Family Spillovers in Health and Health Behaviors

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Extended Abstract:

Motivation and Overview. The analysis of the behavior of families as economic units has long emphasized linkages across household members through traditional economic channels, such as the sharing of financial resources and consumption, coordination in work activities, and joint investments in children as a public "good" (starting with Becker 1973, 1974, 1991; see a review in Browning, Chiappori, and Weiss 2014). However, there are potentially important causal linkages across adult family members in other key dimensions of economic life. One central dimension of such linkages that the economic literature has largely neglected is family spillovers in health, as a consumption good (from which family members extract utility directly) and as an investment good (that can increase earnings and decrease mortality). These spillovers—namely, the causal effect of one family member's health on the health status or health investments of another—may result from either the financial or the non-financial connections within the family (including the pooling of resources and the flow of information) and can have long-run implications on economic well-being. Still, unlike the study of labor supply and consumption that has transitioned from the individual to the family level, the economic literature has so far exclusively analyzed individuals' health and health-related decisions in isolation.

The importance of identifying family spillovers in health and health investments, and of analyzing the mechanisms through which they operate, stems from the strong academic and policy interest in uncovering the determinants of health and health behaviors. Identifying the inputs of the production function of health is, first of all, crucial for our understanding of the evolution of this key aspect of human capital over the life-cycle. Moreover, identifying these determinants is essential for developing strategies to improve health and well-being, to promote healthy aging, and to reduce health disparities. In this respect, evidence suggests that specific emphasis should be placed on analyzing the factors shape health behaviors and investments at adulthood. Specifically, risk factors that are modifiable through behavioral changes have been identified as leading causes of death, and health behaviors are also believed to be a major driver of the vast and growing socioeconomic disparity in health, which is one of the most pressing issues on policymakers' agenda.[1]

The broad cross-discipline recognition of the significance of potential spillovers in health across

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[1]See, for example, McGinnis and Foege (1993), Mokdad et al. (2004), Cawley and Ruhm (2011), Juel and Koch (2013), Sallis and Carlson (2015), and Chetty et al. (2016). Note that, correspondingly, with an aim to improve health and control health-care costs, the US and other countries (including Denmark, the context of this paper) are currently going through a system-wide paradigm shift from treatment-based medical-care to a health-care approach that is based on illness prevention and promotion of healthy behaviors.

family members is evident by a large and influential earlier and ongoing work outside of economics, in the fields of public health, sociology, psychiatry, and in medical research. This work has conceptualized the important notion of potential linkages in health across adult family members and has provided intriguing evidence on the association between individuals' illness or death and their spouses' or children's health status. So far, however, estimating the causal effects of family members' health has been impeded by two main challenges. The first is the unavailability of large-scale *family-level* data on health outcomes, which are necessary for accurate estimation of spillovers. This data scarcity is even more pronounced for measures of health investments, as well as for the analysis of potential mechanisms which additionally requires links to family-level economic data. The second and more profound obstacle is the lack of empirical strategies that can isolate the causal short and long run effects of these shocks and tackle the inherent difficulties in their identification. Specifically, complex life-cycle trends in the evolution of health and in the utilization of health-care require a clear control group to distinguish between the underlying trend and the causal effect (so that event-study type designs face considerable challenges); and we show that this is likely unachievable by relying on comparisons to (matched or unmatched) unaffected households who exhibit substantially different patterns over time.

In this paper we study family spillovers in health and health behaviors by analyzing the causal effects of fatal and non-fatal severe health shocks on adult family members' health-care utilization, health, and well-being. We leverage long panels of detailed administrative datasets with a wide range of family-level health and economic outcomes, and estimate the causal effects of these shocks using a new research design that relies on the timing of a shock (Fadlon and Nielsen 2015) and overcomes the significant obstacles in their identification. With the combination of our new quasi-experimental research design and the unique datasets that we use, the contribution of this paper is twofold. First, we provide novel *causal* estimates of the short, medium, and long run effects of severe health shocks on spouses' and adult children's health. We study aggregate measures of health-care utilization and separately analyze administrative measures of physical and mental health. Second, we conduct a novel analysis of (yet to be explored) changes in health behaviors and investments in response to family shocks. Notably, we provide new evidence of how severe health shocks affect family members' consumption of health-improving preventive care, induce changes in risky behaviors, and lead to utilization responses consistent with higher awareness of health. Lastly, we also exploit the unique link to administrative information on income to investigate the degree to which income losses and household economic conditions may serve as a potential mechanism in the family health spillovers that we identify.

Overall, our findings provide clear evidence of significant and persistent family spillovers in health and health behaviors at adulthood. We additionally find strong supportive evidence that within-family financial linkages may have an important role in our estimated causal health linkages across family members.

To study family spillovers, we exploit population-level administrative data from Denmark on linked family members from years 1980 to 2011. Starting from the universe of married and cohabiting couples with or without children, we study over 400,000 households in which one spouse experienced

a fatal health shock of any kind and over 100,000 households in which one spouse experienced a (fatal or non-fatal) heart attack or stroke. Since our goal is to identify spillovers within families as tight economic units—that form individuals' closest social network and whose members share financial resources and information—our analysis is conducted at two levels. First, we put particular emphasis on spouses in order to analyze spillovers that are not confounded by biological channels across family members whose financial linkages are most pronounced. Second, we study the effect on *adult* children to identify intergenerational spillovers that are driven by family linkages and interactions at adulthood (so that they are not confounded by early-life channels, such as the physiological uterine environment or childhood circumstances).

Our data comprise comprehensive information on health-care utilization, covering in detail all contacts with the medical system including prescription drugs purchases. Importantly, the exact codes in the data allow us to disentangle changes in health and changes in health behaviors and the large-scale analysis provides statistical power for studying detailed utilization outcomes which would be otherwise extremely challenging. In addition, the link of health-care data to administrative registers on income provides us with the opportunity to study the role of income losses in health spillovers. Beyond these advantages, the current context is ideal for our purposes since there is near-complete universal health-care coverage in Denmark, so that our analysis identifies effects that are not confounded by the availability of health insurance.

We recover the causal impact of adverse health shocks by offering a quasi-experimental design that focuses on households who experienced a shock at some point in our sample period and identifies the treatment effect from the timing of the shock. Namely, we construct counterfactuals to affected households by using households from the same cohorts that experience the same shocks but a few years in the future. Then, we combine event studies for these two experimental groups and estimate the short and long run treatment effects using a straightforward "dynamic" (i.e., period by period) differences-in-differences estimator. Doing so, our new method overcomes the two key identification problems in our setting: strong underlying life-cycle trends, which challenge the use of an event-study type analysis; and the non-comparability of affected and unaffected households, which challenges matching methods and calls for alternative counterfactuals. In the methodological section of the paper we clearly show that these challenges pose first-order concerns in our application and demonstrate how traditional estimation methods would lead to significant biases. Our identification strategy relies on the assumption that the timing of the shock within a short period of time is as good as random, which we consistently validate by providing clear visual evidence of parallel trends across our treatment and control groups prior to the shock (for every outcome that we study).

Main Findings. In this extended abstract we describe the effects of fatal and non-fatal severe health shocks on spouses. Since the results regarding the effects on adult children are very recent, we unfortunately have not managed to cleanly report them while meeting the workshop's deadline. However, we find clear effects on adult children's overall health care utilization, mental health, and consumption of preventive care. We can have these findings written up very soon and would be happy to provide them to the conference's organizers. Also, to keep this write-up more concise, we attach figures for the main results of the effects on spouses. We would be happy to provide figures

and tables for any other result that we mention here upon the organizers' request.

We find significant on-impact increases in overall health-care utilization as a result of spousal fatal health shocks (see Figure 1). By the first year after the shock, individuals' visits to medical-care professionals increase by more than 12% and their hospitalization rate increases by 2.9 percentage points (pp) from a baseline of 32.6 pp. These effects are very persistent over time and are apparent even nine years after the shock (see Figure 4). They are also pervasive over the age distribution, so that even younger prime-age individuals exhibit significant long-lasting increases in utilization of medical-care.

To study whether part of the increased utilization is attributable to changes in spouses' health status, we analyze proxies for physical and mental health. We put emphasis on mental health conditions due to the growing importance of their economic implications—specifically, their large share in the incidence and growth of disability rolls (Duggan and Imberman 2009; Maestas et al. 2013)—as well as their high relevance as a key policy target in the United States and in the rest of the developed world (OECD 2015; White House 2016a,b,c). For physical health, we study the presence of major health conditions and find an increase of 9.3% in their prevalence following spousal death. For mental health, we study the consumption of medications that treat depression, anxiety, and stress (see Figure 2). We find that following fatal shocks spouses' consumption of mental health medication exhibits a sharp spike of 75% (an increase of 20 pp). While this immediate spike quickly declines, there is a considerable persistent effect for several years after spousal death, which amounts to about 4 pp by the fourth year after the shock. We additionally find that non-fatal severe health shocks (specifically, heart attacks and strokes) lead to similar patterns of increased short and longer run consumption of mental health medications by spouses (albeit much smaller in magnitude), and that these declines in mental health are larger when the spouses' shocks are more severe. Studying the exact timing of prescription purchases, we find that much of the immediate mental health effect of both fatal and non-fatal shocks is concentrated within the month the shock occurs. This high-frequency utilization response has implications for models of health, regarding the rate at which the mental health stock can change due to extreme household events, as well as for the speed at which the medical system is able to respond to households' needs.

As health is a key component of human capital and a major determinant of productivity, the adverse health effects of family shocks can have important long-run implications on households' economic well-being and self-sufficiency. To study these potential implications, we analyze the effect of fatal spousal shocks on individuals' productivity by studying the degree to which affected households become dependent on the welfare system (i.e., social insurance and assistance programs). We find significant and very persistent declines in households' economic self-sufficiency as a result of these shocks. Specifically, the takeup rate and benefit receipts from welfare programs increase by more than 50% by the first year after the shock and remain 30% higher compared to the counterfactual even nine years after the shock. The same patterns of declines in economic self-sufficiency are also prevalent among younger prime-age individuals who experience the shock prior to age 45.

Next, we move on to a novel analysis of utilization outcomes that capture responses in health behaviors and investments in the context of central classes of illnesses and risky behaviors. We

start by studying whether individuals increase their utilization of types of preventive care that are consistent with new information or salience of specific health conditions. To do so, we study the utilization of risk-specific preventive care in the context of the two leading causes of mortality in developed countries: cardiovascular disease and cancer. We show that individuals whose spouse died of a heart attack or a stroke significantly increase their consumption of medications (i.e., Statins) that aim to reduce the risk of these cardiovascular disease, as compared to those whose spouse died of any other cause. Same significant increases in the takeup of these medications are also clear following both fatal and non-fatal spousal heart attacks or strokes within our sample of health shocks. In a similar manner, individuals whose spouse died of cancer are much more likely to visit diagnostic radiologists (who screen for cancer) following their spouse's death.

Additionally, we find evidence of behavioral responses that aim to avoid two of the most notorious harmful behaviors—namely, smoking and alcohol abuse—which are believed to play a significant role in the long-run trends in health and health disparities. Specifically, we find that fatal spousal health shocks induce immediate increases in the takeup of medications that assist in cessation of chronic smoking or excessive alcohol consumption. Correspondingly, we also find clear evidence of reductions in consumption of prescription Opioids, a class of controversial addictive medications that are widely-believed to be harmful and have been at the forefront of public health officials' and policymakers' concerns (Rudd et al. 2016; White House 2016). Finally, we find responses in outcomes that can indicate higher awareness of health issues or increased sense of urgency with respect to receiving medical attention.

Put together, these results provide novel evidence that family health shocks causally lead household members to invest in their health capital through consumption of health-promoting preventive care and through improved health behaviors. The persistence of these increased investments following spousal shocks highlights the significance of family spillovers in habit formation within the important area of health. The behavioral changes that we find are consistent with responses to new information on health risks or to increased salience of medical conditions and with a generally higher awareness of different aspects of health.

Lastly, we investigate the interaction between the traditionally studied financial linkages across family members and the health spillovers that we identify. We do so by analyzing the role of financial distress imposed by fatal shocks in their large and economically-important effect on spouses' mental health.[2] We find new evidence that the increase in the consumption of mental health medication is strongly associated with shock-induced income losses throughout our event period (see Figure 3). We show that financial distress following spousal death can account for about 25% of the declines in mental health in the short-run and for more than 50% of the long run effect, suggesting an important role for household economic conditions in health spillovers within the family.

Implications. Our findings of significant and persistent family spillovers in health and health behaviors have three main sets of implications. First, they have immediate implications for economic

[2]This relates to the literature on the mental health effects of financial shocks through unemployment shocks (e.g., Arnetz 1991, Browning et al. 2006), lottery winnings (e.g. Lindahl 2005, Gardner and Oswald 2007), or randomized unconditional cash transfers in developing countries (e.g., Baird et al. 2013, Haushofer and Shapiro 2016).

models of health and health investments, which are widely used in a variety of applications, such as Grossman's (1972a,b) canonical human capital model (and its many extensions) and Murphy and Topel's (2006) model for valuing health improvements. All these models analyze the health and health-related decisions of individuals as isolated economic entities. However, our findings provide strong evidence that similar to the common practice of family-level analysis of consumption and labor supply, we should analyze the evolution of the health stock over the life-cycle, the process of health investments, and the demand for medical care and health-care coverage at the family level.

Our findings also have implications for the design of social insurance. We show that there is potential scope for making social insurance programs more comprehensive in the context of severe illnesses and subsequent deaths, which comprise a significant share of government budgets in developed countries. That is, we show that it may be welfare improving to not only cover direct medical costs (through, e.g., Medicare and Medicaid) and lost labor earnings (through disability insurance and survivors benefits), but to additionally cover the consequential increase in the health-care needs of other family members. Relatedly, it may be welfare improving to target the health of family members of severely ill as a high-risk group through guaranteed health-care coverage and more intense medical-care. Importantly, our findings on the potential role of financial distress in spousal mental health also suggest that social income insurance programs may have significant additional gains that have not been considered so far. In particular, beyond their main rationale of smoothing consumption, these programs can have potentially important gains of improved health.

Finally, our results have implications for fostering healthy behaviors and for the pressing issue of health disparities. Research has found that health behaviors may be an important determinant of the socioeconomic disparities in health and has suggested that policy interventions should focus on changing health behaviors among low-income households (see, e.g., Chetty et al. 2016). We have identified severe health shocks to family members as major life events that induce individuals to make important non-transitory health-related behavioral changes and to invest in their health through persistent utilization of preventive-care. Doing so, our findings provide new insights into the determinants of health behaviors over the life-cycle and suggest that crucial family events may represent an effective window of opportunity for such targeted interventions. Hence, this paper may take us a step forward in the effort to devise non-traditional strategies to promote healthy behaviors that can address the socioeconomic disparities in health. While we provide some related analysis, our results call for further research to uncover the mechanisms that drive the effect of family shocks on behavioral changes (e.g., new information, salience of health conditions, or more frequent interactions with the medical system) to help develop more efficient strategies to foster healthy behaviors. This is particularly important in light of the mounting evidence that financial incentives (either direct transfers or changes in prices) have limited effectiveness in inducing sustainable healthy behavioral changes. In this respect, our results provide an important proof of concept that health behaviors are not immutable and that persistent improvements in health-promoting behaviors are achievable indeed. Our results also identify a causal mechanism that exacerbates health disparities across households. Family spillovers in health imply that severe illnesses, which are much more pervasive among economically disadvantaged individuals, translate into more pronounced family-

level socioeconomic disparities in health. Notably, this suggests that there could be higher returns to health interventions, as family spillovers imply a potential "multiplier" effect in policies that aim to improve health outcomes and reduce health disparities.

Related Literature. This paper is mostly related to two strands of the literature. First, as we mentioned above, there is a large and active related body of work, primarily outside of economics, that aims to investigate the potential linkages across family members' health. By analyzing the evolution of health outcomes around shocks or by relying on comparisons to unaffected households, this literature has studied the association between individuals' illness or death and their spouses' or children's health (with a focus on mortality risk).[3] We contribute to this important literature by providing, to the best of our knowledge, the first clean causal estimates for (non-physiological) linkages in health across family members in the short, medium, and longer run. We clearly display complex life-cycle trends in health-care utilization and the non-comparability (in both levels and trends) of affected and unaffected households (that persists even after accounting for differences in observables). These illustrate in a straightforward way that traditional estimation strategies—specifically, pure events studies or matching techniques that rely on unaffected households—would be inappropriate for identifying the causal effects of family shocks. We demonstrate how these methods would lead to significant biases (and even to estimates with opposite signs), particularly for the medium and longer run which are our primary goal. By comparison, we show consistently throughout the analysis how our new design produces treatment and control groups that are closely comparable and exhibit tight pre-trends for every shock, outcome, and sub-sample that we analyze. We additionally contribute to this literature by analyzing measures of both physical and mental health and by conducting new analysis of the potential financial mechanism that may underlie these health effects.

Second, our paper is related to the literature on the determinants of health behaviors in developed countries. There is a large body of work that aims to study the role of education, income, taxes and subsidies, advertising, information provision, and peer effects in shaping health-related behaviors. While much of the literature documents correlations between health behaviors and these

[3]This literature includes Maddison and Viola (1968), Parkes et al. (1969), Bartrop et al. (1977), Helsing and Szklo (1981), Schleifer et al. (1983), Irwin et al. (1987), Kapiro et al. (1987), Irwin et al. (1988), Bruce et al. (1990), Jacobs et al. (1990), Jagger and Sutton (1991), Schaefer et al. (1995), Martikainen and Valkonen (1996), Shaw et al. (1997), Prigerson et al. (1999), Schulz and Beach (1999), Christakis and Iwashyna (2003), Subramanian et al. (2008), Elwert and Christakis (2008a,b), Christakis and Allison (2009), Jin and Christakis (2009), Pfeffer et al. (2009), Rolden et al. (2014), and Holland et al. (2014). We are aware of only one paper (Jin and Christakis 2009) that aims to additionally study the quality of care that individuals receive following spousal death, and a few studies that use questionnaires and surveys to analyze interviewed widows' habits and behaviors (e.g., Maddison and Viola 1968, Romelsjo et al. 1991, Byrne et al. 1999, Prigerson et al. 1999, Perreira and Sloan 2001, and Tamers et al. 2014). Papers that have analyzed the relationship between bereavement and the stress hormone cortisol of relatives other than spouses or of friends include Pfeffer et al. (2007), Dietz et al. (2013), and Holland et al. (2014).

Note that this work as well as ours is interested in family spillovers through social/non-physiological channels, and is in contrast to the literature on the physiological channel of the uterine environment that studies variation in pregnant women's physical or mental health. For work on physical health see reviews in Almond and Currie (2011) and Currie (2011), and for work on psychological stress see Huttunen and Niskanen (1978), Kashan et al. (2008), Kashan et al. (2011), Class et al. (2011), Abel et al. (2014), Black, Devereux, and Salvanes (2016), Persson and Rossin-Slater (2016), and Aizer, Stroud, and Buka (forthcoming).

hypothesized mechanisms, clear work on their causal effects is scarce and is sometimes mixed (see a comprehensive review of this literature in Cawley and Ruhm 2011). Recent work studies other potential mechanisms that can shape behavior by analyzing individuals' responses to health risks and to illness diagnosis, the effect of changes in life expectancy, and vaccination responses to disease outbreaks (Oster et al. 2013a,b; Oster 2015, 2016), as well as by studying how utilization of preventive care may respond to cost sharing within health insurance products (Choudhry et al. 2011; Cabral and Cullen 2016). Additionally, a growing strand of the literature studies the causal effect of financial incentives and commitment mechanisms using randomized control trials, and mostly finds limited improvements in health behaviors in the short run.[4] We contribute to this literature by identifying a pervasive causal mechanism, i.e., family health shocks, that shapes individuals' health behaviors and consumption of preventive-care in the natural course of the life-cycle. Moreover, we show that these family spillovers in health investments are not only significant in magnitude but are also persistent in the longer run, and hence (as we alluded to above) may serve as a fruitful benchmark for policies that aim to promote sustainable behavioral changes and form healthy habits.

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[4] In the context of developed countries this work includes, for example, Finkelstein et al. (2007), Volpp et al. (2008), Volpp et al. (2009), Charness and Gneezy (2009), John et al. (2011), Just and Price (2013), Acland and Levy (2015), and Royer et al. (2015). Notable exceptions that find longer run effects of commitment contracts (for a year or more after the intervention) are Gine et al. (2010) and Royer et al. (2015).

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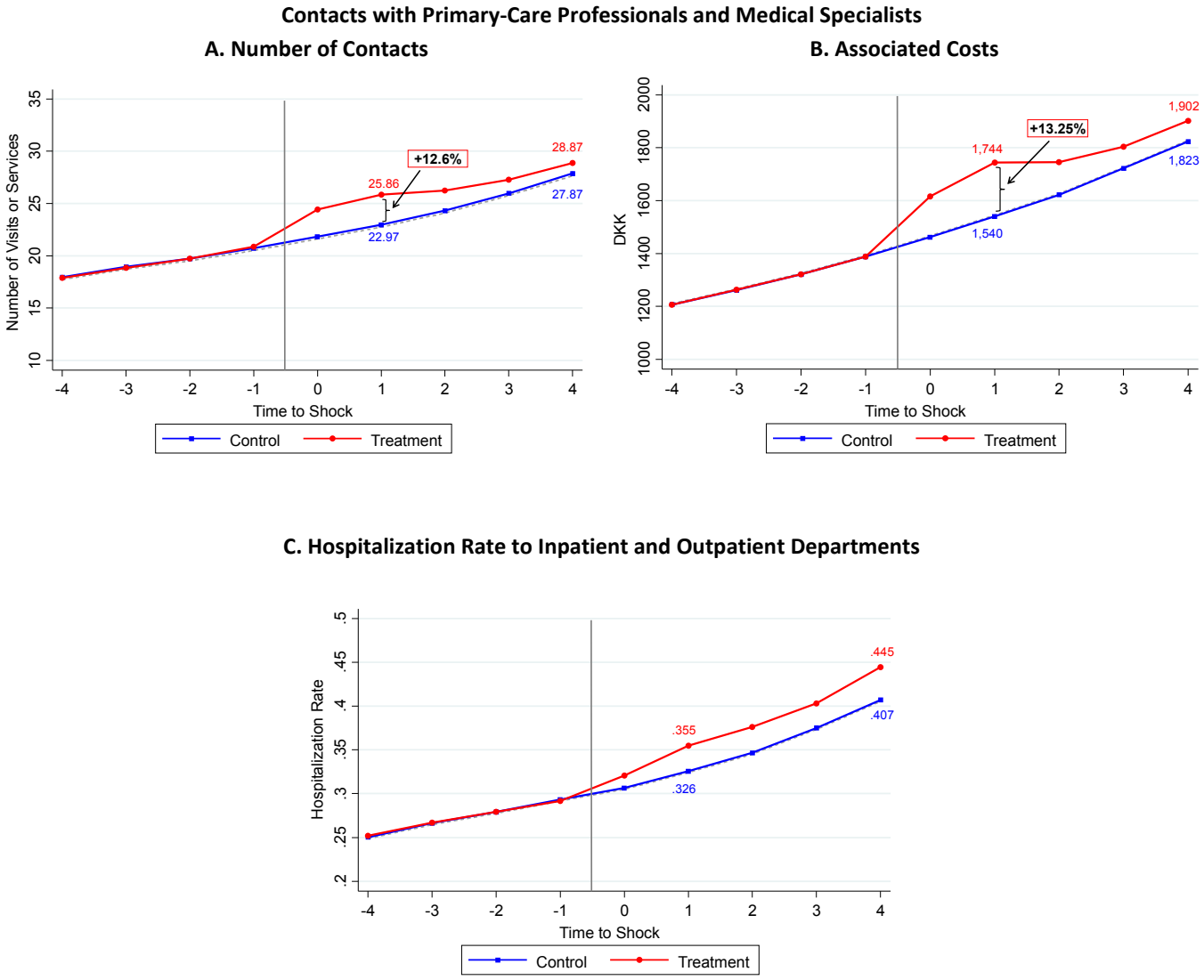
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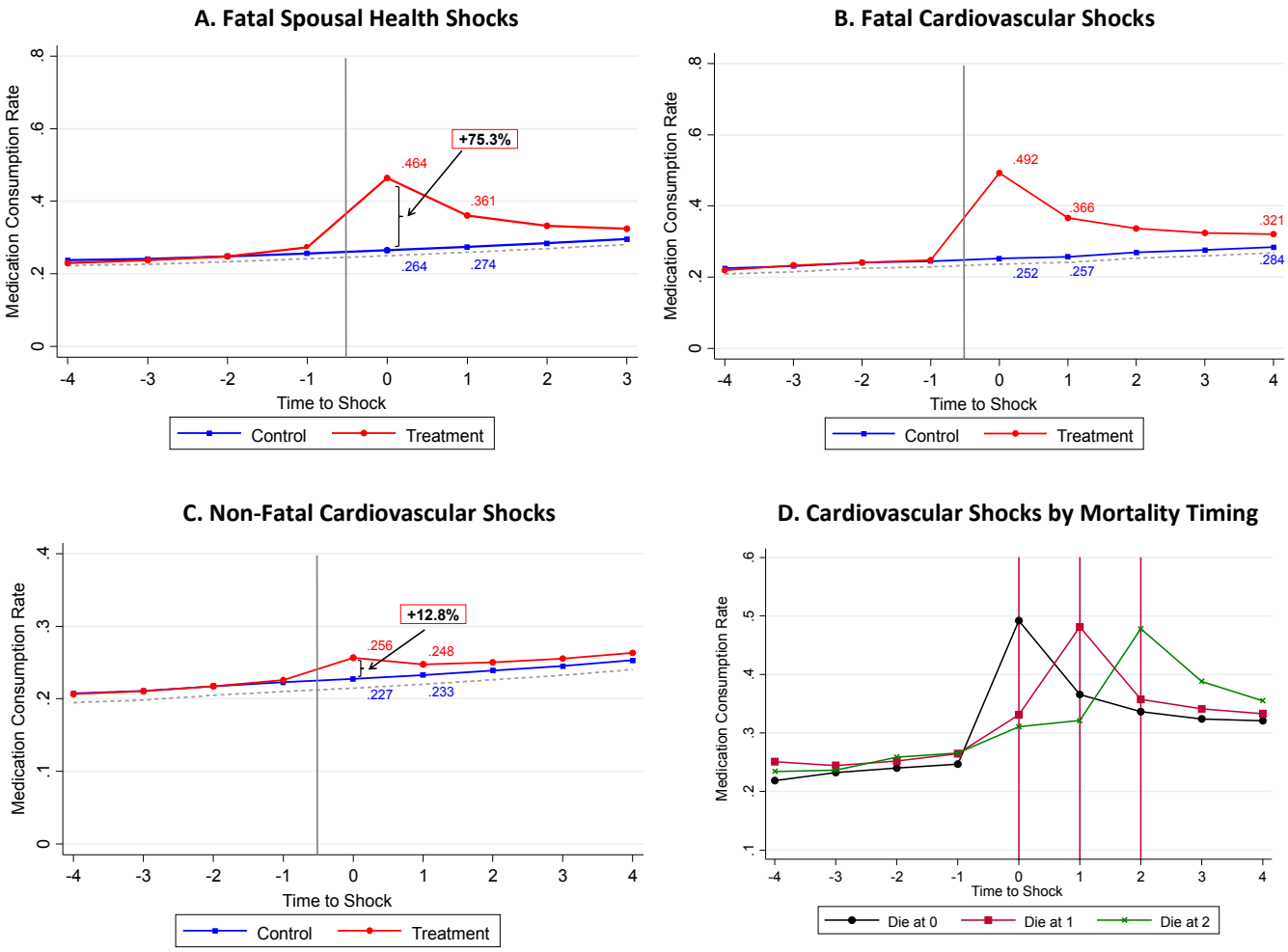
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Figure 1:
Health-Care Utilization Effects of Fatal Spousal Health Shocks



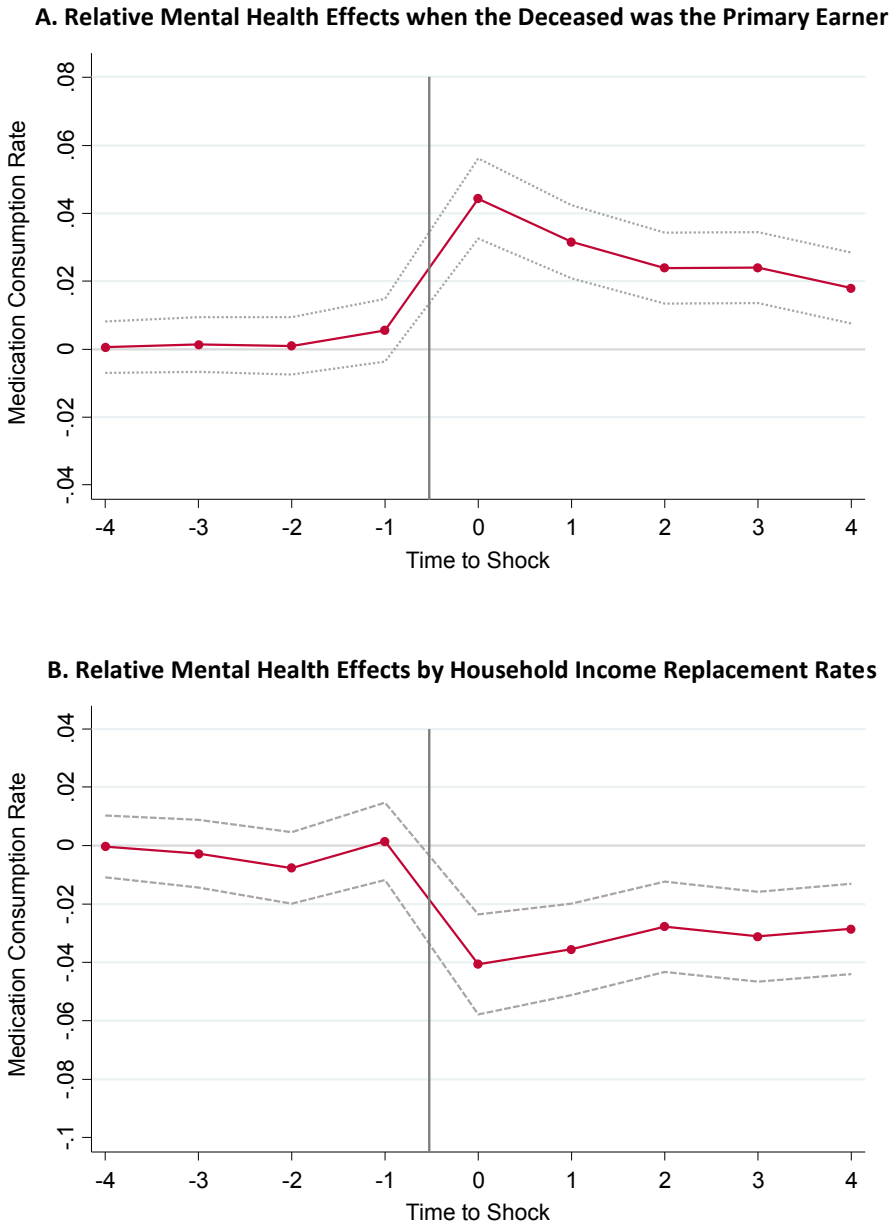
Notes: These figures plot the effects of fatal spousal shocks on individuals' overall health-care utilization. Panels A and B analyze contacts with primary-care professionals or with medical specialists outside of hospitals (which include any service, treatment, or medical test that was associated with a particular visit), and panel C analyzes hospital visits to both inpatient and outpatient departments. The sample includes all households in which one spouse experienced a fatal shock between years 1985 and 2011 and in which both spouses were between ages 45 and 80 in the year of the shock. The treatment group is composed of households that experience a shock in year τ (between 1985 and 2006), and the matched control group is composed of households from the same cohorts that experience the same shock but in year $\tau + \Delta$, with a choice of Δ=5. We identify the treatment effect purely from the change in the differences in outcomes (i.e., the difference-in-differences) across the two groups over time. The x-axis denotes time with respect to the shock, normalized to period 0. For the treatment group, period 0 is when the actual shock occurs; for the control group period 0 is when a "placebo shock" occurs (while their actual shock occurs in period 5). The dashed gray line plots the behavior of the control group. To ease the comparison of trends, we normalize the level of the control group's outcome to the pre-shock level of the treatment group's outcome. This normalized counterfactual is displayed by the blue line and squares. The red line and circles plot the behavior of the treatment group.

Figure 2:
Consumption of Mental Health Medication in Response to Spousal Severe Health Shocks



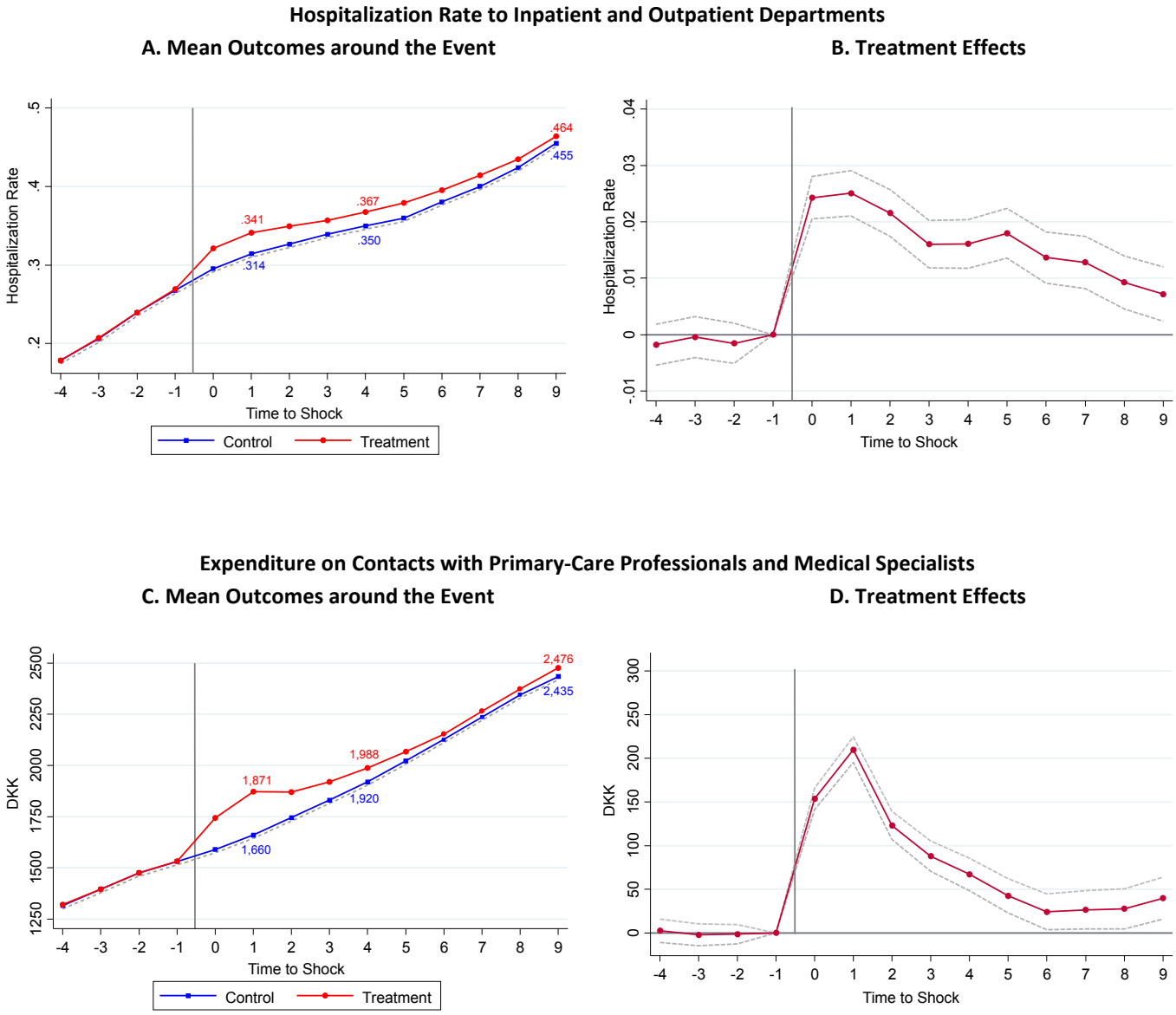
Notes: These figures plot the effects of spousal health shocks on individuals' consumption of medication that treat depression, anxiety, or stress (ATC codes N05 and N06). The sample of Panel A is comprised of all households in which one spouse experienced a fatal shock between years 1985 and 2011 and in which both spouses were between ages 45 and 80 in the year of the shock. The figure in panels A is constructed as explained in the notes of Figure 1. The sample of panels B, C, and D is comprised of all households in which one spouse experienced a heart attack or a stroke (for the first time) between years 1985 and 2011 and in which both spouses were between ages 45 and 80 in the year of the shock. Panel B includes only households in which the spouse that experienced the cardiovascular shock died within the same year, and panel C includes only households in which the spouse survived the entire sample period of four years. The figures in panels B and C are constructed as explained in the notes of Figure 1. Panel D divides the households in which one member experienced a cardiovascular health shocks by the timing of this member's mortality following the shock, and plots the spouse's consumption of mental health medication around the event.

Figure 3:
The Role of Financial Distress in the Effects on Mental Health



Notes: These figures analyze the role of financial distress in the effect of fatal shocks on spouses' consumption of mental health medication. Each panel plots the coefficients on the interaction of indicators of time with respect to the shock with a measure of the income loss imposed by fatal shocks (where the gray dashed lines represent 95% confidence intervals). Panel A uses as a measure of income loss an indicator for whether the deceased spouse was the primary earner, and plots the coefficients on the interaction between time relative to the shock and this indicator. Being the primary earner is defined as accounting for more than 50% of the household's total labor earnings prior to the shock (so that panel A includes only households in which at least one spouse worked in the pre-period). Panel B uses as a measure of income loss the household's overall income replacement rate following the shock, and plots the coefficients on the interaction between time relative to the shock and this comprehensive replacement rate measure which we construct as follows. First, we calculate the household's overall income from any source (including earnings, capital income, annuity payouts, and benefits from social programs), holding the spouse's earnings and direct social benefits at their pre-shock level (in $t = -1$). Second, we calculate the ratio of this "potential income" measure in $t = 1$ to the household's income in $t = -1$. Third, we normalize this ratio for the treated households by the mean ratio of the control households in order to purge life-cycle and time effects. This leaves us with a measure of the potential income replacement rate for each treated household, that captures the change in household income directly attributed to (and only to) the death of a spouse. Notably, it accounts for the deceased spouse's income from any source---labor earnings, private or social retirement income, and benefits from government programs---so that it also captures the income loss imposed by the death of older non-working individuals who receive income from sources other than the labor market. The sample is comprised of all households in which one spouse experienced a fatal shock between years 1985 and 2011 and in which both spouses were between ages 45 and 80 in the year of the shock.

Figure 4:
Long-Run Effects on Health-Care Utilization



Notes: These figures plot the effects of fatal spousal shocks on individuals' overall health-care utilization. Panels A and B analyze contacts with primary-care professionals or with medical specialists outside of hospitals (which include any service, treatment, or medical test that was associated with a particular visit); panels C and D analyze hospital visits to both inpatient and outpatient departments. Panels A and C follow the structure of Figure 1 but where the control group is constructed using $\Delta = 10$. Panels B and D plot the coefficients on the interaction of an indicator for whether a household belongs to the treatment group with indicators for time with respect to the shock, where the gray dashed lines represent 95% confidence intervals. The sample includes all households in which one spouse experienced a fatal shock between years 1985 and 2011 and in which both spouses were between ages 45 and 80 in the year of the shock.