (2013) and Rellstab et al. (2020) who study the Netherlands, Frimmel et al. (2020) studying Austria, and Nahum et al. (2007) and Jeon and Pohl (2017) focusing on Sweden and Canada, respectively.

of the consequences of these events. The second contribution concerns the limited evidence that existing literature has provided in understanding how family responses are driven by caregiving needs. This limitation arises because these studies generally focus on a narrow set of health conditions and have limited data on caregiving, which hamper their ability to understand how families vary their responses by the level of caregiving needs. In this project, we are able to pair rich data on caregiving with data on health shocks, allowing us to explore the role of caregiving requirements in labor supply responses.

This paper proceeds as follows. Section I introduces the mechanisms that drive the labor market responses of family members when hit by a health shock. Section II describes our primary data set and sample. Section III documents our empirical strategy and discusses our main results: the effect of ED events on the ill individual and the family members. Section IV studies heterogeneity by severity of the medical event and gender, discussing our work in context to the literature, before we conclude in section V.

I Conceptual Framework

Upon the realization of a health shock on an individual, there are two main forces that govern the labor market decisions of working age family members. On the one hand, the health shock induces an *income effect* on all family members. The income effect stems from the two following sources: firstly, health shocks generate medical expenses that are only partially covered by health insurance, and secondly, if the receiver of the health shock has wage income, to the extent that the health shock reduces this income either because the individual is no longer able to work, or takes a leave, the household's income will be reduced. Therefore, either by increasing expenses or reducing the family's income, health shocks give rise to income effects that push affected family members to compensate for the loss of income by increasing labor market participation on either the intensive or extensive margins.

On the other hand, the health shock induces an opposite effect on all family members, which we call a *caregiving effect* (in the same spirit as Jeon and Pohl (2017); see Van Houtven et al. (2013) for more work measuring the direct effects of caregiving). The caregiving effect can be interpreted as an increase in the marginal utility of leisure triggered by the idea that, firstly, the individual receiving the health shock requires care for special needs that the family members want to provide, and secondly, family members might gain a larger utility from spending time with the affected individual, even beyond having to take care of their special needs. The caregiving effect, then pushes family members to withdraw from the labor market, in potentially both the intensive and extensive margins. It might also affect

the family member’s productivity and wage by affecting their mental health or promoting ‘on the job caregiving’, such as taking time from work to schedule doctor appointments for the ill individual.

These forces oppose each other and which one prevails is the main empirical question we address in this paper. A simple model illustrating these two channels and the overall labor supply effects is also included in the appendix.

Moreover, note that from the nature of these forces, the ambiguity of the net effect remains regardless of the severity of the health shock. A more ‘severe’ shock would imply both a stronger income effect pushing family members to work more, and a stronger caregiving effect pushing them to work less. Therefore, while heterogeneity by severity level is certainly possible, we cannot predict the direction of the labor market response with certainty. This is the second empirical question this paper addresses.

We acknowledge that other channels might also drive family labor supply. For example, [Michaud and Vermeulen \(2011\)](#) illustrate that households demonstrate complementarities in leisure, [Finkelstein et al. \(2013\)](#) remark that the marginal utility of consumption declines with health, while [Brown et al. \(2016\)](#) show that marginal utility of consumption is dependent on health status with substantial heterogeneity. Lastly, there might be secondary price effects, where a previously working household member’s change in labor supply affects the marginal tax rate of the family ([Looney and Singhal, 2006](#)). Our dataset allows us to focus on illustrating the implications of the income and caregiving effects and offer analysis on a rich set of labor supply outcomes, which are complementary to existing work that focuses on other channels of family responses.

We also explore how labor supply responses might differ by gender. Traditionally, the literature has examined the spousal added worker effect, particularly for married women, (e.g. [Cullen and Gruber 2000](#)) and found women to have higher labor supply elasticity ([Chetty 2012](#); [McClelland and Mok 2012](#) for a review of the labor supply elasticity literature). For historical and cultural reasons, women might feel a greater responsibility to caregive. In a survey by [Horowitz et al. \(2017\)](#), 65% of women and 44% of men report that they are the primary caregiver should their family need one.

II Data

We use 21 years of data with over 281,000 individuals (of whom about 23% visited the ED) from the household component of the Medical Expenditure Panel Survey (MEPS) dataset offered through the Agency of Healthcare Research and Quality (AHRQ).⁷ This dataset is

⁷Accessed 2019 and 2020.

unique in the United States in that it offers detailed information on medical spending of individual households and their members, for the civilian non-institutionalized population, as well as extensive labor market information. Examples of papers that have also exploited the unique benefits of this dataset include [Garthwaite \(2012\)](#), [Barcellos and Jacobson \(2015\)](#) and [Mahoney \(2015\)](#). MEPS has an overlapping panel design which consists of interviewing individuals five times over the course of two years, where the sample of households is meant to be representative of the U.S. population. One particularly important feature of the data for this study is that it provides observations at the event level for several medical events such as ED visits and hospital stays. For the purpose of our empirical design, we focus primarily on ED events to estimate the overall labor supply effects. To understand the underlying mechanisms, we additionally include the MEPS’ sample of hospitalizations.⁸ MEPS is a uniquely rich dataset that allows us to observe, for each interview round, each time an individual in the family visited the ED or hospital, how many times, what expenses this visit generated, and the medical condition associated with the event.

II.A Main Sample

We pool together 21 longitudinal surveys covering 1996 to 2017. We restrict the analysis to civilians who are present for all five rounds, thus excluding births, deaths, and individuals who might move abroad or become institutionalized. We do not allow for mortality or births because such events are often anticipated or induce major changes to the entire family, which would confound our results. Starting with 315,746 civilians, these restrictions remove 12,504 individuals. We drop all families who had emergency room visits and hospitalizations associated with pregnancies ($\sim 2\%$ and $\sim 5\%$ of ED and inpatient events are pregnancy-related), and individuals with missing families. All dollar amounts are adjusted to 2017 values.

Our final sample includes approximately 281,000 individuals distributed across 128,261 families. We link individuals together into families following MEPS criteria, where a family includes “persons related to one another by blood, marriage, adoption, foster care, or self-identified as a single unit”. Our sample shows 63,508 (23%) individuals visit the ED at least once during the length of our panel. Among them, 44% are men, 35% are younger than 26, and 17% are age 65 or over. Altogether, about 40% of people in our sample belong to families where at least one family member at some point in the panel visited the ED, one or more times.

⁸The ED events sample and the hospitalizations sample overlap in the subset of ED events that lead to hospitalizations.

Hospitalizations are less frequent and more costly than ED visits. 9% of individuals are hospitalized in our sample (41% men, 15% younger than 26 and 34% age 65+), and almost 20% of people belong to families where at least one family member was hospitalized at some point in our panel, one or more times. While we expect these events to be less exogenous and unanticipated than ED events, they are, on average, more severe. The first two columns of table 1 show average OOP payments, expenditures, and charges for both types of events. Hospitalizations have, on average, more than ten times larger charges and expenditures than ED events. ED events give rise to OOP payments that are slightly over a fourth of those caused by inpatient events. Taking charges and expenditures as reflective for the severity of the events, table 1 draws a clear picture showing hospitalizations as much more serious shocks than ED visits.

Table 1: Charges and Expenses

	Hospitalizations	Emergency Department		
		All	Injury	Non-injury
Out-of-Pocket Payment (\$)	419.62	126.66	122.70	128.34
Total Expenditure (\$)	15,032.48	1,113.40	1,015.35	1,155.14
Total Charge (\$)	38,807.39	3,079.52	2,495.28	3,328.18
Hospital Nights	5.11			

Source: MEPS 1996-2017. Reflects average costs across rounds where medical event occurred. All dollar values deflated to 2017 dollars.

II.B Main Labor Supply Outcome Variables

In addition to identifying health shocks, MEPS provides detailed information on wage income from the individual’s main job, as well as employment status, hours worked per week, hourly wage, and an indicator for working more than one job.⁹

As a way to summarize both extensive and intensive margin changes, we measure the log

⁹Given the survey structure, hourly wage measures only capture wages when initially asked about the job, and not subsequent changes in wage if the individual stays in the same job. However, we do not believe this introduces much bias considering wages rarely change without a change in employment. We do create a variable that captures both job switch wage changes and changes in wage within a job. Only about 6% of wages actually changed during the same job. However, MEPS only started asking these questions in later panels, and sometimes MEPS is unable to ascertain the new wage values. Due to these data issues, our main results use the hourly wages from switching. The contemporaneous wage variable produces coefficients with similar magnitudes, but with larger standard errors from loss of power. Hence, we are comfortable with our original wage measure.

weekly wage income of the individual.¹⁰ Weekly wage income is the product of weekly hourly wage and weekly hours worked as reported in the MEPS. This measure only captures wage income from the individual’s main job, and not secondary jobs or self-employment. In the appendix we supplement this measure with analysis on family labor responses through the probability of having more than one job and the probability of being self employed. Given that individuals might be moving in and out of employment, we capture extensive margin changes by taking those who are not employed as having a weekly income of zero.

II.C Medical Conditions and Family Composition

A wide array of medical conditions lead individuals to the emergency room. Panel A in table 2 lists the top 10 most frequent conditions (defined using MEPS clinical classification code). While some types such as sprains and injuries are more common, the range of conditions is varied and includes conditions such as asthma attacks or pneumonia. Our main results on labor supply of working age family members include all medical conditions for any individual of the family, while in later sections we offer robustness to our main findings by restricting to ED events related to physical injuries.

For both ED and inpatient events, adult family members are mostly spouses and parents of the ill individual, although hospitalizations see a larger share of family members being children of the ill, rather than parents. This is consistent with hospitalizations being mostly suffered by older individuals, relative to ED events, as well as with adults in families with dependents being more prone to be hospitalized. Table A.1 in the appendix shows the full distribution of relationships that individuals in our sample have with the ill individual for both events.

III Main Results: Overall Labor Supply

Our main empirical approach uses differences-in-differences event studies to estimate the effect of a health shock on household members’ labor market decisions. We focus attention on ED events, because they are more unanticipated than other events such as those requiring an appointment ahead of time (e.g. an elective non-emergency surgery). Our main identification assumption relies on the exogenous nature of these events. As a further robustness check, in section IV we also focus on a subset of unanticipated medical conditions associated with

¹⁰A natural issue is defining the logarithm of those with zero income; the results presented are for $\log(1 + income)$, though our results are robust to alternative specifications, such as changing zero income to one dollar, or using the inverse hyperbolic sine transformation.

Table 2: 10 Most Common Conditions by Type of Event

Clinical Classification Code	Description
Panel A: Emergency Department events	
244	Other injuries and conditions due to external causes
232	Sprains and strains
126	Other upper respiratory infections
236	Open wounds of extremities
128	Asthma
229	Fracture of upper limb
205	Spondylosis; intervertebral disc disorders; other back problems
239	Superficial injury; contusion
127	Chronic obstructive pulmonary disease and bronchiectasis
235	Open wounds of head; neck; and trunk
Panel B: Inpatient events	
122	Pneumonia
109	Acute cerebrovascular disease
049	Diabetes mellitus without complication
100	Acute myocardial infarction
098	Essential hypertension
133	Other lower respiratory disease
101	Coronary atherosclerosis and other heart disease
108	Congestive heart failure; nonhypertensive
127	Chronic obstructive pulmonary disease and bronchiectasis
149	Biliary tract disease

Notes: 1996-2015. A tabulation of each condition reported.

Emergency Department and Inpatient events can be associated with multiple conditions (23.5% and 34.0% respectively).

ED events, where we argue that these events tend to be more random in nature than other ED associated medical conditions.

Our results generally fall into two categories: the effect on the individual who received the shock, and the effect on family members.

III.A Self Effect

To understand the magnitude of ED shocks and explore channels through which these shocks affect a family, we first display results on how ED events change the labor market outcomes of the people who themselves received the shock.

Following an event study framework, for individual i in family f , in round r and panel p , with a medical event in round τ , we estimate:

$$Y_{ifrp} = \alpha_i + \gamma_{rp} + \sum_{t=-4}^4 \beta_t 1(t = r - \tau_f) \cdot 1(Ever_Shock_f) + X_{ifrp}\delta + \epsilon_{ifrp} \quad (1)$$

where $Ever_Shock_f$ indicates whether the individual suffered an ED shock ever, in the 2 years we observe. We interact this indicator with a dummy for each time period relative to the medical event. We include individual fixed effects (α_i), calendar time fixed effects (γ_{rp}), and controls (X_{ifrp}) for the individuals' family size, insurance status, and linear age.¹¹ Our outcome variables are labor market outcomes at both the extensive and intensive margins. Given that we follow the same families and individuals for two years, we are able to control for any underlying unobserved characteristics of individuals and families, as long as these characteristics are not time-varying. The inclusion of individual age, insurance status, and family composition allow us to control for time-varying characteristics. In all event study figures, we pool estimates 3 and 4 rounds before and after the event since sample size shrinks as we depart from round 0, making estimates noisy.¹² Given that the ED event could happen at any round, we normalize the round of the ED event to 0, and omit the -1 round. All magnitudes reported are averaged over rounds 1, 2, 3, and 4 after the health shock.

Individuals who suffer ED events in some round are in the treatment group, while our control is individuals who never had ED events in our panel. For implementation purposes, note that an individual can have multiple ED events in our 2-year time frame, and a family can have multiple members suffer ED events. We define an individual or family as “treated” the first time the person or the family receives the event. We further remove all rounds after

¹¹Results are robust to dropping insurance status as a control variable, under concerns of potential endogeneity.

¹²In the appendix, we also show event study figures without pooling rounds 3/4 and -3/-4 for our main results on the family labor supply effects.

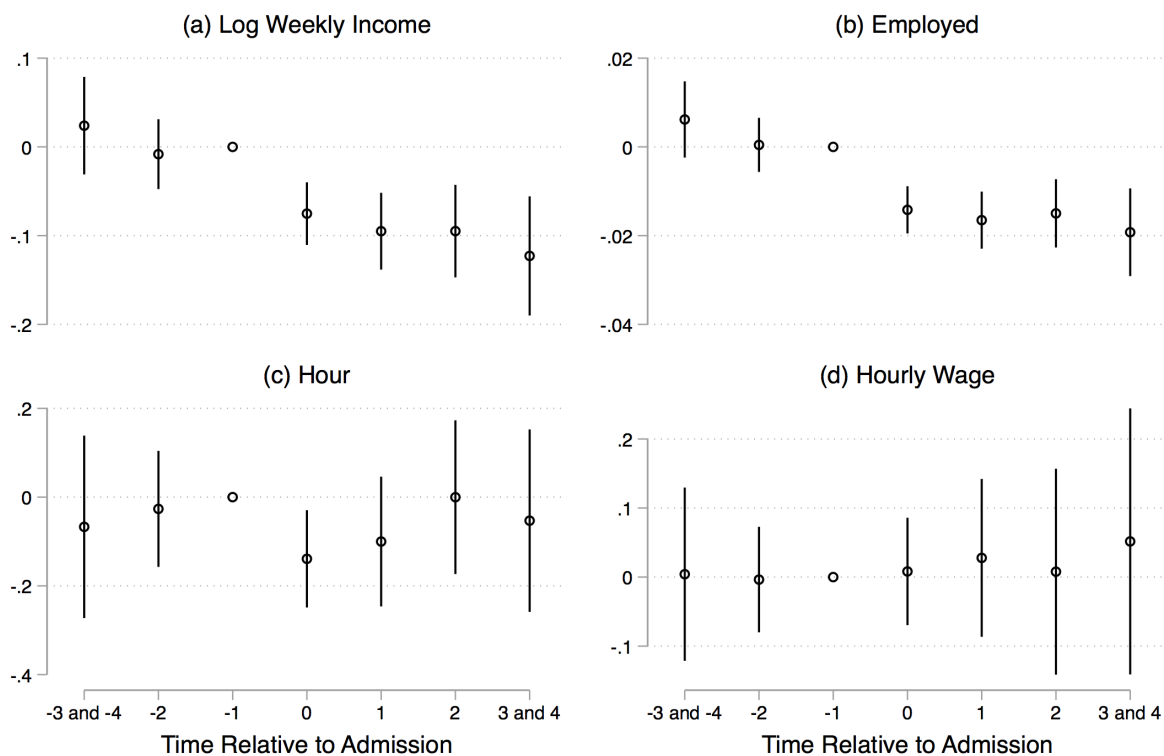
which an individual is in a family where more than one member has suffered a medical event; we do not want people with ED events themselves to be also influenced by family members who suffered ED events, since this would confound our interpretation of the estimates.

To complement our analysis, we also show DD estimates that summarize the event study:

$$Y_{ifrp} = \alpha_i + \gamma_{rp} + \beta MedShock_{frp} + X_{ifrp}\delta + \epsilon_{ifrp} \quad (2)$$

where on the right hand side, there are individual fixed effects, round-panel time fixed effects, and an indicator that becomes 1 in all periods on or after an individual has an emergency room shock.

Figure 1: Effect of Emergency Department Event on Ill Individual



Note: Observations from MEPS 1996-2017 sample between 25 and 65 years old. Excludes pregnancy-related emergency department events and those in single member families. *Log Weekly Income*, or $\log(1 + income)$ includes those not employed with income set to zero, *Employed* is an indicator for employment, *Hour* is weekly hours conditional on being employed, and *Hourly Wage* is hourly wage in dollars conditional on being employed. Robust standard errors are clustered at the individual level.

We show event studies for the entire sample of individuals who visit the ED in figure

1, excluding those in one-person households. This figure shows that ED events have strong negative impacts on those who suffer them in our event studies, causing a 10.4% decrease in their weekly income (9.2% in the DD estimates, as shown in table 3). The bulk of this income reduction is driven by individuals who exit from employment (employment goes down by 2.3%). These effects are persistent for 4 rounds, or approximately 18 months. The intensive margin effects are less persistent; conditional on working, hours dip in the round when the ED visit occurred, but recover in subsequent rounds. Therefore, for some individuals, medical conditions related to ED visits are serious enough to induce exit from employment; however, conditional on continuing to be able to work (perhaps for less severe events), these individuals do seem to return to their usual working hours. Hourly wages, which are conditional on working, are largely stable. These shocks also affect a second extensive margin by persistently decreasing the probability of having a second job for those still working (14.8% decrease).

Table 3: Emergency Department Self Effect

	(1)	(2)	(3)	(4)
	Log(Weekly Income)	Employed	Hourly Wages	Hours per week
Post Event	-0.0918 (0.0180)	-0.0167 (0.00268)	0.0146 (0.0483)	-0.0881 (0.0627)
Constant	4.777 (0.297)	0.757 (0.0438)	22.17 (0.709)	40.55 (0.872)
Obs.	549379	621028	398236	459373
Mean Dep. Var	4.664	0.740	21.93	40.49
SD Dep. Var	3.055	0.439	12.89	12.03

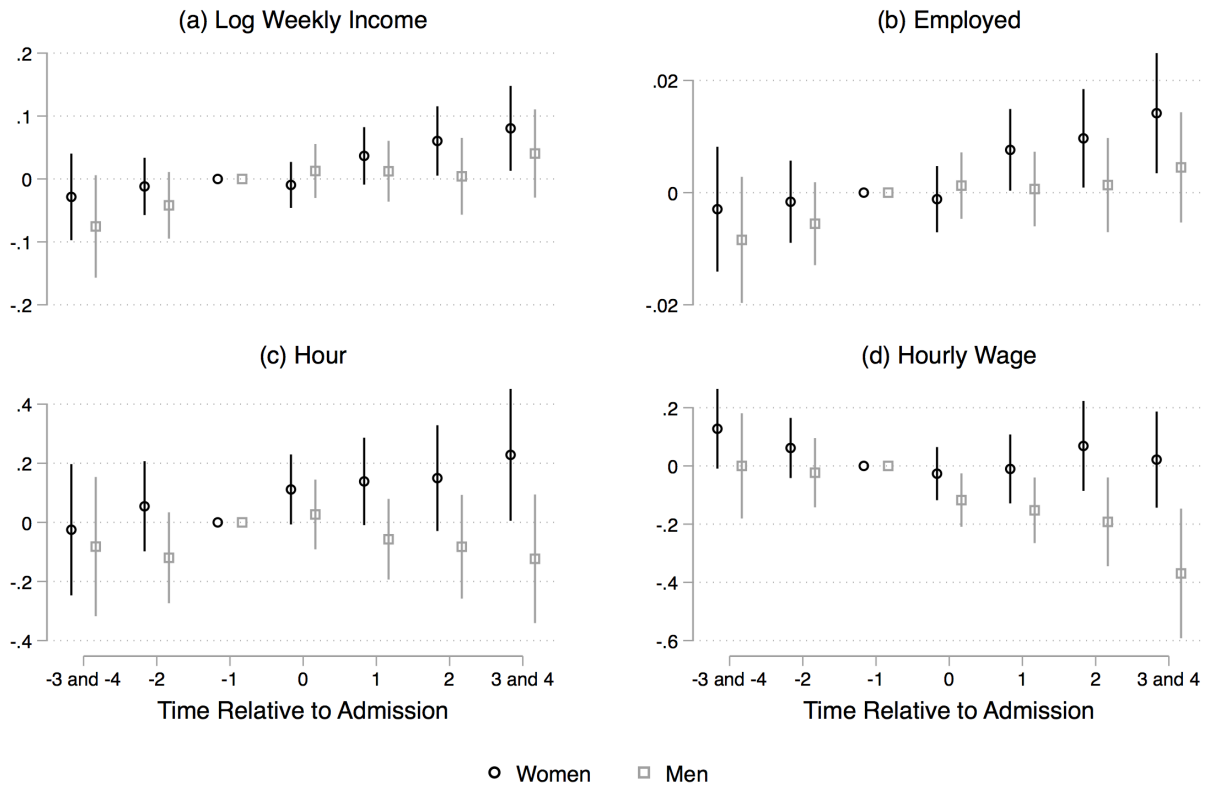
Note: Robust standard errors clustered at the individual level. Observations are from MEPS 1996-2017 and regression output includes 25-65 year olds who themselves suffered the ED shock as treatment. We drop families where more than one member suffered a shock in the same round. The sample excludes ED events that are pregnancy related and those in single member households. Includes controls for family size, health insurance status, linear age. *Log Weekly Income*, or $\log(1 + income)$ includes those not employed with income set to zero, *Employed* is an indicator for employment, *Hourly Wage* is hourly wage in dollars conditional on being employed, and *Hours per Week* is weekly hours conditional on being employed.

Our results suggest that ED events actually produce a fairly substantial effect on the household, in that the affected individuals reduce work, and therefore, wage income. Notice that these results do not capture medical costs and bills associated with the event, suggesting that the income effect we show is a lower bound on the actual effect families face.

III.B Family Effects

Our main results on the overall effects of health shocks focus on the impact of an individual visiting the ED on their relatives' labor market outcomes. We estimate the same event study as in (1), where $Ever_Shock_f$ now indicates whether anyone in the family suffered an ED shock. Our treatment group consists of family members who had someone in their families suffer an ED event, but they themselves suffered no event, while control individuals are in families where no one received an ED event. While all results include health shocks that occurred in any round in the panel, figure A.11 in the appendix shows how our results are robust to limiting to a balanced panel through excluding families where shocks happen in rounds 1 or 5.

Figure 2: Effect of Emergency Department Event on Family Member, by Gender of the Family Member



Note: Observations from MEPS 1996-2017 sample between 25 and 65 years old. Excludes pregnancy-related emergency department events. *Log Weekly Income*, or $\log(1 + income)$ includes those not employed with income set to zero, *Employed* is an indicator for employment, *Hour* is weekly hours conditional on being employed, and *Hourly Wage* is hourly wage in dollars conditional on being employed. Robust standard errors are clustered at the family level.

Figure 2 shows the estimated impact of an individual visiting the ED on their relatives' probability of employment, hours worked, hourly wage, and weekly income. We present these results separated by the gender of the family member to uncover heterogeneity in the estimated effects. In section IV we discuss why we can expect such heterogeneity.

ED visits increase employment of female family members by 1.5%, but do not significantly affect male employment. The first plot in the second row of figure 2 suggests that the effect we observe for women in the extensive margin is also present on hours worked per week. The last plot in figure 2 shows hourly wages for the whole sample of family members, separated by gender. Contrary to what we observe for employment, hourly wages do not seem to be greatly affected by these shocks for women family members. However, men see a persistent decrease in wages of almost 1% (about 23 cents an hour). Hence, after an individual visits the ED, there is some evidence that male family members realize lower paying jobs relative to those in families where no one received a shock. The event study reveals an increasingly falling wage for affected men through time, suggesting a persistent and increasing dynamic of the effect in the long run. We observe no clear evidence of impacts on the likelihood of working more than 1 job or probability of being self-employed for family members of the shocked individuals, as shown in the appendix.

Table 4: Emergency Department Family Effect, by Gender of the Family member

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Weekly Income)	Employed	Hourly Wages	Hours per week	Miss Work to Caregive	Days Missed to Caregive
Panel A: Men						
Post Event	0.0361 (0.0217)	0.00435 (0.00299)	-0.152 (0.0515)	0.0335 (0.0658)	0.0296 (0.00386)	0.117 (0.0283)
Constant	5.759 (0.486)	0.871 (0.0669)	23.58 (1.306)	43.82 (1.410)	-0.118 (0.0905)	-1.076 (0.598)
Obs.	238151	280406	193538	230329	228180	233598
Mean Dep. Var	5.623	0.856	25.15	43.17	0.0465	0.139
SD Dep. Var	2.641	0.351	14.38	11.43	0.210	1.549
Panel B: Women						
Post Event	0.0264 (0.0195)	0.00455 (0.00311)	-0.0279 (0.0522)	0.118 (0.0682)	0.0449 (0.00555)	0.246 (0.0365)
Constant	4.087 (0.456)	0.673 (0.0716)	21.19 (0.992)	37.26 (1.440)	-0.249 (0.122)	-3.272 (0.913)
Obs.	279057	305276	187163	208327	204677	211442
Mean Dep. Var	4.696	0.749	21.57	37.80	0.0846	0.261
SD Dep. Var	2.980	0.434	12.62	11.64	0.278	1.888

Note: Robust standard errors clustered at the family level. Observations are from MEPS 1996-2017. The sample excludes ED events that are pregnancy related. Includes controls for family size, insurance status, linear age. *Log Weekly Income*, or $\log(1 + income)$ includes those not employed with income set to zero, *Employed* is an indicator for employment, *Hourly Wage* is hourly wage in dollars conditional on being employed, and *Hours per Week* is weekly hours conditional on being employed. *Miss Work to Caregive* refers to a binary variable of having missed at least a half day of work for caring for family members. *Days Missed to Caregive* refers to number of at least half days missed for caring for family members. Both caregiving variables are conditional on being employed.

We prefer to summarize our results using the event study analysis, which are less prone to measurement error and are better at illustrating the delay in effects. While both the DD estimates in Panel A of table 4 and the event study in figure 2 show no significant effects

on male employment, the event study allows us to uncover a significant effect for women that our DD estimates in table 4's Panel B do not show, due to the dynamic nature of the family responses. Our event-study magnitudes averages the 4 rounds after the ED event to take into account delays in family responses to the event, and to prevent measurement error in the exact timing of the medical event within the round. Taken altogether, while the DD estimates show a 2.6% increase in weekly income for women, our event study in figure 2 shows a 5.9% increase in income for the rounds following the round of the event. The effect is persistent, with weekly income increasing by 8.0% in rounds 3 and 4 after the event.

We consider three possible mechanisms that might explain wage decreases: selection, changes in preferences, and changes in productivity. Firstly, given that our wage measure is conditional on working, changes in employment can be driving the results, based on who decides to continue working. However, figure 2 does not suggest that employment is changing drastically for men, so selection does not seem to be a main driver.

Secondly, a compensating differentials mechanism could explain why, following a shock, men switch to jobs with lower wages. For example, this would reflect men switching into jobs that pay worse, but offer better amenities that are in greater demand following the medical event, such as better health insurance coverage or more flexible working hours. We do not see this effect for women, since women have lower base wages than men, so for them, their margin of effect is on earning more income. Meanwhile, men already have a higher base income, so they can afford to lower their incomes slightly, in order to gain greater work hours flexibility or better health insurance to care for the ill family member or child. We look at some indicators of job quality, such as whether the job has paid doctor's visit, sick pay, paid vacation, and choices of health insurance options. As shown in the appendix, across the board, we do not see an effect for our affected population. While these variables are a proxy for the level of job amenities, such as average health insurance premiums or number of health insurance choice offerings, insofar as our measures are correlated with these variables, we do not believe compensating differentials as driving the results. In addition, compensating differentials as the main driver would imply that male family members are now more likely to switch into the jobs they now prefer. However, it is not the case that these men are more likely to be switching jobs following an ED event, as shown in the appendix.

Finally, our preferred explanation for falling wages for men is loss of productivity, likely derived from caregiving. In economic theory, wages reflect a worker's level of productivity. Therefore, another explanation is that men's productivity decreases following a family ED shock, for which we offer suggestive evidence. Physical and mental health effects of caregiving are well documented (Schulz and Sherwood, 2008), with caregivers susceptible to depression and stress. Appendix figure A.4 shows the consequences of health shocks on mental health of

family members as reported by the head of household. These results support the hypothesis that these health shocks impose a statistically significant burden on the family members' mental health, which might affect their productivity in a way captured by wage loss. In addition, hours tend to be sticky, which makes adjustments on this margin costly. Moreover, family members might also be providing 'on-the-job caregiving', such as taking family members to doctor visits during working hours, or taking time from work to schedule medical appointments. Therefore, there are consequences of caregiving that might not show up in labor supply changes of hours or employment, but are nonetheless important to highlight. Note that these productivity changes could be manifesting itself through our control group getting increasingly better jobs, while treated men could be passed up on promotions or job raises.

A potential threat to interpreting our results as causal comes from changes in the outcome variable inducing treatment, though we do not believe this to constitute a main driver. For example, the individual could have lost a job and then this stressful event triggered adverse health, including an emergency room visit. If an individual had previously worked but at the time of the survey did not, they were asked the reason why they were not working. As a conservative measure, the fraction of all people-rounds who report not working because they could not find work, was on temporary layoff, or chose the option 'other' is 8.7%. In addition, out of all people who themselves have an ED shock, 8.0% of the people-rounds fall into this possibly 'lost job' category, so the rate of a possible lost job is not disproportionately higher in our treatment group. On top of that, given our interest in family dynamics, the concern would have to also be that changes in labor supply of a family member triggered adverse health and ED events in another family member, which seems more unlikely. Another concern might be that those with worse health are more prone to ED events, and health affects labor supply through other channels. We do not believe this to be a primary concern for the following three reasons: firstly, our regression includes individual fixed effects that control for non-time-varying baseline health, secondly, we do not observe systematic pre-trends in labor supply, and thirdly, our main analysis focuses on labor supply of family members, and not the individual who visited the ED.

IV Heterogeneity Analysis

The lack of robust insurance systems for the consequences of illness induces family members to provide informal insurance for loss of income and caregiving needs. We show that visiting the ED induces income loss for the ill individual, and women in the family work more in subsequent periods when looking at all ED events, while men exhibit wage losses.

In this section, we explore two dimensions of heterogeneity, through examining how family responses are affected by the type of medical condition, and through exploring mechanisms for differential responses by the gender of the family member. In particular, we show how our work fits in with the existing literature.

IV.A Medical Conditions

In this section, we explore how family insurance responses might differ by the type of medical condition, through comparing injury and non-injury related ED events, and through comparing all ED events with hospitalizations. Our purpose for performing such analysis is threefold. Most importantly, we illustrate how family labor supply adjust given the type of medical condition through the role of caregiving. Moreover, by focusing on a subset of ED events that are more plausibly exogenous, we provide a robustness check to our main results. Lastly, through extending our analysis to inpatient events, we discuss our work in the context of previous findings and the existing literature.

Comparing different medical conditions allows us to illustrate how family members respond to health events that induce differential medical expenses and caregiving needs. Our framework suggests that, on the one hand, increased medical expenses and loss of income for the family drives family members to work more, and on the other hand, increased caregiving needs induce them to work less. We leverage measures of caregiving to provide novel evidence of family labor supply sensitivity to caregiving needs associated with the health shock.

Secondly, we limit to a subset of ED events that are more exogenous in nature, to provide a robustness check to the main results. A concern with emergency room shocks is whether they are truly anticipated, and if individuals can simply defer their medical event to a future period. While we do not see much evidence of anticipatory effects (there does not appear to be an overall systematic pre-trend in the event studies), separating out plausibly more unanticipated or exogenous events provides a useful robustness check for our main specification above. Similar to [Eichner \(1997\)](#) and [Kowalski \(2016\)](#), we argue ED events with associated medical condition involving physical injuries are particularly exogenous and unexpected.

Lastly, the addition of hospitalizations to our analysis allows us to connect with existing papers in the literature, which largely focuses on severe medical illnesses. [Dobkin et al. \(2018\)](#) also examines the effects of medical events in the United States, by focusing on the elderly who get hospitalized. While they show large and persistent income losses for the individual who gets hospitalized, they do not find spousal income response changes, which

is in contrast with our findings for the consequences of ED events. Similarly, [Fadlon and Nielsen \(2020\)](#) finds that spouses in Denmark did not change labor supply in response to non-fatal severe health events, such as heart attacks and strokes. The results of the existing literature further suggest the importance of examining more severe health shocks through hospitalizations. One major difference and possible driver of the different results is that ED events induce different family effects than hospitalizations based on the nature of the medical event itself. ¹³

We provide some evidence for this explanation by showing that different events have different caregiving needs.

Classifying Medical Conditions and Measuring Caregiving

MEPS produces Clinical Conditions Codes (CCC) that are relatively stable across all years of the sample, which we use to classify medical conditions. These codes are an aggregate of the standard ICD codes used by medical professionals to classify conditions, where similar ICD codes are grouped together. We focus on conditions such as fractures, wounds, burns, and poisonings; see table 5 for the full list of conditions classified as an injury. All other conditions are labelled as non-injury, including fairly diverse conditions ranging from heart attacks to headaches.¹⁴ As columns (3) and (4) in table 1 show, family OOP payments are very similar for injury-related ED events (\$122.70) and non-injury events (\$128.34), suggesting that the costs associated directly with the ED visit are not substantially different. Indeed, event studies reveal injuries and non-injuries induce declines in income by 12.7% and 9.1%, respectively.

MEPS also provides detailed information on each hospitalization, allowing us to focus on the effects of a hospitalization on the family. Medical conditions that lead people to be hospitalized are more severe than ED related conditions on average, with Panel B in table 2 showing common conditions of those hospitalized. Hospital admissions are also on average more costly than ED visits for the family, both in terms of medical expenses (see table 1), with approximately four times greater family OOP payments, and loss of wage income from the ill individual. Indeed, as [Dobkin et al. \(2018\)](#) do, we see evidence of decreased and

¹³Another difference with [Fadlon and Nielsen \(2020\)](#) is that the United States has less complete insurance than Denmark, possibly giving rise to stronger caregiving and income effects.

¹⁴In our data, individual medical ED events can be associated with multiple medical conditions. Therefore, if any of the conditions corresponding to an ED event has a CCC code corresponding to an injury, we classify the event as injury-related. Also, note that a very small subsample of ED events do not have any corresponding medical condition. For example, in the 1996 data, this constitutes fewer than 10%.

Table 5: List of Medical Conditions Classified as Injury

Clinical Classification Code	Description
225	Joint disorders and dislocations; trauma-related
226	Fracture of neck of femur (hip)
227	Spinal cord injury
228	Skull and face fractures
229	Fracture of upper limb
230	Fracture of lower limb
231	Other fractures
232	Sprains and strains
233	Intracranial injury
234	Crushing injury or internal injury
235	Open wounds of head; neck; and trunk
236	Open wounds of extremities
237	Complication of device; implant or graft
238	Complications of surgical procedures or medical care
239	Superficial injury; contusion
240	Burns
241	Poisoning by psychotropic agents
242	Poisoning by other medications and drugs
243	Poisoning by nonmedicinal substances
244	Other injuries and conditions due to external causes

persistent labor supply for the individual who is hospitalized. As figure A.8 in the appendix shows, we find a 25.2% decline in weekly income. In addition, we see evidence of labor supply changes prior to the round of the hospitalization, which is consistent with hospitalizations being more anticipated in nature.

We utilize measures of caregiving that illustrate how labor supply of family members decreases as caregiving needs increase. For a subset of the years, MEPS asks individuals whether they have taken at least a half day of work off to care for someone else’s health needs. For those who said ‘yes’, the surveyor asks how many days were taken off. Note that these variables are only available for those who are employed. These variables are likely lower bound estimates of caregiving needs, in that we do not capture caregiving needs for those not already working, and time taken off at other points throughout the day (such as caring for family in the evenings or on weekends).

Results: Family Responses

In this section we incorporate our caregiving measures and uncover the crucial role that caregiving plays as a component of intra-family informal insurance.

We summarize the results of the medical condition heterogeneity analysis in figure 3. Each point in the scatter plot reflects a different health shock; the graph incorporates injury-related

ED events, non-injury related ED events, all ED events, and all hospitalizations. On the y-axis we show the regression coefficient for the effect of the health shock on log weekly income, following equation (2). The regression coefficient is multiplied by 100, for the percentage change on weekly income. We focus our analysis only on women. Our ED analysis reveals that women are more responsive in increasing their wage income in response to family health shocks, which allows us to have more variation in illustrating income responses across medical conditions. By examining the estimates relative to the y-axis, we can see that injury events induce the largest change in the family member’s income, constituting a 5.5% increase. The fact that the point estimate for what are plausibly more exogenous medical events produce a family income response provides a strong robustness check on the validity of our overall ED results.

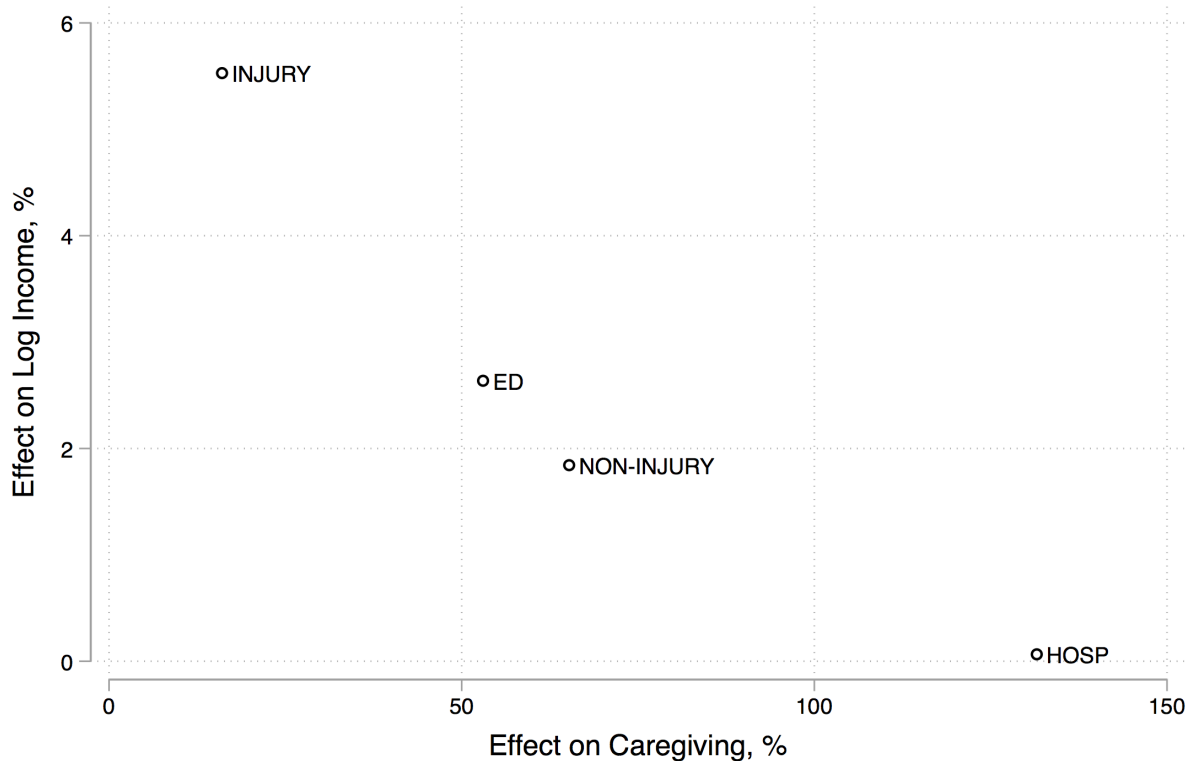
For hospitalizations we see a very small point estimate and statistically insignificant effect on the female family member’s weekly income. Our results for hospitalizations are thus in line with the findings of [Dobkin et al. \(2018\)](#) and [Fadlon and Nielsen \(2020\)](#), who find no statistically significant labor supply changes for family members. Therefore, the fact that we observe a family labor supply change for ED events but not hospitalizations suggests that the nature of the medical shock itself affects the degree of family responses. In the context of our conceptual framework, the caregiving effect moves in the opposite direction of the income effect, and so we test whether conditions that exhibit larger caregiving needs see smaller (or negative) overall labor supply effects.

For medical events where there is a larger family caregiving effect, we see a smaller or nonexistent change in the family labor supply. The x-axis of figure 3 reflects the effect of the health shock on the amount of female family member’s caregiving, through estimating the DD model detailed in equation (2). More specifically, caregiving is measured here as an indicator for whether an individual has taken at least half a day off of work to care for family members. The point estimates are normalized by the mean of the untreated sample and scaled by 100, so that the values can be interpreted as percent differences. Injury-related ED events induce a 16% increase in the probability that a female family member takes time off for caregiving, while hospitalizations induce a 132% increase. This analysis thus illustrates the importance of examining the caregiving needs in conjunction with income losses, and reveals that caregiving is an important component of intra-family informal insurance.

IV.B Gender Asymmetry

Our results contribute to the rich literature studying gender heterogeneity by showing ED events produce differential effects by the gender of the family member. Existing evidence

Figure 3: Female Family Member’s Income and Caregiving Responses by Medical Condition



Note: Observations from MEPS 1996-2017 sample of women between 25 and 65 years old. Excludes pregnancy-related emergency department events and individuals in single member families. Each point in the scatter plot displays the coefficient of a differences-in-differences regression of the effect of a health shock. For the y-axis, the outcome variable is *Log Weekly Income*, multiplied by 100 to obtain percentage changes in income. $\log(1 + \text{income})$ includes those not employed with income set to zero. The x-axis reflects an outcome variable that is an indicator for having missed at least a half day of work for caring for family members. The differences-in-differences coefficient is scaled by the mean of the untreated and then multiplied by 100, to obtain percent changes in caregiving. Robust standard errors are clustered at the family level.

suggest labor market reactions to health shocks might be a function of gender. Our estimates are in line with most of the previous literature in that we find no differences in male and female’s responses to someone in their family being hospitalized. Coile (2004) explores spouse responses to more severe health shocks such as heart attacks or new cancer diagnoses. She finds that the added worker effect is small for male family members, and that there is no corresponding effect for women. However and in contrast to the previous literature, female family members work more, both on the extensive and intensive margins, in response to a

family member visiting the ED.

Table 6: 10 Most Common Emergency Department Medical Conditions by Gender of the Ill Individual

Clinical Classification Code	Description
Panel A: Men	
244	Other injuries and conditions due to external causes
236	Open wounds of extremities
232	Sprains and strains
229	Fracture of upper limb
235	Open wounds of head; neck; and trunk
239	Superficial injury; contusion
126	Other upper respiratory infections
128	Asthma
205	Spondylosis; intervertebral disc disorders; other back problems
122	Pneumonia
Panel B: Women	
244	Other injuries and conditions due to external causes
232	Sprains and strains
159	Urinary tract infections
205	Spondylosis; intervertebral disc disorders; other back problems
126	Other upper respiratory infections
128	Asthma
084	Headache; including migraine
127	Chronic obstructive pulmonary disease and bronchiectasis
239	Superficial injury; contusion
098	Essential hypertension

Notes: 1996-2015. A tabulation of each condition reported.

An ED event can be associated with multiple conditions (23.5%).

There are several explanations that might drive these differential effects. Firstly, men and women have differential baseline labor supply; before the medical event, 14% of men aged 25-64 are not employed, while 28% of women are not employed. Given that men are half as likely to be not working than women, the potential to work more is much smaller for men. Secondly, men and women might go to the ED for different medical conditions. Given that many of the family members are spouses, it can be the case that men in the family are responding to different types of medical events than women in the family. Therefore, the gender heterogeneity we observe could be due to heterogeneity in the nature of shocks received by the family member. Table 6 shows the 10 most common ED medical conditions for men and women separately. Differences in the economic consequences of these conditions could partially drive the differential effects by gender that we summarized above. Finally, previous papers have found that, for a variety of reasons, women have higher elasticity of labor supply than men (some examples include [Jacobsen 1998](#), [Blundell and MaCurdy 1999](#),

and [Blau and Kahn 2007](#)). While this gap seems to be shrinking, its existence could also be driving the results above.

V Conclusion

The consequences of medical events are not confined to the individual, but rather, affect the entire family. Given that a family acts as an economic unit, understanding how other family members might adjust their labor market outcomes gives us a glimpse at the intra-family dynamics at play. We notably highlight the existence of the caregiving channel in addition to the income effect channel, through examining family responses to ED visits in a setting characterized by incomplete insurance markets for health events. We focus on heterogeneity by medical conditions leading to the ED, as well as extending our analysis to hospitalizations, to provide novel evidence on the role of caregiving in driving household members' responses to these shocks. We also show how family members' labor market responses differ by gender, which may translate into longer term effects on wages and income, thus contributing to our understanding of gender gaps in labor market outcomes. We believe richer analysis of these intra-family insurance channels can be accomplished through more granular measures of caregiving and the ability to track other sources of family income, such as the take-up of social insurance.

Depending on the goals of a social planner, there are several directions of future research for optimal insurance design. In light of our findings, there ought to be more exploration on the role of family leave insurance in insuring against earnings losses due to the need or desire to caregive. For example, given the loss in men's wages, and if the goal is to prevent such wage losses, then a social insurance program that offers wage protection for individuals to care for ill family members will be effective. Family leave insurance is already in place in many European countries and in a few U.S. states, though relatively little economic research has been done into exploring the effects of these insurance programs (the vast majority of research into this area has been on maternity/paternity leave insurance, as opposed to general caregiving). With the rise in popularity of family leave policies the United States, we hope future work will continue to inform us of insurance design in protecting families.

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