The Burden of Alzheimer's Disease:
Spousal Spillovers among Elderly Couples in the United States

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Project Description:

Thousands of studies have estimated the burden of diseases that afflict the elderly and, in particular, the burden of Alzheimer's Disease and Related Dementias (ADRD). Nearly 6 million Americans live with ADRD, and its cost has been estimated to be over $700 billion (Matthews et al., 2019).

Yet, current estimates only identify the *direct* effects of ADRD; that is, they include costs that are directly attributed to treating those with the disease. Diseases, however, do not only affect the patient who receives the diagnosis—they also affect the patient's family. This is particularly true for ADRD, in that patients require increasing levels of home care as their disease progresses. The true economic and social burden of ADRD involves not just the direct effects on patients but also the disease's broader effects on their spouses. While policy discussions of ADRD burdens have recognized this fact (e.g. Deb et al., 2017), few empirical studies quantify more than the direct effects of ADRD.

In this project, we aim to fill this gap in the literature using a newly available dataset that allows us to link spouses in Medicare and study the effect of ADRD mortality and quality of care on spouses. We created this dataset using a custom crosswalk from the Centers for Medicare and Medicaid Services (CMS). The dataset includes beneficiaries' addresses, as tracked by the Social Security Administration. We then group beneficiaries who live at the same address and identify spouses by selecting cases where only two people of different genders live at the same address. This gives us the unique opportunity to study spousal spillovers in health in the U.S. with large-scale and rich administrative healthcare data.

As an example of what the data allow us to observe, consider Figure 1 below. We identify all deaths in the Medicare claims data to which we can link the deceased to a spouse. We then plot the surviving spouse's use of antidepressant medications before and after the death, and compare this outcome to Medicare recipients whose spouses died two years later. Such a comparison is similar one pioneered by Fadlon and Nielson (2019, 2021).

The figure suggests a clear pattern: the death of a spouse increases the utilization of antidepressants. Such effects of increased healthcare utilization after spousal death have been documented in countries where administrative healthcare data with direct spousal linkages are available (e.g., Rolden et al. 2014 in the Netherlands and Fadlon and Nielsen 2019, 2021 in Denmark). Figure 1 therefore provides a "proof of concept" for our constructed dataset of spousal linkages and proposed empirical work.

Analysis Plan and Specific Aims:

We propose investigating three questions regarding the impact of ADRD on spousal well-being, which correspond to the following aims.

Aim 1: First, we will study how deaths of ADRD patients impact spousal healthcare utilization and underlying health, and how these impacts may differ from spousal loss more generally. Such impacts can vary widely as a function of the deceased's health deterioration trajectory prior to the death event itself and the differential burden of different diseases on the spouse.
Aim 2: Second, we will study how—if at all—the quality of care a person receives for ADRD mitigates spousal effects. Following the logic of Aim 1, the quality of care prior to death can alter the trajectory leading to the event and shape the effects on spouses through the burden they bear.
Aim 3: Finally, we will investigate what role financial barriers to access to care—including spend-down programs to qualify for Medicaid—play a role in driving the potential effects.

More specifically, we will begin by describing Medicare recipients whose spouses die from ADRD. This includes descriptive characteristics such as gender, age, and overall health status, e.g., chronic conditions. Following descriptive analyses, we will address Aim 1 by estimating the dynamic effects of death of ADRD on spousal well-being: total healthcare utilization, underlying physical and mental health, and, ultimately, mortality. To study the evolution of these outcomes, we will estimate event studies for two experimental groups: spousal pairs experiencing a death in time *t* and a matched control group of those who experience a death in time $t + \Delta$. This approach, as discussed by Fadlon and Nielsen (2019; 2021), increases comparability across treatment and control groups by ensuring that even control units are ultimately treated, as well as by differencing out potential selection and life-cycle effects. Our primary specification takes the form:

$$y_{i,t} = \alpha_i + \beta treat_i + \sum_{r \neq -1} \gamma_r \times I_r + \sum_{r \neq -1} \delta_r \times I_r \times treat_i + \lambda X_{i,t} + \varepsilon_{i,t}$$

where r is time relative to the assigned event (actual for treatment units and placebo for control units) and I_r are indicators for time relative to the assigned event. The coefficients of interest, δ_r, identify the differential evolution of outcomes between the treatment and control groups.

Identification of causal effects on spousal well-being relies on several assumptions. Most notably, we will need to rely on the assumption that the timing of spousal death is plausibly exogenous in the short run. Such an assumption can be plausibly tested in our setting by examining differences between the two groups in the periods prior to the (actual or assigned) death event, in order to assess their co-movement in the pre-shock periods. Additionally, we will investigate the evolution of spousal outcomes around the event of ADRD diagnoses, which could offer insights into the pathways that precede the death event and its consequences for the well-being of the surviving spouse.

Second, in Aim 2, we propose investigating how differential access to high-quality treatment may affect spousal health outcomes. We will incorporate recent work on estimating heterogeneity in the value-added of care centers to identify facility-level differences in quality (Einav, Finkelstein, and Mahoney, 2022). Exploiting these estimated differences—which take into account patient selection into care facilities—would allow us to identify heterogeneous treatment effects across quality.

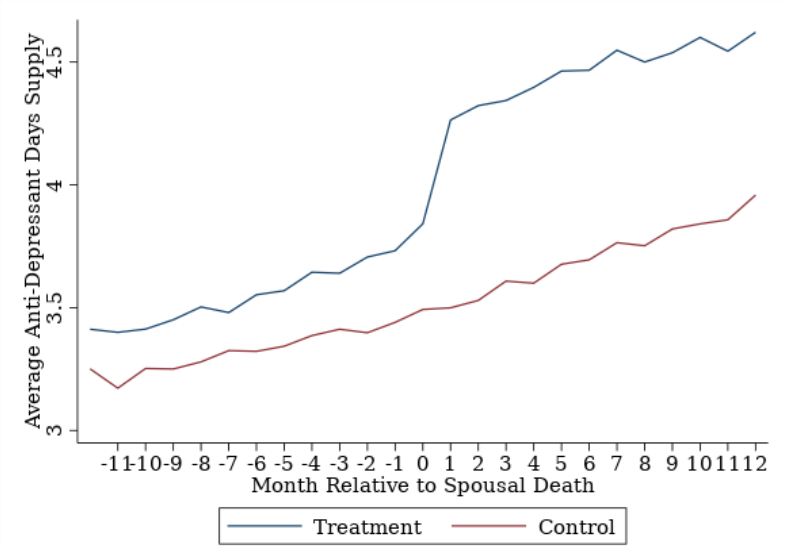
Finally, financial incentives may also play a large role in the quality of care sought and the impact of ADRD death on spousal health. To address Aim 3, we will exploit state-level variation in policies requiring individuals to reduce ("spend down") their assets in order to qualify for Medicaid. The extent to which variations in policy contribute to differences in spousal well-being following a death

will shed light on the ways policies governing financial incentives may generate adverse spillover effects within the household.

To the best of our knowledge, investigating spillovers in ADRD with high-quality large-scale healthcare data in the U.S. has not been possible thus far. Indeed, we are aware of only a few earlier studies that study *any* type of spousal spillovers in healthcare using large datasets in the U.S. Specifically, Christakis and Allison (2006) examined the association between the hospitalization of a spouse and a partner's risk of death among elderly people, and Jin and Christakis (2009) explored whether the transition to widowhood is associated with lower quality of care that surviving spouses receive. These studies have not focused on ADRD and were correlational in nature.

Our work is still preliminary and ongoing, but we are encouraged by the initial results. We hope to pioneer analysis of this important question, which we believe could lead to multiple research studies.

Figure 1: Evolution of Antidepressant Use Following Spousal Death



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