Social Security and Elderly Mortality

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Abstract

The research literature generally finds a positive relationship between income and health over many populations and many time periods. Some studies found the relationship to weaken at older age, but it is difficult to ascertain causality since income and health are jointly determined. This study uses a new natural experiment to address the *causal effect* of income on the mortality of retired elderly. I use an exogenous shift in benefit generosity for divorced retired women to estimate the impact of income on their mortality. I employ instrumental variable and treatment effect techniques and find no evidence that an increase in income at retirement age has an effect on the mortality of the elderly.

"In 2008--just four years from now--the first cohort of the baby-boom generation will reach 62, the earliest age at which Social Security retirement benefits may be claimed and the age at which about half of prospective beneficiaries choose to retire[…]. This dramatic demographic change is certain to place enormous demands on our nation's resources--demands we almost surely will be unable to meet unless action is taken." *Testimony of Chairman Alan Greenspan before the Committee on the Budget, U.S. House of Representatives.* February 25, 2004

"For the trust funds to remain solvent throughout the 75-year projection period, the combined payroll tax rate could be increased […] 1.89 percentage points, benefits could be reduced […] 12.6 percent, general revenue transfers equivalent to $3.7 trillion (in present value) could be made during the period, or some combination of approaches could be adopted. Significantly larger changes would be required to maintain solvency beyond 75 years. *2004 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds.* March 23, 2004.

1. INTRODUCTION

The research literature generally agrees on the positive relationship between income and health. However, it is quite difficult to ascertain the causality since income and health are jointly determined. This paper will bring additional evidence on the *causal effect* of income on the mortality of retired elderly. I use a new exogenous shift in benefit generosity for divorced retired women to estimate the impact of income on their mortality.

In a recent testimony before the Special Committee on Aging in the US Senate, Alan Greenspan, the Federal Reserve Board Chairman, pointed out that the aging of the population means that the government will need to make changes in the Social Security program (Greenspan, 2003). One suggested change was the reduction of benefits. It is critical to understand the causal relationship between elderly income and mortality, especially in the light of the dramatic demographic changes to take place in the near future, and at a time when reform of the Social Security program seems imminent.

Previous literature generally finds a positive association between socio-economic status (SES) and health over many populations and many time periods, but the relationship seems to weaken at old age. SES can be measured in many ways including income, wealth, education,

and occupation. Health can be assessed as lower mortality, disease occurrence, health habits, mental and emotional problems, as well as in other ways. In most cases, the positive correlation remains, but the causality can flow from SES to health, from health to SES, or from a third factor to both health and SES. For example, higher income improves health through access and use of health services, and reductions in such risk factors as smoking, alcohol consumption, and bad patterns of diet and nutrition. The economic theory also predicts that good health leads to greater income through higher labor participation rates and higher wage rates. It is then possible that, in the absence of a natural experiment, the effect of income on health measured by previous studies was due to reverse causality.

This essay makes at least three contributions to the research literature. First, I use a new natural experiment as the source of identification of the causal link between income and mortality. Second, I focus on retired divorced women, a group that is the fastest increasing among the elderly, faces the highest rate of poverty, and is relatively understudied. As a result, I contribute to the small literature on the welfare of divorced elderly women. Third, I use the New Beneficiary Data System (NBDS), a relatively unexplored dataset that has some advantages compared to previous studies.

Under current law, a divorced spouse can claim Social Security spousal benefits on her ex-husband's Social Security record if their marriage lasted at least ten years. If she is also entitled to benefits based on her own record, she will receive the maximum of the two amounts. In addition, if an ex-spouse dies, a woman becomes entitled to widow benefits, roughly double the amount of spousal benefits. I investigate the effect of income on elderly divorced women mortality using the death of the ex-husband to generate an instrumental variable for Social Security income. I then restrict the sample to divorced women receiving spousal benefits and,

using the natural experiment, perform a treatment effect analysis. As a baseline, I also replicate the work of some of the previous studies, and examine the relationship between income and mortality across the entire elderly population using the Social Security income as the variable of interest.

I find that higher income is *associated* with lower mortality across all elderly. Bringing new evidence on the *causal* link from income to mortality, I find no evidence that higher income influences the mortality of divorced retired women.

2. BACKGROUND

2.1. The Social Security program and the divorced women

Aged persons are entitled to primary Social Security benefits if they had ten or more years of covered lifetime earnings or as a disabled worker (US Social Security Administration 2001). They are called primary benefits because they are based on one's own work in employment covered by Social Security. One may also collect secondary benefits as a spouse or ex-spouse, based on their former spouse's covered work. Individuals may be eligible to both primary and secondary benefits. If the primary benefit is less than the secondary one, the dually entitled beneficiary receives the full primary benefit and a partial secondary benefit. If the retired-worker benefit is higher, she will not collect any secondary benefit.

More than 98 percent of the aged persons collecting secondary benefits are women (Table 5.A1, U.S. Social Security Administration 2001). An elderly divorced woman is entitled to secondary benefits upon the ex-husband's retirement if the marriage that ended in divorce lasted at least 10 years. If the ex-husband is alive, she is eligible to 50 percent of the ex-spouse's

primary insurance amount (PIA) if collected at normal retirement age (NRA), or to actuarially reduced benefits if the claim is made between age 62 and NRA.[1]

Should an ex-spouse die, widow benefits can be claimed at age 60, earlier than divorced benefits, and amount to 100 percent of the ex-husband PIA if claimed at NRA. Remarriage forfeits the divorced-wife benefits for the duration of the new marriage. However, starting in 1984, remarriage at age 60 or later does not affect the widow benefits. In that case, the newly married wife can choose between the existing widow benefits and the new wife benefits.

There were 126,750 women receiving divorced-wife benefits in December 2001, and 330,590 surviving divorced-wife benefits, for a total of 457,340 (Table5.A1.3, U.S. Social Security Administration 2002). Haider, Jacknowitz, and Schoeni (2003) estimate these benefits to be received almost exclusively by women aged 62 and older, whose count was 2,094,000 in 2001. The authors' calculations imply that roughly 22 percent of elderly divorced women receive spousal benefits on ex-spouse's record.

2.2 Previous literature

The literature on the links between socio-economic status and health spans across many disciplines, including economics, health studies, and sociology.[2] Some of the recent papers on this topic are Deaton and Paxson (2001, 1999), Deaton (1999), Smith (1999), Backlund, Sorlie, and Johnson (1999), and Ecob and Smith (1999). There is also a large literature on the connection between SES and health in an elderly population, the interest of this paper (Case 2001; Hurd, McFadden, and Merrill 1999; Smith and Kington 1997; Chapman and Hariharran 1994; Mechnik 1993; Mete 2004).

[1] NRA is 65 for persons born in 1937 or earlier, and it is increasing to 67 for individuals born in 1960 or later. For every one-year increase in the year of birth, NRA goes up two months (that is 65 and 2 months if born in 1938, 65 and 4 months if born in 1939, up to 67 if born in 1960 or later).
[2] A good survey of this literature is Goldman (2001).

The general finding is that higher SES is associated with better health and longer life, but some studies find that the relationship weakens or is even reversed at older age. There is a long debate on the causal mechanism behind this association, "but there have been relatively few natural experiments that permit causal paths to be definitely identified (Adams et al. 2003)." Empirical studies identifying the causal links between SES and health of the elderly (Ettner 1996, Case 2001, Evans and Snyder 2002, Adams et al. 2003, Adda, Chandola, and Marmot 2003, and Mete 2004) report mixed findings.

Ettner (1996) uses two-stage instrumental variables estimation to measure the effect of income on health of individuals aged 64 and under. Potential instruments for family income include the state unemployment rate, work experience, parental education, and spouse characteristics. The empirical evidence supports the hypothesis that income has beneficial impacts on mental and physical health. Case (2001) quantifies the impact of a large, exogenous increase in income following the introduction of South African state old age pension on the health of elderly Black and Colored. The author finds, in households that pool income, that the pension protects the health of all household members.

Evans and Snyder (2002) use a major change in the Social Security law, the so-called "notch", as exogenous variation in income to examine its impact on elderly mortality. Based on the year of birth, individuals born before January 1, 1917 receive higher benefits than individuals born afterwards. The authors compare five-year mortality rates after age 65 for males born before and after the 1917 notch. Somewhat surprisingly, they find that the higher income group has significantly *higher* mortality. The authors explain the surprising results by the fact that men in the higher income group engaged less in post-retirement work, and social isolation may increase elderly mortality.

Adams et al. (2003) study the population of elderly Americans 70 and older, and test for the *absence* of causal links from SES to health and from health to changes in wealth using an adaptation of the Granger causality framework to panel data. The authors cannot reject the hypothesis of *no* causal link from SES to mortality when controlling for previous health problems, and reject the hypothesis of no causal link from health conditions to changes in wealth. Adda et al. (2003) replicate the above methodology on two different panel data sets: a panel of British civil servants (Whitehall II study) aged between 35 and 55, and a sample of men and women representative of the Swedish population aged between 28 and 84. The results are similar with Adams et al. (2003), the notable exception being that the hypothesis of no causal link from SES to women mortality in the Swedish sample is not accepted.

Mete (2004) uses longitudinal survey and controls for the health status at the first wave survey to get around the reversed causality issue. The author does not find an effect of the socioeconomic characteristics on the mortality of the elderly. If an individual does not report good health at an old age, better schooling and wealth do not help in delaying mortality.

Divorced retired women may claim spousal benefits on the ex-husband's Social Security record if their marriage lasted at least ten years. If an ex-spouse dies, a woman becomes entitled to widow benefits, roughly double the amount of spousal benefits. I employ this previously unused, exogenous source of variation in Social Security income to identify the effect of income on ten-year mortality of retired divorced women. In addition, I rely on NBDS, a relatively unexplored data set with certain advantages over the previous literature. First, I am not aware of any other data that directly records the death of an ex-husband, the event generating the exogenous Social Security benefit increase used in this study. Second, it contains detailed individual-level information on socio-economic characteristics, and precise information on

mortality and on benefits from Social Security administrative data. Third, it allows the precise identification of the divorced beneficiaries receiving secondary benefits, based on the benefit type from their administrative files. Finally, it covers a recent period so policy implications derived from this study are relevant in today's economic environment.

Hurd and Kapteyn (2003) provide a very good description of the mechanisms through which SES may influence health/mortality. More economic resources increase access and use of health care services. Also, more wealth and higher SES lead to reductions in such risk factors as unstable marriage, smoking, alcohol consumption, stress, work-related dangers, and neighborhood effects. Mechnik (1993) adds that income affects mortality through patterns of diet and nutrition, and demand for inferior goods in general.

However, the income shock studied in this paper comes late in life, after retirement, and it might have a relatively weaker effect on health as compared to income changes at a younger age. One reason is that some of the mechanisms described above, such as an unstable marriage, stress, and work-related dangers, might be less significant at older age. In addition, health may be more difficult to improve in late life, especially if chronic health problems settle in.

Some of the previous literature found a protective effect of income on elderly health, other recent studies found no effect of income on the health or mortality of the elderly. I use a new natural experiment to identify the causal link from income to the mortality of elderly divorced women.

3. DATA

This study uses the NBDS, developed by the Social Security Administration (SSA).[3] The NBDS is based on the New Beneficiary Survey (NBS) administered in 1982. At the time of the 1982 NBS survey, the sample of 18,599 new beneficiaries represented about 2 million individuals beginning to receive benefits during 1980-1981. The New Beneficiary Follow-up (NBF) conducted in 1991 on the initial respondents, and matched data from the SSA administrative records complete the NBDS.

There are three separate categories of respondents in the data, based on the type of Social Security benefits they receive: disabled workers; retired workers receiving at least part of the benefits based on their own record – primary benefits; and other beneficiaries (wives, widows, divorced wives and surviving divorced wives) receiving benefits based solely on the (ex-) husband's Social Security record – full secondary benefits. Men rarely get full secondary benefits based on the (ex-) wife's record, so NBDS samples only women in the group of "other beneficiaries."

The 1982 NBS survey has information on the demographic characteristics, employment, marital and childbearing histories of the respondent; household composition, health, income and assets; information on the (ex-) spouse; and the knowledge about the Social Security program.

The 1991 NBF is an interview updating the information on all surviving respondents and the surviving spouses of the deceased, with an emphasis on the changes that occurred since the initial interview. About 24 percent of the original sample persons died by the time of the NBF, and another 10 percent did not participate in the follow-up interview. The 1991 interview updates the information in the 1982 survey and contains additional sections on family contacts, post-retirement employment, major reasons for changes in economic status, a more extensive

[3] See Iams (2000) for a more detailed description of the NBDS.

section on health, and information on household moves and reasons for moving. Each record also contains matched Social Security administrative files contain benefit information from 1980 to 1991, yearly reports of earnings from 1951 to 1992, and Medicare expenditures from 1984 to 1992.

4. RESULTS

4.1. Baseline estimation, all retired elderly

Many previous studies use the income (or the Social Security benefits) as the explanatory variable of interest, none using the NBDS dataset. As baseline results for this paper, and to confirm there are no peculiarities in my data, I perform a cross-section probit regression on the pooled elderly population sampled in the initial 1982 interview, and by marital status, on married couples, widowed elderly, divorced and separated, and never married elderly. The dependent variable is the ten-year mortality, a dummy indicating whether respondents passed away by the follow-up 1991 interview. Social Security benefits represent the key independent variable.

Focusing on retired elderly alleviates the reverse causality problem in the health-income relationship. Higher income may decrease mortality and, in turn, bad health can lower earnings. However, it is less likely that bad health lowers the earnings of retired elderly, since relatively few engage in post-retirement work. In addition, for the ones that do work, the wage income is a smaller fraction of total income as compared to pre-retirement years.[4]

The pooled sample consists of all the elderly interviewed in 1982 (11,957 observations), except the disabled beneficiaries. The dependent variable is constructed based on precise

[4] It is still possible that elderly low income is due to bad health over the lifetime. I argue that, at least regarding the contemporaneous effects, the reverse causality from health to income is less probable in old age.

administrative data on the individual's year of death, reported for all the respondents. It is coded 1 if the year of death is 1991 (the year of the follow-up interview) or earlier, and 0 otherwise.

Table 1 presents sample means and standard errors for the variables of interest in the 1982 cross section. Married elderly receive the largest Social Security benefits, approximately $8,000 a year. Never married individuals fare best in every health measure, but, surprisingly have the highest 10-year mortality at 28 percent. The divorced and separated have the worst wealth and health measures. Specifically, they receive the lowest Social Security benefits; they have significant lower assets; all three health measures are the worst among all elderly: divorced or separated individuals have, on average, the most limits on doing housework, the most difficulties in performing daily activities and report the highest number of health problems.

I estimate a probit regression weighting the observation by their sampling rate, and report robust standard errors:

$$(1) \qquad P(\textit{ten-year mortality}) = \Phi(\beta * (\textit{Social Security income}) + X'\gamma)$$

where *ten-year mortality* takes the value 1 if the respondent is deceased by 1991, and 0 otherwise; *Social Security income* is measured in thousands of 1982 dollars per year, from the SSA administrative data. The X vector of covariates includes total assets – in 1982 dollars; education – in completed schooling years; age; sex; race – 1 if white, 0 otherwise; number of children; three health measures - whether or not the respondent has limits on doing housework, whether or not she has much difficulty performing daily activities, and the number of health problems reported. The independent variables are all measured at the initial interview in 1982. The coefficient of interest is β, and it shows the change in the probability of being deceased by the follow-up interview associated with an increase in the Social Security benefits.

The results reported in the first column of Table 2 confirm the findings of some of the recent literature. Across all elderly, I do not find an effect of income on the likelihood of being deceased in ten years. The coefficient of interest is -0.0001, not statistically significant, implying an elasticity of the dependent variable with respect to Social Security income of -0.01.

I continue the analysis by marital status, and find the coefficient of interest not statistically significant in either of the subsamples. The probit coefficient for the married elderly is -0.0001, implying an elasticity of -0.001. The coefficient on Social Security income of widowed elderly is -0.004, with an implied elasticity of -0.03, while for the never married elderly the coefficient is -0.022 with an elasticity of -0.13. Across the divorced or separated beneficiaries the coefficient of interest is 0.008, and the implied elasticity is 0.05. In most specifications, the covariates have the expected signs: higher wealth, more education, and being married decrease mortality; older males with limits on doing housework and with more health problems have higher mortality.

The above results are likely to be biased due to the likely endogeneity of income. To overcome this problem and identify correctly the causal effect of income on mortality, I do the following: first, I use an instrumental variable for Social Security benefits; second, I perform a treatment effect analysis on the sample of divorced women and surviving divorced women receiving only spousal benefits.

4.2. All divorced women, IV

To correctly identify the effect of income on elderly mortality, I restrict the sample to divorced women only. Under current law, a divorced spouse can claim spousal benefits on her ex-husband's Social Security record if their marriage lasted at least ten years. If she is also entitled to benefits based on her own record, she will receive the maximum of the two amounts. In addition, if an ex-spouse dies, a woman becomes entitled to widow benefits, roughly double

the amount of spousal benefits. I use the death of the ex-husband to construct an instrument for the Social Security benefits and draw on the instrument to investigate the effect of income on elderly mortality.

The sample consists of 768 divorced women interviewed in 1982. They receive primary benefits only, may be dually entitled, or receive just spousal benefits. Table 3 presents descriptive statistics for the variables of interest.

I estimate the effect of Social Security benefits on mortality in two steps. In the first stage, an OLS regression predicts the instrument:

(2) $$SSincome = \beta * IV + X'*\gamma + \varepsilon$$

where IV is a dummy variable taking the value 1 if the divorced woman collects spousal benefits and the ex-husband is deceased, and 0 otherwise; X is the same vector of covariates as in equation (1); ε reflects other influences on the dependent variable.

In the second stage I use the predicted value of benefits from (2) in a probit regression:

(3) $$P(\textit{ten-year mortality}) = \Phi(\beta * (\textit{predicted SS income}) + X'\gamma)$$

The predicted Social Security benefits do not enter in equation (3) in a straightforward way, since the estimated coefficients would be biased. Instead, I use a Stata program that implements the method of Newey (1987) for a probit instrumental variable estimation.

I test the endogeneity of the Social Security benefits by including the residuals from equation (2) in equation (3), along with the benefits, not the predicted values. An F test rejects the hypothesis that the coefficient on the residuals from the first stage is zero, confirming the endogeneity.

The key identification assumptions are that the instrument IV is correlated with variation in Social Security benefits and not correlated with the residuals in equation (3). To be more

specific, the death of the ex-husband is not affected by the wife's mortality or by other factors that influence the mortality of the wife. The latter assumption may be violated if the health (and mortality) of the husband is correlated with the health of the wife. However, in that case the health of surviving divorced women would be worse than the health of divorced women whose ex-husbands are alive. The increase in the divorced woman's benefits following the death of the ex-husband would be correlated with higher mortality, and would work against finding the expected effect of income.

I provide two tests to confirm the quality of the instrument. First, an F test rejects the hypothesis that the coefficient on *IV* in equation (2) is zero (F statistic is 89.62). Second, a regression of Social Security benefits on a constant and the predicted benefits yields a coefficient of virtually one, statistically significant at the 1 percent level.

Table 4 presents the estimation results of the second stage equation. Using the Social Security benefits as the variable of interest, I report in the first column an positive, not statistically significant OLS coefficient. The second column of Table 4 shows the results from the instrumental variable analysis. The coefficient of interest is -0.061, not statistically significant, and the implied elasticity of ten-year mortality with respect to Social Security income is -0.37. Most covariates have the expected signs: higher wealth, more education, and having more children decrease mortality; older, white males with limits on doing housework and more health problems have higher mortality.

4.3. Divorced women receiving secondary benefits, treatment effect analysis

For a more precise identification I further restrict the sample to divorced women receiving secondary benefits based on the ex-husband working record. The death of the ex-husband

provides an increase in Social Security benefits assumed exogenous to the respondent's mortality.

I perform a treatment effect analysis on the comparison group of divorced women whose ex-husband is alive and the higher-benefit treatment group of divorced women whose ex-husband is deceased. First I include in the sample recipients of only divorced benefits, because NBDS allows a precise assignment into treatment and comparison groups based on administrative data on the benefit type. The sample is a cross-section of 369 divorced women receiving full secondary benefits at the time of the 1982 interview. There are 185 women whose ex-husbands are alive in the comparison group, and 184 surviving divorced women in the treatment group.

In a second specification I add to the analysis dually entitled divorced women, receiving primary and secondary benefits. The sample increases by 20 observations, 10 in the treatment and 10 in the comparison group. However, the dually entitled self-report the status of divorced or surviving divorced beneficiary, the assignment into the treatment and comparison groups being then imprecise.

The women in the treatment group and the comparison group might differ in demographic characteristics, and then the difference in mortality might reflect underlying dissimilarities between the two groups rather than a treatment effect. It is important to comparison for demographics, especially if the distinctions between groups are likely to be correlated with the dependent variable. After controlling for covariates, I assume the treatment and comparison groups to be observational equivalent. The probit treatment effect equation is

$$P(\textit{ten-year mortality}) = \Phi(\beta * \textit{treatment} + X'\gamma) \tag{4}$$

where *ten-year mortality* is 1 if the woman lives independently and 0 otherwise; *treatment* is a dummy indicating whether the person is in the higher income group of surviving divorced

women. In addition to the variables included in equation (1), the vector X contains the ex-husband's primary insurance amount and a dummy indicating whether or not the ex-husband is in the birth cohorts from 1910 through 1916, to control for differences in lifetime earnings due to the Social Security notch.[5] The coefficient of interest is β, and it shows the effect of an exogenous increase in Social Security income on the ten-year mortality.

Table 5 presents descriptive statistics and standard errors for the variables of interest. Revisiting the assumption of exogeneity of the ex-husband death to the wife's mortality, I compare the health scores across the two groups. The average health scores are similar: 41 percent of surviving divorced women have limits on doing housework compared to 44 percent in the comparison group; 60 percent have much difficulty in daily activities compared to 61 percent in the comparison group; and women in both groups report on average about three health problems. Furthermore confirming that the women's health is uncorrelated with the "treatment" event, t-tests confirm that women in the treatment group are not statistically different than women in the comparison group along any of the health measures.

The surviving divorced women in the treatment group collect on average 70 percent more benefits than divorced women in the comparison group, and the difference in benefits translates into the total income difference between the two groups. As expected, the higher-income group has a lower mortality, 18 percent as compared to 21 percent in the comparison group, although the numbers are not statistically different.

The estimation results are presented in Table 6. Controlling for covariates, the coefficient of interest is -0.201, not statistically significant, with an implied elasticity of mortality with respect

[5]Due to the so-called Social Security "notch", a high real lifetime earnings and date of birth after Jan/1/1917 could yield similar benefits as low real lifetime earnings and a date of birth before Jan/1/1917.

to Social Security income of -0.35.[6] Having more children decreases the elderly mortality, while being older and in worse health, by any of the three health measures, increase the mortality. As a specification check, I include dually entitled divorced women in the analysis. I find similar results, the estimate of interest being -0.177, and not statistically significant.

5. CONCLUSIONS

There is an extensive literature documenting the association between income and health, a sizeable part focusing on the elderly population. Only a few studies identify the causal link from income to health or mortality of the elderly, and the results are mixed. It is difficulty to identify the causal effect in the absence of a natural experiment as the causality may flow from income to health, from health to income, or from another factor to both income and health.

The group of elderly divorced women is increasingly relevant to research and policy, and yet they received little attention in the literature. At retirement, they are entitled to Social Security benefits based on their ex-husband's work record, provided the marriage lasted 10 years or more. If the ex-husband dies, the divorced benefits roughly double.

I use this exogenous variation to examine the impact of income on the mortality of the elderly entering retirement. The Social Security data show no effect of income on the mortality of divorced elderly women, in line with some recent studies that investigated the causal link from socioeconomic status to elderly health.

Most literature finds that socioeconomic status is a major determinant of health, but that seems to be not true late in life. One explanation for the lack of effect of income on the mortality

[6] I compute the elasticity of mortality with respect to Social Security income as the percentage change in mortality (when 'treatment' changes from 0 to 1) divided by the percentage change in benefits (when 'treatment' changes from 0 to 1). By the estimation results, the percentage change in mortality is -0.25, and based on my calculations the percentage change in benefits is 0.70.

of the elderly is that the effect "is a function of the extent to which death is preventable; at older ages the income effect becomes insignificant as death is no longer preventable (Duleep 1986, p. 239)."

A better socioeconomic status at an early age may lead to better health outcomes and a longer life, and that is when policies that enhance socioeconomic status are the most effective in improving health. However, if the policy interventions come late in life, the improvement in socioeconomic status is likely to have no effect on health and mortality.

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Table 1
Sample Means and Standard Deviations:
1982 Cross-section, Pooled Elderly, and Marital Status Subgroups.

Variables	Pooled sample	Married	Widowed	Divorced / separated	Never married
Proportion deceased by 1991	0.21 (0.40)	0.20 (0.40)	0.20 (0.40)	0.26 (0.44)	0.28 (0.45)
Social Security income	7.11 (3.53)	7.95 (3.57)	4.97 (2.13)	4.54 (2.13)	4.84 (2.31)
Total assets	1.20 (4.80	1.42 (5.50)	0.64 (1.94)	0.45 (1.24)	0.75 (1.72)
Proportion living independently	0.77 (0.42)	0.81 (0.40)	0.70 (0.46)	0.66 (0.47)	0.61 (0.49)
Education	10.95 (3.23)	11.02 (3.18)	10.71 (3.16)	10.80 (3.43)	11.05 (3.71)
Respondent is white	0.90 (0.30)	0.92 (0.27)	0.86 (0.35)	0.80 (0.40)	0.88 (0.33)
Respondent is male	0.44 (0.50)	0.50 (0.50)	0.15 (0.36)	0.40 (0.49)	0.46 (0.50)
Age of respondent	64.91 (2.15)	64.93 (1.98)	64.61 (2.79)	64.98 (2.15)	65.33 (2.12)
Number of children	2.55 (2.05)	2.72 (2.02)	2.42 (2.03)	2.45 (2.05)	0.16 (0.90)
Married	0.74 (0.44)	-	-	-	-
Widowed	0.15 (0.36)	-	-	-	-
Separated / divorced	0.07 (0.26)	-	-	-	-
Never married	0.04 (0.20)	-	-	-	-
Limits on doing housework	0.26 (0.44)	0.25 (0.43)	0.28 (0.45)	0.30 (0.46)	0.20 (0.40)
Much difficulty in daily activities	0.36 (0.48)	0.35 (0.48)	0.42 (0.49)	0.45 (0.50)	0.33 (0.47)
Number of health problems	2.06 (1.76)	2.01 (1.72)	2.16 (1.81)	2.36 (1.93)	1.96 (1.80)
Sample size	11957	7765	2410	1225	557

Note: The sample does not include disabled beneficiaries. Social Security income is measured in 1982 thousand dollars. Total assets are measured in hundred of thousands 1982 dollars.

Table 2
Probit, Baseline Estimates, 1982 Cross-section
The dependent variable is 1 if deceased by 1991, 0 otherwise.
Sample: all elderly (disabled beneficiaries not included).
Elasticity in brackets.

Variables	Pooled sample	Married	Widowed	Divorced / separated	Never married
Social Security income	-0.0001 (0.005) {-0.001}	-0.0001 (0.005) {-0.001}	-0.004 (0.016) {-0.03}	0.008 (0.024) {0.05}	-0.022 (0.029) {-0.13}
Total assets	-0.015 (0.006)	-0.014 (0.006)	-0.013 (0.024)	-0.071 (0.050)	-0.066 (0.047)
Living independently	-0.005 (0.037)	0.021 (0.048)	-0.020 (0.077)	-0.113 (0.114)	0.135 (0.151)
Education	-0.012 (0.005)	-0.011 (0.006)	-0.003 (0.012)	0.0003 (0.017)	-0.049 (0.020)
Respondent is white	0.013 (0.051)	-0.022 (0.068)	0.037 (0.104)	0.080 (0.140)	0.212 (0.214)
Respondent is male	0.463 (0.038)	0.439 (0.047)	0.680 (0.106)	0.369 (0.124)	0.555 (0.157)
Age of respondent	0.056 (0.006)	0.058 (0.008)	0.060 (0.013)	0.059 (0.019)	0.019 (0.027)
Number of children	-0.011 (0.008)	-0.010 (0.010)	-0.014 (0.017)	-0.010 (0.025)	-0.015 (0.070)
Widowed	0.161 (0.045)	-	-	-	-
Separated / divorced	0.225 (0.060)	-	-	-	-
Never married	0.275 (0.080)	-	-	-	-
Limits on doing housework	0.281 (0.042)	0.322 (0.051)	0.112 (0.091)	0.319 (0.143)	0.302 (0.202)
Much difficulty in daily activities	0.035 (0.039)	0.039 (0.048)	0.044 (0.083)	0.079 (0.135)	-0.083 (0.166)
Number of health problems	0.076 (0.010)	0.069 (0.012)	0.112 (0.021)	0.067 (0.034)	0.040 (0.048)

Note: Robust standard errors in parenthesis. Social Security income is measured in 1982 thousand dollars. Total assets are measured in hundred of thousands 1982 dollars. The reference group for the marital status dummies is comprised of married elderly.

Table 3
Sample Means and Standard Deviations:
Divorce elderly women.

Variables	**Divorced women**
Proportion deceased by 1991	0.21 (0.41)
Social Security income	4.20 (1.97)
Total assets	0.38 (0.92)
Proportion living independently	0.68 (0.47)
Education	11.03 (3.24)
Respondent is white	0.87 (0.34)
Age of respondent	64.90 (2.19)
Number of children	2.41 (1.96)
Limits on doing housework	0.31 (0.46)
Much difficulty in daily activities	0.45 (0.50)
Number of health problems	2.35 (1.92)
Sample size	768

Note: Social Security income is measured in thousands and total assets in hundred of thousands of 1982 dollars. Education is expressed by the number of schooling years.

Table 4
Probit, Instrumental Variable, All Divorced Women, Cross-section
The dependent variable is 1 if deceased by 1991, 0 otherwise.
Sample: divorced women
Elasticity in brackets.

Explanatory variables	**No IV**	**IV**
Social Security income	0.022 (0.036) {0.14}	-0.061 (0.091) {-0.37}
Total assets	-0.072 (0.072)	-0.060 (0.070)
Living independently	-0.275 (0.162)	-0.271 (0.161)
Education	-0.015 (0.022)	-0.014 (0.022)
Respondent is white	0.530 (0.235)	0.612 (0.251)
Age of respondent	0.036 (0.026)	0.058 (0.032)
Number of children	-0.039 (0.038)	-0.048 (0.040)
Limits on doing housework	0.852 (0.189)	0.862 (0.191)
Much difficulty in daily activities	-0.535 (0.189)	-0.544 (0.191)
Number of health problems	0.102 (0.041)	0.097 (0.042)

Note: Robust standard errors in parenthesis. The estimation includes a dummy indicating whether the respondents receive only secondary benefits.

Table 5
Sample Means and Standard Deviations
Divorced Women Receiving Only Secondary Social Security Benefits.
(control group: divorced women, ex-spouse alive; treatment group: surviving divorced women; 1982 cross-section).

Variables	**Control group**	**Treatment group**
Proportion deceased by 1991	0.21 (0.41)	0.18 (0.38)
Social Security income	2.67 (1.79)	4.58 (1.52)
Total assets	0.22 (0.54)	0.22 (0.53)
Live independently	0.72 (0.45)	0.63 (0.48)
Education	10.30 (3.71)	10.56 (3.10)
Respondent is white	0.80 (0.40)	0.88 (0.33)
Age of respondent	65.29 (2.24)	63.81 (3.13)
Number of children	3.64 (2.65)	2.98 (2.18)
Primary insurance amount	7.04 (2.09)	6.43 (1.69)
Ex-husband born during the notch period	0.61 (0.49)	0.35 (0.48)
Marriage count	1.36 (0.61)	1.58 (0.69)
Limits on doing housework	0.44 (0.50)	0.41 (0.49)
Much difficulty in daily activities	0.61 (0.49)	0.60 (0.49)
Number of health problems	2.95 (2.38)	2.64 (1.95)
Sample size	185	184

Note: Social Security income and primary insurance amount are measured in thousands of 1982 dollars. Total assets are measured in hundred thousands 1982 dollars. Education is expressed by the number of schooling years.

Table 6
Probit, Cross-Sectional Analysis, as of 1982
The dependent variable is 1 if deceased by 1991, 0 otherwise.
Sample: divorced women receiving only secondary benefits.
Treatment group: surviving divorced women.
Elasticity in brackets.

Explanatory variables	**Static analysis: divorced VS surviving divorced women**
Treatment	-0.201 (0.183) {-0.35}
Total assets	0.017 (0.155)
Living independently	-0.330 (0.183)
Education	0.014 (0.030)
Respondent is white	0.232 (0.252)
Age of respondent	0.074 (0.031)
Number of children	-0.016 (0.033)
Primary insurance amount	-0.052 (0.061)
Ex-husband born during the notch period	-0.326 (0.187)
Limits on doing housework	0.315 (0.209)
Much difficulty in daily activities	0.065 (0.229)
Number of health problems	0.040 (0.047)

Note: Robust standard errors are reported in parenthesis.