Household Responses to Transfers and Liquidity: Evidence from Social Security's Survivors Benefits [1]

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PRELIMINARY DRAFT

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Abstract:

We use administrative tax data that include the entire U.S. population to identify the causal effects of Social Security's survivors insurance on American families' behavior and financial well-being. We exploit a sharp age discontinuity in eligibility for Social Security's survivors benefits and study over a quarter of a million widowed households in which the husband died between 2002-2007. We find significant impacts of the program on newly-widowed families' net income and labor supply behavior, which translate to a high valuation of survivors benefits in protecting Americans against mortality shocks. We approximate an average gain of $1.17 for every $1 transferred, with gains being the highest among specialized households in which husbands were the primary earner. To explore the role of liquidity and benefit timing, we then study how already-widowed women's labor supply responds to anticipated survivors benefit receipt. We find considerable responses that underscore the value of liquidity provided by government transfers. These responses and their heterogeneity highlight mechanisms that underlie the labor supply behavior of older vulnerable households, and they point to liquidity constraints (rather than myopia or benefit-schedule misperceptions) as a likely operative channel. Our results have implications for the design of survivors benefits, and, more generally, for retirement behavior and response mechanisms to transfers among older populations.

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1. Introduction

The death of a primary earner is among the most devastating shocks that households face, and it poses a major source of economic risk for American families. At any given time, there are approximately 15 million surviving spouses, with 1.4 million newly-widowed households each year. The social insurance program that aims to protect against the income losses imposed by this shock—namely, Social Security's survivors insurance—has been rapidly growing and has become one of the largest safety-net programs in the United States. In 2015, the U.S. government paid more than $95 billion to 4.2 million surviving spouses; where, by comparison, unemployment and Earned Income Tax Credit benefits amounted to $35 and $60 billion, respectively (White House 2016; SSA 2018a). Yet, to the best of our knowledge, there is virtually no direct causal evidence on the economic effects of Social Security's survivors insurance or on the value of the financial protection it provides to vulnerable American households.[2]

Using tax records that cover the entire U.S. population, we estimate the causal effects of Social Security's survivors benefits on households' behavior and economic well-being. From a panel that spans the years 1999 through 2011, we analyze close to a quarter of a million households that have experienced a spousal death shock. The data include a rich range of financial outcomes. This provides us with the distinct advantage to investigate aggregates of effective financial well-being, accounting for substitution of alternative sources of income, such as private savings; as well as with the ability to analyze households' behavioral responses, most importantly, in their labor supply. To estimate the economic impacts and households' valuation of Social Security's survivors benefits, we exploit a sharp discontinuity in the age at which surviving spouses become eligible for transfers. In particular, widowed individuals become eligible at exactly age 60 for their deceased spouses' potential Social Security retirement benefits. We leverage the scope and detailed nature of the data to investigate financial outcomes and behaviors of households that fall just below and just above the age eligibility cutoff in the years following spousal death.

We exploit our empirical setting—a considerable financial shock, a large social program relevant for a significant share of households, and a clean quasi-experiment—to study two related broader questions on the responses of financially vulnerable households to government transfers. The first question is how households respond to benefit receipt in the immediate periods following a large financial shock, which allows us to understand the protective value of transfers. The second question is how households respond to *anticipated* benefit receipt, which allows us to study the role of benefit timing and the value of liquidity provided by the government. Notably, we take advantage of the program's design and our data to explore

[2] Relatedly, Hurd and Wise (1996) simulated how widows' poverty would mechanically change (i.e., abstracting from behavioral responses) if Social Security's survivors benefits were to increase in a balanced-budget way through declines in spousal benefits to couples; and McGarry and Schoeni (2000) study factors that can explain the long-run changes in widows' living arrangements toward independent living and point to income growth through increased Social Security benefits as a potential explanation.

the behavioral channels that underlie these responses, focusing on the degree of forward looking behavior and liquidity constraints.

We start by estimating the effects of survivors benefit eligibility in protecting households against the immediate adverse financial impact of a spousal death. Since female surviving spouses comprise the vast majority of widowed households, our analysis focuses on studying widows whose husbands have died. Using the eligibility-age discontinuity, we investigate the responses of newly-widowed households, and we find large impacts of benefit receipt. First, we show that eligibility leads to an average increase of $4,804 in *net* annual household income (accounting for potential crowd-out responses via alternative income sources), which represents a substantial improvement in widows' overall financial circumstances. Second, eligibility for survivors benefits leads to significant declines in widows' labor supply. The evidence indicates that these labor market responses are likely socially desirable, as we document considerable income effects (vs. distortionary substitution effects) in family labor supply behavior.

Together, these findings point to a high valuation of Social Security's survivors benefits by American families in terms of the immediate protection they provide against mortality shocks. The benefits generate gains to newly-widowed households both through significant increases in household income available for consumption, and through greater consumption of leisure as the social program mitigates the need for income compensation via family labor supply. A back-of-the-envelope calculation suggests that every dollar transferred to widows generates an average gain equivalent to $1.17, i.e., an excess value of 17%. In line with priors and economic theory, we find that more value is generated by households with low-attachment spouses and high-attachment decedents; and that survivors insurance is indeed valued the most by specialized households in which the main earner dies, who are the primary targeted population of this social insurance program.

We then proceed to study the labor supply and retirement responses of already-widowed households to fully anticipated benefit receipt. We analyze households who already transitioned to widowhood several years prior to becoming eligible for survivors benefits, whose future entitlement and benefit schedule have been already determined and expected. This allows us to zoom in on the impacts of benefit timing (for an unchanged level of present discounted value of benefits), and hence to explore the role of liquidity provided by the federal government to vulnerable older Americans.

The findings point to significant deviations from the frictionless first-best benchmark in which labor supply should be smoothed and exhibit no sensitivity to anticipated benefit timing. Widows' retirement rate displays a clear jump at survivors benefit availability, which translates to considerable declines in earnings and labor force participation in response to anticipated benefit receipt. These responses first indicate the value of liquidity by widowed households. Moreover, the evidence implies that at least

one of the underlying assumptions of the frictionless model is violated, consistent with either myopia or liquidity constraints as potential underlying channels.

We provide several empirical tests that explore which response channels are likely operative. We first show that the responses cannot be accounted for by misperceptions of the earnings test as a tax that distorts work incentives, by studying households that are infra-marginal to it. We then show that complete myopia among widowed households is unlikely to explain the results, since widows exhibit strategic timing of remarriage for ensuring benefit entitlement, which requires forward-looking planning. Lastly, we show that the labor supply declines in response to anticipated benefit receipt is significantly larger among low-liquidity households as compared to higher-liquidity households, and that almost the entire average effect is attributable to households with low liquidity. In line with these findings, we also illustrate that presumably myopia-free households, who are still potentially subject to liquidity constraints (specifically, those who display strategic remarriage and those with active savings but low balances), exhibit considerable declines in labor supply when benefits become available. The results therefore point to liquidity constraints, rather than benefit misperception or lack of forward-looking behavior, as a likely operative mechanism underlying the responses to anticipated benefits.

Our results have implications for the design of survivors insurance. First, the evidence is consistent with close-to-full income compensation for the immediate losses from spousal deaths among eligible families and indicates that ineligible households are exposed to substantial risk and would highly value government transfers. For the program's generosity, this finding suggests that providing higher benefits to eligible households is unlikely to create additional welfare gains, and it underscores the potential for welfare gains from expanding the benefit coverage in the immediate post-shock years to currently-ineligible families. Second, the results have revealed an important role for the timing of anticipated benefits receipt, and have pointed to liquidity constraints as a likely explanation. This suggests that injecting liquidity earlier by smoothing the benefit profile, keeping the current level of present discounted value of benefits unchanged, has potential for considerable welfare improvements.

Beyond their direct conclusions for the behavior of widowed households, our results can have broader positive implications for retirement behavior and response mechanisms to transfers at older ages. First, and most importantly, widows represent a considerable share of older households, as more than 13.5% of all American women are widowed by age 65. As such, the nature of their responses to early eligibility for benefits through the large survivors insurance program can be informative more generally for the mechanisms that govern the retirement decisions of older Americans, particularly those who are financially vulnerable. Given the features of the survivors benefits program, our application also provides a distinct setting in which such responses are likely governed by income and liquidity effects rather than substitution effects (which we verify using several tests). Second, more suggestively, the analysis could be informative

for the discussion of the possible responses to reforming the Social Security Early Eligibility Age (EEA) of age 62, as the early eligibility for anticipated benefits among widows at age 60 is the only source of early-eligibility variation since its introduction. Lastly, we find that high-attachment widows exhibit a considerable spike in retirement rates in response to benefit receipt. With the significant trend of increases in female labor force participation at older ages in the U.S., and as widows comprise an important share of older American women, the evidence suggests that Social Security's survivors insurance program itself could play an increasingly active role in female retirement behavior.

The remainder of the paper is organized as follows. Section 2 describes the data, and Section 3 provides background information and basic facts on widowhood in the U.S. In Section 4, we lay out the empirical framework. Section 5 presents our analysis of the causal effects of Social Security's survivors benefits and discusses the implications of the findings. Section 6 concludes.

2. Data

Data Sources. We use administrative tax data on all American households for the years 1999 through 2011. The data include both income tax returns (e.g., Form 1040) and information returns filed by third parties (e.g., Form W-2, Form 1099-SSA, and Form 1099-R). We observe exact dates of birth (to determine age-eligibility for survivors benefits by widows) and exact dates of death (to identify spousal mortality shocks) using SSA administrative records.

Spousal linkages are established through filing a joint tax return in the years prior to the mortality shock. Having established such a link, the data allow us to characterize total income for all detected widows, since information returns are available for surviving spouses who are either filers or non-filers.

Outcomes and Variable Definitions. From the income tax returns, we extract Adjusted Gross Income (AGI) and marital status.[3] From the information returns, we extract wage earnings (using Form W-2), Social Security benefits paid from the retirement and the disability trust funds (which are reported separately on Form 1099-SSA), unemployment benefits (using Form 1099-G), and distributions from pensions, annuities, retirement plans, individual retirement accounts (IRAs), and insurance contracts (as reported on Form 1099-R).

Based on these data, we define *overall household income* as the net pre-tax family income available from any reported source, which broadly follows the recent convention in the literature that uses federal income tax records (e.g., Chetty et al. 2014). For income-tax filers, this measure includes AGI, tax-exempt interest, and nontaxable Social Security income; for non-filers, the measure includes wages, unemployment

[3] AGI includes earnings, capital income, retirement income, and taxable Social Security benefits.

benefits, and gross Social Security income, as well as taxable distributions from retirement savings accounts. As such, our primary measure of family income includes labor earnings, capital income, unemployment benefits, and any payments from Social Security (including retirement, survivors, or disability benefits) or retirement accounts. It excludes non-taxable cash transfers (e.g., TANF and SSI), in-kind benefits (e.g., SNAP benefits), refundable tax credits (e.g., EITC), and non-taxable contributions to retirement savings accounts (e.g., to 401k's).

For *labor supply* outcomes—i.e., earnings, labor force participation, and retirement—we rely on data from Form W-2. Participation is defined as having positive earnings in a given period, and retiring is defined as having positive earnings in the current period and no earnings in the next period.

3. Background

In this section, we briefly describe the relevant economic environment to set our empirical setting for studying the impact of Social Security's survivors insurance. We provide background information on the prevalence of widowhood in the U.S., and we then describe the adverse financial effects of spousal death to illustrate the significant economic burden it imposes on American households.

Basic Facts. We use annual data from the American Community Survey (ACS) to provide basic facts on widowhood (see Appendix Figure 1). The ACS is a representative survey conducted by the U.S. Census Bureau containing information on the demographics and economic characteristics of households.

In any given year, more than 15 million Americans are either a widow or a widower (panel A), with a flow of more than 1.4 million newly-widowed households each year (panel B). In the cross section of surviving spouses, and across the age distribution, female surviving spouses comprise the vast majority of households. In 2016, for example, widows (whose husband has died) accounted for 78% of all surviving spouses, where widowers (whose wife has died) accounted for the remaining 22% (panel C). By age 65, a significant share of 13.5% of all American females are widows, which increases to 21.5% by age 70 (where, for males, these shares are 4.3% and 6.9%, respectively; see panel D). Since the population of surviving spouses is predominantly female, we analyze widows whose husbands have died.

These statistics highlight that widowhood is a prevalent risk and that, as such, Social Security's survivors insurance program is directly relevant for many households.[4] Indeed, the program is among the largest social insurance and safety-net programs in the U.S. It pays benefits to more than 4 million surviving

[4] Compton and Pollak (2018) also show that widowhood is expected to constitute a considerable share of one's life-cycle. For example, the survivor life expectancy of a 60-year-old wife in a typical American couple in 2010 is more than 12 years if she is the surviving spouse.

spouses every year, and it has substantiality grown from $64 billion in year 2000 to $97 billion in year 2017 (SSA 2018a).

Effects of Spousal Death. Next, we use our data to show that American families are exposed to significant financial risk from a spousal death shock, which sets the stage for the potential value of Social Security's survivors insurance.[5] To do so, we utilize an event-study approach that exploits the potential randomness of the timing at which a death shock was realized within a short period. Specifically, we construct counterfactuals for affected spouses in households that experience a shock in year τ, using spouses from the same cohorts in households that experience the same shock but a few years later in year $\tau + \Delta$. Correspondingly, we assign a "placebo" shock for control households at year τ.

We draw a 20% random sample of men who died between the years 2002 and 2007 and who were married in the year prior to their death. Our analysis sample for studying the effects of mortality shocks is then comprised of their surviving widows. Based on the time range of the data, our choice of Δ is four years, so our research design matches households who experience the shock 4 years apart. As a result, our treatment group is composed of women whose husband died in 2002-2003 and our control group is composed of women whose husband died in 2006-2007. We restrict this sample of widows to those who were between ages 50 and 70 in the assigned shock (the actual event year for the treatment group, and the placebo event year for the control group), which allows us to focus on the age range around Social Security's survivors insurance eligibility age of 60. Our sample includes 63,707 households in the treatment group and 74,214 households in the control group. In the year before the assigned event year, wives are on average 60.39 years old in the treatment group and 60.16 years old in the control group, where the mean calendar year is around 2001.5 for both groups.[6]

To estimate the effect of a spousal death we combine event studies for the two experimental groups into a dynamic difference-in-differences estimator. We normalize the time of observation such that the time period, t, is measured with respect to the assigned shock year; that is, $t = year - \tau$, where $t = 0$ is when the assigned shock occurs. Our estimating equation is therefore of the following form:

$$y_{i,t} = \alpha + \beta treat_i + \sum_{r \neq -1; r=-3}^{3} \gamma_r \times I_r + \sum_{r \neq -1; r=-3}^{3} \delta_r \times I_r \times treat_i + \lambda X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

[5] Some important earlier work investigated survey data to analyze aspects of widows' financial circumstances. A first set of papers studied the adequacy of household preparedness in terms of maintaining survivors' living standards in the case of spousal death, mostly by projecting potential losses from hypothetical deaths of spouses (Holden et al. 1986; Auerbach and Kotlikoff 1987, 1991a; Myers et al. 1987; Weir and Willis 2000; Bernheim et al. 2003a,b). A second set of papers assessed the poverty of widows or evaluated changes in economic outcomes, generally across two survey waves, of women who became widowed in between waves (Hurd 1989; Holden et al. 1988; Hurd and Wise 1989; Auerbach and Kotlikoff 1991b; Sevak et al. 2003; Angel et al. 2007). Lastly, a third set of papers analyzed the specific financial aspect of medical out-of-pocket expenditure following a spousal death (McGarry and Schoeni 2005a,b; Goda et al. 2013).

[6] For more details on the validity of this research design and its identifying assumption, see Fadlon and Nielsen (2017).

where $y_{i,t}$ denotes an outcome for household i at time t; $treat_i$ denotes an indicator for whether a household belongs to the treatment group; and I_r are indicators for time relative to the assigned shock year. The key parameters of interest are δ_r, which estimate the period r treatment effects ($r > 0$) relative to the pre-period $t = -1$. $X_{i,t}$ is a vector of controls that includes age fixed effects and calendar year fixed effects. We report robust standard errors clustered at the household level. For visualizing our empirical strategy, we also provide a graphical analysis of the raw data for each of the outcomes we study.

As a measure that aggregates households' financial well-being, we first investigate the effect of spousal death on overall *net* household income. This composite measure captures both direct declines from lost husband income as well as changes, either positive or negative, via a variety of compensating income sources, including widows' earnings, government transfers, and distributions from pensions, annuities, insurance contracts, and private retirement accounts. For the current exercise, we combine all households irrespective of whether the widow is eligible for Social Security benefits, which we revisit later. Panel A of Appendix Figure 2 displays the effects of a husband's death on the evolution of household income and shows a prompt and persistent decline after the shock. Quantifying these effects using equation (1) in column 1 of Appendix Table 1, we find that households' overall net income declines by roughly $25,000 in the post-shock years (periods 1 to 3) compared to counterfactual levels.

To interpret this finding, it is useful to consider benchmarks for the estimated dynamics in household income. Following a spouse's death, the household needs to support one less individual so that maintaining the consumption of the surviving members does not require the entire pre-shock level of household income. At the same time, potential economies of scale within the household can make half of a two-person household's income before the shock insufficient for surviving spouses to maintain their pre-shock consumption levels (see, e.g., Nelson 1988, Browning et al. 2013). The share of the household's income that would keep single individuals' consumption at its pre-shock level is usually assumed to lie between 0.50 and 1 and is commonly referred to as the adult "equivalence scale". Some commonly used scales are the modified OECD equivalence scale of 0.67 and the square-root scale of 0.71. Accordingly, these scales suggest that declines in household income following a spousal death on the order of 29-33 percentage points could be interpreted as full compensation.[7]

Our analysis finds that the death of a spouse leads to a 40 percentage-point decline in household income. This suggests that widows experience substantial income shocks due to spousal death and are meaningfully far from full coverage of losses based on the adult equivalence scales. Translating the household-level income into adjusted per-capita terms using the square-root scale, we find that net annual income falls by $5,500 and remains at this lower level in the post-shock years. This represents a significant

[7] Of course, full compensation (equating effective consumption levels across states) and full insurance (equating marginal utility of consumption across states) are not the same when preferences are state-dependent.

and persistent decline of 12% in annual income. To further illustrate the economic vulnerability of widowed households, we study a measure of financial insolvency. Particularly, we analyze whether the widow received (under *her* name)[8] the Form 1099-C for "Cancellation of Debt". This form is issued when debt balances are not being appropriately paid (or when a debt of $600 or more has been cancelled/forgiven). We find immediate increases in household insolvency, which are economically large compared to counterfactual levels and are present even at the end of our analysis window (see panel B of Appendix Figure 2 and column 2 of Appendix Table 1).

The net decline in household income that we documented captures actual financial circumstances ex-post. As such, it incorporates potential behavioral responses to compensate for some of the income loss imposed by spousal death. In Appendix Figure 2 and Appendix Table 1, we report the degree to which such compensation takes place in practice and prevents widows from experiencing even larger income losses. We find that there is insurance through several channels which shrinks the potential per-capita income decline that would occur in their absence by 70%. The largest share of operative income compensation is attributed to self-insurance in the form of payments from households' pension and retirement plans, which includes their associated private survivors insurance and life-insurance annuity arrangements. The second largest share of income compensation is attributed to social insurance in the form of payments from Social Security and, on average, self-insurance through spousal labor supply plays only a negligible role.

4. Empirical Framework

To estimate the causal effects of Social Security's survivors benefits on households' behavior and economic outcomes, we exploit a sharp discontinuity in the program's benefit-eligibility schedule. In this section, we outline the main features of Social Security's survivors benefits program, and we then describe our research design for estimating the effects of the program on American households.

Institutional Details. Surviving spouses become universally eligible for Social Security's survivors benefits at exactly age 60.[9] The benefit amounts that surviving spouses can receive are based on the deceased spouse's potential Social Security retirement benefits, which are themselves determined by the deceased's work history. Specifically, Social Security retirement benefits accrue to individuals whose earnings are subject to Social Security taxes. Generally, to become eligible for retirement benefits, individuals are required to accumulate 40 "credits", which translate to 10 years of work since workers can earn up to 4 credits each year (where, e.g., in 2016, $1,260 in earnings = 1 credit). Survivors benefits are

[8] This allows us to avoid including automatic debt cancellations under the deceased's name.
[9] To be eligible, surviving spouses cannot remarry before age 60. Disabled survivors are eligible for survivors benefits when they reach age 50. Surviving spouses with dependent children under age 16 are also eligible for benefits regardless of their own age.

then calculated as a percentage of the deceased's retirement benefits, and this percentage is determined by the surviving spouse's age at the beginning of benefit claiming. The percentage ranges from 71.5% at age 60 to 100% at the widow's full retirement age.[10]

By design, the schedule of Social Security's survivors benefits depends on the deceased's earnings history and does *not* depend on the survivor's earnings history. Therefore, the potential impacts of the program on widows' labor supply are likely to operate primarily through an "income" effect. Still, similar to retirement benefits, survivors benefits are subject to an earnings test when claimed prior to full retirement age. If the surviving spouse's labor income exceeds a certain level (e.g., $16,920 in 2017), benefits are withheld at a given rate, but are later paid back in the form of increased benefits. Since research has shown that such benefit adjustments may be misperceived as a tax, the earnings test is a program feature that may create a "substitution" effect. We utilize this feature of the program later in the analysis.

Research Design. We exploit the eligibility-age discontinuity in Social Security's survivors benefits to identify the program's causal effects on widowed households. Specifically, we study the patterns of family outcomes as a function of widows' age in the post-shock years, and we conduct causal inference by estimating sharp breaks in trends at the exact eligibility cutoff age of 60.

Importantly, by doing so, we allow for smooth underlying trends in widows' outcomes. These trends account for any changes that are continuous in age, and would therefore not affect the interpretation of our results. Such changes could be directly attributed to the evolution of the running variable of widows' age, or indirectly attributed to factors correlated with a widow's age in the post-shock years, such as the husband's age at death. One important specific implication is that the estimation is not confounded by potential changes to preferences as a result of a spousal death, as long as those are continuous in the widow's age upon the shock, since all analyzed households are already exposed to spousal death and its direct impacts.

We begin by identifying the effects of benefit eligibility in protecting households against the immediate adverse financial impact of a spousal death. This implies that we should study outcomes of "*newly-widowed" households* in the periods just after the event occurs. In choosing these periods, we must consider the properties that: (i) the data are annual and measure values at the end of a calendar year; and (ii) the year of the shock, $t = 0$, is a transitional period (as is apparent in the impact of spousal death that we documented in Section 3), since households experience the mortality shocks at different points during the calendar year. The first period in which all sample households have been fully exposed to spousal death, and involves a minimal degree of benefit anticipation, is therefore $t = 1$. We also include $t = 2$ in the

[10] Claiming of survivors benefits and its timing do not alter widows' schedule of own retirement benefits, which they can become eligible for and transition to at age 62 according to the standard Social Security rules.

analysis for increased statistical power and visual clarity, though the results remain the same when only $t = 1$ is considered (see Appendix Table 2).

By construction, since identification is based on comparing just-eligible and just-ineligible households immediately after the shock occurs, this analysis estimates the effect of receipt of benefits that has not been anticipated. This is because variation is driven by a widow's age at the time of the spousal death shock and the *exact* timing of the death shock is likely unpredictable.

Accordingly, we then proceed to study how *"already-widowed" households* respond to receipt of benefits that can be fully anticipated. Studying widows' labor supply responses to anticipated benefits from Social Security allows us to focus on the specific role of benefit timing. In turn, this analysis can have normative implications for the optimal design of survivors insurance (e.g., by uncovering the impact of the provision of liquidity for given life-time wealth), and it can also shed light on the mechanisms underlying these vulnerable households' responses to transfers (e.g., myopia vs. liquidity constraints).

To conduct this analysis, we utilize a similar research design, but we use observations of women who had already transitioned to widowhood. Specifically, we study widows whose husbands had died at least 5 years in the past, and we analyze behaviors against a widow's age (around the eligibility cutoff) using observations from years $t = 6 - 10$ following the husband's death. This means, for example, that observations at the critical age of 60 are composed of 60 year-old women whose husband had died when they were between the ages 50 and 54.

Estimation. We study the universe of widows whose husband died in the years 2002-2007. The population level data allow us to lead our analysis with a graphical representation of the results. We take advantage of survivors' exact dates of birth, and plot means of each outcome variable of interest against the widow's "monthly age." Since tax information is observed as of December in a given year, age is defined as a person's age at the end of the calendar year of observation. To focus on the eligibility cutoff of age 60, we plot outcomes of widows who at the time of observation were between ages 55 and 62 (the early eligibility age for standard retirement benefits).

The data's annual frequency and the utilized variation in monthly age at the end of a calendar year, imply that the effect of being "fully exposed" to eligibility for Social Security's survivors benefits is captured when widows are eligible for benefits for the entire calendar year. Specifically, widows who turn 60 in January are eligible for benefits throughout an entire calendar year, as they just turned 60 at its beginning, whereas widows who turn 60 in December are eligible for only one month at most. Hence, it is the behavior of widows in the former group that displays the full-exposure effect. Technically, as these widows turn 60 at the beginning of a year and since age is defined at the end of a calendar year, the effect

of being fully exposed to eligibility for survivors benefits is identified by widows whose age at the end of the year is just below 61.

Therefore, we quantify the full-exposure effect of the program by using the following equation:

$$y_{i,t} = \beta_0 + \beta_1(age_{i,t} - 60) + \beta_2\{age_{i,t} > 60\} + \beta_3\{age_{i,t} > 60\} \times (age_{i,t} - 60) + \varepsilon_{i,t}. \quad (2)$$

In this regression, $age_{i,t}$ represents a widow's age in months, and $\{age_{i,t} > 60\}$ is an indicator variable that assumes the value 1 if the widow is observed at an age older than 60 (in terms of monthly age). We estimate this equation using the sample of widows between ages 55 to 61, and we include two separate linear trends in outcomes: one for observations before and one for observations after the eligibility age of 60. In this specification, β_0 captures a baseline level and β_1 captures an underlying trend. We estimate the program's treatment effect as the full-exposure impact by age 61, which equals: $\beta_2 + \beta_3 \times (11/12)$. That is, the estimator is composed of sharp behavioral changes around the eligibility-age cutoff, which come from both a break in levels (captured by the change to the intercept, β_2) and a break in trends (captured by the change to the slope, β_3), accounting for the time period that captures full exposure.

Our choice of the parametric assumptions in equation (2) is closely guided by the graphical analysis of the raw data. For visual clarity in presenting our findings and assessing these assumptions, we combine the graphical analysis and the regression analysis. In particular, we present figures that plot raw means of outcomes by widow's monthly age, and we superimpose the estimates from the corresponding estimation of equation (2).

5. The Effects of Social Security's Survivors Benefit Receipt

We now turn to estimate the effects of Social Security's survivors benefits on widows' labor supply and household income. We first analyze their protective role on newly-widowed households in the immediate years following a spousal death, and we then study responses by already-widowed households to anticipated benefit receipt.

5.1. Effects in the Immediate Post-Shock Period

Benefit Claiming. We begin by looking at the claiming behavior of survivors benefits by newly-widowed women, which constitutes a "first stage" in our analysis. Panel A of Figure 1 clearly shows a jump in the take-up of benefits by just-eligible widows at the cutoff age 60. By age 61, the full-exposure effect amounts to a 51 percentage-point increase in claiming (see column 1 of Table 1). The corresponding pattern in benefit amounts is displayed in panel B of Figure 1. The trend in benefit levels breaks exactly at the cutoff age as the increased claiming begins, with the average amount of benefits transferred to survivors

reaching its full effect by age 61. At that point, the average increase in benefits, including zeros for those not claiming, amounts to $5,605 (see column 2 of Table 1).

Household Income. To evaluate the impact of eligibility for survivors benefits on newly-widowed women's overall financial well-being, we analyze our comprehensive measure of net household income. Panel C of Figure 1 reveals a clear break in the trend in overall household income exactly at the point where widows are just-eligible for Social Security's survivors benefits. Benefit-eligible widows' annual income then increases at a fast rate over the eligibility range, until it reaches the full-exposure effect as displayed by widows of age 61. The *net* increase in income—that importantly takes into account potential crowd out in all the measured margins of self-insurance and alternative transfers—totals to $4,804, which represents an increase in family income of more than 11% (see column 3 of Table 1).

Labor Supply. Next, we investigate how benefit eligibility affects the labor supply of widows, which constitutes an important dimension of household gains from social insurance through changes in the consumption of leisure. In panel D of Figure 1 and column 4 of Table 1, we study widows' retirement behavior, defined as having positive earnings in the current period but no earnings in the next. There is a clear jump in widows' retirement rate at benefit eligibility, which averages to a retirement flow of about 1.83 percentage points within the one-year exposure period (of ages 60 to 61). This response represents a 30% increase compared to a counterfactual of approximately 6 percentage points.

To estimate how these changes in flows translate to the *cumulative* labor supply effects which are the focus of our interest, we next study widows' labor force participation rates. The full exposure effect on labor force participation amounts to a decline of 2.87 percentage points (see panel E of Figure 1 and column 5 of Table 1). This decline translates to an average decrease of $1,751 in annual earnings (see panel F of Figure 1 and column 6 of Table 1).

5.1.1. Implications

By design, this analysis identifies the effects of benefit receipt in the immediate post shock years. Both households just below and just above the threshold would be eligible for benefits in future periods and can anticipate their receipt, but only those just above the threshold when the shock occurs are eligible for receiving (unanticipated) benefits promptly upon the shock's realization. Therefore, these effects capture the protective insurance role of survivors benefits against the immediate adverse financial consequences of a spousal death.

The results provide two main takeaways which underscore eligible households' valuation of the protection provided by the federal government against mortality shocks. First, the causal effect of survivors benefits eligibility on overall household income is considerable and exhibits little net crowd out of benefits through other potential compensating sources. On average, every $1 of benefits translates to a $0.86

(=$4,804/$5,605) increase in actual (net) household income available for consumption. Second, on top of that, the provision of benefits allows widows to meaningfully decrease their labor supply. That is, Social Security's survivors benefits generate gains to newly-affected households both through significant increases in household income and through increases in the consumption of leisure.

Back-of-the-Envelope Calculation of Eligible Households' Valuation. To provide a back-of-the-envelope calculation of the valuation of benefits by recently-widowed households, we link their responses to the gains from the government transfers using a simple model of household behavior in the context of survivors insurance. We model responses to the provision of government benefits within one period, which represents the immediate post-shock years. This mirrors our empirical analysis, in which just-eligible and just-ineligible households differ in benefit eligibility during the periods just after spousal death, and they are equally eligible for benefits in future periods. We introduce simple dynamics later when we analyze responses to *anticipated* benefit receipt.

We consider a newly-widowed household and we denote by c and l the widow's consumption and labor supply, respectively. Let A denote the household's wealth and non-labor income, including transfers from any source of individual or employer-provided retirement accounts, transfers from relatives, and event-related expenses. We denote the widow's labor income by $z = wl$, where w is the (net-of-tax) wage rate. Finally, let B represent benefits from the government in widowhood. With this notation, the widowed household's overall income, y, satisfies $y = A + z + B$. Let $U = u(c) - v(l)$ represent the spouse's utility in *widowhood*, where $u(c)$ is utility from consumption and $v(l)$ represents disutility from labor (including the utility loss from direct work costs and the opportunity costs of lost home production). We assume that the consumption utility and the labor disutility functions are well-behaved—i.e., that $u' > 0$, $u'' < 0$, $v' > 0$, and $v'' > 0$. At the optimum, the widow's labor supply choice satisfies $u'(c) = \frac{v'(l)}{w}$.[11]

For any variable x, let $x(0)$ denote the outcome for a just-ineligible household and let $x(1)$ denote the outcome for a just-eligible household. The effect of eligibility for survivors benefits in the immediate post-shock periods on outcome x is the difference in outcomes across just-eligible just-ineligible households: $\triangle x \equiv x(1) - x(0)$. To map the estimated responses to the dollar value that American families assign to Social Security's survivors benefits, consider the widowed household gains from receiving survivors benefits B:

$$\triangle U = U(1) - U(0) = [u(y(0) + \triangle y) - v(l(0) + \triangle l)] - [u(y(0)) - v(l(0))].$$

[11] Note that the model freely allows for state dependence in preferences, i.e., potential changes in spouses' utility when the shock occurs. All analyzed households have been recently widowed, and we study variation in eligibility for benefits among them.

To represent this gain with a cardinal metric, we define the value of Social Security benefits to widows, V, as $V = \frac{\triangle U}{u'(y(0))}$, which normalizes the household gain from the program ($\triangle U$) by gain from an additional dollar in the absence of eligibility ($u'(y(0))$). A first-order expansion to $\triangle U$ (around $U(0)$) allows us to approximate V by:

$$V \cong \frac{u'(y(0))\triangle y - v'(l(0))\triangle l}{u'(y(0))} = \triangle y - \triangle z, \quad (3)$$

where the latter equality follows from the household's first-order condition ($wu'(c) = v'(l)$). Equation (3) monetizes the overall valuation of Social Security's survivors benefits by widowed households, and illustrates that it can be approximated by the sum of the causal effects on household net income and on widows' labor earnings. That is, V represents the ex-post value generated by the Social Security survivors program through two channels: the utility gain from increases in household income available for consumption; and the utility gain from increases in leisure as the social program mitigates the need to self-insure through family labor supply.

Using this formula, the findings point to a significant average valuation of Social Security's survivors benefits by recently-widowed households, which amounts to $V \cong \$4{,}804 + \$1{,}751 = \$6{,}555$ annually. The average value generated per transferred dollar is captured by $V/\triangle B$, where $\triangle B$ is the first-stage effect on benefits received. Due to the associated value of transfers in the presence of insurance/credit market imperfections, every dollar transferred to widows generates an average gain equivalent to $\frac{V}{\triangle B} = \frac{6{,}555}{5{,}605} = \$1.17$—that is, an excess value of 17%.

This is, of course, a simplistic illustrative approach. It aims to provide a theory-based normative interpretation to our findings, in terms of the value of benefits and the composition of its sources (i.e., increases in net income or reductions in labor supply). To take the formula at face value, one would need to move from measuring household income to measuring consumption. This is the main limitation of our data: the data allow for bridging the gap between the two measures through only retirement savings (in 401k or IRA accounts), since there are no federal tax records on savings through other vehicles (such as non-taxable bank account balances). As a partial treatment within the scope of the data, we show that newly-widowed households do not use the additional income from benefits to increase their savings through retirement accounts in the immediate years following the shock; and we also provide estimates for the effects on net household income using alternative measures that differ in their inclusion of contribution to/distributions from retirement accounts (Appendix TBD).

Value of Benefits to Ineligible Households. Our estimated labor supply responses have direct implications for the excess value ineligible widows would assign to a dollar of benefits relative to the benchmark of eligible households. To see this, note that value of a dollar is given by $u'(c) = v'(l)/w$.

Hence, the excess value of transferring benefits to ineligibles on the margin is given by $\frac{v'(l(0))-v'(l(1))}{v'(l(1))}$, which can be approximated by $\varphi\frac{l(0)-l(1)}{l(1)}$, where $\varphi \equiv \frac{v''l(1)}{v'l(1)}l(1)$. As the gain is proportional to our estimated causal effect of benefit eligibility on labor supply, $\frac{l(0)-l(1)}{l(1)}$, our results point to potentially meaningful valuation of benefits by ineligible widows. For example, calibrating the utility parameter φ to equal 1 as is the case under quadratic labor disutility, the findings suggest that the excess value of an additional dollar to ineligible widows is approximately 9.3%.[12]

5.1.2. Heterogeneous Responses by Household Specialization

The degree of exposure to economic risk due to a spousal death depends on the potential income loss involved in this shock. In turn, it depends on the extent to which households specialize across labor market and home production activities. We therefore study how the gains from survivors benefits are distributed across households with differential degrees of spousal attachment to the labor force.

For each spouse, we define the degree of labor market attachment in the pre-shock years using labor force participation prior to the death event. We then split households into four groups, which are characterized by a binary degree of attachment (low/high) of each spouse. For each type of household, we estimate the effects on benefit amount, net family income, labor earnings, and their combination into household valuation. The results are presented in Table 2.

There are two key observations. First, in line with priors and economic theory (see, e.g., Persson 2017), more value is generated by households with low-attachment spouses (wives) and high-attachment decedents (husbands). In particular, the survivors insurance scheme is most valued by the targeted highly-specialized households in which the main earner dies. Second, for higher-attachment spouses, a larger share of the value of benefits comes in the form of reduced earnings; that is, from increases in leisure rather than in net income.

Our analysis can also have broader implications for female retirement behavior, since widows comprise a large share of older American women (as we have shown in Appendix Figure 1). When we split households by the wife's attachment, we find, as expected, that households with high-participation wives drive the spike in retirement rates at benefit eligibility, with a differential effect of 0.02775 (s.e.: 0.00333).[13] With the significant trend of increases in female labor force participation at older ages in the U.S. (specifically, by 15.1 pp from 1988-2013 among women of age 55-59; Goldin and Katz 2018), Social Security's survivors insurance may play an increasingly important role in female retirement choices.

[12] As a benchmark one could also compare across ineligible households and actual recipients, which would require scaling the estimated responses by the take-up rate and would point to even higher marginal value.

[13] The estimates for the full-exposure effect on retirement rate are -0.0007824 (s.e.: 0.002357) and 0.0269675 (s.e.: 0.0023514) for low-attachment and high-attachment widows, respectively.

5.1.3. Assessing the Degree of Income Coverage

To understand the scope of the current program, we gauge the extent to which households eligible for Social Security's survivors benefits are protected against the financial burden imposed by spousal death. For this descriptive exercise, we revisit the event study analysis (from Section 3) to assess the impact of spousal death on overall household income among women that at the year of observation were of the eligible ages 60-61. We accompany the analysis with a similar exercise for women of the ineligible ages 58-59. We quantify the degree of income coverage by estimating the standard difference-in-differences equation of the following form:

$$y_{i,t} = \alpha + \beta treat_i + \gamma post_{i,t} + \delta treat_i \times post_{i,t} + \lambda X_{i,t} + \varepsilon_{i,t}. \quad (4)$$

In this regression, $post_{i,t}$ denotes an indicator for whether the observation belongs to post-shock periods. The parameter δ represents the average effect of the shock on households' income.

The results in Table 3 indicate that eligible households experience a decline of $23,548 in household income, which represents a decline of 34%. Using the adult equivalence scales discussed earlier as a benchmark, the evidence is consistent with close-to-full compensation for income losses from spousal deaths among eligible families. However, this assessment relies on the accuracy of estimates for equivalence scales to account for economies of scale. To avoid this issue, we assess the degree of coverage further by additionally analyzing widows' labor supply behavior, which is an input that directly enters an *individual*'s utility and does not requires scaling. Fadlon and Nielsen (2018) demonstrate that, under certain conditions, labor supply responses to a spousal death as self-insurance can capture the extent to which households lack formal insurance, and are correspondingly proportional to the gains from more generous government benefits. Table 3 indicates that, in response to a spousal death, eligible widows exhibit no changes in labor supply following the shock. This suggests that self-insurance through labor supply is not required for those with access to Social Security's survivors benefits, which further supports the view that the program provides close-to-full income compensation to eligible households. Note that this labor supply approach is not assumption free either, and it requires taking a stand on whether and how labor disutility may change as a result of the death of a spouse.

These findings can point to implications regarding the generosity of the Social Security survivors benefits program. Both the income compensation levels and the lack of self-insurance through labor supply suggest that providing higher benefits to eligible households is unlikely to create additional welfare gains. In contrast, Table 3 points to the financial vulnerability of ineligible households: they experience a significantly larger income decline and exhibit a non-negligible increase in labor supply (of 7%), consistent with a need to self-insure against the income loss imposed by the mortality shock. With the high estimated valuation of benefits by eligible widows, this finding highlights potentially considerable (gross) welfare

gains from expanding the coverage of Social Security's survivors insurance to the currently-ineligible families.

5.1.4. Income and Substitution Effects

Under standard preferences, declines in labor supply among those eligible for benefits are always favorable from the point of view of a single household, and they therefore represent an important component of the gains from government programs. However, the overall *net* welfare consequences from the social planner's perspective depend on the degree to which labor supply responses represent an income versus a substitution (or a moral hazard) effect. This is because substitution effects are socially suboptimal responses to distortionary wedges between private and social marginal costs, while income or liquidity effects are socially beneficial responses to the correction of the credit and insurance market failures (Chetty 2008).[14]

Unlike Social Security retirement benefits, survivors benefits are generally decoupled from own labor supply, so there are presumably no direct distortions in the incentives to work. In that sense, the estimated effect on widows' labor supply could be attributed to a welfare-beneficial income or liquidity effect. Intuitively, the income/liquidity provided by the social insurance program attenuates the need for costly self-insurance through labor supply, leading to efficient increases in the consumption of leisure toward the optimal allocation in the absence of a market failure.

Nonetheless, research in the context of Social Security retirement benefits has suggested that individuals may misperceive earnings tests as distortionary income taxation, even though transfer reductions due to the earnings test are paid back to beneficiaries after they reach full retirement age (Liebman and Luttmer 2012, 2015; Brown et al. 2013). We therefore proceed by analyzing a subsample of households for whom only an income effect is likely operative in their responses. To do so, we study the labor force participation of widows whose pre-shock earnings were below the annual earnings test thresholds. The figures for the relevant outcomes that we study in this subsection appear in Appendix Figure 3, and the regression results are reported in Appendix Table 3.

Similar to the analysis of the full sample, we find meaningful declines in labor force participation among the current subsample of households. Widows with labor income below the earnings test thresholds exhibit a decline of 2.42 percentage points on a counterfactual baseline of approximately 30. As there is likely no moral hazard component involved in their responses, this points to a meaningful non-distortionary (or corrective) increase in the consumption of leisure.

It may be useful to compare this response to that of the overall sample as a natural benchmark. To provide a comparison across more similar moments, we convert the labor supply effects into elasticities.

[14] In the context of the life insurance market in the U.S., Hendren (2013), for example, provides evidence of private information and a market failure in the form of rejection of applications by insurance companies.

Specifically, we estimate the percent change in participation divided by the percent change in household income that is attributed to government benefits. The overall sample of households and the subsample of households who are likely subject only to an income effect display very similar elasticities. In the full sample, the elasticity of labor force participation with respect to government-provided income is -0.35; and it is -0.38 in the sample of widows whose earnings were below the test thresholds in the pre-shock years.[15] We note that this exercise is only suggestive due to potential heterogeneity in labor supply responses along the earnings distribution.

5.2. Responses to Anticipated Benefits

In this last section, we study whether and to what extent widowed households' labor supply responds to anticipated benefit receipt. Recall that this analysis allows us to focus on the role of benefit timing and to explore the value of liquidity provided by government transfers to vulnerable older families.

5.2.1. Benchmark

As a benchmark against which it would be useful to compare such responses, we resort to a frictionless first-best model. Specifically, we analyze the case in which the following assumptions hold: (1) households are forward-looking and understand the Social Security benefit schedule and rules; (2) there are no liquidity constraints. A main prediction of this familiar model is that of labor supply smoothing: there should be no discontinuity in labor market choices when the anticipated benefits become available. For a given level of the present discounted value (PDV) of benefits, the household's behavior should not depend on their timing (following a similar logic as that in MaCurdy 1981).

To see this in the simplest way, we extend the one-period model from Section 5.1 to a two-period model. The results extend, of course, to multi-period dynamic models, since they rely on classical Euler conditions. For any variable x, let x_t represent the value of x in period t, $t \in \{1,2\}$, and consider the planning problem of a household that has transitioned to widowhood at the beginning of period 1. For simplicity, we set the discount rate and the interest rate to zero.

We assume that benefit eligibility comes into effect only in period 2, such that $B_1 = 0$ and $B_2 > 0$, and that this benefit schedule is deterministic, and hence anticipated, at the beginning of the planning period. We carry the term B_1 rather than setting it to 0, to demonstrate behavior in the presence of a more general form of benefit timing. Formally, the household solves the problem: max $U_1 + U_2 = u(c_1) - v(l_1) + u(c_2) - v(l_2)$, subject to the within-period budget constraints: $c_1 = A + wl_1 + B_1 - s$ and $c_2 = A + wl_2 + B_2 + s$. The choice of saving (or borrowing), s, is unconstrained beyond guaranteeing that $c_1, c_2 \geq$

[15] These quantities are calculated as follows: $\frac{-0.0287/0.6175}{5{,}605/42{,}000} = -0.35$ and $\frac{-0.0242/0.30}{7{,}258/34{,}000} = -0.38$.

0.[16] At the optimum, widows smooth consumption and leisure, so that $c_1 = c_2$ and $l_1 = l_2$. This implies that the saving/borrowing decision follows $s = \frac{1}{2}(A + B_1 - B_2)$. As a result, the whole planning problem can be rewritten in terms of the present discounted value of life-time unearned income, $I \equiv A + B_1 + B_2$, so the household maximizes $U_1 + U_2$ subject to $c_t = wl_t + \frac{1}{2}I$ for $t \in \{1,2\}$.

Hence, an immediate implication of the frictionless model is that labor supply does not display a discontinuous change from period 1 to period 2 and does not depend on the timing of benefits (for a given discounted value of the benefit stream). It is straightforward to also explicitly incorporate an earnings test similar to that of the Social Security survivors insurance, whereby benefits increase permanently to account for the months in which benefits are withheld if widows' earned income crosses a given threshold (SSA 2018b). If households correctly perceive the earnings test, the qualitative results of our model remain the same.

Deviations from this benchmark—i.e., from insensitivity of widows' labor supply profile to anticipated benefit timing—would imply that at least one of the underlying assumptions of the model is violated.

5.2.2. Evidence and Implications

Do households deviate from the frictionless benchmark? To answer this question, we study whether already-widowed women respond to anticipated benefit receipt, by analyzing the labor supply of widows in years 6-10 following the husband's death as a function of the widow's age.

Results. Figure 2 and Table 4 show clear deviations from the frictionless benchmark. Specifically, there is a pronounced jump in widows' retirement rate at benefit availability, which averages to a retirement flow of about 2 percentage points on a counterfactual baseline of 4.5 percentage points. The full exposure effect on labor force participation totals to a decline of 3.12 percentage points, with a decrease of $1,938 in annual labor earnings. The evidence is inconsistent with the conjecture that these responses can be fully explained by misperceptions of the earnings test. We repeat the analysis for widows whose lagged earnings were below the annual earnings test thresholds, and we find large responses among them as well (see Appendix Table 4 and Appendix Figure 4).

The results point to a meaningful reduction in labor supply at eligibility age of 60. This deviation from the benchmark of labor supply smoothing has two sets of implications which we now discuss.

Normative Implications. First, it has implications for the design of Social Security's survivors insurance. The findings underscore that timing of benefits and liquidity play a considerable role and can have direct value to households. Therefore, there are potential welfare gains from changing the benefits'

[16] That is, s must satisfy: $-wl_2 - B_2 \leq s \leq A + wl_1 + B_1$.

timing to inject liquidity earlier and smooth their distribution over the course of widowhood (for a given program size). That is, holding the present discounted value of benefits *unchanged*, merely transferring benefits from later periods to earlier periods could get widowed households closer to first-best smoothing.

It is straightforward to show that the gross marginal gains from such budget-neutral retiming of benefits is captured by the extent to which households fail to smooth their behavior. Specifically, they are captured by the relative gap in u', or equivalently in v', across periods. In the context of our model, this would translate to $\frac{v'(l_1)-v'(l_2)}{v'(l_1)}$, which can be approximated by $\varphi \left|\frac{l_2-l_1}{l_1}\right|$, where $\varphi \equiv \frac{v''(l_1)}{v'(l_1)} l_1$ is the curvature of the labor disutility function.[17] That is, the gain from incrementally smoothing labor supply across periods is proportional to the meaningful labor supply responses to benefit availability that we find (which are approximately 9.4%). Importantly, the benefits from a smoother benefit profile are similar irrespective of the reason households fail to smooth their behavior; in particular, whether it is driven by lack of forward-looking behavior or by liquidity constraints.

Positive Implications and Response Channels. Second, our findings have implications for the mechanisms that underlie widows labor supply responses to transfers, which can be also informative more generally for the channels that govern vulnerable older Americans' retirement decisions. Since households meaningfully deviate from the frictionless benchmark, the results are consistent with either myopia and lack of forward-looking behavior or with liquidity and borrowing constraints as driving channels.

To further explore the source of this deviation, we offer tests that aim to distinguish between these potential cannels. We first investigate whether the responses can be explained by complete myopia and lack of forward-looking behavior among these households. To do so, we exploit the unique feature of Social Security's survivors insurance that, to be eligible, surviving spouses cannot remarry before age 60; if they do remarry before reaching the eligibility age, they lose their entitlement for survivors benefits altogether. This gives rise to an empirical test for the presence of planning. Specifically, we study whether there is strategic behavior of remarriage timing around age 60, in the form of increased rates just after age 60 which would ensure benefit eligibility. Evidence for such responses would be generally inconsistent with myopia since it requires planning. Panel A of Figure 3 shows clear evidence in support of strategic timing of marriage. The break in the trends is visible exactly at age 60, where the full-exposure effect amounts to an increased remarriage hazard rate of 0.893 percentage points (see column 6 of Table 4) on a counterfactual of 0.819. Consistent with optimal responses to incentives, we also show that the sample of widows who likely strategically time their remarriage takes up benefits at a higher rate and receives higher average

[17] This is similar to Fadlon and Nielsen's (2018) analysis of transferring resources across states of nature but applied to transferring resources across periods.

benefits from the program as compared to the overall sample (see columns 1-2 of Table 6 compared to columns 1-2 of Table 4).

Next, we investigate if there is evidence that liquidity constraints may play a role. To this end, we study whether household labor supply responses vary by the degree of liquidity as proxied by *lagged unearned* income. We split households by the median and analyze our labor supply outcomes for each subsample. Sample splits that use the top and bottom quartiles provide similar qualitative results (see Appendix Table 5).

To visualize the differential responses across the two groups, panel B of Figure 3 plots the retirement rate of widows and displays a visually larger response by low liquidity households. In Table 5, we report the estimates from specification (2) for each group. A few interesting patterns emerge. First, low liquidity households exhibit significantly larger labor supply reductions compared to high liquidity households in response to availability of anticipated benefits. In fact, almost the entire average effect in labor supply responses to anticipated benefits is driven by the low liquidity households. Second, while both groups receive similar-magnitude average benefit amounts, their utilization of benefits meaningfully differ (as seen in both Table 5 and Appendix Table 5). Higher-liquidity households mostly use the benefits for increases in income, while lower-liquidity households mostly use the benefits for reductions in labor supply. That is, low liquidity households utilize the injection of liquidity to substitute for income generated through earnings, consistent with an inability to smooth the consumption of leisure prior to the actual receipt of the anticipated benefits.

Lastly, we further take advantage of the rich data to focus on subsamples of households who are likely forward-looking, but are still potentially subject to liquidity constraints. We analyze responses of two such subsamples using specification (2). The first is the sample of widows who remarry at or just after the year they turn 60. The second is the sample of widows who have Individual Retirement Accounts (IRAs), but whose (lagged) account balances are low (i.e., below the median).[18] Unlike 401k accounts, whose initiation could be passively driven by employer-based defaults, initiation of IRAs usually involves some degree of active savings choices and could hence be indicative of future planning. For both subsamples, we find meaningful declines in labor supply in response to the availability of (anticipated) survivors benefits from Social Security (see Table 6).

Overall, the results point to liquidity constraints, rather than benefit misperception or myopia, as a likely operative mechanism of the large responses to anticipated benefit receipt that we estimate.

[18] Among those with below-median IRA balances the mean level of balances is $8,433.

6. Conclusion

Exploiting the age discontinuity in eligibility for Social Security's survivors benefits, we find important casual impacts of this large program on the behavior, welfare, and financial security of American families. The evidence points to a high valuation of survivors benefits in protecting Americans against the immediate adverse economic impact of spousal mortality, which comes in the form of considerable increases both in net household income and in the consumption of leisure by widowed households. The evidence also firmly points to valuation of the liquidity provided by the federal government, which is likely due to liquidity constraints rather than lack of forward-looking behavior. Our findings suggest potentially important welfare gains from expanding the program's coverage to ineligible families and from a smoother benefit profile. More broadly, the results shed light on vulnerable American households' retirement behavior and their response mechanisms to receiving transfers at older ages.

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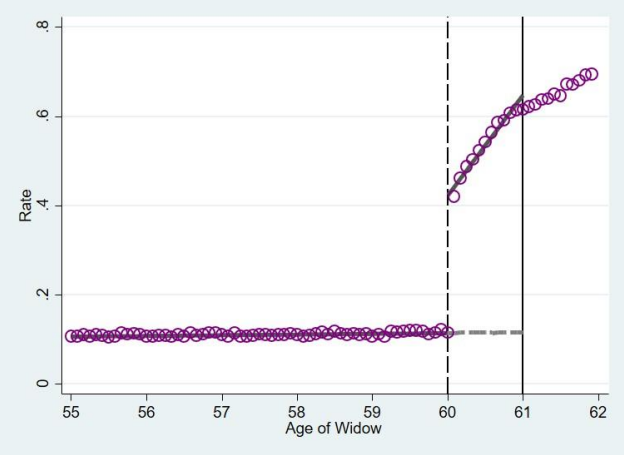
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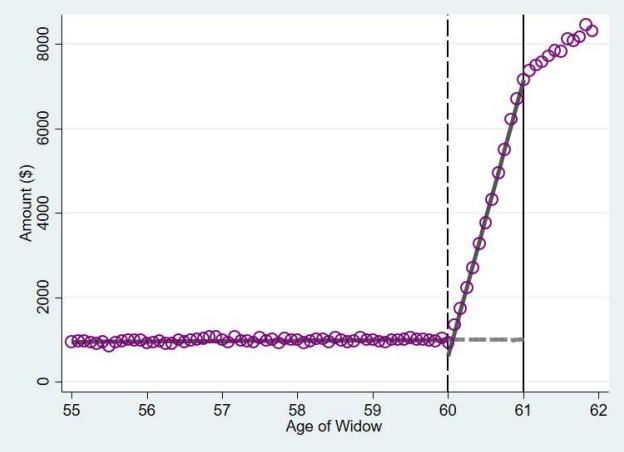
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Figure 1: Effects of Social Security's Survivors Benefit Receipt on Newly-Widowed Households

A. Social Security Benefit Claiming



B. Social Security Benefit Amounts



C. Overall Net Household Income

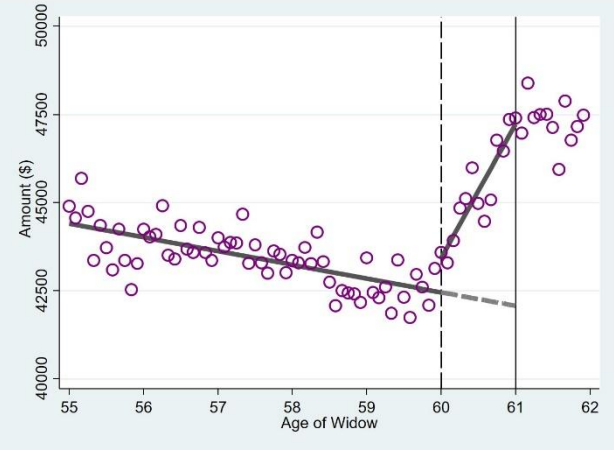
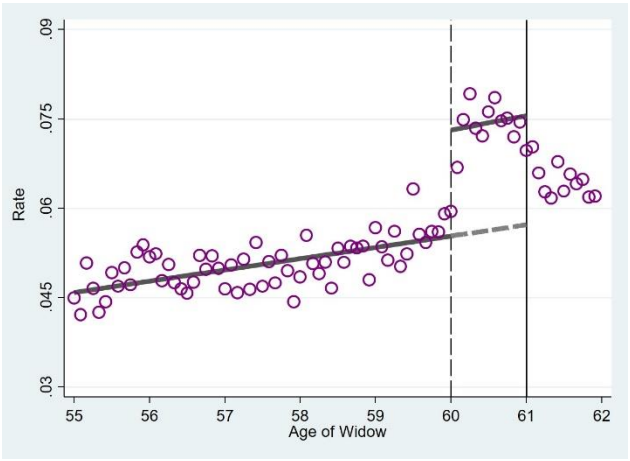
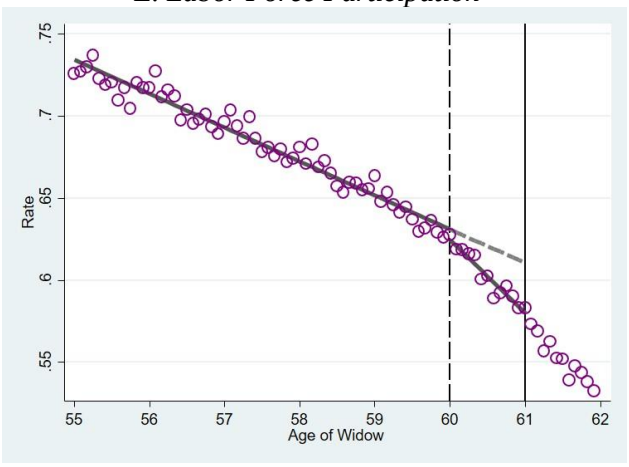


Figure 1: Effects of Social Security's Survivors Benefit Receipt on Newly-Widowed Households (*continued*)

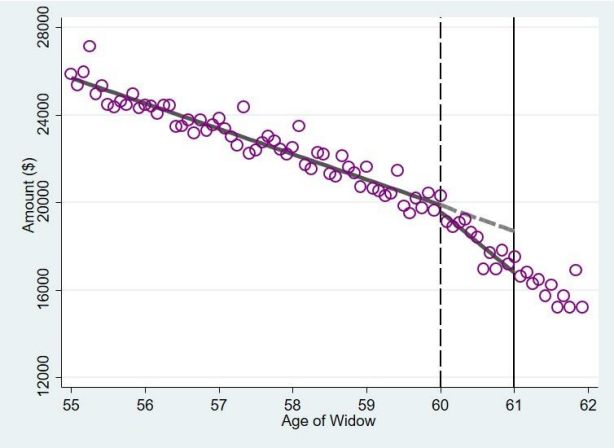
D. Retirement Rate



E. Labor Force Participation



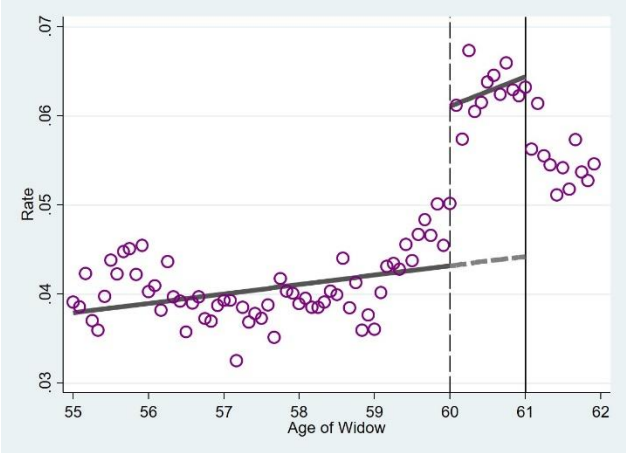
F. Wage Earnings



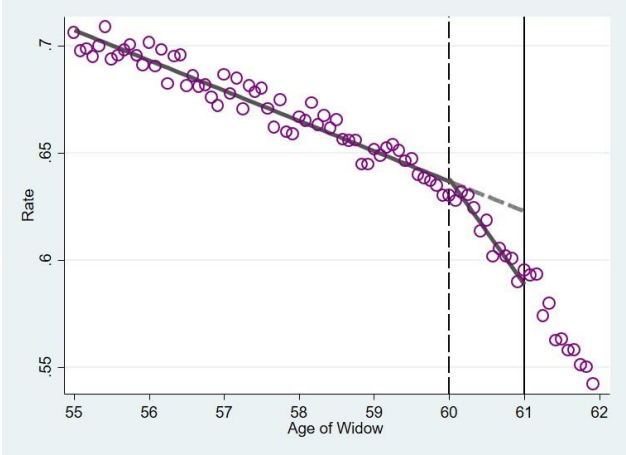
Notes: These figures plot different household outcomes in the years just after a mortality shock ($t = 1,2$) as a function of the surviving spouse's age in months. The purple circles represent means of raw data at each "monthly age" bin. The solid gray lines plot the piecewise linear fit using equation (2). The dashed gray line in the age range 60-61 represents the counterfactual behavior in the absence of eligibility for survivors benefits based on specification (2), which extrapolates the linear relationship estimated on observations prior to age 60. Eligibility for benefits begin at exactly age 60. The full-exposure effect of benefit eligibility is represented by the vertical gap between the solid and the dashed gray lines at age 61.

Figure 2: Labor Supply Responses to Anticipated Benefits

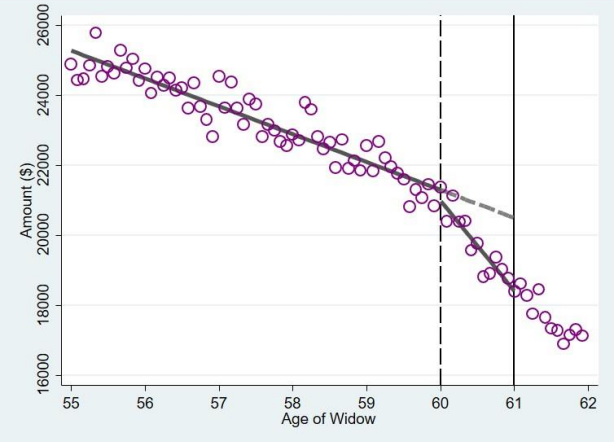
A. Retirement Rate



B. Labor Force Participation



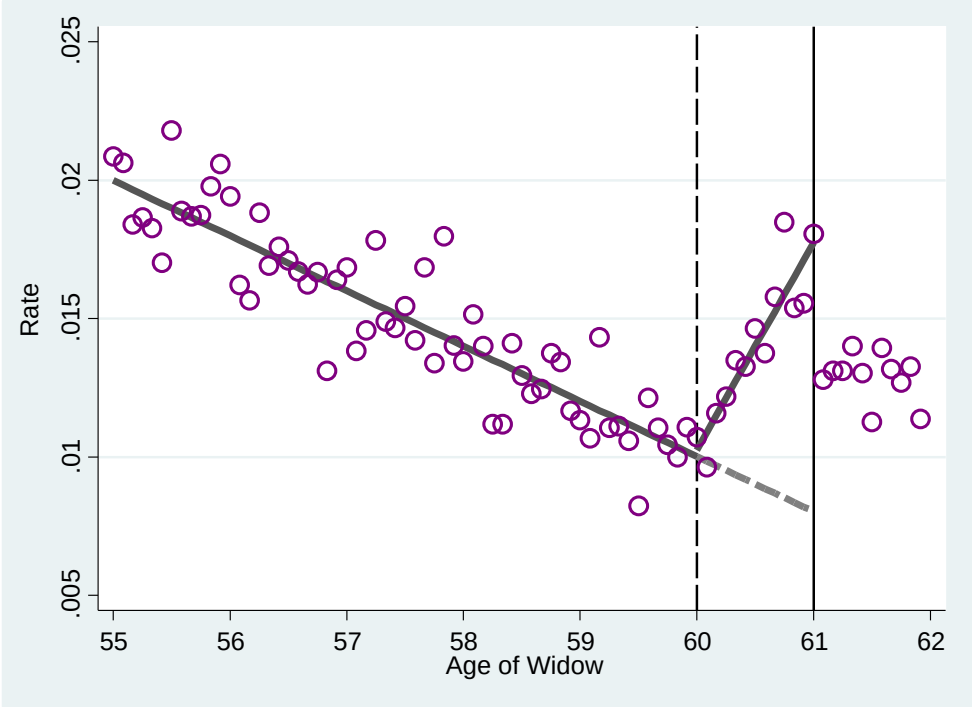
C. Wage Earnings



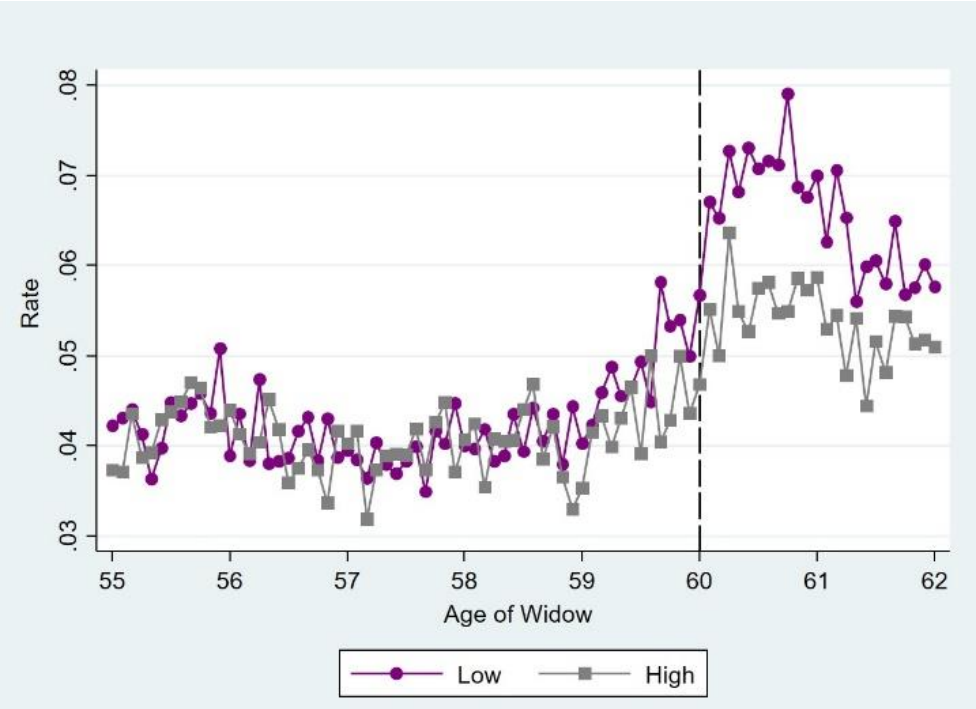
Notes: These figures plot different labor supply outcomes of already-widowed households (from years $t = 6 - 10$ following the spousal death) as a function of the surviving spouse's age in months, to display widows' responses to anticipated benefit receipt. The purple circles represent means of raw data at each "monthly age" bin. The solid gray lines plot the piecewise linear fit using equation (2). The dashed gray line in the age range 60-61 represents the counterfactual behavior in the absence of eligibility for survivors benefits based on specification (2), which extrapolates the linear relationship estimated on observations prior to age 60. Eligibility for benefits begin at exactly age 60. The full-exposure effect of benefit eligibility is represented by the vertical gap between the solid and the dashed gray lines at age 61.

Figure 3: Mechanisms of Responses to Anticipated Benefits

A. Remarriage Rate



B. Retirement Rate by Liquidity



Notes: These figures offer different tests to explore the mechanisms that underlie widows labor supply responses to anticipated transfers received at age 60. Panel A investigates the presence of forward-looking behavior by studying widows' remarriage rate as a function of age among widows who were single in the lagged period. It is constructed as described in the note of Figure 1. Panel B investigates whether there is evidence that liquidity constraints may play a role by plotting retirement rates as a function of age for high-liquidity and low-liquidity households. We proxy for the degree of liquidity using lagged unearned income and split households by the median.

Table 1: Effects of Social Security's Survivors Benefit Receipt on Newly-Widowed Households

	Social Security Benefits		Overall Net Household Income	Labor Supply		
	Claiming Rate	Amounts		Retirement Rate	Participation	Wage Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
Full-Exposure Effect	.51351***	5,605***	4,804***	.01829***	-.02866***	-1,751***
	(.00336)	(39)	(343)	(.00188)	(.00349)	(301)
Number of Obs.	504,104	504,104	504,104	504,104	504,104	504,104
Number of Clusters	293,857	293,857	293,857	293,857	293,857	293,857

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2). It provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations from the immediate post-shock years ($t = 1,2$). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Heterogeneous Responses and Valuation by Household Specialization

	Wife:							
	High Attachment				***Low Attachment***			
Husband:								
Low Attachment								
	Benefit Amount	Net Income	Wage	Household Valuation	Benefit Amount	Net Income	Wage	Household Valuation
	4,248***	2,895***	-2,301***	5,196	6,484***	6,487***	-399***	6,886
	(57)	(533)	(512)		(118)	(1211)	(151)	
Valuation Share		56%	44%			94%	6%	
High Attachment								
	Benefit Amount	Net Income	Wage	Household Valuation	Benefit Amount	Net Income	Wage	Household Valuation
	5,612***	4,490***	-1,699***	6,189	7,494***	8,302***	-1,626***	9,928
	(58)	(511)	(529)		(114)	(997)	(543)	
Valuation Share		73%	27%			84%	16%	

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2) for households with differential degrees of spousal attachment to the labor force. For each spouse, we define the degree of labor market attachment in the pre-shock years using labor force participation prior to the death event. We then split households into four groups, which are characterized by a binary degree of attachment (low/high) of each spouse. For each type of household, we estimate the effects on benefit amount, net family income, labor earnings, and their combination into household valuation. The table provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations from the immediate post-shock years ($t = 1,2$). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Mean Effects of Spousal Death Below and Above Age 60

	Household Income	Income Per Capita	Wage Earnings
	(1)	(2)	(3)
Ages 58-59			
Treat x Post	-29,411***	-9,537***	1,292**
	(1,109)	(845)	(546)
Counterfactual	72,327	51,185	18,416
Percent Change	-41%	-19%	+7%
Number of Obs.	79,008	79,008	79,008
Ages 60-61			
Treat x Post	-23,548***	-4,613***	-615
	(1,066)	(812)	(461)
Counterfactual	69,369	49,096	16,040
Percent Change	-34%	-9.4%	-3.8%
Number of Obs.	82,065	82,065	82,065

Notes: This table reports mean difference-in-differences estimates for changes in household outcomes in response to mortality shocks using specification (4). The upper panel includes the sample of women who at the year of observation were of the eligible ages 60-61; the lower panel includes the sample of women who at the year if observation were of the ineligible ages 58-59. We include as controls age indicators and calendar year fixed effects, and we report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Responses to Anticipated Benefits

	Social Security Benefits		Labor Supply			Remarriage
	Claiming Rate	Amounts	Retirement Rate	Participation	Wage Earnings	
	(1)	(2)	(3)	(4)	(5)	(6)
Full-Exposure Effect	.33598***	3,655***	.01997***	-.03118***	-1,938***	.00893***
	(.00308)	(36)	(.00165)	(.00302)	(197)	(.00089)
Number of Obs.	544,223	544,223	544,223	544,223	544,223	485,798
Number of Clusters	226,701	226,701	226,701	226,701	226,701	206,903

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2). It provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations of already-widowed households (from years $t = 6 - 10$ following the spousal death). Column 6 additionally constrains the sample to estimate remarriage rates among those who were single in the previous period. We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Responses to Anticipated Benefits by Degree of Liquidity

	Labor Supply			Benefit Amount	Overall Net Household Income
	Retirement Rate	Participation	Wage Earnings		
	(1)	(2)	(3)	(4)	(5)
Full-Exposure Effect					
Low Liquidity	.0245***	-.0386***	-2,821***	3,684***	1,839***
	(.0018)	(.0034)	(236)	(39)	(215)
High Liquidity	.0073**	-.01003	-83	3,324***	2,939***
	(.0029)	(.0062)	(339)	(76)	(627)
Difference:	-.0172***	.0286***	2,739***	-360***	1,100*
	(.0034)	(.0072)	(416)	(86)	(665)
Number of Obs.	680,740	680,740	680,740	680,740	680,740
Number of Clusters	255,362	255,362	255,362	255,362	255,362

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2) for high-liquidity and low-liquidity households. We proxy for the degree of liquidity using lagged unearned income and split households by the median. The table provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations of already-widowed households (from years $t = 6 - 10$ following the spousal death). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

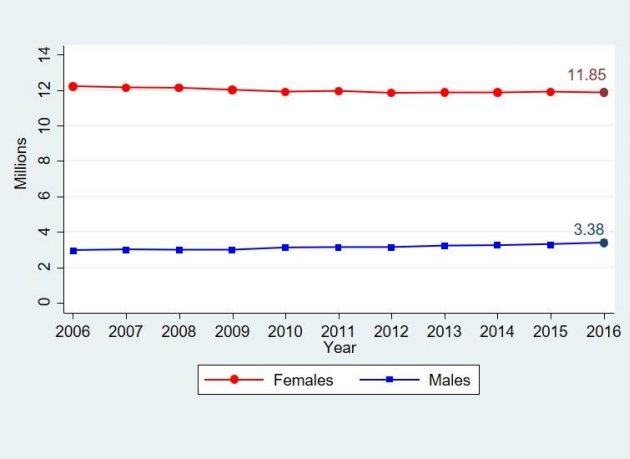
Table 6: Responses to Anticipated Benefits among Different Subsamples

	Remarried at or Just Above 60					Positive but Low IRA Balances		
	Social Security Benefits		Retirement Rate	Participation	Wage Earnings	Retirement Rate	Participation	Wage Earnings
	Claiming	Amounts						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Full-Exposure Effect	.50079***	5,714***	.04559**	-.05111*	-5,243***	.01328***	-.04267***	-2,729***
	(.02623)	(329)	(.01877)	(.02874)	(1,434)	(.00483)	(.00882)	(522)
Number of Obs.	7,042	7,042	7,042	7,042	7,042	62,835	62,835	62,835
Number of Clusters	6,980	6,980	6,980	6,980	6,980	30,652	30,652	30,652

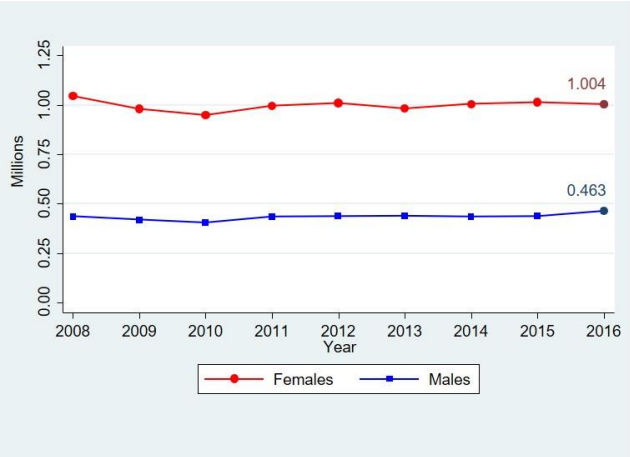
Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2) for different subsamples of households who are likely forward-looking, but are still potentially subject to liquidity constraints. The first is the sample of widows who remarry at or just after the year they turn 60, whose outcomes are studied in columns 1-5. The second is the sample of widows who have Individual Retirement Accounts (IRAs), but whose (lagged) account balances are low (i.e., below the median). Their outcomes are studied in columns 6-8. The table provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations of already-widowed households (from years $t = 6 - 10$ following the spousal death). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Figure 1: Facts on Widowhood in the U.S.

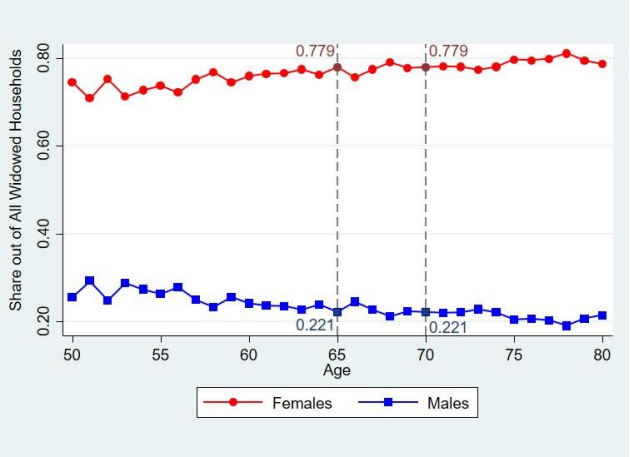
A. Number of Widowed Households



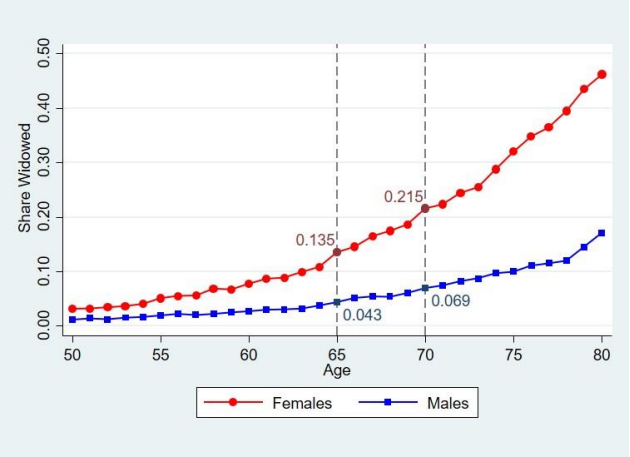
B. Number of Newly-Widowed Households



C. Gender Breakdown



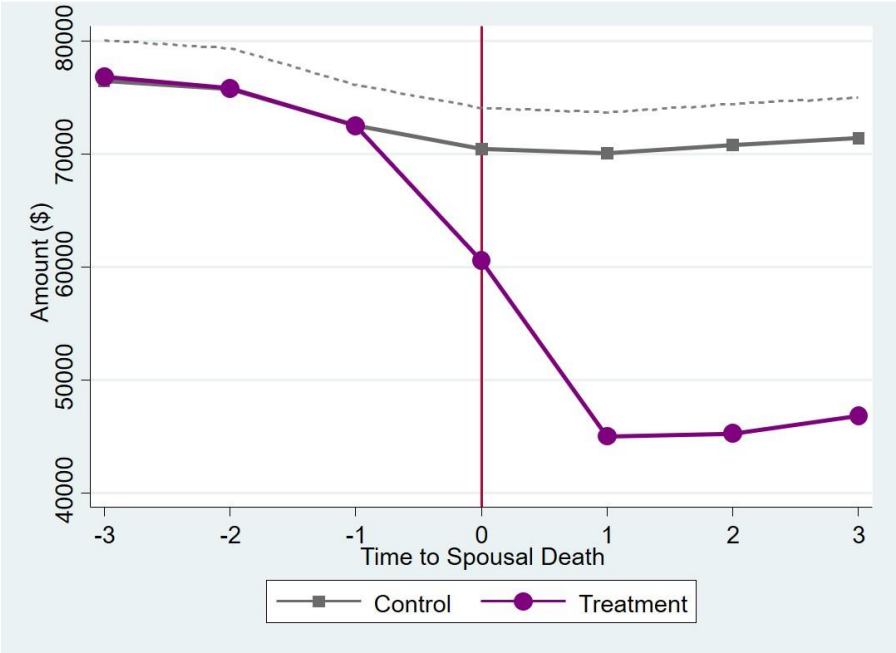
D. Widowhood by Age



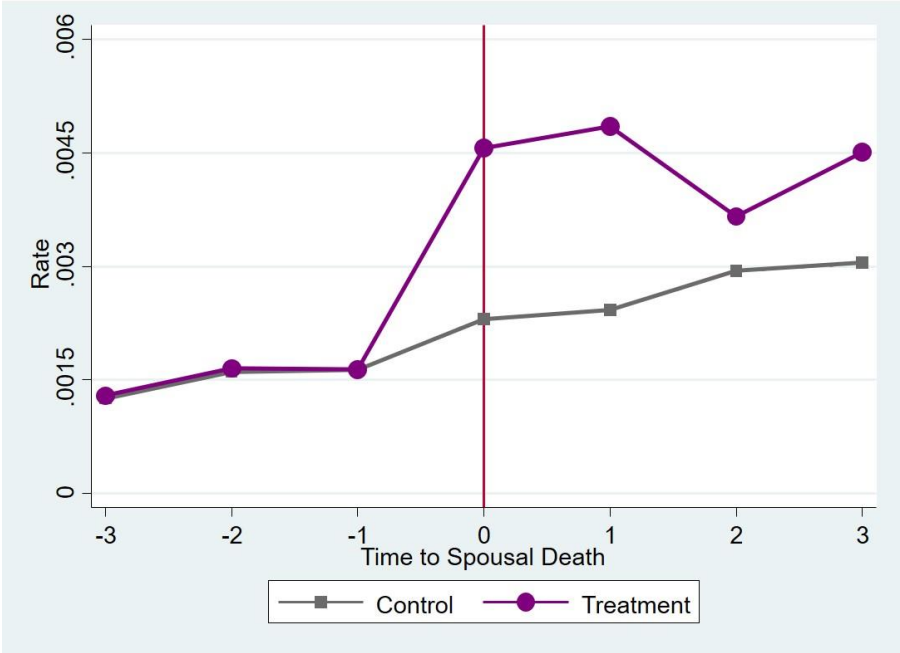
Notes: These figures use annual data from the American Community Survey (ACS) to provide basic facts on widowhood in the U.S. The ACS is a representative survey conducted by the U.S. Census Bureau containing information on the demographics and economic characteristics of households.

Appendix Figure 2: Effects of Spousal Death

A. Overall Net Household Income

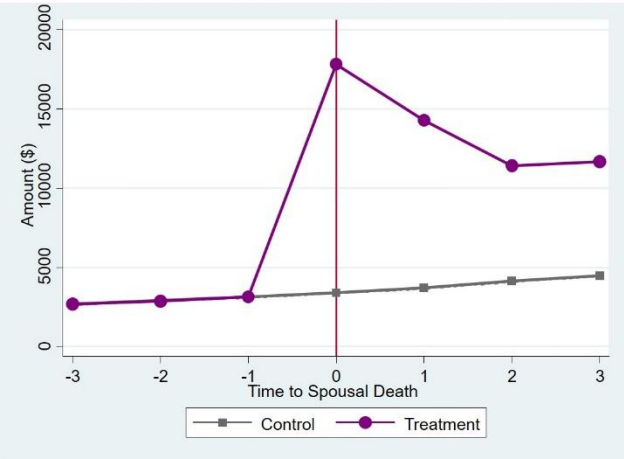


B. Insolvency: Cancellation of Debt

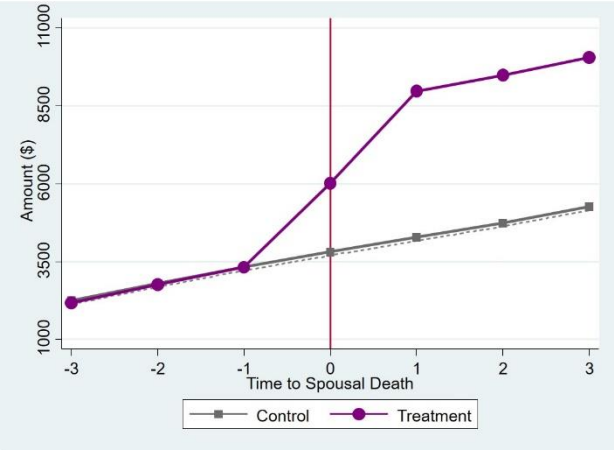


Appendix Figure 2: Effects of Spousal Death (*continued*)

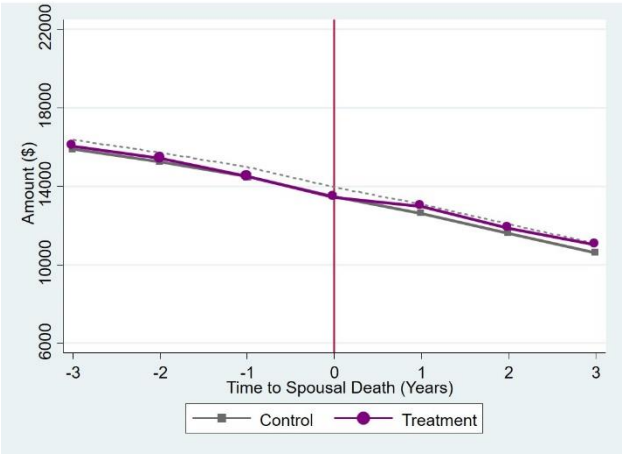
D. Income Reported on Form 1099-R: Distributions from Pensions, Annuities, or Retirement Plans, IRAs, and Insurance Contracts



C. Social Security Income



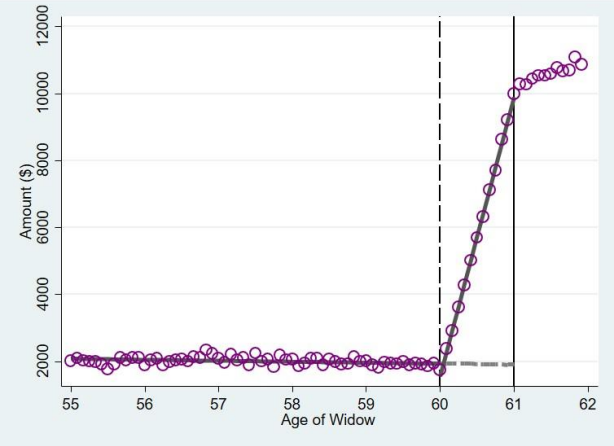
C. Wage Earnings



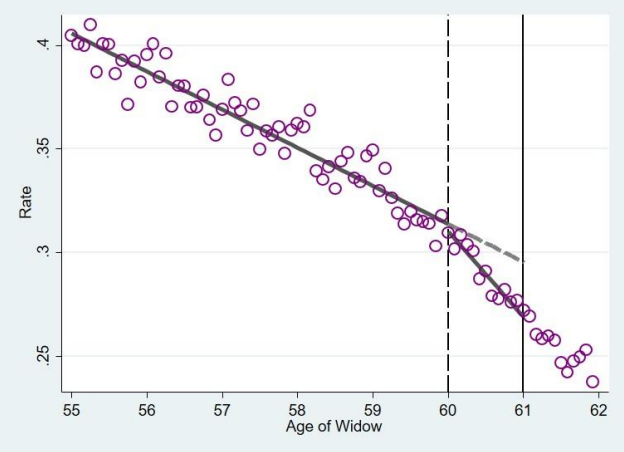
Notes: These figures plot the evolution of different household outcomes in response to a mortality shock. The x-axis denotes time with respect to the shock year, normalized to period 0. For the treatment group, period 0 is when the actual shock occurs; for the control group, period 0 is when a "placebo" shock occurs (while their actual shock occurs in period 4). The dashed gray line plots the behavior of the control group. To ease the comparison of trends, from which the effect is identified, we normalize the level of the control group's outcome to the pre-shock level of the treatment group's outcome (in period $t = -1$). This normalized counterfactual is displayed by the solid gray line and squares. The purple line and circles plot the behavior of the treatment group.

Appendix Figure 3: Effects of Social Security's Survivors Benefit Receipt on Newly-Widowed Women with Pre-Shock Labor Income below the Earnings Test

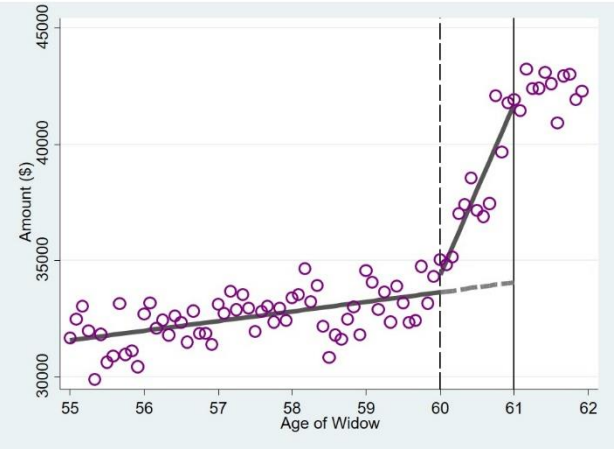
A. Social Security Benefit Amounts



B. Labor Force Participation



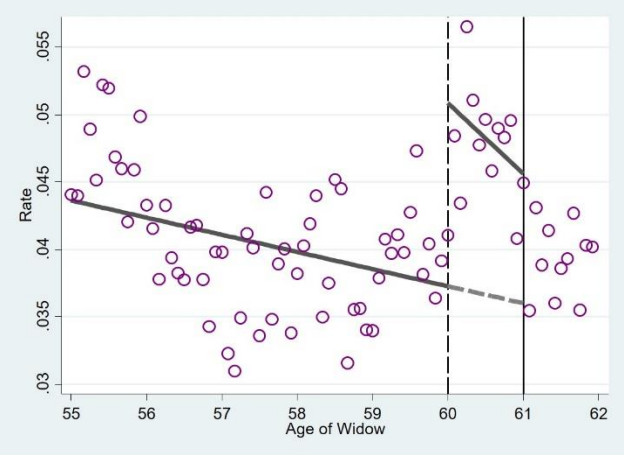
C. Overall Net Household Income



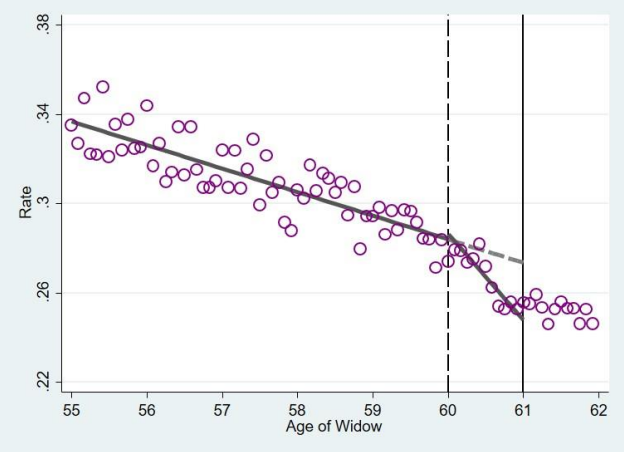
Notes: These figures plot different household outcomes in the years just after a mortality shock ($t = 1{,}2$) as a function of the surviving spouse's age in months. They include the sample of widows whose pre-shock earnings were below the earnings test thresholds. The purple circles represent means of raw data at each "monthly age" bin. The solid gray lines plot the piecewise linear fit using equation (2). The dashed gray line in the age range 60-61 represents the counterfactual behavior in the absence of eligibility for survivors benefits based on specification (2), which extrapolates the linear relationship estimated on observations prior to age 60. Eligibility for benefits begin at exactly age 60. The full-exposure effect of benefit eligibility is represented by the vertical gap between the solid and the dashed gray lines at age 61.

Appendix Figure 4: Labor Supply Responses to Anticipated Benefits by Already-Widowed Women with Lagged Labor Income below the Earnings Test

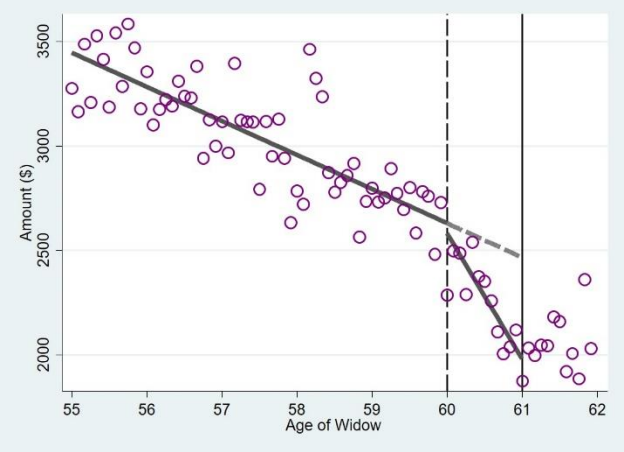
A. Retirement Rate



B. Labor Force Participation



C. Wage Earnings



Notes: These figures plot different labor supply outcomes of already-widowed households (in years $t = 6 - 10$ following the spousal death) as a function of the surviving spouse's age in months. They include the sample of widows whose lagged earnings were below the earnings test thresholds. The purple circles represent means of raw data at each "monthly age" bin. The solid gray lines plot the piecewise linear fit using equation (2). The dashed gray line in the age range 60-61 represents the counterfactual behavior in the absence of eligibility for survivors benefits based on specification (2), which extrapolates the linear relationship estimated on observations prior to age 60. Eligibility for benefits begin at exactly age 60. The full-exposure effect of benefit eligibility is represented by the vertical gap between the solid and the dashed gray lines at age 61.

Appendix Table 1: Effects of Spousal Death

	Overall Net Household Income	Cancellation of Debt	1099-R Distributions	Social Security Income	Wage Earnings
	(1)	(2)	(3)	(4)	(5)
Time to Shock:					
-3	424*	0	26	-19	113
	(233)	(0)	(58)	(15)	(124)
-2	59	0	-48	-11	171
	(198)	(0)	(62)	(11)	(128)
-1	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
0	-9,904***	0.002***	14,417***	2,187***	-45
	(207)	(0.0)	(322)	(17)	(136)
1	-25,073***	0.002***	10,591***	4,657***	379***
	(239)	(0.0)	(196)	(25)	(142)
2	-25,580***	0.001*	7,292***	4,701***	283**
	(252)	(0.0)	(128)	(25)	(135)
3	-24,616***	0.001***	7,213***	4,759***	412***
	(263)	(0.0)	(26)	(26)	(149)
Number of Obs.	965,447	965,447	965,447	965,447	965,447
Number of Clusters	137,921	137,921	137,921	137,921	137,921

Notes: This table reports the dynamic difference-in-differences estimates for the evolution of different household outcomes in response to a mortality shock using specification (1). It displays estimates for the δ_r parameter vector on the interaction between the treatment indicator and the indicators for time with respect to the assigned shock year from period -3 to period +3, where the baseline period is -1. We include as controls age fixed effects and calendar year fixed effects, and we report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 2: Effects of Social Security's Survivors Benefit Receipt on Newly-Widowed Households in the First Post-Shock Year (t = 1)

	Social Security Benefits		Overall Net Household Income	Labor Supply		
	Claiming Rate	Amounts		Retirement Rate	Participation	Wage Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
Full-Exposure Effect	.54086***	5,959***	4,910***	.01331***	-.03514***	-1,784***
	(.00461)	(53)	(501)	(.00258)	(.00504)	(448)
Number of Obs.	259,407	259,407	259,407	259,407	259,407	259,407
Number of Clusters	259,407	259,407	259,407	259,407	259,407	259,407

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2). It provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations from the post-shock year $t = 1$ only. We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 3: Effects of Social Security's Survivors Benefit Receipt on Newly-Widowed Women with Pre-Shock Labor Income below the Earnings Test

	Social Security Benefits		Overall Household Income	Labor Supply		
	Claiming	Amounts		Retirement Rate	Participation	Wage Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
Full-Exposure Effect	.60301***	7,258***	7,074***	.00534**	-.02424***	-1,065***
	(.00461)	(60)	(522)	(.00241)	(.00482)	(214)
Number of Obs.	216,167	216,167	216,167	216,167	216,167	216,167
Number of Clusters	126,635	126,635	126,635	126,635	126,635	126,635

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2), for widows whose pre-shock earnings were below the earnings test thresholds. It provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations from the immediate post-shock years ($t = 1,2$). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 4: Responses to Anticipated Benefits by Already-Widowed Women with Lagged Labor Income below the Earnings Test

	Social Security Benefits		Labor Supply		
	Claiming	Amounts	Retirement Rate	Participation	Wage Earnings
	(1)	(2)	(4)	(5)	(6)
Full-Exposure Effect	.37165***	4,493***	.00994***	-.02314***	-449***
	(.00563)	(71)	(.00251)	(.00503)	(72)
Number of Obs.	171,149	171,149	171,149	171,149	171,149
Number of Clusters	85,954	85,954	85,954	85,954	85,954

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2), for widows whose lagged earnings were below the earnings test thresholds. It provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations of already-widowed households (from years $t = 6 - 10$ following the spousal death). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 5: Responses to Anticipated Benefits by Degree of Liquidity

	Labor Supply			Benefit Amount	Overall Net Household Income
	Retirement Rate	Participation	Wage Earnings		
	(1)	(2)	(3)	(4)	(5)
Full-Exposure Effect					
Low Liquidity	.02443***	-.05056***	-3,182***	3,537***	1,115***
	(.00345)	(.00595)	(546)	(62)	(412)
High Liquidity	.00740**	-.00370	418	3,306***	3,716***
	(.00302)	(.00622)	(334)	(76)	(622)
Difference:	-.01703***	.04686***	3,600***	-231**	2,601***
	(.00458)	(.00865)	(645)	(98)	(750)
Number of Obs.	283,530	283,530	283,530	283,530	283,530
Number of Clusters	143,595	143,595	143,595	143,595	143,595

Notes: This table reports estimates of the impact of eligibility for Social Security's survivors benefits based on specification (2) for high-liquidity and low-liquidity households. We proxy for the degree of liquidity using lagged unearned income, and we define households at the top quartile of this measure's distribution as high liquidity and households at the bottom quartile of this measure's distribution as low liquidity. The table provides the effect of a full year of exposure to eligibility for the program, which is captured by $\beta_2 + \beta_3 \times (11/12)$. The estimation includes observations of already-widowed households (from years $t = 6 - 10$ following the spousal death). We report robust standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.1.