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How Does the Death of a Partner During the COVID-19 Pandemic Affect the Economic Security of the Surviving Older Adult? Evidence From Credit Panel and Labor Force Participation Data

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The research reported herein was derived in whole or in part from research activities performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement and Disability Consortium. The opinions and conclusions expressed are solely those of the author(s) and do not represent the opinions or policy of SSA or any agency of the Federal Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation or favoring by the United States Government or any agency thereof. This research was also supported in part by P2C-HD058484 from the Eunice Kennedy Shriver National Institute of Child Health & Human Development awarded to the Ohio State University Institute for Population Research.

Abstract

The death of a partner has long been recognized as a threat to the economic security of older adults. Older adults experienced a significant increase in unexpected deaths during the COVID pandemic. This study asks: How did the death of a partner during the COVID pandemic affect the economic security of the surviving older adult? Does this differ from pre-pandemic periods? We utilize a unique panel dataset for 2015–2021, combining individual-level administrative data on quarterly labor force participation and earnings and detailed financial information from credit report data for older adults (ages 50 and older) in Ohio. The credit data include death indicators each quarter. We match individuals in our dataset to probable partners within a household. We (1) examine how pre-pandemic indicators of financial vulnerability associate with the death of a partner during the COVID pandemic; (2) estimate the relationship between the death of a partner and labor force and credit outcomes—identifying differential pandemic effects relative to prior periods; and (3) explore heterogeneous effects for particularly vulnerable groups of survivors—including women and those with weaker financial histories who are more likely dependent on Social Security survivor benefits. This study is among the first to provide a detailed analysis of the economic security of older adults who experienced the death of a partner during the COVID pandemic.

Keywords: COVID-19; economic security; labor force participation; spousal death; mortality
JEL Codes: D14; G51; J26; J64, H55, I32, J14

1. Introduction

The death of a partner has long been recognized as a threat to the economic security of older adults—particularly for widowed women, who are two to three times more likely to be in poverty than married women (Burkhauser et al. 2005; Diebold, Moulton, and Scott 2017; Holden and Zick 2000; McGarry and Schoeni 2005b; McGarry and Schoeni 2005a; Sevak, Weir, and Willis 2003/2004). While the share of widowed adults in poverty has declined steadily since the expansion of Social Security survivor benefits in the 1970s (Munnell, Sanzenbacher, and Zulkarnain 2020; Weaver 2001), the COVID-19 pandemic presents a unique threat. Older adults faced a significant increase in deaths, with risk-adjusted mortality rates being 12.4 percent higher in 2020 compared to 2019 among Medicare enrollees (Gilstrap et al. 2022). Many of these deaths were unexpected and hence the financial consequences unplanned, and they occurred at a time when older adults were disproportionately exiting the labor force (Goda et al. 2022; Quinby, Rutledge, and Wettstein 2021). Further, mortality risk from COVID-19 was higher for financially vulnerable groups (Clouston, Natale, and Link 2021; Hawkins, Davis, and Kriebel 2021). In this study, we ask: How did the death of a partner during the COVID-19 pandemic affect the economic security of the surviving older adult? Does this differ from the pre-pandemic period?

To inform these questions, we construct a unique panel dataset combining individual-level administrative data on quarterly labor force participation and earnings and detailed financial information from credit report data for a random sample of 850,000 adults ages 50 and older in Ohio from the fourth quarter of 2017 through the fourth quarter of 2021. In addition to those of the randomly selected individuals, our panel includes data for all adult household members with credit files living at the same address as the randomly selected older adult in a given quarter. We limit our analysis sample to older adults living with a probable partner as of one of two baseline periods: the fourth quarter of 2017 (two years prior to the onset of the COVID pandemic), or the fourth quarter of 2019 (the quarter prior to the onset of the pandemic in March 2020). We trace partner deaths reported in credit data as well as credit and employment outcomes for eight quarters following the baseline quarter. We observe how credit and employment outcomes evolve following the death of a partner for older adults during the first eight quarters of the COVID pandemic relative to how outcomes evolve following the death of a partner during a "normal" pre-pandemic period.

Our first aim describes how pre-pandemic indicators of financial vulnerability associate with the death of a partner after the onset of the pandemic. Here, we are interested in understanding the financial characteristics of older adults who experienced the death of a partner after the onset of the pandemic, and how this may differ from the financial characteristics of older adults who experienced a death of a partner prior to the pandemic. We define financial vulnerability based on household income and credit characteristics prior to the onset of the pandemic. Prior studies find that lower-income and lower-wealth older adults are more likely to become widowed at younger ages than higher-income older adults, due in part to the income-health gradient where mortality rates increase as socioeconomic status decreases (McGarry and Schoeni 2005b; Weaver 2010). Unique to our study, we find that older adults with lower credit scores are more likely to experience the death of a partner in all periods, with a slight increase in the relationship between credit score and probability of a partner's death during the pandemic.

Our second aim identifies how the death of a partner during the pandemic associates with credit and labor market outcomes for the surviving older adult. Prior research indicates a steep decline in household income across multiple sources following the death of a spouse (Gillen and Kim 2009; Munnell, Sanzenbacher, and Zulkarnain 2020; Streeter 2020). One way to offset this reduction is increased labor supply of the surviving partner (Fadlon, Ramnath, and Tong 2019). However, this option may be less utilized by widowed older adults during the COVID pandemic period, as labor force participation rates of older adults declined during this period for multiple reasons—including reduced mobility and fear of disease transmission (Goda et al. 2022; Quinby, Rutledge, and Wettstein 2021). While short-term accommodations on debt payments provided temporary relief to many older adults at the height of the pandemic (Brown, Collins, and Moulton 2022), whether the accommodations effectively targeted pandemic widows and widowers in need remains an open question. Moreover, as these accommodations end, surviving older adults—particularly those with lower incomes—may be vulnerable to economic distress.

We estimate a series of difference in difference models, examining differences in outcomes post death of a partner before and after the onset of the COVID pandemic. We find that in all periods, the death of a partner is associated with a drop in credit score and increase in credit distress for the surviving partner that begins shortly after the death and persists through the eight quarters we observe in our data. This drop in credit score persists for partner deaths during the pandemic period. Thus, while the pandemic-era protections, such as forbearance on debt payments and

increased benefit generosity, boosted credit profiles for older adults overall, these protections did not buffer the shocks to the credit profiles of older adults who experienced the death of a partner during the pandemic.

Our third aim examines heterogeneity in financial outcomes following the death of a partner, with a focus on age, gender, and the financial role of the surviving older adult in the household. To explore heterogeneous effects, we add triple interaction terms to our difference in difference models that measure the differential effects of the death of a partner before and after the onset of the pandemic for particular demographic groups. We find that the negative relationship between the death of a partner and credit score is largest and most consistently statistically significant for the oldest adults in our sample (over the age of 72) and for older adults where both partners were out of the labor force as of the baseline period. These oldest adults—and those out of the labor force—may be less able to offset the loss of income or economic hardship caused by a partner's death through participation in the labor force and thus may experience more credit distress. We do not find evidence that these heterogenous effects worsened or improved during the pandemic period.

Taken together, the findings from this study make several novel contributions to the literature and offer important implications for policy. First, ours is the first study to our knowledge to examine the effects of the death of a partner on the surviving older adult's credit record. While prior studies document a decline in income (Munnell, Sanzenbacher, and Zulkarnain 2020) and an increase in self-reported financial strain after the death of a partner (Stroebe and Schut 2021), we newly observe that financial strain manifests in a meaningful, persistent reduction in credit score for the surviving partner. This is notable given that many older adults rely on credit for basic consumption—with 85 percent of adults aged 65 and older holding a credit card and 45 percent of older adults with a credit card revolving their balance in a given month, indicating a need for liquidity that is met through borrowing on credit cards (Fulford and Schuh 2015). Lower credit scores may result in higher borrowing costs for older adults following the death of a partner and, potentially, reduced access to credit markets to help smooth consumption or meet unexpected expenses.

Second, our findings indicate that the credit disparities that occur after the death of a partner persisted during the COVID pandemic—despite generous credit and income support policies to protect vulnerable households. While the average older adult's credit record improved during the

pandemic period, older adults who experienced the death of a partner experienced a drop in credit score and increase in payment distress following their partner's death. COVID-era financial protections have been credited with efficiently and effectively targeting people with job-related hardships during the pandemic (Chudik, Mohaddes, and Raissi 2021); however, our research highlights a vulnerable group of older adults who were disproportionately affected by COVID-era deaths and who experienced financial hardships.

2. Literature Review

2.1 Prevalence of Partner Deaths in Older Age and the COVID-19 Pandemic

2.1.1 Prevalence of partner deaths.

Based on the 2021 American Community Survey, 14.8 million Americans are widowed, including 11.4 million women and 3.4 million men (Census 2021a). Women are disproportionately widowed, with widowed women constituting 7.0 percent of women aged 55 to 64 years old and 29.8 percent of women aged 65 years and older. Widowed men constitute only 2.4 percent of men aged 55 to 64 and 10.3 percent of men aged 65 and older (Census 2021c). Of the 11.4 million widows, 2.14 million participate in the labor force; of the 3.4 million widowers, 800,682 are in the labor force (Census 2021a). Reflecting the COVID pandemic, the 2021 American Community Survey estimates that as many as 1.12 million women and 514,512 men became newly widowed in 2021 (Census 2021b) (for comparison, in 2019, 1.02 million women and 455,486 men became newly widowed per 2019 American Community Survey estimates (Census 2019)). Based on 2019 estimates of the American Community Survey, 16 percent of newly widowed adults aged 60 and older had incomes below the federal poverty threshold (10 percent of the population aged 60 plus), 28 percent of the newly widowed men and women still carried a mortgage, 41 percent had a disability (31 percent of the general population aged 60 plus), 24 percent had no internet access (15 percent of the general population aged 60 plus), and 11 percent had moved in the past year (7 percent of the general population aged 60 plus) (CFPB 2022).

2.1.2 Partner deaths during the COVID-19 pandemic.

The number of bereaved older adults in the United States rose during the COVID-19 pandemic, with 1.13 million individuals dying due to COVID-19 (CDC 2023; Stroebe and Schut 2021). Black and Hispanic older adults represented population groups that experienced 2.1 and 2.3-times higher death rates from COVID than White adults (Lundberg et al. 2023). In addition, death rates from other health conditions increased due in part to reduced access to and quality of primary care and postponement of the treatment of other diseases (Cole et al. 2023).

COVID-related deaths differ from the majority of gradual and anticipated deaths prior to COVID due to the "rapid occurrence of death," which was frequently unexpected or sudden (Stroebe and Schut 2021). Lack of preparation, distress, and isolation align with the notion of a "bad death" (Carr, Boerner, and Moorman 2020; Wang et al. 2022). These circumstances have been shown to align with a greater number of loss-related financial stressors for the bereaved (Carr and Utz 2001) and "widowhood effects" (Wang et al. 2022). The more difficult consequences that follow a "bad death" emerge through slower adjustment of the surviving partner because the "couple did not have the opportunity to resolve emotional, financial, and practical 'unfinished business'" (Carr and Utz 2001). A literature review of 44 bereavement studies identified economic stressors as the most important stressors of COVID-related deaths (Stroebe and Schut 2021).

The extent to which surviving partners plan for and cope with financial stressors, for example by "taking up employment to compensate for the deceased's lost income or learning skills that had been done by the deceased" (Stroebe and Schut 2021, p. 503), has been linked to their longer-term mental health, physical health, and mortality (Wang et al. 2022). Sullivan and Fenelon (2014) found that "Widowhood mortality risk increases for men if their wives' deaths were unexpected rather than expected; for women, the extent to which their husbands' death was expected matters less" (Sullivan and Fenelon 2014, p. 53).

Building from the prior literature, the current study considers the financial consequences of widowhood to be stressors that can compound the emotional and social changes of widowhood. The extent to which surviving partners cope with financial stressors moderates their longer-term well-being and longevity. Following the literature, we consider unexpected COVID-related deaths to have been particularly stressful transitions for the surviving partner, especially with regard to financial stressors.

2.2 Death of a Partner and Economic Security

The death of a partner is a distressing life transition that has long been recognized as one of the most significant threats to the economic security of older adults, especially women (Carr and Utz 2001). The process of becoming widowed can begin years prior to the actual death, starting with the onset of a partner's illness (Carr 2008). The financial situation of older adults who experience the death of a partner has been described both in terms of financial changes over time due to worsening health conditions and death and from the perspective of the level of financial means available to the family (van der Houwen et al. 2010).

2.2.1 Changes in income.

It is well established that widowhood is associated with a decline in household income and a greater likelihood for income to fall below the poverty level (Munnell, Sanzenbacher, and Zulkarnain 2020). Estimates of income decline have changed over time and vary by the age of the surviving older adult. Streeter (2020) examines Health and Retirement Study waves from 1992 to 2016, including 1,402 men and 3,744 women aged 50 and older who became widowed, using the wave prior to widowhood as baseline. Widows' family-size adjusted income drops by close to 22 percent within the first two years and remains lower than the pre-widowed baseline income after eight years. The data indicate significant declines in "pension income (-35 percent), Social Security retirement income (-49 percent), Social Security disability income (-72 percent), and other government welfare transfers (-64 percent)" while widows' earnings increase (+37 percent) (Streeter 2020). In their study (which includes working-age older adults between the ages of 50 and 65), widows' income from earnings increases by 37 percent. Widowers' income is not significantly different from their pre-widowed baseline income (Streeter 2020).

Studies that focus on adults aged 65 and older who become widowed find larger income declines. Gillen and Kim (2009) use data of the Health and Retirement Study from 2002 to 2004 to analyze a targeted sample of 5,799 women aged 65 and older who received Social Security benefits. Results document an average 41-percent decline in income for these older women, extending to all sources of income, including income from employer retirement plans (-51 percent), earnings (-68 percent), Social Security retirement benefits (-38 percent), and asset income (-15 percent) (Gillen and Kim 2009). The sole income source associated with transition into

poverty is a decline in Social Security income. The findings document the central role of this income source in widowhood (Gillen and Kim 2009).

Munnell, Sanzenbacher, and Zulkarnain (2020) examine changes in widows' financial situation due to women's gains in education and labor force participation since the 1990s, which increases the size of their Social Security retirement benefits. The study is based on data of the HRS from 1994 to 2014 of 4,138 widows aged 65 to 85. Results show that the percentage of widows below the federal poverty level for persons aged 65 and older decreased from 19.9 percent in 1994 to 13.2 percent in 2014. In addition, longer life expectancies of men and the trend among male workers to claim Social Security retirement benefits later is suggested to have added to the reduction in widows' poverty (Munnell, Sanzenbacher, and Zulkarnain 2020).

2.1.2 Social Security survivor benefits.

Diebold, Moulton, and Scott (2017) focus on the role of Social Security retirement benefits, specifically husbands' claiming age of Social Security retirement benefits and widows' poverty status.[1] Data of 802 widows in the Health and Retirement Study whose husbands died between 1994 and 2012 show that if husbands claim Social Security retirement income at the earliest possible age, their widows' income is more likely to be below the federal poverty threshold. The association of claiming age and survivor poverty status grows weaker as husbands' claiming ages approach full retirement age (Diebold, Moulton, and Scott 2017). Widows who depend on Social Security survivor benefits for more than half of their income are more likely to enter poverty as a result of the husband's claiming age (Diebold, Moulton, and Scott 2017). These findings are highly relevant for the understanding of the economic insecurity of widows for several reasons: the largest group of men nearing retirement, about 50 percent in 2021, claimed Social Security retirement benefits early, with 24 percent, the largest group, claiming at the earliest age of 62 (SSA 2022; Romig 2023), thereby permanently reducing their wives' Social Security survivor benefits. About 98 percent of recipients of survivor benefits in older age are women (Weaver 2010). Their largest source of income by far, averaging about 22 percent (Streeter 2020), is Social Security survivor benefits, thus they bear the consequences of their husbands' claiming behavior (Henriques 2018).

[1] According to the Social Security Administration, workers receive their full amount of Social Security retirement income if they claim at their full retirement age, which is age 66 or 67 (for those born 1960 and later). Workers can claim Social Security retirement benefits as early as age 62 by taking into account a permanent 25- to 30-percent reduction in benefits, which extends to their surviving spouses' Social Security survivor benefits (SSA 2023).

Fadlon, Ramnath, and Tong (2019) analyze data of administrative tax records of American households with 504,104 observations of newly widowed Social Security survivor benefits recipients and 544,223 observations of already widowed persons for the years from 1999 to 2014. The goal was to examine the two groups' participation in the labor markets. Results show that for newly widowed persons, the receipt of Social Security survivor benefits after the death of a spouse leads to significantly higher incomes of widows of 11.4 percent in general and of 20.1 percent of low-income widows. The Social Security survivor benefits are associated with a decrease in employment of 9.3 percent across income groups and of 27 percent among low-income widows, who constitute almost half of the study sample (43 percent). These findings point to the economic security provided by Social Security survivor benefits. Similar reductions in employment are also found among widows who become newly eligible for Social Security survivor benefits when reaching the eligibility age of 60 (Fadlon, Ramnath, and Tong 2019).

2.2.2 Employer provided pensions.

There is less research on the role of employer-provided pensions, i.e., defined benefit plans, and their survivor-related benefits. Defined benefit plans at private-sector employers must include a provision about the surviving spouse, the so-called Qualified Joint and Survivor Annuity. Per the IRS, "The amount paid to the surviving spouse must be no less than 50 percent and no greater than 100 percent of the amount of the annuity paid during the participant's life" (Internal Revenue Service 2022). About two-thirds of married individuals working in the private sector select a Joint and Survivor Annuity, per 2014 data of the Health and Retirement Study (Clark, Hammond, and Vanderweide 2019). Per Streeter (2020), most couples accept the default option of a 50-percent survivor annuity amount. In contrast, in the public sector, retirees are not provided with a default option and therefore annuity decisions are highly consequential for retired households. Clark, Hammond, and Vanderweide (2019) examine these annuity choices at retirement. The data are drawn from 72,350 public sector retirees in North Carolina from 2009 to 2014. They find that 44 percent of the sample of married public sector retirees select a Joint and Survivor Annuity. This option is more likely chosen by male retirees when their spouse doesn't have a pension herself, thus pointing to extensive intrahousehold decision processes. This finding confirms the analysis of older adults in the 1992–2000 waves of the Health and Retirement Study (Johnson, Uccello, and Goldwyn 2003).

2.2.3 Wealth decumulation.

The loss of income following a partner's death combined with increased out-of-pocket spending for medical expenditures and care at the end of spouses' lives is associated with significant asset decumulation. Streeter (2020) finds a 10-percent reduction in assets in the first two years of women's widowhood in an analysis of Health and Retirement Study waves from 1992 to 2016 of widowed women aged 50 and older. The data further show that widows continue to significantly decumulate wealth over time, whereas widowers' wealth remains unchanged after it declines in the two years immediately following the death of a wife (Streeter 2020).

A large literature examines out-of-pocket spending at the end of life for different diseases (Narang and Nicholas 2017; Hudomiet, Hurd, and Rohwedder 2019). Kelley et al. (2013) examine end-of-life spending by marital status across diseases. The study uses the years of 2002 to 2008 of the Health and Retirement Study for 3,209 Medicare recipients aged 70 and older in the five years prior to the death of a spouse. Descriptive analysis shows that about 24 percent of those survived by a spouse spent more than 100 percent of their baseline non-housing assets (Kelley et al. 2013). The median household spent about 17 percent of median household assets (Kelley et al. 2013). Nursing home expenditures are the largest spending category, amounting to up to two-thirds of expenses (Kelley et al. 2013; Goda, Shoven, and Slavov 2013). Goda, Shoven, and Slavov (2013) specifically focus on health expenditures of widowed persons aged 55 and older using data from the HRS from 2002 to 2010. The analysis shows that widowed persons have about 30 percent higher medical expenditures than married couples, controlling for changes in health and insurance status. The results suggest that increased use of nursing homes and other formal care contribute to the higher out-of-pocket spending of widowed older adults (Goda, Shoven, and Slavov 2013).

During the COVID-19 pandemic, out-of-pocket spending for health care changed due to emergency government policies. For example, the cost-sharing waivers of private and Medicare insurance providers limited out-of-pocket spending for hospitalizations in 2020 and into 2021 (Chua, Conti, and Becker 2022). When reinstated, these out-of-pocket amounts averaged $1,638 for Medicare Advantage patients, varying by length of stay and location (Chua, Conti, and Becker 2022).

2.2.4 Credit and debt.

Taken together, the financial challenges of partner deaths are well documented, especially for widows. Studies indicate a loss of income from all sources and significant decumulation of wealth, both of which have been shown to influence labor market decisions of the widowed older adult. In contrast, very little is known about the credit and debt of newly widowed older adults. On one hand, credit can serve as a form of liquidity to make up for lost income or wealth, allowing the surviving older adult to smooth consumption. On the other hand, most debt needs to be repaid and monthly payments can be burdensome for surviving partners who experience declining incomes and stress from their partners' death. Further, debts that are jointly held (such as a mortgage) or that were in the deceased partner's name will need to be restructured (or paid off) following death. The current study is the first to contribute a detailed analysis of the credit outcomes of surviving older adults immediately following the death of a partner. Based on the prior literature, we expect to observe differences in the relationship between a partner's death and the credit and debt of the survivor based on the gender, age, and financial position of the surviving older adult.

3. Data and Methods

3.1 Data and Sample Construction

3.1.1 Data.

We construct a unique panel dataset for this analysis, combining data on adults ages 50 and older in Ohio from two sources. The first is credit panel data from Experian, one of three national credit bureaus, with data on the full population with credit records in the state of Ohio (8.83 million individuals)—covering about 95 percent of the adult population in Ohio in a given quarter.[2] In the Ohio Credit Panel data, we observe account balances (e.g., credit cards, student loans, auto loans, and mortgages), payment delinquency, credit score, and ZIP code. We also observe death indicators as reported in Experian data based on creditor information and expired Social Security Numbers in a quarter.

[2]Prior studies estimate that approximately 11 percent of adults in the U.S. do not have a credit file (Brevoort, Grimm, and Kambara 2016). However, coverage in credit data has expanded over the past few years. Further, Ohio has a very small immigrant population and thus fewer people who have not yet established a credit file compared to states like California, Texas, Florida, and New York.

For this study, we select a 20-percent random sample of individuals and their household members in the Ohio Credit Panel dataset during our study period.[3] We identify the random sample based on the last digit of the anonymized person ID, which is a time invariant unique random identifier similar to a Social Security number. In this way, our panel refreshes each quarter as people with the same randomly selected last digit enter or exit the sample. We link this sample to our second data source, administrative data on quarterly employment for all workers in the state of Ohio through the Ohio Longitudinal Data Archive (OLDA).[4] The quarterly OLDA employment data allow us to observe wage income and weeks worked for each employer each quarter. We merge in ZIP-code-level data on race and urban areas from the 5-year American Community Survey (ACS), 2015-2019, as race and neighborhood characteristics are not reported in credit data.

While our data are limited to one state, Ohio includes diverse urban and rural communities with 16 metropolitan statistical areas and 32 counties in the rural Appalachian region, providing important heterogeneity for this analysis. Ohio mirrors the nation with regard to its age and gender distribution, the percent of individuals who identify as Black, and the percentage of individuals in the labor force.[5]

3.1.2 Sample construction.

We restrict the analysis sample to adults ages 50 and older who co-reside with a probable partner during one of two baseline periods, as of the fourth quarter of 2017 (Q4 2017) or fourth quarter of 2019 (Q4 2019). The Q4 2017 baseline sample is used to analyze outcomes for eight quarters during the pre-pandemic era, and the Q4 2019 baseline sample is used to analyze outcomes for eight quarters through the pandemic era. While our data sources do not include explicit measures of marital or partner relationships, our credit panel data include all individuals living at the same address in a given quarter, and we use the age of co-residing individuals to identify a probable partner of the randomly selected older adult.

[3] The subsample of the full credit panel is required by our data providers to allow matching between our credit panel and state administrative data.
[4] The Ohio Longitudinal Data Archive is a project of the Ohio Education Research Center (oerc.osu.edu) and provides researchers with centralized access to administrative data. The OLDA is managed by The Ohio State University's Center for Human Resource Research (chrr.osu.edu) in collaboration with Ohio's state workforce and education agencies (ohioanalytics.gov), with those agencies providing oversight and funding. For information on OLDA sponsors, see http://chrr.osu.edu/projects/ohio-longitudinal-data-archive.
[5] U.S. Census Bureau: https://www.census.gov/quickfacts/fact/table/OH,US/PST045219, April 26, 2021.

Specifically, we define as a partner an individual residing at the same address who is within 15 years of age of the randomly selected older adult (the primary older adult). Ninety-seven percent of U.S. married couples in 2021 had an age difference of 14 or fewer years (CPS 2021). The large majority of adults who live in pairs and have an age difference of 15 or fewer years are married or partnered couples (Goldschmidt, Klosterhuber, and Schmieder 2017, authors' calculations using the CPS). Thus the 15-year threshold increases the probability that we are measuring partners and not child-parent or child-grandparent relationships. We drop households with more than 10 living older adults over the age of 18, as this likely represents communal living arrangements (nursing home, prison) rather than individual households. We also drop households with more than two adults within 15 years of the same age, as we would not be able to identify which individual is the probable partner for the randomly selected individual. While we require the randomly selected individual to be aged 50 or older as of the baseline quarter, we do not require the partner to be over the age of 50—but they must be within 15 years of age of the randomly selected older adult.

Table 1 reports the share of the randomly selected individuals (primary older adults) in our Ohio Credit Panel whom we define as living with a probable partner as of the baseline periods, by age of the primary older adult. As of both baseline periods, we estimate that 62 to 63 percent of adults ages 50–71 live with a probable partner. This closely approximates U.S. Census data (2020), where 64 to 65 percent of the population ages 50 to 74 live with a probable partner. We estimate that about 52 to 53 percent of adults ages 72 and older live with a probable partner; U.S. Census data estimates indicate 55 percent of adults ages 75–84 and 34 percent of adults ages 85 and older live with a partner.

Table 1: Share Living with a Partner in Ohio Credit Panel, by Baseline and Age

Quarter	Age	% w/Partner	Total Sample N
Q4 2017			
	50-61	62.8%	350,286
	62-71	63.0%	249,742
	72+	52.5%	217,248
Q4 2019			
	50-61	62.0%	342,224
	62-71	62.0%	262,471
	72+	52.0%	247,574

Notes: Table 1 reports the share of randomly selected individuals (primary older adults) in our Ohio Credit Panel who co-reside with a partner as of a given baseline period, by age of the primary older adult.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel.

Our analysis sample thus consists of 491,519 randomly selected primary older adults with a probable partner in the baseline period Q4 2017 and 504,103 randomly selected older adults with a probable partner in Q4 2019. It is worth noting that our panel is relatively stable: about 85 percent of the 2017 Q4 baseline sample primary adults also appear in the 2019 Q4 baseline sample. Hence our pre-pandemic and pandemic-era observations may represent many of the same households.

3.2 Empirical Specifications

3.2.1 Baseline financial vulnerability and the death of a partner.

Our first set of empirical specifications describes the characteristics of older adults who experience the death of a partner during the first eight quarters after the onset of the COVID-19 pandemic compared to older adults who experience the death of a partner during pre-pandemic periods. Our focus is on baseline indicators of financial vulnerability that may differ for partner deaths occurring during the pandemic period relative to the pre-pandemic period. We define the baseline quarter as Q4 2017 for the pre-pandemic quarters (Q1 2018–Q4 2019) and as Q4 2019 for the pandemic quarters (Q1 2020–Q4 2021). We limit the sample to the randomly selected older adults with a living partner as of the baseline quarter and predict partner deaths occurring anytime within eight quarters following the baseline quarter—as of Q4 2019 (pre-pandemic) or Q4 2021 (pandemic). We estimate the following model:

$$\text{Death}_{i,t+8} = \beta_0 + \beta_1\text{Financial}_{i,t} + \beta_2\text{Demog}_{i,t} + \beta_3 X_{z,t} + \beta_4\text{Pandemic}_{t+8} + \beta_5(\text{Pandemic}_{t+8}*\text{Financial}_{i,t}) + \beta_6(\text{Pandemic}_{t+8}*\text{Demog}_{i,t}) + \beta_7(\text{Pandemic}_{t+8}*X_{z,t}) + e_{it} \quad (1)$$

where the outcome $\text{Death}_{i,t+8}$ is an indicator of whether person i experienced the death of a partner in any of the eight quarters since the baseline quarter. Financial vulnerability at baseline is measured by a vector of financial variables ($\text{Financial}_{i,t}$) that include labor force status and wage income of the randomly selected primary adult and their partner (separately), household debt levels by type of debt (mortgage, credit card, student loan, auto loan), and credit score. The vector of baseline individual demographic characteristics ($\text{Demog}_{i,t}$) includes gender and age cohort (50–59; 60–61; 62–66; 67–69; 70–71; 72+). $X_{z,t}$ is a vector of ZIP code characteristics, including an indicator for population in a ZIP code being majority Black. Pandemic_{t+8} is an indicator coded "1" for outcomes measured as of Q4 2021 and "0" for outcomes measured as of Q4 2019. The key

coefficients of interest are the vectors of interaction terms that measure the differential effect of financial (β_5), demographic (β_6), and ZIP code (β_7) characteristics on the probability of experiencing the death of a partner after the onset of the pandemic, relative to the pre-pandemic period.

3.2.2 Death of a partner and financial well-being.

For our second aim, we estimate the association of the death of a partner with subsequent indicators of economic well-being from wage and credit data. We explore differential effects of a partner's death during the pandemic period relative to partner deaths during pre-pandemic periods using the same sample and definitions of the baseline quarter as in Aim 1. Our regression specification is similar to equation (1); however, we include a vector of indicators for the death of a partner. We estimate the following model using OLS regressions:

$$Y_{i,t+n} = \beta_0 + \beta_1 Financial_{i,t} + \beta_2 Demog_{i,t} + \beta_3 X_{z,t} + \beta_5 Pandemic_{t+n} + \sum_{j=0}^{n} \beta_{6,j} Death_{i,j} + \sum_{j=0}^{n} \beta_{7,j} (Pandemic_{t+n} * Death_{i,j}) + e_{i,t} \quad (2)$$

where the outcome $Y_{i,t+n}$ is a particular labor or credit outcome for person i at time t+n. We estimate this equation in cross-sections representing n = 4 and n = 8, corresponding to one year and two years after the baseline period (e.g. for the pandemic period, this corresponds to the fourth quarters of 2020 and 2021). For labor outcomes, we construct an indicator for being in the labor force at time t+n, measured as any weeks worked in the quarter and separately as total wages in a quarter. For credit outcomes, we measure credit score at time t+n, as well as indicators of delinquency or default on payments (credit distress), indicators for newly opened credit (e.g., opening a new credit card or auto or mortgage loan), and levels of consumer debt by type.

The vectors of financial, demographic, and ZIP code characteristics are the same as those described for model (1). As before, the vector of baseline individual demographic characteristics ($Demog_{i,t}$) includes gender and age cohort, and vector $X_{z,t}$ represents ZIP code characteristics, including race and ethnicity distribution measures. $Pandemic_{t+n}$ is an indicator coded "1" for cross-sectional observations in which base period t = Q4 2019 and "0" for those in which t = Q4 2017. We measure partner deaths using a series of indicator variables for the number of quarters since death as of t+n. The indicators are $Death_{i,j,}$ j = 0,…,n, where j represents the number of quarters between the partner's death and the date of observation; if the partner is still living, the indicator

variables all take the value of "0". The primary coefficients of interest are $\beta_{6,j,}$ on the indicators for time since the death of a partner and $\beta_{7,j,}$ on the interaction of the pandemic indicator and the indicators for death ($Death_{i,j}$).

3.2.3 Heterogeneous effects.

For our third aim, we explore heterogeneous effects of age, gender, and financial position of the randomly selected primary older adult on credit and labor outcomes by including a vector of triple interaction terms in equation (2). We construct indicators for the financial position of the primary older adult relative to their partner by comparing prior earnings and credit histories of both partners as of the baseline quarter, as described below. We interact the gender, age, and financial position categories with the vector of time-since-death indicators and the ($Pandemic_{t+n}$*$Death_{i,j}$) interaction. This allows us to examine the relative effect of a partner's death during the pandemic for particularly vulnerable groups compared with the relative effect of a death for these same vulnerable groups during the pre-pandemic period.

3.3 Variable and Construction and Sample Characteristics

3.3.1 Coding deaths in credit data.

The credit data we use for this study includes two indicators for the death of a consumer. When a person dies, any debts held by the individual generally pass to the person's estate. If estate funds are insufficient, the debts are generally left unpaid unless accounts are co-owned with another individual, who would still be responsible for the debt (CFPB 2023). After an individual's death, creditors eventually stop reporting on the debt to the credit bureau and may indicate the consumer as deceased. The credit bureau also identifies a person as deceased if they learn that a consumer's Social Security Number has expired. Our data include both death indicators for all individuals and their household members in our credit panel.

The death indicators reported in credit data are an underrepresentation of actual deaths, as creditors are not required to report deaths to the credit bureau, the credit bureau does not always receive information about expired Social Security Numbers, and not all adults have a Social Security Number or a credit file. We quantify the magnitude of the underrepresentation by comparing the quarterly number of deaths reported for all individuals in our Ohio Credit Panel to the mortality counts for Ohio from the WONDER database provided by the Centers for Disease

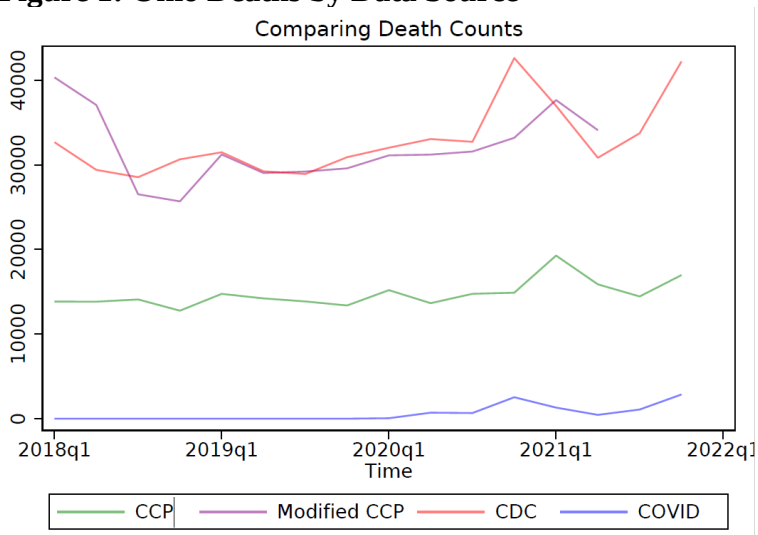
Control and Prevention (CDC) in a quarter.[6] Figure 1 reports the number of deaths in the Ohio population as reported in the full Ohio Credit Panel data (all ages) compared to CDC death counts for a given quarter.

In any given quarter, the credit data death indicators capture only about 40 percent of total deaths reported in the state for that quarter. However, the trends in deaths observed in credit data tend to follow the trends in CDC deaths, with a slight lag. The lag is to be expected given that credit data is reported based on credit history from the prior quarter. In addition to observing actual reported deaths in credit data, we develop a modified credit panel death measure to attempt to increase the number of deaths that can be observed using credit data. To do this, we predict probable deaths in the credit panel based on characteristics of the consumer's credit profile that indicate inactivity, including no updates on any accounts from creditors in the prior six months ("stale" accounts). We exclude from this measure individuals who return to having activity on some account in the future and individuals who are eventually reported as being dead (who are otherwise coded as "dead" in the future period). Finally, when a death is predicted using the above stale criteria, we reallocate "death" back to the quarter when the individual's account first went stale, rather than when they first met the criteria. Figure 1 demonstrates that adding predicted deaths to the actual deaths reported in credit data ("Modified CCP deaths") very closely approximates the count of deaths as reported by the CDC in most quarters—with a slight lag. The exceptions are the first and second quarters of 2018, when the predicted deaths exceed actual deaths. This may be due to our credit panel data beginning in the fourth quarter of 2017—we have less credit history with which to accurately predict deaths for individuals in early 2018. Given the importance of the 2018 credit panel to compare pre- and post-pandemic deaths, for the remainder of this report, our focus is on actual deaths reported in credit data rather than our constructed "modified CCP deaths."[7] However, subsequent analyses can test the robustness of our findings using the modified CCP death measure for a more limited sample.

[6] Centers for Disease Control and Prevention, National Center for Health Statistics. National Vital Statistics. "System, Mortality 1999–2020 on CDC WONDER Online Database, released in 2021. Data are from the Multiple Cause of Death Files," 1999–2020, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Feb 2, 2023 10:52:53 AM.

[7] Our approach will falsely code some respondents as not having a partner death. Assuming there is an effect of death on the outcomes, our estimates will understate the true effect. The comparison group of individuals without a partner death will include those who truly do not experience a partner death as well as those who do have a death

Figure 1: Ohio Deaths by Data Source



Notes: Figure 1 shows calendar-year quarters in the x-axis and number of deaths in the y-axis for deaths reported in credit data ("Modified CCP deaths"), the count of deaths as reported by the CDC, and COVID-19 deaths.

3.3.2 Death of a partner in the analysis sample.

Each primary older adult in the analysis sample has a living partner as of at least one of the baseline periods (Q4 2017 or Q4 2019). We follow this partner for eight quarters after the baseline period for evidence of death. If the primary older adult dies or otherwise exits the credit panel, we no longer follow the individual or their partner (e.g., the observation is censored beginning in the quarter that the randomly selected person exits the credit panel or dies). Table 2 reports the share of primary older adults in the analysis sample by age and baseline period who experience the death of a partner within eight quarters (two years) after the baseline period as defined using only reported deaths in credit panel data. As expected, the share of adults ages 50 and older in our sample with a partner death increases from the pre-pandemic to post-pandemic baseline periods from 1.8 percent to 2.0 percent—an excess mortality rate of 1.11. Prior research finds an increase in the crude mortality rate of 1.14 and the risk-adjusted mortality rate of 1.12 during the first nine months of the pandemic in 2020 compared to the same nine-month period in 2019 (Gilstrap et al. 2022).

that we miss. However, the number of individuals with a partner death is small relative to the number of individuals without a (true) partner death. Thus our estimates are likely biased downwards but not by a large amount.

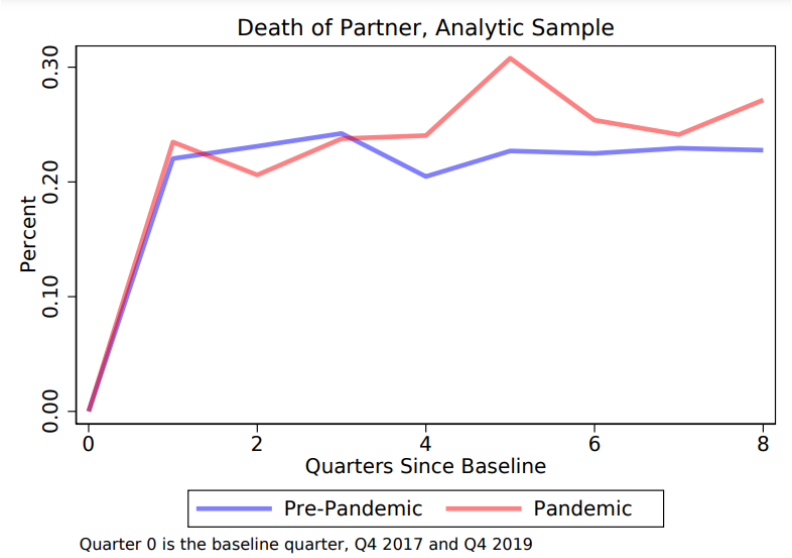
Figure 2 plots the share of primary older adults in our sample with the death of a partner by quarter over time, separately for the pre-pandemic and post-pandemic periods. Excess partner deaths associated with the pandemic period began in the fourth quarter of 2020 and peaked in the first quarter of 2021 (5th quarter post baseline), corresponding to the rise in COVID-related deaths during this period in Ohio.

Table 2: Percent of Sample with Partner Deaths within Eight Quarters after Baseline

	Pre-Pandemic (Baseline Q4 2017)		Post-Pandemic (Baseline Q4 2019)		Excess Mortality
Age	N	% Death	N	% Death	Post/Pre
50+	466,023	0.018	477,483	0.020	1.11
62+	254,425	0.027	273,341	0.029	1.07
72+	104,523	0.043	118,179	0.044	1.02

Notes: Table 2 reports the share of primary older adults in the analysis sample by age and baseline period who experience the death of a partner within eight quarters (two years) after the baseline period as defined using deaths in credit panel data.
Source: Authors' calculations from Experian Ohio Consumer Credit Panel.

Figure 2: Share of Analytic Sample with Partner Death, Occurring N Quarters Post Baseline



Notes: Figure 2 plots the share of primary older adults in our sample with the death of a partner by quarter over time (0 to 8 quarters), separately for the pre-pandemic and post-pandemic periods.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel.

3.3.3 Economic well-being from credit and wage data.

Table 3 summarizes the wage and credit outcomes modeled in Equation (2) as of eight quarters after the pre-pandemic (Q4 2017) or post-pandemic (Q4 2019) baseline period, overall and by whether or not the primary older adult experienced the death of a partner at some point after baseline. The credit outcomes include those measuring credit score, debt payment delinquency, newly opened credit card debt, amount of debt in collections, and total debt levels. Credit score is the Experian VantageScore 4.0, with values ranging from 300 to 850. As indicated elsewhere (Kowalik, Liu, and Wang 2021), credit scores increased for the average consumer shortly after the onset of the COVID pandemic due to a combination of generous forbearance policies, a general decline in debt levels, and an increase in liquidity during the period.

The outcome "total debt" includes all debt for which the primary older adult is legally responsible and includes mortgages, credit cards, auto loans, personal installment loans, student loans, and collections. Debt levels may increase or decrease following the death of a partner as the surviving older adult settles the estate and re-establishes their own credit profile. The amount of collections debt is a continuous variable that measures the amount of medical and non-medical debt that was sent to a third-party collection agency. The outcome for 60+–day payment delinquency is an indicator that takes the value "1" if an individual is delinquent on any debt payment for 60 or more days (two months of missed payments) within the prior 12 months (including the present quarter). The outcome for newly opened credit card debt is an indicator that takes the value "1" if an individual opened a new credit card trade in the prior quarter. The level of debt in collections and payment delinquencies and newly opened debt may increase after the death of a partner and can negatively impact the older adult's credit score and overall financial health. We construct two outcomes from wage data. The first is an indicator that takes the value "1" if the primary older adult worked any weeks in the quarter. The second is a continuous measure of the total wages earned by the primary older adult in the quarter, which takes the value of "0" if the older adult did not work in the quarter.[8]

The summary statistics show that older adults with the recent death of a partner have weaker credit profiles (lower credit scores, more likely to be delinquent, slightly higher collections debt, and more likely to seek new credit) than older adults without the recent death of a partner as

[8] We report nominal wages, not adjusted for inflation.

of eight quarters after baseline. They are also less likely to be in the labor force, and they have lower quarterly wages than older adults without a recent partner death—which may be in part a function of the older age of adults who are more likely to experience the death of a partner. Our multivariate regression models for Aims 2 and 3 will control for age and gender, as well as baseline credit characteristics and labor force participation.

While the results presented in Table 3 report the levels of the outcome variables as of eight quarters after baseline, it is also helpful to consider the change since baseline. Appendix Figure B.1 plots the cumulative distribution of the change in credit score from the baseline period to eight quarters after baseline, separately by pre-pandemic and post-pandemic cohort. Within each cohort, we separately shade changes in credit scores corresponding to individuals who experienced the death of a partner at some point since the baseline period. Primary adults without a partner death were more likely to experience an increase in credit score of 0-25 or 25-50 points, while primary older adults with the death of a partner were more likely to experience a decline in credit score. For example, about 20 percent of primary older adults who experienced the death of a partner had a credit score decline of 50 points or more, compared with about 10 percent of primary older adults who did not experience the death of a partner.

Table 3: Summary Statistics for Credit and Wage Outcomes as of Q8, Aims 2 & 3

	Pre-Pandemic (Q4 2019)			Post-Pandemic (Q4 2021)		
	All	No Death	Death	All	No Death	Death
Credit Score (100)	7.58	7.59	7.42	7.61	7.62	7.41
	(0.84)	(0.839)	(0.865)	(0.795)	(0.793)	(0.852)
Total Debt (in $)	60,232	60,757	31,689	58,994	59,545	31,915
	(91,143)	(91,540)	(59,397)	(94,438)	(94,901)	(62,071)
Total Collections (in $)	207	206	224	206	205	228
	(1049)	(1048)	(1110)	(1061)	(1059)	(1139)
Delinquent 60+ Days in Prior 12 Mos. (0,1)	0.060	0.059	0.089	0.041	0.040	0.076
	(0.237)	(0.236)	(0.284)	(0.198)	(0.196)	(0.265)
New Credit Card in Prior Quarter (0,1)	0.057	0.057	0.069	0.051	0.051	0.058
	(0.232)	(0.231)	(0.254)	(0.221)	(0.22)	(0.233)
Labor Force Participation (0,1)	0.384	0.388	0.177	0.360	0.363	0.166
	(0.486)	(0.487)	(0.381)	(0.48)	(0.481)	(0.372)
Quarterly Wages ($10,000)	0.671	0.679	0.210	0.739	0.749	0.224

	(4.225)	(4.261)	(0.877)	(5.64)	(5.695)	(0.921)
N	465,257	456,850	8,407	476,657	467,155	9,502

Notes: Table 3 summarizes the wage and credit outcomes modeled in Equation (2) as of eight quarters after the pre-pandemic (Q4 2017) or post-pandemic (Q4 2019) baseline period, overall and by whether the primary older adult experienced the death of a partner at some point after baseline.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data, measured eight quarters after the baseline quarter as of Q4 2019 (pre-pandemic) or Q4 2021 (post-pandemic).

3.3.4 Baseline indicators of financial vulnerability and demographic characteristics.

Table 4 summarizes the baseline levels of the financial, demographic, and ZIP-code level variables included in Equations (1) and (2) as of the baseline periods (Q4 2017 or Q4 2019). We report the summary statistics by whether the primary older adult subsequently experienced the death of a partner at any point in the following eight quarters. The means of the financial and demographic variables at baseline in years 2017 and 2019 are largely similar—indicating that the baseline periods are comparable on key covariates. This is important for our difference in differences identification strategy for Aims 2 and 3—the ability to attribute differences in outcomes to the pandemic period requires that both cohorts are similar at baseline prior to the onset of the pandemic. Summary statistics for older adults with and without the death of a partner differ expectedly, with older females and those living in predominately Black ZIP codes being more likely to experience the death of a partner during the study period. Unique to our data, we observe that older adults who subsequently experience the death of a partner have slightly weaker credit profiles at baseline, with lower credit scores and more debt that is derogatory (severely past due). They also have lower total debt levels and mortgage debt levels at baseline.

Table 4: Summary Statistics for Baseline Covariates, by Cohort and Partner Death

	Pre-Pandemic (Baseline Q4 2017)		Post-Pandemic (Baseline Q4 2019)	
	No Death Mean	Death Mean	No Death Mean	Death Mean
Age	64.133	72.54	64.714	72.704
Age 50–59	0.38	0.134	0.357	0.126
Age 60–61	0.079	0.04	0.075	0.043
Age 62–66	0.176	0.134	0.178	0.129
Age 67–69	0.091	0.093	0.092	0.091
Age 70–71	0.055	0.063	0.055	0.068
Age 72+	0.219	0.534	0.242	0.543
Black ZIP Code	0.04	0.051	0.04	0.052

Female	0.489	0.658	0.489	0.65
Credit Score (100)	7.574	7.532	7.556	7.474
HH Mort Debt (100K)	0.601	0.385	0.598	0.395
HH Credit Card Debt (100K)	0.087	0.069	0.089	0.077
HH Student Loan Debt (100K)	0.099	0.055	0.104	0.056
HH Auto Debt (100K)	0.071	0.05	0.129	0.093
Wage Earnings (10K)	0.722	0.243	0.739	0.244
Partner Wages Earnings (10K)	0.707	0.144	0.727	0.157
Labor Force Participation	0.428	0.208	0.422	0.213
Partner Labor Force Participation	0.429	0.119	0.422	0.129
N	457600	8423	467965	9518

Notes: Table 4 summarizes the baseline levels of the financial, demographic, and ZIP-code level variables included in Equations (1) and (2) as of the baseline periods (Q4 2017 or Q4 2019). We report the summary statistics by whether the primary older adult subsequently experienced the death of a partner at any point in the following eight quarters.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data, measured in the baseline quarter, as of Q4 2017 (pre-pandemic) or Q4 2019 (post-pandemic).

3.3.5 Defining relative financial position of partners.

For our third aim, we explore heterogeneous effects based on the financial position of the primary older adult (the randomly selected individual) relative to their partner as of the baseline period. We define the relative financial position of the primary older adult at baseline in two ways. First, we use the wage data to construct four categories for employment status at baseline, as follows: (1) neither primary adult nor partner employed at baseline; (2) only primary adult employed at baseline; (3) only partner employed at baseline; or (4) both primary adult and partner employed at baseline. Table 5 reports the distribution of primary older adults across the four employment categories as of the two baseline periods, overall, and by death of the partner as of eight quarters post the baseline quarter. For the largest share (42 percent), neither partner works, followed by 26 percent of the sample with both partners working. The remainder of the sample is evenly split with only the primary older adult or only the partner working as of the baseline period. For older adults in our sample who subsequently experience the death of a partner, the majority (74 percent) were in couples in which neither was in the labor force as of the baseline period.

Second, we use the credit data to identify who in the household was the owner of at least one credit card as of the baseline period. Typically, credit cards are legally owned by only one individual, with other individuals added as "authorized users." Authorized users can use the credit card, but they are not legally responsible for the credit card balance. We use ownership of a credit card as a proxy for assuming a financial role within the household, and we construct four categories

for credit card ownership at baseline as follows: (1) neither primary adult nor partner owns a credit card at baseline; (2) only primary adult owns a credit card at baseline; (3) only partner owns a credit card at baseline; or (4) both primary adult and partner own a credit card at baseline. Table 5 reports the distribution of primary respondents across the four credit card categories as of the two baseline periods and by subsequent partner death. In just over half of our sample (55–56 percent), both partners own a credit card as of the baseline period, with 12 percent of the sample with neither owning a credit card as of the baseline period. The remainder of the sample is evenly split between only the primary older adult or only the partner owning a credit card as of the baseline period.

Table 5: Relative Financial Position of Partners at Baseline, by Death of Partner Post Baseline

	Pre-Pandemic			Post-Pandemic		
	All	No Death	Death	All	No Death	Death
Labor Force (LF) Participation						
Neither in LF	0.42	0.41	0.74	0.43	0.42	0.73
Primary Adult Only in LF	0.16	0.16	0.14	0.16	0.16	0.14
Partner Only in LF	0.16	0.16	0.06	0.16	0.16	0.06
Both in LF	0.26	0.27	0.06	0.26	0.26	0.07
Credit Card (CC) Account						
Neither owns CC	0.12	0.12	0.14	0.12	0.12	0.13
Primary Adult Only owns CC	0.16	0.16	0.15	0.17	0.17	0.14
Partner Only owns CC	0.16	0.16	0.21	0.17	0.17	0.23
Both own CC	0.56	0.56	0.5	0.55	0.55	0.5
N	465,257	456,850	8,407	476,657	467,155	9,502

Notes: Table 5 reports the distribution of primary older adults across the four employment categories as of the two baseline periods, overall, and by whether they experienced the death of the partner as of eight quarters post the baseline quarter.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

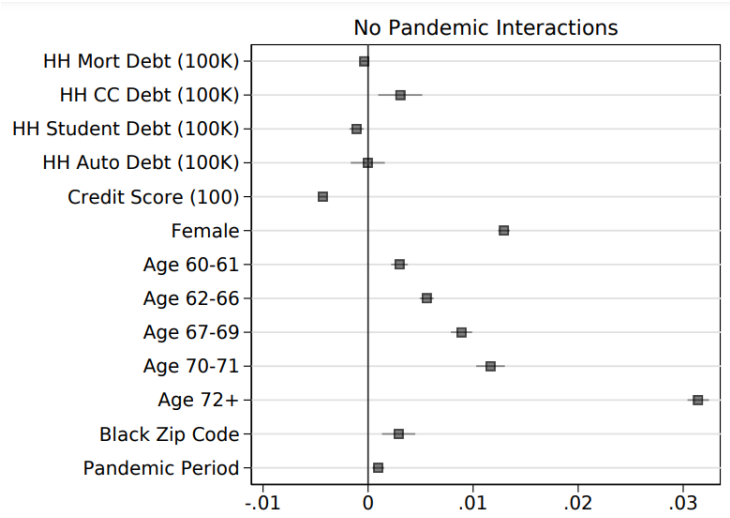
4. Results

4.1 Financial Vulnerability at Baseline and the Death of a Partner

Our first aim (Equation 1) identifies baseline factors that are associated with the probability of a partner death, exploring differences during the pandemic period. Full regression results are reported in Appendix Table A.1. Figure 3 plots key coefficients from the regression model without the pandemic period interactions. The base probability (unconditional mean) of a partner death in our analysis sample is 0.019 and is 0.018 in the pre-pandemic period. Thus, the pandemic coefficient of 0.001 in the first model (Figure 3) represents a 6-percent increase in the probability

of a partner death during the pandemic period relative to the pre-pandemic period. Demographic covariates are as expected. In all periods, female older adults are 68 percent more likely to experience the death of a partner than male primary adults. The probability of experiencing a partner death increases with age, with adults ages 72 and older being 165 percent more likely to experience the death of a partner than adults ages 50–59 (the omitted reference group). Older adults residing in majority Black ZIP codes are 15 percent more likely to experience the death of a partner than older adults in non-majority Black ZIP codes. Labor force participation and wages of the primary older adult at baseline are not significantly associated with subsequent partner deaths; however, partner labor force participation (at baseline) is associated with a 64-percent reduction in the probability of a partner death.

Figure 3: Select Regression Coefficients for Probability of Partner Death Post Baseline



Notes: Figure 3 shows regression coefficients for select baseline covariates from a linear probability model predicting death in the eight quarters after the baseline period; clustered standard errors by individual. The 95% confidence intervals are displayed. N= 942,064 (545,661 unique people).
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

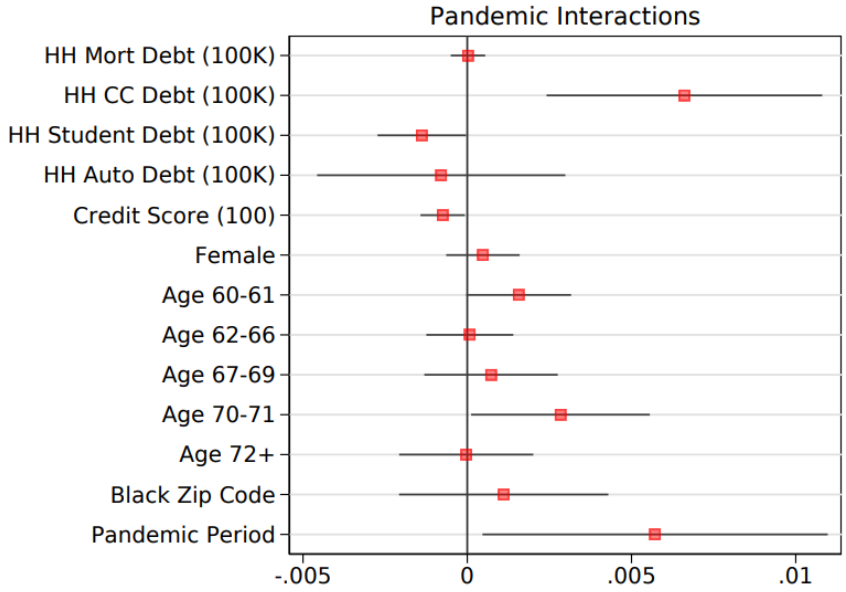
Unique to our study, we find a statistically significant relationship between credit score and the probability of a partner death, with a 100-point increase in credit score being associated with a 23-percent reduction of partner death. This is in line with prior studies that find that older adults with lower incomes and fewer financial resources are more likely to experience the death of a partner than more financially secure older adults, due in part to the strong gradient in mortality risk by income (McGarry and Schoeni 2005b; Poterba, Venti, and Wise 2018; Sullivan and

Fenelon 2014). Higher installment debt levels (mortgage and student loan debt) are associated with a reduced probability of experiencing a partner death, while higher credit card debt levels at baseline are associated with an increased probability of partner death—a $10,000 increase in credit card debt is associated with an increase in the probably of partner death of 1.6 percent. It is perhaps not surprising to find different associations by type of debt. While older adults may decumulate installment debt (mortgages, student loans) in older age and in preparation for an expected partner death, credit card debt levels may reflect consumption to pay for medical expenses and end-of-life expenses—both of which may be associated with partner deaths.

Figure 4 plots key ($p<0.05$) pandemic interaction coefficients, with full results of the regression model reported in the second column of Appendix Table A.1. With regard to demographic variables, we find a significant interaction between being in the 70–71 age category and the probability of a partner death—while older adults in this age category are typically 54 percent more likely to experience the death of a partner than older adults in the 50–59 age group (0.0102/0.019); during the pandemic, being in this age category is associated with a 68-percent increase in the probability of a partner death ((0.0102+0.0028)/0.019).

We also observe a slightly larger association between credit score at baseline and probability of a partner death during the pandemic period. In the pre-pandemic period, a 100-point increase in credit score is associated with a 21-percent decrease in the probability of partner death (-0.0039/0.019), while in the pandemic period, the same increase in credit score is associated with a 24-percent decrease in the probability of a partner death ([-0.0007+-0.0039]/0.019). The association between credit card debt at baseline and the probability of partner death is statistically significant only during the pandemic period. In the pandemic period, a $10,000 increase in credit card debt at baseline is associated with a 3.5-percent increase in the probability of a partner death (0.00066/0.019). Student loan debt is negatively associated with the probability of a partner death only during the pandemic period, although the size of the effect is very small. Wage earnings are also significantly associated with partner deaths only during the pandemic—but the effect is very small, with $10,000 more in wage earnings in a quarter associated with a 0.5-percent decrease in the probability of a partner death. Other interactions are not statistically significant, suggesting no differential associations of other baseline covariates with the probability of partner death during the pandemic relative to the pre-pandemic period.

Figure 4: Select Interaction Coefficients for Probability of Partner Death Post Baseline



Notes: Figure 4 plots the pandemic interaction coefficients for select covariates from a linear probability model predicting death in the eight quarters after the baseline period; clustered standard errors by individual. 95% confidence intervals are displayed. N= 942,064 (545,661 unique people).
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

4.2 Financial Well-Being Following the Death of a Partner

4.2.1 Event study.

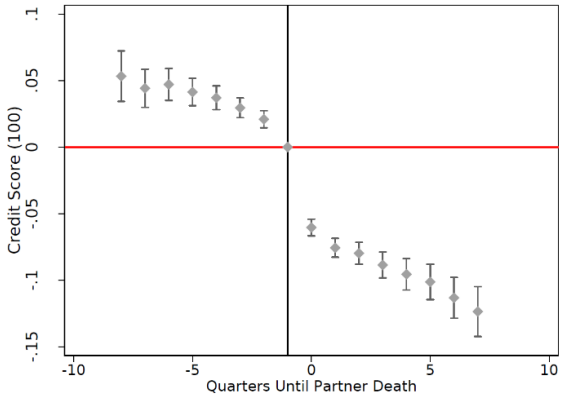
The purpose of Aim 2 is to explore the relationship between the death of a partner and the surviving older adults' financial well-being as measured in credit and wage data. Before turning to the regression results for Equation (2), we present the results of simple event study models of how credit and labor outcomes evolve before and after the death of a partner. Our event study models are limited to the older adults in our analysis sample who are living as of a given quarter but for whom we observe the death of partner at some point during the study period. We follow credit and labor outcomes for up to eight quarters before and eight quarters after the death of the partner. We graph the coefficients from event study panel regression models that include individual fixed effects and that control for the time varying age of the primary older adult, the calendar year of the outcome, and whether or not the outcome is observed during the pandemic period.

Figure 5 Panels A–F plot the coefficients from the event study models separately for each outcome. There are several notable trends in the credit outcomes after the death of a partner. Panel

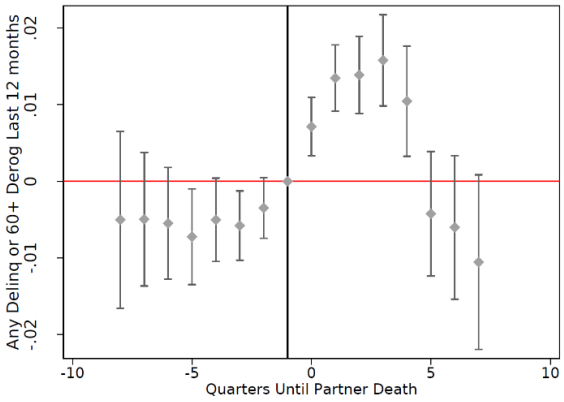
A shows a drop in credit score beginning in the first quarter after the partner's death that persists through the end of the study period—resulting in a credit score that is an average of about 15 points lower two years post the death of a partner relative to the quarter prior to death. This drop in credit score could be a function of falling behind on debt payments, an increase in derogatory or collections debt, an increase in debt relative to income or available credit, or an increase in inquiries and new debts.

Panel B shows an increase in delinquency on debt payments that begins in the quarter of the partner's death and continues to increase through one year after the death. The magnitude of the change in delinquency is roughly 1.5 percentage points, a notable increase given a base of 6.0 percent in the pre-COVID period and 4.1 percent post COVID. Collections debt levels also increase slightly in the second and third quarters following the death (Panel C), but the difference is not statistically significant. Panel D documents a steady drop in total debt held by the individual that increases shortly after the death of a partner—this could be due to co-owned or other debt that is paid off from the estate as well as a reduction in consumption following the death of a partner. Panel E shows a sharp increase in the share of older adults opening new credit card accounts in the quarter of the partner's death through the second quarter after death. If credit card accounts were previously owned by the partner, the surviving older adult may need to open new accounts in their name following a partner's death. We observe no break in the downward trend in labor force participation following the death of a partner (Panel F).

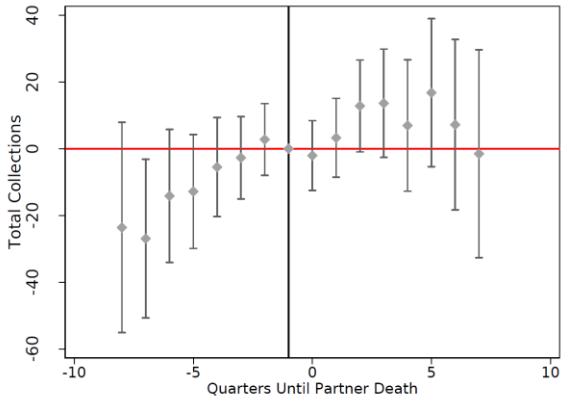
Figure 5: Event Study Models of Outcomes, before and after the Death of a Partner



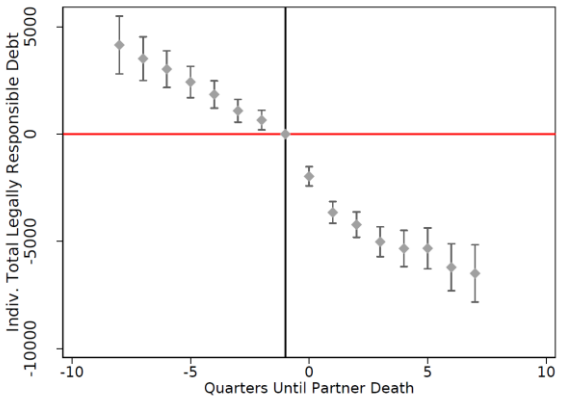
Panel A: Credit Score



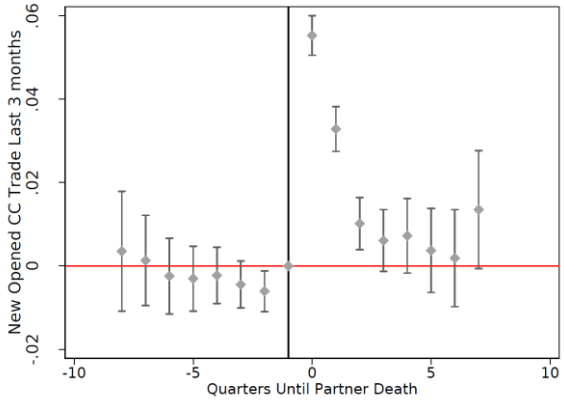
Panel B: Any 60 days+ Delinquency



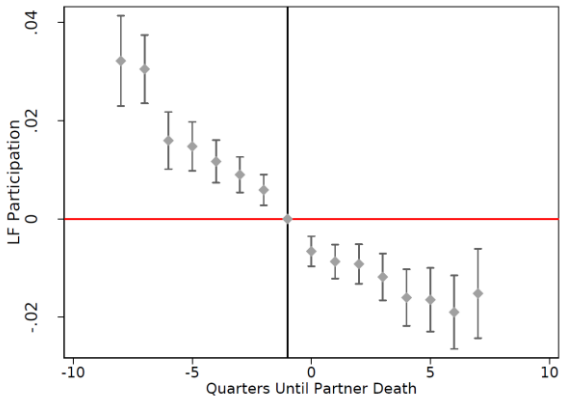
Panel C: Collections Debt



Panel D: Total Debt



Panel E: New Credit Cards



Panel F: Labor Force Participation

Notes: Panels A–F of Figure 5 plot coefficients from event study panel regression models that include individual fixed effects and that control for the time varying age of the primary older adult, the calendar year of the outcome, and whether the outcome is observed during the pandemic period. 95% confidence intervals are displayed; N= 161,469 (17,927 unique people).
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

7.2.2 **Regression results.**

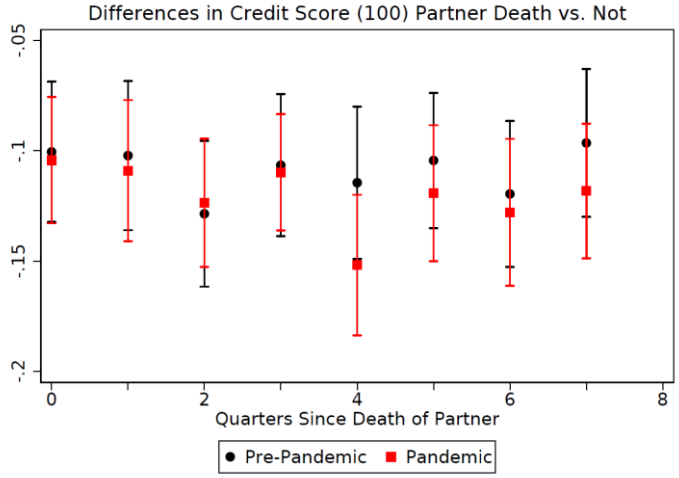
We next turn to the models for Aim 2 (Equation 2) that estimate the relationship between the death of a partner and credit outcomes for the primary older adult as of four quarters or eight quarters following the baseline period (Q4 2017 or Q4 2019). Appendix Tables A.2.1–A.2.2 report the full regression results as of four quarters post baseline (Q4 2018 or Q4 2020) and Appendix Tables A.3.1–A.3.2 report the full regression results as of eight quarters post baseline (Q4 2019 or Q4 2021). The primary coefficients of interest are the overall indicators for partner death (occurring N quarters since the outcome quarter) as well as the interactions between partner deaths and the pandemic period. For ease of interpretation, we produce two visualizations of the key interaction coefficients as of eight quarters after baseline. Figure 6 visualizes the difference in differences estimates from the interactions between the death indicators and pandemic period indicator. Figure 7 visualizes the predicted values for a given outcome for each combination of death and the pandemic period. We focus on the credit score outcomes for these visualizations but discuss the results for other outcomes based on the results in the Appendix.

As of eight quarters after baseline, the death of a partner during pre-pandemic periods is associated with an average reduction in credit score of 10 points for deaths occurring in the same (eighth) quarter to a maximum average reduction of 12 points for deaths occurring six quarters prior. As shown in Figure 6, the size of this reduction is slightly larger during some of the early pandemic periods (particularly for deaths that occurred in the fourth quarter of 2020, four quarters prior to the outcome period); however these effects are not statistically significantly ($p<0.05$) different from pre-pandemic periods.

Figure 7 demonstrates that while the sizes of the reductions in credit score for older adults with and without a partner death are similar during the pre-pandemic and pandemic periods, the point estimates of credit scores during the pandemic are higher. This shift is driven by the relatively higher credit scores for older adults with and without a partner death during the pandemic period, indicative of the overall boost to credit scores previously observed in the general population after the onset of the pandemic (Brown, Collins, and Moulton 2022). Specifically, prior to the pandemic, the average credit score for older adults without a partner death in the sample was 757 as of eight quarters after baseline. The average credit score for older adults without a partner death increased to 763 during the pandemic period. However, older adults with the death of a partner experienced roughly the same size decrease in credit score during the pandemic as did older adults with a

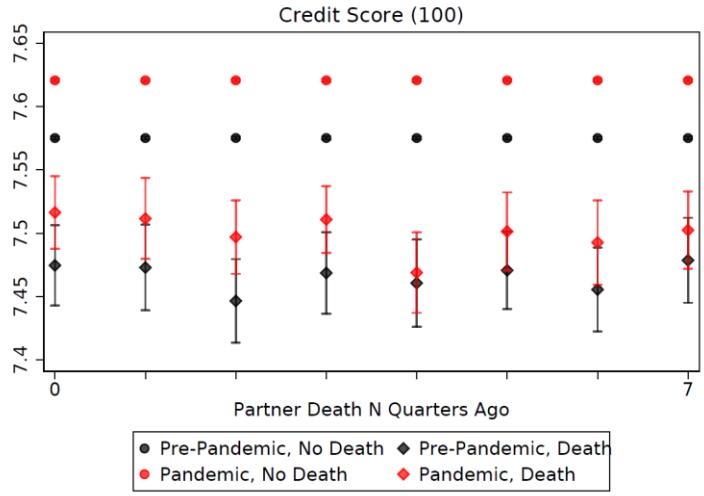
partner death in the pre-pandemic period. Thus, the pandemic-era boost to credit scores equally benefited older adults experiencing the death of a partner and older adults who did not experience the death of a partner. To the extent that pandemic-era policies sought to support the hardest-hit during the pandemic, we would expect a larger buffering effect for widowed older adults.

Figure 6: Difference in Differences Estimates for Partner Death*Pandemic Period on Credit Score as of Eight Quarters Post Baseline



Notes: Figure 6 visualizes the difference in differences estimates from the Aim 2 regression models for the relationship between the death of a partner on credit score in the pre-pandemic and pandemic periods.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

Figure 7: Predicted Credit Score by Partner Death*Pandemic as of Eight Quarters Post Baseline



Notes: Figure 7 visualizes the predicted values for credit score from the Aim 2 regression models for each combination of death and the pandemic period.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

Examining the interaction results for the other credit outcomes helps inform the reasons for the drop in credit score following the death of a partner. The results in Appendix Tables A.3.1 and A.4.1 indicate a consistent, significant increase in delinquency on debt payments following the death of a partner—an effect that is largest for deaths that occurred in the most recent quarters but is still significant for deaths occurring seven quarters prior to the outcome period. There is no significant difference in the association between death and delinquency during the pandemic period relative to the pre-pandemic period, despite the overall reduction in delinquency rates during the pandemic period for all older adults.

The results for opening new credit cards in Appendix Tables A.3.2 and A.4.2 also shed some light on possible reasons for reductions in credit scores following the death of a partner, as opening new lines of credit leads to a temporary drop in credit score. During pre-pandemic periods, the death of a partner is associated with a short-term increase in the rate of the surviving older adult opening new credit card trades (in the same quarter of the death and the quarter immediately following death). During the pandemic period, the difference in the rate of increase for older adults with the death of a partner relative to older adults without the death of a partner is slightly smaller if the deaths occurred in the same quarter, after which there is no significant difference relative to the effects for deaths in pre-pandemic periods (Table A.3.3).

We observe that debt levels generally decline following the death of a partner (Tables A.3.1 and A.4.1), with some evidence of a larger decline for deaths occurring at the end of the pandemic period (e.g., in Q4 2021, zero quarters since the outcome). Debt levels decreased for all older adults during the pandemic period regardless of partner death. We do not observe much evidence of a significant change in collections debt following the death of a partner overall or during the pandemic period.

We do not observe much of a relationship between the death of a partner and the labor force participation of the primary older adults in our sample (Tables A.3.2 and A.4.2), nor do we observe significant changes in this relationship during the pandemic period. Labor force participation overall decreased for older adults in our sample during the pandemic period, but we do not observe differences by death of a partner. By contrast, we observe a modest increase in wages for older adults who experience the death of a partner in pre-pandemic periods—which, when combined with no change in labor force participation, may indicate more hours worked or

changes in the rate of pay for work performed following the death of a partner rather than re-entrance in the labor force. The interaction between death of a partner and the pandemic period on wages is often statistically significant and negative. Thus, the difference in wages between those with and without the death of a partner widened during the pandemic. Overall wage income actually increased for older adults in our study during the pandemic period despite a drop in labor force participation, potentially driven by inflation and selection of the older adults who continued to work during the pandemic. For older adults with the death of a partner, however, wage income did not increase as much during the pandemic.

4.3 Heterogeneous Effects

There is reason to expect that the relationship between the death of a partner and financial well-being is not homogenous but instead will vary by age, gender, and the relative financial position of the surviving older adult. Our Aim 3 regression models (Equation 3) examine heterogeneous effects by including triple interaction terms for particular demographic characteristics, death of a partner, and the pandemic period. While we estimate heterogeneous effects for each of our credit and labor force outcomes, we focus here on credit score as the focal outcome, and eight quarters post baseline as the focal outcome quarter. We plot the predicted credit score by death of a partner and pandemic or pre-pandemic period for each of our heterogeneous interactions. (Complete regression outputs corresponding to heterogeneous effects for all outcomes are available from the authors upon request.)

Figure 8 visualizes the relationship of the death of a partner on credit score by the gender of the primary older adult. Overall, female older adults in our sample have slightly higher credit scores than males ($p<0.05$)—although the magnitude of this difference is very small (less than one point). Visually, it appears that the gap in credit scores for older adults with and without the death of a partner is larger for male older adults (left panel) than for female older adults (right panel) by about five points—however, the gender difference in the gap is statistically significant ($p<0.05$) only for deaths occurring six quarters prior to the outcome period. There is no consistent statistically significant interaction between gender and pandemic deaths—suggesting that any gender difference in the relationship between death of a partner and credit score was statistically similar for deaths occurring during the pandemic period.

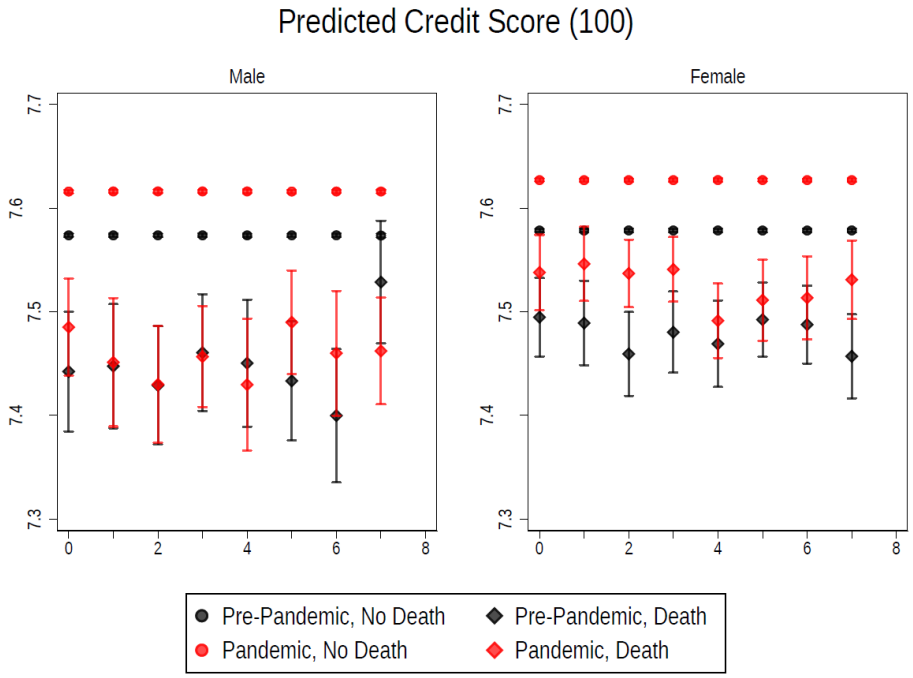
Figure 9 visualizes the relationship of the death of partner on credit score by the age of the primary older adult. It is first informative to compare credit scores by age of older adults generally, without the death of a partner. For older adults not experiencing the death of a partner, those ages 67 to 71 have the highest credit scores of any age group in our sample—an average of five points higher than adults ages 50 to 59 (the omitted youngest group). By contrast, credit scores of the oldest group in our sample (ages 72+) are only about one point higher than the omitted youngest group. During the pandemic period, the oldest adults in our sample experienced less of a boost to their credit scores (only about 2 points on average) than younger cohorts. This is evident visually in Figure 9 by the distance between the black and red circles being smaller for ages 72+ but larger for the younger cohorts. The gap in credit score between older adults with and without the death of a partner is consistently statistically significant and large for the oldest age cohort (ages 72+). For example, deaths occurring four quarters prior to the outcome period are associated with a 21-point decrease in credit score for adults aged 72 and older, with smaller and less consistently statistically significant decreases in credit score for younger adults with a partner death. We do not observe consistent, statistically significant ($p<0.05$) pandemic-era differences in the relationship between death of a partner and credit score by age.

Figure 10 visualizes the financial position of the primary older adult relative to their partner, as defined by labor force status as of the baseline period. In general, our regression results indicate that older adults who are in the labor force have higher credit scores than primary older adults who are not in the labor force by three to four points ($p<0.05$), with the highest scores for primary older adults where both partners are in the labor force. During the pandemic period, older adults in the labor force experienced a larger increase in credit score (of two to three points) than older adults where both partners were out of the labor force. Primary older adults for whom only the partner was in the labor force at baseline had less of a pandemic boost to credit score than primary older adults who themselves were in the labor force. We see some evidence that the gap in credit scores following the death of a partner is largest for older adults where both the primary older adult and partner were out of the labor force as of the baseline period (the upper left panel), with less of a relationship between the death of a partner and credit score differences for those with either the partner or primary older adult (or both) in the labor force as of baseline. We do not observe consistent evidence of significant differences in the relationship between labor force financial position and credit score following the death of a partner during the pandemic period.

Figure 11 visualizes the financial position of the primary older adult relative to their partner, as defined by owning a credit card as of the baseline period. In general, older adults who own their own credit card have significantly ($p<0.05$) higher credit scores (14 to 16 points) than older adults who do not own their own cards—with those primary adults where neither partner owns a credit card having the lowest credit scores. There is a statistically significant ($p<0.05$) interaction between owning a credit card and the pandemic period, suggesting that the pandemic era boost to credit scores was not surprisingly larger for those who owned credit cards. We observe no relationship between the death of a partner and credit score for older adults who owned a credit card but their partner did not (upper right panel)—in these situations, the partner did not have a credit card prior to death and thus any credit effects of the partner's death may have been less severe. By contrast, we observe the largest declines in credit score associated with the death of a partner, both before and during the pandemic, for those couples where only the deceased partner had a credit card in the baseline period (bottom left panel). Given the account opening and delinquency estimates, the surviving respondents in these couples may have suffered credit score declines with the opening of new accounts in their name, missed payments, or both.

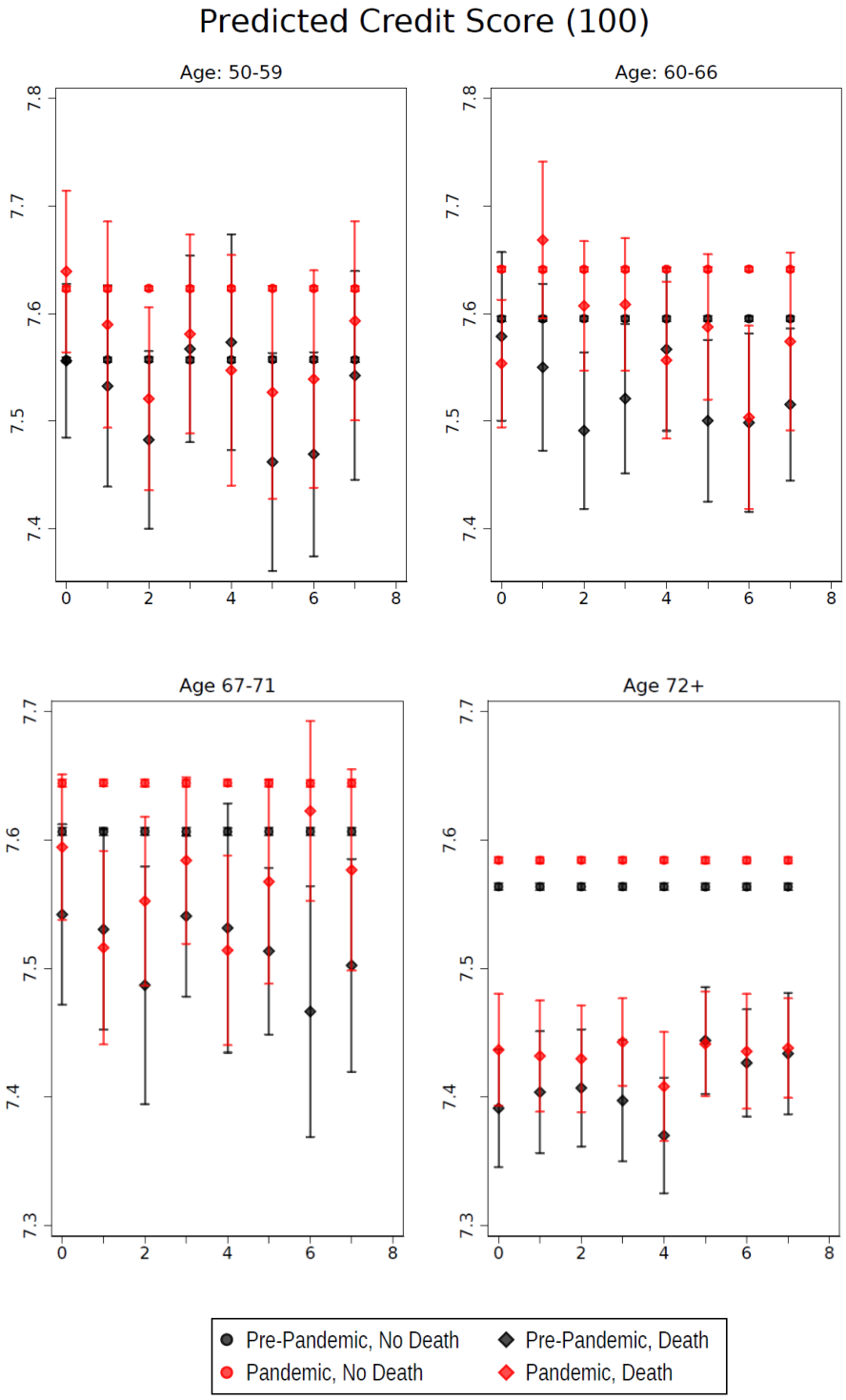
Overall, our estimates indicate a meaningful loss of financial position following the death of a partner, with evidence of heterogeneous effects by age and the relative financial position of the older adult. Specifically, the statistically significant negative relationship between partner death and credit score is concentrated among the oldest adults in our sample (ages 72 and older) and those where both partners were out of the labor force as of the baseline period. While these groups are certainly related (e.g., the oldest adults are also the most likely to be out of the labor force), it is important to note that the effects for our subgroup interactions are conditional on labor force status and age. We also find evidence that the negative relationship between the death of a partner and credit is largest for older adults where only the partner owned a credit card at baseline.

Figure 8: Predicted Credit Score by Partner Death*Pandemic*Gender as of Eight Quarters Post Baseline



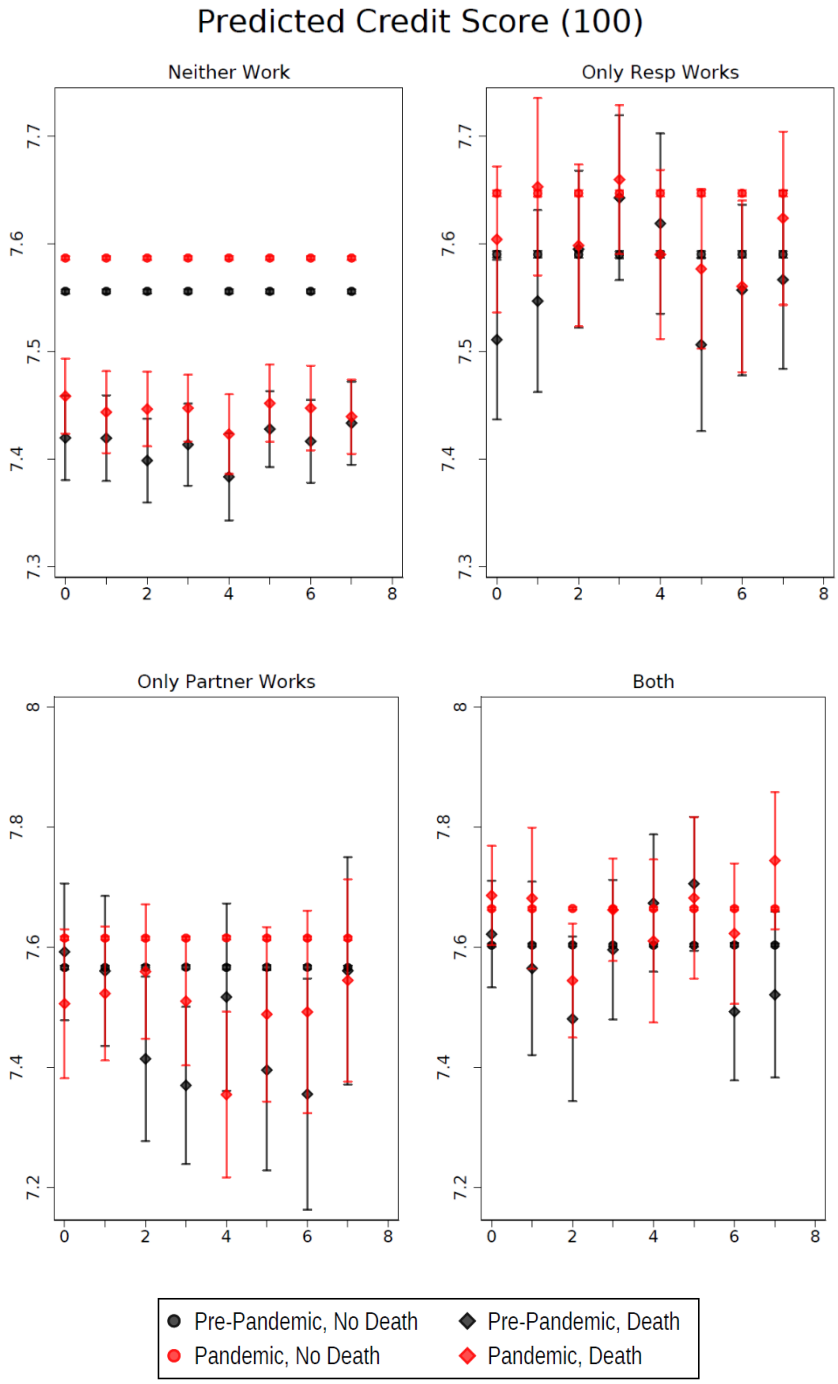
Notes: Figure 8 plots the predicted values for credit score from the Aim 3 regression models, visualizing the relationship of the death of a partner on credit score by the gender of the primary older adult.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

Figure 9: Predicted Credit Score by Partner Death*Pandemic*Age as of Eight Quarters Post Baseline



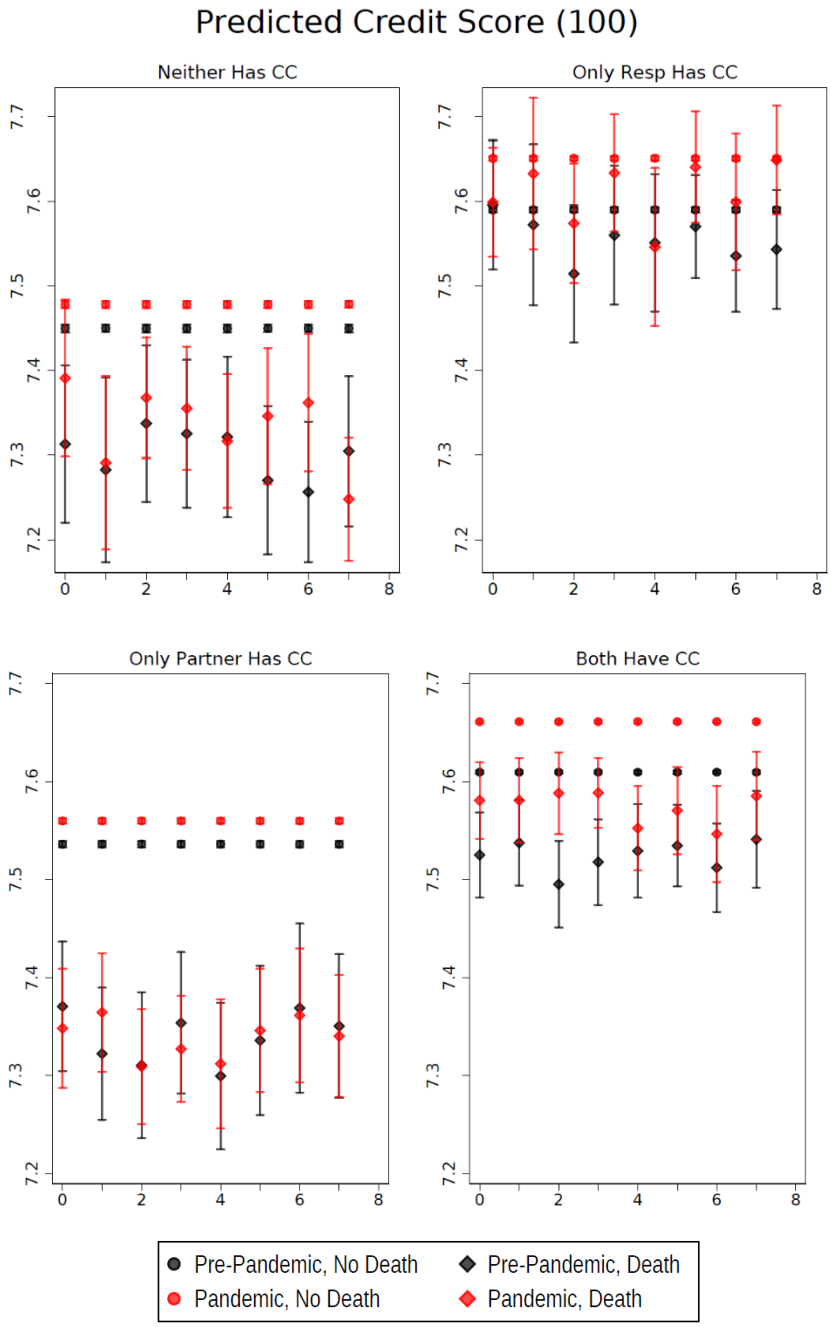
Notes: Figure 9 plots the predicted values for credit score from the Aim 3 regression models, visualizing the relationship of the death of a partner on credit score by the age of the primary older adult.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

Figure 10: Predicted Credit Score by Partner Death*Pandemic*Labor Force Status as of Eight Quarters Post Baseline



Notes: Figure 10 plots the predicted values for credit score from the Aim 3 regression models, visualizing the relationship of the death of a partner on credit score by the financial position of the primary older adult relative to their partner, as defined by labor force status as of the baseline period.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

Figure 11: Predicted Credit Score by Partner Death*Pandemic*Credit Ownership Status as of Eight Quarters Post Baseline



Notes: Figure 11 plots the predicted values for credit score from the Aim 3 regression models, visualizing the relationship of the death of a partner on credit score by the financial position of the primary older adult relative to their partner, as defined by owning a credit card as of the baseline period.
Source: Authors' calculations from the Experian Ohio Consumer Credit Panel and OLDA wage data.

5. Discussion

The current study provides a new understanding of the challenges to the economic security of older adults who experience the death of a partner. While prior studies document a decline in income and wealth following the death of a partner (Munnell, Sanzenbacher, and Zulkarnain 2020; Streeter (2020)), our study calls attention to credit as an important indicator of economic security in older age that may be affected by the death of a partner. Many older adults rely on credit for basic consumption—with 85 percent of adults aged 65 and older holding a credit card, and 45 percent of older adults with a credit card revolving their balance in a given month, indicating a need for liquidity that is met through borrowing on credit cards (Fulford and Schuh 2015). The death of a partner—particularly unexpected deaths—may be associated with acute stress and financial strain (Carr and Utz 2001) that leads to missed bill payments and difficulty managing finances. Further, if the deceased partner was financially responsible for some or all of the bills in the household, the surviving partner may need to establish new, independent lines of credit following the death of the partner. The relationship between the death of a partner and credit and debt outcomes of the surviving older adult is thus an important yet previously overlooked component of economic security in older age.

To inform this relationship, we leverage administrative credit and wage data for a large random sample of adults ages 50 and older in Ohio over 16 quarters, from December 2017 through December 2021. Importantly, our data span pre- and post-pandemic periods, allowing us to examine the relationship between the death of a partner and economic security in relatively "normal" times and in a period when unexpected deaths among older adults were more common. COVID-related deaths were frequently unexpected or sudden (Stroebe and Schut 2021) and were associated with lack of preparation, distress, and isolation (Carr, Boerner, and Moorman 2020; Wang et al. 2022).

Results for our first study aim find that older adults who were more financially vulnerable were more likely to experience the death of a partner in all periods. Our data show few differences in risk factors associated with partner death during pandemic relative to pre-pandemic–period deaths. In line with census data, our credit records confirm that women were more likely to become widowed than men, supporting the use of credit records to study bereavement. Our key finding examines the relationship between credit score and the probability of a partner death. Our data

show that a 100-point higher credit score is associated with a 23-percent lower likelihood of experiencing a partner death. It is important to caution that the observed relationship between credit score at baseline and subsequent death is not causal and likely reflects unobserved factors that correlate with both having a lower credit score and mortality risk. This is in line with prior studies that find that older adults with lower incomes and fewer financial resources are more likely to experience the death of a partner than are more financially secure older adults, due in part to the strong gradient in mortality risk by income (McGarry and Schoeni 2005b; Poterba, Venti, and Wise 2018; Sullivan and Fenelon 2014).

Our second aim examines credit and wage outcomes for older adults following the death of a partner relative to older adults during the same time period who do not experience a partner death. Unique to our study, we find a significant and persistent decline in credit score among older adults following the death of a partner. The size of the effect is notable, with an average decline of 10 points for all older adults following the death of a partner through eight quarters after the death occurs. Further, nearly 31 percent of older adults in our sample experience a drop in credit score of more than 20 points following the death of a partner—which places the older adult at risk for higher borrowing costs and less access to credit in the future. We also observe a significant and persistent increase in delinquency on debt payments following the death of a partner, as well as a short-term increase in the opening of new lines of credit. The negative relationship between partner deaths and credit is statistically similar for deaths in both the pre-pandemic and pandemic periods.

Our third aim explores heterogeneous effects by gender, age, and the relative financial position of the surviving older adult. We find that the negative association of death on credit is concentrated (and largest) in our sample among adults ages 72 and older and those who were out of the labor force. This is the population of older adults who are most likely to be dependent on Social Security retirement and survivor benefits for their economic security, given they are of full retirement age and out of the labor force (Fadlon, Ramnath, and Tong 2019). While this group was disproportionately impacted by pandemic increases in deaths, these individuals may have benefited the least from targeted financial supports that operated through the labor force (e.g., expanded unemployment benefits) or through forbearances on debt payments like mortgages and student loans—which are less commonly held by the oldest adults in our sample.

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Appendix

Appendix Table A.1: LPM Regression Output, Baseline Characteristics Associated with Subsequent Death of a Partner (Within Eight Quarters Post-Baseline)

	(1)	(2)
HH Mort Debt (100K)	-0.0003**	-0.0003
	(0.000)	(0.000)
HH CC Debt (100K)	0.0031**	-0.0003
	(0.001)	(0.001)
HH Student Debt (100K)	-0.0011**	-0.0004
	(0.000)	(0.001)
HH Auto Debt (100K)	-0.0000	0.0004
	(0.001)	(0.002)
Credit Score (100)	-0.0043***	-0.0039***
	(0.000)	(0.000)
Female	0.0129***	0.0127***
	(0.000)	(0.000)
Age 50-59	0.0000	0.0000
	(.)	(.)
Age 60-61	0.0030***	0.0022***
	(0.000)	(0.001)
Age 62-66	0.0056***	0.0055***
	(0.000)	(0.000)
Age 67-69	0.0089***	0.0085***
	(0.001)	(0.001)
Age 70-71	0.0117***	0.0102***
	(0.001)	(0.001)
Age 72+	0.0314***	0.0314***
	(0.001)	(0.001)
Black Zip Code	0.0029***	0.0023*
	(0.001)	(0.001)
Pandemic Period	0.0010***	0.0057*
	(0.000)	(0.003)
Primary Quarterly Wage Earnings (10K)	-0.0000	0.0000
	(0.000)	(0.000)
Partner Quarterly Wages (10K)	-0.0000	-0.0000
	(0.000)	(0.000)
Primary LF Participation	0.0000	-0.0002
	(0.000)	(0.000)
Partner LF Participation	-0.0122***	-0.0120***
	(0.000)	(0.000)
Pandemic x HH Mort Debt (100K)		0.0000
		(0.000)

Pandemic x HH CC Debt (100K)		0.0066**
		(0.002)
Pandemic x HH Student Debt (100K)		-0.0014*
		(0.001)
Pandemic x HH Auto Debt (100K)		-0.0008
		(0.002)
Pandemic x Credit Score (100)		-0.0007*
		(0.000)
Pandemic x Female		0.0005
		(0.001)
Pandemic x Age 50-59		0.0000
		(.)
Pandemic x Age 60-61		0.0016
		(0.001)
Pandemic x Age 62-66		0.0001
		(0.001)
Pandemic x Age 67-69		0.0007
		(0.001)
Pandemic x Age 70-71		0.0028*
		(0.001)
Pandemic x Age 72+		-0.0000
		(0.001)
Pandemic x Black Zip Code		0.0011
		(0.002)
Pandemic x Primary Quarterly Wage Earnings (10K)		-0.0001*
		(0.000)
Pandemic x Partner Quarterly Wages (10K)		-0.0001
		(0.000)
Pandemic x Primary LF Participation		0.0004
		(0.001)
Pandemic x Partner LF Participation		-0.0004
		(0.001)
Constant	0.0397***	0.0373***
	(0.001)	(0.002)
Obs	942064	942064
Mean	0.019	0.019
StDv	0.137	0.137
N	545661	545661
F-statistic	634	329

Notes: *p<0.05; **p<0.01; ***p<0.001; standard errors in parentheses.

Coefficients from OLS regression model; standard errors clustered by individual.

Appendix Table A.2.1: OLS Regression Output, Baseline Characteristics Associated with Credit and Labor Outcomes as of Four Quarters Post Baseline

	Credit Score (100)	Total Ind Debt	Total Collections	Delinq or Derog 60+ in Prior 12m
Baseline HH Mort Debt (100K)	0.0140***	70247.8751***	11.3703***	0.0091***
	(0.000)	(198.715)	(1.228)	(0.000)
Baseline HH CC Debt (100K)	0.1106***	63536.0161***	-693.6019***	-0.0657***
	(0.003)	(771.107)	(9.398)	(0.002)
Baseline HH Stu Debt (100K)	-0.0069***	23485.5181***	-54.7035***	0.0161***
	(0.001)	(409.019)	(4.702)	(0.001)
Baseline HH Auto Debt (100K)	-0.0022	52003.9965***	-20.5621*	0.0286***
	(0.003)	(624.440)	(8.566)	(0.002)
Baseline Credit Score (100)	0.8834***	4965.9818***	-495.0957***	-0.1214***
	(0.001)	(87.008)	(3.013)	(0.000)
Female	0.0057***	-8451.7628***	-6.8503**	0.0029***
	(0.001)	(149.407)	(2.431)	(0.000)
Age 50-59	0.0000	0.0000	0.0000	0.0000
	(.)	(.)	(.)	(.)
Age 60-61	0.0125***	-4070.3544***	-25.3234***	0.0016
	(0.001)	(249.884)	(4.614)	(0.001)
Age 62-66	0.0247***	-4959.3341***	-41.6531***	0.0003
	(0.001)	(216.687)	(3.890)	(0.001)
Age 67-69	0.0348***	-4661.6678***	-76.1809***	0.0051***
	(0.001)	(260.344)	(4.405)	(0.001)
Age 70-71	0.0366***	-4967.3557***	-100.2947***	0.0069***
	(0.002)	(289.678)	(4.662)	(0.001)
Age 72+	0.0100***	-10837.396***	-142.9644***	0.0035***
	(0.001)	(242.945)	(4.159)	(0.001)
Black Zip Code	-0.0426***	-1394.2270***	4.9485	0.0069***
	(0.002)	(289.632)	(8.597)	(0.002)
Pandemic Period	0.0388***	-3814.4344***	31.9021***	-0.0129***
	(0.001)	(95.311)	(1.676)	(0.000)
Baseline Quarterly Wages (10K)	0.0009***	989.7392***	1.2193***	0.0003***
	(0.000)	(153.791)	(0.229)	(0.000)
Baseline Partner Wages (10K)	0.0001	-145.4908	0.0666	0.0000
	(0.000)	(104.402)	(0.058)	(0.000)
Baseline LFP	0.0292***	9332.8523***	-45.8897***	0.0101***
	(0.001)	(286.599)	(3.206)	(0.001)
Baseline Partner LFP	0.0113***	-4161.4496***	-8.7208**	-0.0020***
	(0.001)	(229.246)	(3.008)	(0.001)
Partner Death 0 Quarters Ago	-0.0952***	-3481.5170**	-37.6088	0.0216**
	(0.016)	(1296.778)	(22.937)	(0.008)

Pandemic x Death 0 Quarters Ago	-0.0284	3508.0958	66.1184	-0.0010
	(0.021)	(1852.666)	(42.920)	(0.011)
Partner Death 1 Quarters Ago	-0.0860***	-4993.3655***	-27.2752	0.0248***
	(0.014)	(1431.295)	(24.415)	(0.007)
Pandemic x Death 1 Quarters Ago	-0.0162	1488.5186	-26.4521	-0.0048
	(0.020)	(2060.159)	(36.993)	(0.010)
Partner Death 2 Quarters Ago	-0.0984***	-4177.4628**	82.0743*	0.0391***
	(0.015)	(1346.207)	(37.416)	(0.008)
Pandemic x Death 2 Quarters Ago	-0.0147	1279.6855	-85.3505	-0.0037
	(0.021)	(2084.926)	(50.167)	(0.012)
Partner Death 3 Quarters Ago	-0.0730***	-7317.7979***	111.5693**	0.0379***
	(0.015)	(1415.774)	(37.502)	(0.008)
Pandemic x Death 3 Quarters Ago	-0.0139	4674.1464*	-101.1533*	-0.0019
	(0.020)	(2139.667)	(49.894)	(0.012)
Obs	941919	941919	941919	941919
Mean	7.590	61394.419	215.871	0.058
StDv	0.832	92331.675	1084.967	0.233

Notes: *p<0.05; **p<0.01; ***p<0.001. Standard errors in parentheses.

Coefficients from OLS regression model. Standard errors clustered by individual

Appendix Table A.2.2: OLS Regression Output, Baseline Characteristics Associated with Credit and Labor Outcomes as of Four Quarters Post Baseline

	New CC Open	LF Participation	Quarterly Wages (10K)
Baseline HH Mort Debt (100K)	0.0030***	0.0030***	0.0956***
	(0.000)	(0.000)	(0.016)
Baseline HH CC Debt (100K)	0.0147***	0.0345***	0.2747***
	(0.002)	(0.002)	(0.044)
Baseline HH Stu Debt (100K)	0.0030***	0.0095***	-0.0151*
	(0.001)	(0.001)	(0.006)
Baseline HH Auto Debt (100K)	0.0256***	0.0253***	0.0358*
	(0.002)	(0.002)	(0.018)
Baseline Credit Score (100)	-0.0037***	0.0035***	0.0759***
	(0.000)	(0.000)	(0.013)
Female	0.0120***	-0.0083***	-0.1269***
	(0.000)	(0.001)	(0.026)
Age 50-59	0.0000	0.0000	0.0000
	(.)	(.)	(.)
Age 60-61	-0.0036***	-0.0299***	-0.1033***
	(0.001)	(0.001)	(0.013)
Age 62-66	-0.0046***	-0.0757***	-0.1974***
	(0.001)	(0.001)	(0.020)
Age 67-69	-0.0046***	-0.0951***	-0.2637***
	(0.001)	(0.001)	(0.026)
Age 70-71	-0.0063***	-0.0966***	-0.2673***
	(0.001)	(0.001)	(0.028)
Age 72+	-0.0183***	-0.0955***	-0.2444***
	(0.001)	(0.001)	(0.025)
Black Zip Code	0.0042***	-0.0016	-0.0052
	(0.001)	(0.001)	(0.005)
Pandemic Period	-0.0159***	-0.0196***	0.0449***
	(0.000)	(0.000)	(0.006)
Baseline Quarterly Wages (10K)	-0.0002***	0.0035***	0.6631***
	(0.000)	(0.001)	(0.068)
Baseline Partner Wages (10K)	-0.0000	-0.0002	0.0002
	(0.000)	(0.000)	(0.000)
Baseline LFP	0.0076***	0.8122***	0.3949***
	(0.001)	(0.001)	(0.103)
Baseline Partner LFP	0.0000	0.0113***	-0.0835***
	(0.001)	(0.001)	(0.016)
Partner Death 0 Quarters Ago	0.0493***	-0.0045	0.0034
	(0.010)	(0.006)	(0.013)
Pandemic x Death 0 Quarters Ago	0.0157	0.0093	-0.0316
	(0.013)	(0.009)	(0.016)

Partner Death 1 Quarters Ago	0.0241**	-0.0072	0.0015
	(0.008)	(0.006)	(0.011)
Pandemic x Death 1 Quarters Ago	0.0061	0.0082	-0.0258
	(0.010)	(0.009)	(0.016)
Partner Death 2 Quarters Ago	0.0169*	-0.0043	0.0093
	(0.007)	(0.006)	(0.017)
Pandemic x Death 2 Quarters Ago	-0.0058	-0.0005	-0.0431
	(0.010)	(0.009)	(0.026)
Partner Death 3 Quarters Ago	0.0137	0.0049	0.0161
	(0.007)	(0.006)	(0.011)
Pandemic x Death 3 Quarters Ago	-0.0123	-0.0055	-0.0626***
	(0.009)	(0.009)	(0.017)
Obs	941919	941919	941919
Mean	0.046	0.390	0.717
StDv	0.209	0.488	3.119

Notes: *p<0.05; **p<0.01; ***p<0.001. Standard errors in parentheses.

Coefficients from OLS regression model. Standard errors clustered by individual

Appendix Table A.3.1: OLS Regression Output, Baseline Characteristics Associated with Credit and Labor Outcomes as of Eight Quarters Post Baseline

	Credit Score (100)	Total Ind Debt	Total Collections	Delinq or Derog 60+ in Prior 12m
Baseline HH Mort Debt (100K)	0.0215***	65231.6853***	6.6307***	0.0050***
	(0.000)	(207.900)	(1.224)	(0.000)
Baseline HH CC Debt (100K)	0.1824***	65079.6162***	-520.0155***	-0.0402***
	(0.004)	(818.941)	(10.152)	(0.002)
Baseline HH Stu Debt (100K)	-0.0057***	25371.7294***	-54.0208***	0.0101***
	(0.002)	(427.294)	(4.767)	(0.001)
Baseline HH Auto Debt (100K)	-0.0257***	49359.0298***	7.7496	0.0368***
	(0.003)	(675.275)	(8.564)	(0.002)
Baseline Credit Score (100)	0.8251***	3661.5187***	-464.6632***	-0.0876***
	(0.001)	(92.322)	(2.951)	(0.000)
Female	0.0082***	-8477.4133***	-6.5016**	0.0017***
	(0.001)	(159.572)	(2.397)	(0.000)
Age 50-59	0.0000	0.0000	0.0000	0.0000
	(.)	(.)	(.)	(.)
Age 60-61	0.0178***	-6069.3335***	-16.3740***	-0.0028**
	(0.002)	(288.412)	(4.761)	(0.001)
Age 62-66	0.0293***	-7889.5140***	-34.4378***	-0.0044***
	(0.001)	(238.473)	(3.931)	(0.001)
Age 67-69	0.0446***	-7814.3842***	-66.9400***	-0.0042***
	(0.002)	(282.444)	(4.425)	(0.001)
Age 70-71	0.0428***	-7410.5741***	-88.3667***	-0.0020*
	(0.002)	(319.258)	(4.768)	(0.001)
Age 72+	0.0003	-13423.1320***	-127.0860***	-0.0044***
	(0.001)	(265.239)	(4.187)	(0.001)
Black Zip Code	-0.0604***	-1342.0929***	6.9298	0.0192***
	(0.002)	(310.004)	(8.488)	(0.002)
Pandemic Period	0.0457***	-3826.3927***	-6.3599***	-0.0229***
	(0.001)	(112.181)	(1.633)	(0.000)
Baseline Quarterly Wages (10K)	0.0006**	1061.6626***	0.6108***	-0.0002***
	(0.000)	(168.998)	(0.178)	(0.000)
Baseline Partner Wages (10K)	0.0001	-162.8197	0.0210	-0.0001
	(0.000)	(112.677)	(0.058)	(0.000)
Baseline LFP	0.0448***	9739.2361***	-41.1239***	0.0065***
	(0.001)	(311.262)	(3.147)	(0.001)
Baseline Partner LFP	0.0170***	-4253.7191***	-13.7541***	-0.0039***
	(0.001)	(247.389)	(2.956)	(0.001)
Partner Death 0 Quarters Ago	-0.1005***	-673.1334	4.1840	0.0215**
	(0.016)	(1421.231)	(30.832)	(0.008)
Pandemic x Death 0 Quarters Ago	-0.0038	-4415.2132*	-17.7887	0.0052
	(0.022)	(2020.180)	(42.956)	(0.010)
Partner Death 1 Quarters Ago	-0.1022***	-4439.5182**	49.3373	0.0374***
	(0.017)	(1359.064)	(38.990)	(0.009)
Pandemic x Death 1 Quarters Ago	-0.0069	-1459.4594	-26.2219	0.0065

	(0.024)	(1947.495)	(52.016)	(0.012)
Partner Death 2 Quarters Ago	-0.1286***	-4754.0878***	-45.6836	0.0460***
	(0.017)	(1225.799)	(23.774)	(0.009)
Pandemic x Death 2 Quarters Ago	0.0049	-33.0727	67.3964	-0.0163
	(0.022)	(1848.505)	(39.601)	(0.011)
Partner Death 3 Quarters Ago	-0.1066***	-5586.5131***	-29.1574	0.0319***
	(0.016)	(1348.906)	(25.614)	(0.008)
Pandemic x Death 3 Quarters Ago	-0.0033	1064.9919	21.1095	0.0144
	(0.021)	(1813.328)	(37.594)	(0.011)
Partner Death 4 Quarters Ago	-0.1145***	-6948.9090***	-6.4072	0.0300***
	(0.018)	(1348.377)	(31.002)	(0.009)
Pandemic x Death 4 Quarters Ago	-0.0373	3725.0959	25.8065	0.0064
	(0.024)	(1960.569)	(43.992)	(0.012)
Partner Death 5 Quarters Ago	-0.1044***	-5696.3908***	11.2425	0.0172*
	(0.016)	(1485.352)	(30.946)	(0.007)
Pandemic x Death 5 Quarters Ago	-0.0148	3198.0248	-46.9683	-0.0020
	(0.022)	(2174.050)	(41.472)	(0.010)
Partner Death 6 Quarters Ago	-0.1196***	-6633.4573***	70.6348*	0.0175*
	(0.017)	(1433.438)	(34.297)	(0.008)
Pandemic x Death 6 Quarters Ago	-0.0084	2779.3348	-84.0106	0.0143
	(0.024)	(2210.722)	(46.668)	(0.011)
Partner Death 7 Quarters Ago	-0.0965***	-8177.0238***	53.7585	0.0225**
	(0.017)	(1427.424)	(36.945)	(0.008)
Pandemic x Death 7 Quarters Ago	-0.0218	4450.4952*	-29.8895	-0.0052
	(0.023)	(2201.875)	(48.962)	(0.011)
Obs	941914	941914	941914	941914
Mean	7.598	59605.597	206.146	0.050
StDv	0.817	92826.623	1055.151	0.218

Notes: *p<0.05; **p<0.01; ***p<0.001. Standard errors in parentheses.
Coefficients from OLS regression model. Standard errors clustered by individual

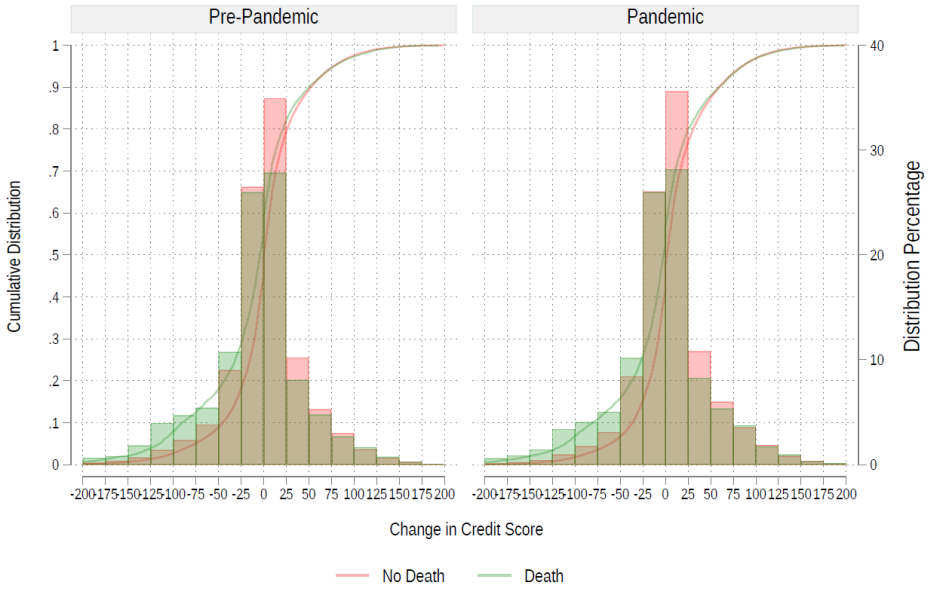
Appendix Table A.3.2: OLS Regression Output, Baseline Characteristics Associated with Credit and Labor Outcomes as of Eight Quarters Post Baseline

	New CC Open	LF Participation	Quarterly Wages (10K)
Baseline HH Mort Debt (100K)	0.0021***	0.0049***	0.0944**
	(0.000)	(0.000)	(0.036)
Baseline HH CC Debt (100K)	0.0218***	0.0474***	0.3632***
	(0.002)	(0.002)	(0.102)
Baseline HH Stu Debt (100K)	0.0046***	0.0174***	-0.0054
	(0.001)	(0.001)	(0.016)
Baseline HH Auto Debt (100K)	0.0325***	0.0285***	0.0674
	(0.002)	(0.002)	(0.038)
Baseline Credit Score (100)	-0.0103***	0.0018***	0.0410
	(0.000)	(0.000)	(0.034)
Female	0.0153***	-0.0097***	-0.0988
	(0.000)	(0.001)	(0.062)
Age 50-59	0.0000	0.0000	0.0000
	(.)	(.)	(.)
Age 60-61	-0.0029**	-0.0393***	-0.0966**
	(0.001)	(0.001)	(0.034)
Age 62-66	-0.0047***	-0.1145***	-0.2573***
	(0.001)	(0.001)	(0.042)
Age 67-69	-0.0044***	-0.1520***	-0.3363***
	(0.001)	(0.001)	(0.059)
Age 70-71	-0.0072***	-0.1485***	-0.3248***
	(0.001)	(0.001)	(0.067)
Age 72+	-0.0200***	-0.1453***	-0.2838***
	(0.001)	(0.001)	(0.066)
Black Zip Code	0.0048***	0.0027	0.0047
	(0.001)	(0.001)	(0.007)
Pandemic Period	-0.0072***	-0.0182***	0.0595***
	(0.000)	(0.001)	(0.011)
Baseline Quarterly Wages (10K)	-0.0001	0.0036***	0.7816***
	(0.000)	(0.001)	(0.169)
Baseline Partner Wages (10K)	-0.0000	-0.0004	-0.0011
	(0.000)	(0.000)	(0.001)
Baseline LFP	0.0085***	0.7219***	0.1164
	(0.001)	(0.001)	(0.256)
Baseline Partner LFP	0.0001	0.0170***	-0.0625
	(0.001)	(0.001)	(0.034)
Partner Death 0 Quarters Ago	0.0731***	-0.0124	0.0199
	(0.010)	(0.007)	(0.016)
Pandemic x Death 0 Quarters Ago	-0.0292*	0.0039	-0.0362
	(0.013)	(0.009)	(0.031)
Partner Death 1 Quarters Ago	0.0289***	-0.0130*	0.0280
	(0.008)	(0.007)	(0.016)
Pandemic x Death 1 Quarters Ago	0.0110	0.0116	-0.0771***
	(0.012)	(0.010)	(0.022)

Partner Death 2 Quarters Ago	0.0041	-0.0052	0.0468**
	(0.007)	(0.007)	(0.015)
Pandemic x Death 2 Quarters Ago	-0.0073	0.0055	-0.0838***
	(0.009)	(0.010)	(0.022)
Partner Death 3 Quarters Ago	0.0013	-0.0074	0.0224*
	(0.007)	(0.006)	(0.009)
Pandemic x Death 3 Quarters Ago	0.0037	0.0147	-0.0268
	(0.009)	(0.009)	(0.018)
Partner Death 4 Quarters Ago	0.0208*	0.0044	0.0387*
	(0.008)	(0.007)	(0.015)
Pandemic x Death 4 Quarters Ago	-0.0151	-0.0063	-0.0525*
	(0.010)	(0.010)	(0.026)
Partner Death 5 Quarters Ago	0.0096	-0.0025	0.0057
	(0.007)	(0.007)	(0.014)
Pandemic x Death 5 Quarters Ago	-0.0122	-0.0017	-0.0276
	(0.009)	(0.010)	(0.023)
Partner Death 6 Quarters Ago	0.0023	-0.0037	0.0166
	(0.007)	(0.007)	(0.028)
Pandemic x Death 6 Quarters Ago	0.0009	-0.0004	-0.0351
	(0.010)	(0.010)	(0.038)
Partner Death 7 Quarters Ago	0.0119	0.0128	0.0266*
	(0.008)	(0.007)	(0.012)
Pandemic x Death 7 Quarters Ago	-0.0045	-0.0067	-0.0653**
	(0.010)	(0.010)	(0.024)
Obs	941914	941914	941914
Mean	0.054	0.372	0.705
StDv	0.226	0.483	4.992

Notes: *p<0.05; **p<0.01; ***p<0.001. Standard errors in parentheses.
Coefficients from OLS regression model. Standard errors clustered by individual

Appendix Figure B.1: Distribution of Change in Credit Score from Baseline to Eight Quarters After Baseline, by Partner Death



Notes: Figure B.1 graphs the difference in credit score eight quarters after baseline from the credit score in the baseline quarter (in 25-point increments). The cumulative distribution function, left axis, reports the percentage of individuals who had a change in credit score of at least x points. The histogram, right axis, reports the approximate percentage of individuals who had a change of x points. The left and right panels display the distributions for pre-pandemic and pandemic periods, respectively. The graphs are shaded such that those who experience a spousal death any time during the period are shaded as green, and those who did not are shaded as red. N= 9,286,650 (549,432 unique individuals).

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