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INHERITANCES, HEALTH AND DEATH

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SUMMARY

We examine how wealth shocks, in the form of inheritances, affect the mortality rates, health status and health behaviors of older adults, using data from eight waves of the Health and Retirement Survey. Our main finding is that bequests do not have substantial effects on health, although improvements in quality-of-life are possible. This absence occurs despite increases in out-of-pocket spending on healthcare and in the utilization of medical services, especially discretionary and non-lifesaving types such as dental care. Nor can we find a convincing indication of changes in lifestyles that offset the benefits of increased medical care. Inheritances are associated with higher alcohol consumption, but with no change in smoking or exercise and a possible decrease in obesity.

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1. INTRODUCTION

Do improving economic circumstances lead to better health? At first blush the answer seems obvious. Economic theory predicts that higher wealth will relax the budget constraint, allowing individuals to obtain more of all normal goods, presumably including health (Grossman, 1972). Research across a variety of disciplines suggests a positive relationship between social or economic advantage and health (Kitagawa and Hauser, 1973; Marmot *et al.*, 1984, 1991; Feinstein, 1993). However, such cross-sectional associations are less convincing than they first appear because of the possibility of reverse causation–whereby health determines economic circumstances rather than vice versa (Smith, 1999) – or if there are omitted confounding factors (such as discount rates) that cause both health and economic status (Fuchs, 1982). Moreover, time series data often tell a different story. For instance, many types of physical health worsen when the economic conditions *temporarily* improve (Ruhm, 2000, 2005, 2007). Wealth effects might also vary across the lifecycle, with some analysts emphasizing the particular importance of economic circumstances at young ages (Wadsworth and Kuh, 1997; van den Berg *et al.*, 2006).

This paper investigates how inheritances are related to mortality, health status and health behaviors. Our data come from the first eight waves of the *Health and Retirem*ent Survey (HRS), a large US longitudinal survey of adults 51 and older. Bequests are useful to examine because they frequently represent large unanticipated or not fully anticipated shocks. As such they can be thought of as pure

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income effects, in contrast to wage increases that contain a potentially offsetting substitution effect on labor supply. The HRS contains multiple measures of health, as well as data on a wide variety of individual characteristics including health status prior to inheritance receipt.

Beyond focusing on bequests, which have been rarely studied in this context, our analysis improves upon most related previous research in several ways. First, we take extra care in accounting for potential confounding factors by controlling for a wide variety of characteristics, including baseline health status, and by incorporating a falsification-based framework whereby the predicted 'effects' of inheritances too small to plausibly influence health are attributed to unobserved heterogeneity and are subtracted from those of larger bequests. Second, we separately examine how inheritances are related to future mortality and to several measures of health status among the living. Third, we explicitly consider the role of multiple types of medical care in explaining any observed changes in health. Finally, we examine whether bequests affect lifestyle behaviors that have potential consequences for health.

Our main finding is that the wealth shocks associated with sizable inheritances do not substantially affect the health of senior citizens, although some improvements in quality-of-life are possible. The point estimates suggest a small (statistically insignificant) *rise* in overall mortality, but with some possibility of modest benefits for men as well as minor or imprecisely estimated improvements in some health measures. The absence of strong health impacts comes despite increases in out-of-pocket (OOP) health-care spending and in the utilization of many types of medical services, particularly those with a large discretionary component. Nor can we find convincing evidence of offsetting changes in lifestyles. The positive wealth shocks raise light drinking, with no change in smoking or vigorous exercise, and some indication of lower obesity prevalence.

2. QUASI-EXPERIMENTAL ESTIMATES

Potential biases due to reverse causation or confounding factors limit what we learn from previous evidence of positive cross-sectional associations between economic circumstances and health. An ideal experimental design would provide sizable wealth shocks to randomly assigned individuals, whose health could then be compared over several years with otherwise similar persons. Since such experiments are impractical, a potentially promising alternative is to obtain estimates that are 'quasi-experimental', in that they exploit natural experiments or use econometric identification strategies that mimic experimental designs.

Such approaches contain inherent limitations, relative to the experimental 'gold standard', if the variation is not truly random, the treatment group does not represent the full population, or the size and nature of the shocks are limited. For instance, like many related studies, our analysis focuses on mature adults. This is restrictive if socioeconomic status-related health gradients initially grow with age but narrow later in life (Deaton and Paxson, 1998; Case *et al.*, 2002; Smith, 2004), since wealth might then not affect the health of senior citizens (e.g. for purely biological reasons or because U.S. seniors have nearly universal health insurance) while having important benefits at younger ages. Quasi-experimental approaches nevertheless hold promise for providing information on how wealth shocks affect the groups considered and for types of variation available in the data. Although we do not attempt to comprehensively review the prior literature, the remainder of this section characterizes the main results obtained from previous quasi-experimental approaches and supplies context for understanding the contribution of the current analysis.

Instrumental variables (IV) models provide a standard econometric method for dealing with the endogeneity. Ettner (1996) provides the best-known example in this literature. Using data from several sources, she finds that income is positively related to health as proxied by self-reported overall status, bed-days, limitations in activities of daily living (ADLs) and depression scores; stronger associations are

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obtained from IV than ordinary least squares (OLS) estimates.[1] As is typical, the challenge is in finding valid instruments – which are correlated with income but do not independently affect on health – and several of those used by Ettner (e.g. state unemployment rates and education of the spouse or parents) may directly influence health.

Mixed results have been obtained using a second procedure that exploits variations in cohort-specific incomes. Deaton and Paxson (1998) show that cohort-incomes are positively related to health in the United States, with the strongest effects observed in middle-age, whereas Adda *et al.* (2009) fail to uncover such a correlation for the United Kingdom. These conflicting results could reflect cross-country differences or limitations of the estimation strategy. Specifically, reverse causation due to *individual* health status is eliminated but *cohort* level biases are not: better average health might cause cohort incomes to rise and omitted factors (e.g. medical technologies or lifestyle changes) could be correlated with average levels of cohort health and income.

A third strategy exploits government policies creating plausibly exogenous variations in wealth. Case (2004) found that pension reforms leading to unanticipated increases in the wealth of black and coloured South Africans were associated with health improvements. Such results might not extend to industrialized countries, however, with Snyder and Evans (2006) providing countervailing evidence of reduced mortality rates for U.S. seniors whose retirement wealth was unexpectedly *lowered* due to the Social Security benefit 'notch'. Interestingly, they suggest that health improved due to higher rates of (part-time) post-retirement employment, which, in turn, were hypothesized to reduce social isolation. Similarly, Frijters *et al.* (2005) showed that the increased incomes experienced by East Germans, following German unification, resulted in only slightly higher levels of health satisfaction, although their experimental design combined the impact of pure income shocks (due to currency conversion) with wage changes that may generate additional substitution effects on labor supply. These results do not necessarily generalize to younger individuals or to wealth increases unaccompanied by changes in market work.

Finally, a number of researchers examine how health is affected by individual income or wealth shocks. Smith (2004) investigates the effects of changes in stock market wealth and fails to uncover any connection with health. However, this could occur because such fluctuations are viewed to be transitory or uncertain. An alternative is to examine the effects of winning a lottery. Lindahl (2005) shows that, among Swedes, larger prizes are associated with better health and lower mortality rates, with bigger estimated effects from IV than OLS models. However, his sample is limited to winners and he has no information on the frequency of lottery playing. Gardner and Oswald (2007) attempt to overcome these problems, by comparing the consequences of medium-size (£1000–£120 000) UK lottery winners to those receiving small prizes ($<$ £1000) not expected to affect health. The key assumption is that small and medium prize winners have similar unobserved characteristics, since both play the lottery. They find that medium-size prize winners report reductions in mental stress, although the effects take two years to show up. In a related study, Apouey and Clarke (2010) show that, conditional on being a British lottery winner, the size of the prize is unrelated to general health status but is positively associated with mental health, smoking and social drinking. A general concern is that lotteries could influence health through channels other than income. For instance, winning a large lottery might place stress on social relationships (Kaplan, 1978).

This study examines inheritances. As mentioned, bequests frequently represent large wealth shocks that, unlike wage changes, do not have an offsetting substitution effect on labor supply. Inheritances also are potentially received by a wide cross-section of the population, in contrast to lotteries that can only be won by players. That said inheritance shocks are not without problems of their own. One issue is that inheritances need not be unanticipated, raising the possibility of changes in health or lifestyles prior to their actual receipt, and probably leading to an understatement of the effects in our analysis.

[1]Stronger IV estimates could occur because the unobserved characteristics of high-income persons result in relatively poor health (which seems unlikely); or because IV models estimate local average treatment effects that identify at a margin (depending on the instrument), where the income effect is higher; or because measurement error attenuates the OLS coefficients.

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However, even when anticipated (with some probability), the amount and timing of bequests are uncertain, making it likely that many individuals feel constrained in using the prospective future wealth prior to obtaining it. We provide evidence below that our results are not sensitive to accounting for the subjective *ex ante* probability of inheriting and show that individuals frequently have difficulty correctly predicting the probability of future bequests.

A more serious concern is that inheritances may be correlated with unobserved determinants of health. For example, members of wealthy families may have relatively high probabilities of receiving bequests but also gain (unobserved) social capital that contributes to good health.[2] This may be an issue for Meer *et al.* (2003), who use inheritances to instrument changes in wealth and uncover what they describe as weak improvements in self-assessed health status.[3] Michaud and van Soest (2008) similarly instrument changes in wealth with bequests. They present statistical evidence indicating the importance of unobserved heterogeneity and argue that accounting for it completely eliminates the causal effects of wealth on health. However, their identification strategy is quite different than ours and they examine a shorter time period, a more restrictive sample, and a less comprehensive set of outcomes.

We use three strategies to minimize potential omitted variables biases. First, we take advantage of the substantial information available in the *Health and Retirement Survey* to account for a wide variety of observable characteristics. Our analysis suggests that such controls are important, since bequests are not received randomly but instead tend to be obtained by persons with characteristics correlated with good health. More comprehensive controls therefore reduce the estimated health benefits of inheritances. Second, we hold constant health status and behaviors at baseline (prior to the potential receipt of an inheritance). Previous research (Adams *et al.*, 2003; Gardner and Oswald, 2007) demonstrates the usefulness of this approach, and these covariates account for important sources of otherwise uncontrolled for heterogeneity. Lastly, we incorporate an implicit 'falsification test', focusing on the differential impact of a substantial inheritance over and above that of small bequests expected to have no (or at most tiny) health consequences. Specifically, our main specifications focus on the incremental effect of inheritances of \$10 000 or more. It seems unlikely that bequests below \$10 000 (averaging under \$4300) affect health much. Conversely, inheritances above this threshold average almost \$114 000 (in 2002 year dollars) and so are large in both absolute terms and as a share of lifetime income, representing around 2.4 years of income, at the sample average.

3. DATA AND OUTCOMES

3.1. Health and retirement survey

Our analysis uses longitudinal data from the initial cohort of the Health and Retirement Survey (HRS), consisting of persons born from 1931 to 1941, and their spouses. The first interview took place in 1992, with seven additional survey waves at two-year intervals through 2006.[4] This age group and data set have several advantages. Mortality and morbidity are prevalent among seniors, potentially making it easier to observe the health effects of wealth shocks. The chance of receiving an inheritance also increases with age (e.g. Gist and Figueiredo, 2006, show that 29.2% of persons born before 1946 received an inheritance by

[2]Also, since our treatment group excludes persons obtaining inheritances at young ages, most bequests are from relatively long-lived parents, raising the possibility that observed inheritance receipt is correlated with 'good' genes.

[3]This characterization can be questioned. A \$250 000 inheritance increases the predicted probability of good health by 2 percentage points, on a base of 81%, which Meer *et al.* consider to be small. However, this equivalently reduces the probability of poor health by two points on a base of 19%, which seems substantial. This study also contains other limitations. For example, self-assessed health is the only outcome examined and a limited set of covariates are accounted for.

[4]The HRS added four cohorts that are not incorporated in our analysis – the Study of Assets and Health Dynamics Among the Oldest Old (AHEAD), Children of Depression (CODA), War Baby (WB) and Early Baby Boomers (EBB), in 1993, 1998, 1998 and 2004, respectively.

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2004, versus 18.4% of those born between 1946 and 1964 and 12.1% of those born after 1964) and the *HRS* contains detailed information on individual characteristics, health and mortality.

In each survey wave, HRS respondents were asked some variant of:

> 'People sometimes receive property or lump sum payments of money from such things as pension settlements, insurance settlements, cashing in annuities, or inheritances. In the past two years did you [or your (husband/wife/partner)] receive a lump sum of money or property worth $500 or more that you have not already told me about?'

An affirmative answer led to queries about the source of lump sum (e.g. insurance or pension settlement, inheritance, or annuity). We use these responses to limit the wealth shock analyzed to inheritances. Other shocks are excluded because they could affect health for reasons unrelated to wealth changes (e.g. insurance settlements due to auto accidents could represent compensation for harm caused to health and annuities are frequently the anticipated realizations of wealth flows from savings earlier in life). Respondents were also asked the amount of the bequest, with information on bracketed values of more or less than $50 000 requested for persons not specifying an exact amount. We converted inheritances to 2002 dollars (using Current Price Index) and substituted the average amount conditional on receiving less or more than $50 000 for persons providing categorical information (these averages were $17 276 and $186 509 respectively). The original HRS data were used for the inheritance-related variables. All other information came from the RAND HRS Data (version H), which has been cleaned and transformed to be user-friendly (RAND, 2008).

The original HRS cohort contains 12 652 persons at the baseline (1992) interview. We restrict our sample in three important ways. First, we exclude respondents receiving a bequest before the 1992 survey, since we do not have pre-inheritance information for them. Second, our analysis is limited to whites. The reason for this is pragmatic. Blacks have low probabilities of inheriting and obtain relatively small amounts when they do: just 5.7% obtained a bequest (after 1992) and only 3.5% received $10 000 or more, compared with 23.5 and 17.0% of whites (Table I). The average inheritance amount for whites is $20 449 and conditional upon receipt (receipt more than $10 000) it is $87 015 ($113 909). Sex differences in bequest receipt and size are modest. Third, the HRS includes spouses of persons born between 1931 and 1941, regardless of their age. To maintain a fairly homogeneous sample, we restrict spouses to those born within five years of the original cohort (between 1926 and 1946); the results are not sensitive to this choice.

Attrition is potentially problematic, since 16.4% of respondents dropout prior to the wave 8 interview. Some of this may represent unidentified deaths, which we account for when analyzing mortality by censoring such observations at the time of attrition. However, this could be an issue for evaluating health status, since persons exiting the sample could differ systematically from those who do not. To provide information on the potential magnitude of this problem, we compared baseline

Table I. Probability of receiving inheritance and size of inheritance

	Whites	Blacks	White females	White males
% Received inheritance by wave 8	23.50	5.72	23.88	23.08
% $\geq$$10 000	17.00	3.50	16.96	17.05
% < $10 000	4.33	1.35	4.64	3.99
% Missing inheritance amount	2.15	0.87	2.28	1.99
Average cumulative inheritance amount by wave 8 (2002 dollars)				
Full sample	20 449	2201	19 955	21 002
Received inheritance	87 015	38 463	83 577	91 010
Received inheritance $\geq$$10 000	113 909	61 230	116 522	110 990
Received inheritance of < $10 000	4288	4426	4256	4331
N	5217	1258	2760	2457

Note: Data are from the Health and Retirement Survey and refer to respondents who had not received an inheritance prior to 1992 and lived through the wave eight (2006) interview.

characteristics of attriters (by wave 8) and non-attriters. The sample means were generally quite close. For instance, 24% of non-attriters classified their health in 1992 as excellent and 28% as very good, versus 23 and 27% of attriters; 53% of the former group are female compared with 52% of the latter. However, less educated individuals are slightly more likely to exit the sample: 28% of attriters are high school dropouts and 13% are college graduates, compared with 24 and 17% of non-attriters.

3.2. Outcomes

Our dependent variables include mortality and multiple measures of health status. To investigate potential mechanisms for changes in health, we also analyze OOP medical care expenditures, the use of several types of healthcare, and a set of lifestyle behaviors.

Mortality is, in some sense, the ultimate health outcome. Since the HRS respondents are aged 51 to 61 (their spouses are 46 to 66) at baseline, and are followed for 14 years, deaths are common: around 20% of the non-attriter sample die prior to the 2006 interview. On the other hand, because some important health outcomes are unrelated or only weakly related to death, we also examine other indicators. The first is self-reported overall health.[5] From the original categories of excellent, very good, good, fair and poor, we construct dichotomous variables for excellent and fair/poor health. Second, we measure limitations in ADLs or instrumental IADLs. The binary ADL variable is set to one for persons reporting difficulty in: bathing, dressing, eating, moving from bed to chair or walking around. IADL equals one for individuals who have difficulty (without help): answering a phone, managing money, taking medicine, shopping or preparing meals. Our final proxy relates to mental health and is based on scores from the eight-item Center for Epidemiologic Studies (CESD) depression scale.[6] Following previous research (Emptage *et al.*, 2005; Doshi *et al.*, 2008), we define persons with CESD scores of three or greater as ‘depressed’.

Since wealth might protect health or improve quality-of-life by allowing individuals to consume more medical care, we investigate how inheritances are related to OOP medical expenditures, inpatient and outpatient treatments, nursing and home health care, doctor visits, prescribed medications and dental care. OOP spending indicates the total amount paid for medical services (on hospital or nursing home stays; doctor, outpatient and dental visits; home healthcare and prescription drugs) since the last interview; the other variables are dichotomous indicators of use since that time. Hospital and nursing home visits are coded as positive if there has been an overnight stay. Outpatient care refers to outpatient surgery (as distinguished from doctor visits) and home healthcare to visits by medically trained professionals such as nurses, nurse’s aides, physical/occupational therapists, chemotherapists or respiratory therapists. Doctor visits measure whether a respondent went to a physician at least once and dental care includes seeing a dentist or obtaining dentures. Prescription drugs indicate regular use of prescription medications during the last two years.

Bequests may also change health-related lifestyles. We examine the effects on alcohol use, smoking, vigorous exercise and obesity. Drinking is modeled in several ways. First, we include a dichotomous indicator of whether the respondent consumed any alcohol during the last three months and a continuous measure of drinks per day conditional on use.[7] Second, since the effects of recreational and

[5]Self-reported health is predictive of health status and future mortality (e.g. Idler and Angel, 1990). There may be cultural differences in self-assessments of health (Jürges, 2007) but this should not be much of an issue for panel data exploiting within-person variations.

[6]CESD scores in waves 2 and later of the HRS range between zero and eight and are obtained by summing eight questions related to depression. These include both negative indicators (e.g. feelings of sadness, depression, and lonliness) and positive ones (e.g. feelings of happiness or life enjoyment). All questions are scored such that higher values are more indicative of depression. Turvey *et al.* (1999) provides discussion of the eight-item CESD scale.

[7]Drinks per day is calculated as the product of the number of weekly drinking days times the number of beverages consumed on these days, again measured over the last three months. This information is not provided for 1994 and observations for that year are excluded from this portion of the analysis.

heavy drinking could differ (with the former sometimes associated with health benefits), we analyze categorical variables measuring consumption of 1–7 or 1–14 drinks per week (light/moderate alcohol use) and greater than 14 drinks weekly (heavy consumption). In these cases, the reference group includes non-drinkers, as well as persons consuming other than the specified amounts. We investigate tobacco use, through a binary variable set to one for persons smoking at the time of the interview, and physical activity using a dichotomous indicator of vigorous exercise occurring at least three times per week. Lastly, we consider obesity – defined as body mass index (BMI) of 30 or higher – which reflects the combined influences of the physical activity and diet, and class 2 obesity (BMI of 35 or more).

3.3. Explanatory variables

The key explanatory variables relate to inheritances. We delete from the analysis persons obtaining bequests prior to the initial interview (in 1992) and calculate the total inheritance amount received between the first interview and the current survey (whether from single or multiple bequests). Our main analysis uses two variables. The first indicates if any inheritance has been received; the second denotes bequests of \$10 000 or more. For brevity, we refer to the latter as 'large' inheritances, with those below \$10 000 sometimes called 'small'.[8] We also perform sensitivity analysis dividing inheritance amounts more finely (e.g. into five categories rather than two), varying the threshold between 'large' and 'small' bequests, or measuring inheritance size as a proportion of income rather than by an absolute dollar amount.

Supplementary regressors include demographic characteristics such as sex, age and age-squared, marital status, education and (the natural log of) household income, all measured at baseline. Most of these are standard and do not require explanation. Married and cohabiting individuals are separately classified, as are high school graduates and those with a GED. Household income refers to receipts by the husband and wife from earnings, veterans' benefits, retirement or pensions, annuities, IRA distributions, stocks and bonds, savings accounts, rental properties, investment trusts and other sources. Finally, to allow for the possibility that recent death of a parent affects the outcomes, we control for whether the respondent's mother or father (two dichotomous variables) died since the previous survey wave.

Most models control for health and lifestyle at baseline (in 1992). This includes four dummy variables for self-assessed overall health (fair, good, very good or excellent, with poor health the reference category), dichotomous regressors for underweight, overweight, mild obesity or severe obesity (BMI ranges ≤ 18.5, 25 to 29.9, 30 to 39.9, and ≥ 40), as well as smoking status. Appendix Table AI provides summary statistics on these and other variables used in the analysis, as well as the outcomes.

We also estimated specifications with controls for parental education, ADLs, IADLs and alcohol use at baseline, which capture remaining sources of heterogeneity. The results were insensitive to their inclusion and these models are not reported below.

4. ECONOMETRIC METHODS

4.1. Basic model

The question of interest is whether inheritance receipt causally affects health outcomes and inputs. Consider a general specification:

$$Y_{i,t} = X_i\, b + Any\ Inherit_{i,t}\, c + \mu_{i,t}, \tag{1}$$

where $Y_{i,t}$ is a health outcome for individual i at time t, $Any\ Inherit_{i,t}$ indicates inheritance receipt by the current survey wave, X_i is a vector of control variables measured at baseline, and $\mu_{i,t}$ is a regression

[8]Inheritances less than \$50 000, but with the exact amount not specified, are placed in the 'large' category, introducing some possibility for error. The resulting bias is likely to be minor since this covers just 1.6% of inheritances and similar results are obtained when these individuals are dropped from the sample.

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Table II. Selected demographic variable means by inheritance receipt and amount

Baseline control variables	No inheritance	Inheritance < \$10 000	Inheritance ≥ \$10 000
Female	0.5264	0.5664	0.5276
Education			
High school dropout	0.2869	0.1460	0.0811
GED	0.0619	0.0664	0.0361
High school graduate	0.3390	0.4159	0.3382
Some college	0.1741	0.2212	0.2593
College graduate	0.1381	0.1504	0.2852
Self-assessed health status			
Excellent	0.2122	0.2300	0.3439
Very good	0.2674	0.3142	0.3315
Good	0.2791	0.3009	0.2345
Fair	0.1456	0.1283	0.0710
Poor	0.0958	0.0266	0.0192
Smoker	0.2641	0.2876	0.1849
N	3991	226	887

Note: Sample is limited to whites providing data through 2006. All baseline variables are measured in 1992, except for smoking, where the data were first collected in 1994. Subsamples are stratified according to inheritance receipt and amount through the eighth survey wave (in 2006).

disturbance term. The HRS surveys individuals at two-year intervals (from 1992 to 2006) and Equation (1) allows even recently received inheritances to affect the outcomes. The results are generally insensitive to this assumption, as discussed below.

Our most important concern relates to the difficulty of adequately controlling for heterogeneity between persons who do and do not receive bequests. Observable characteristics available in the *HRS* suggest that the inheritance receivers are more advantaged along a variety of dimensions: they are relatively educated and healthy at baseline (Table II). Failure to account for this heterogeneity will lead to erroneously favorable estimates of the health benefits of inheritances. We partially address this issue by controlling for demographic characteristics and health status at baseline.

An additional innovation is that we focus on the incremental impact of large bequests, beyond those of inheritances likely to be too small to meaningfully affect health. Specifically, our main models take the form:

$$Y_{i,t} = X_i b + Any\ Inherit_{i,t} c + Inherit \geq \$10\,000_{i,t} d + \mu_{i,t}, \tag{1$'$}$$

where *Inherit* ≥ \$10 000 indicates receipt of inheritances of \$10 000 or more. Thus, *Any Inherit* and *Inherit* ≥ \$10 000 are both set to one for persons obtaining 'large' bequests, whereas only the former equals one (with *Inherit* ≥ \$10 000 set to zero) for individuals receiving small (below \$10 000) inheritances. $\hat{c}$ then provides the regression estimate of the 'effect' of a small inheritance, which is assumed to reflect otherwise uncontrolled for heterogeneity; $\hat{d}$ shows the additional (causal) impact of a large bequest and is the treatment effect of interest focused upon below.[9] For ease of exposition, we frequently refer to this simply as the inheritance or bequest effect below (rather than stating that the amount inherited exceeds \$10 000). The key identifying assumptions are that inheritances below \$10 000 must be too small to materially affect health and that receivers of small and large inheritances have similar unobserved characteristics, after controlling for baseline demographics and health status. The first assumption seems quite plausible. Although we are less sure about the second supposition, any remaining omitted variables seem likely bias the estimates towards overstating the health benefits of

[9]To see this, assume that $Y_{i,t} = X_i b + Inherit < \$10\,000_{i,t-1} c' + Inherit \geq \$10\,000_{i,t-1} d' + \mu_{i,t}$, where *Inherit* < \$10 000 is a binary variable indicating receipt of a 'small' inheritance. Since *Inherit* equals one if either *Inherit* < \$10 000 or *Inherit* ≥ \$10 000 is one, this can be rewritten as: $Y_{i,t} = X_i b + Inherit_{i,t-1} c' + Inherit \geq \$10\,000_{i,t-1} (d' - c') + \mu_{i,t}$. Therefore, in equation (1′), $c = c'$ and $d = d' - c'$.

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inheritances, since the observables suggest more favorable selection for larger inheritances (Table II), so that a finding of little or no benefit is informative.

4.2. Mortality estimates

Inheritance receipt is likely to be mechanically correlated with death rates because early mortality precludes the future receipt of a bequest. Consider the example where inheritances have no effect on health and two individuals would both inherit in wave 5, conditional on living that long, but with one of them dying in wave 3 (before the bequest is received). Inheritances are then negatively associated with fatality rates – since the non-receiver does not live as long as the inheritor – but this reflects mortality selection rather than a causal effect.

To address this issue, we estimate a discrete time logit hazard model specified by:

$$M_{i,t} = \exp(Z_{i,t}\beta)/(1+\exp(Z_{i,t}\beta)) \tag{2}$$

where $M_{i,t}$ is the mortality hazard rate, the probability of dying between wave $t-1$ and t conditional on being alive at $t-1$, and

$$Z_{i,t}b = X_i b + Any\ Inherit_{i,t}-1c + Inherit \geq \$10\,000_{i,t-1}d + \mu_{i,t}. \tag{3}$$

Since inheritance receipt is measured at $t-1$, and the hazard rate is conditioned on living at least that long, these estimates are not contaminated by the mortality selection. The model also easily accounts for censoring due to attrition or survival through the end of the analysis period.

Since (2) can be rewritten as:

$$\ln[M_{i,t}/(1 - M_{i,t})] = Z_{i,t}\beta \tag{2$'$}$$

and mortality hazard rates are small, averaging 0.029, $(1–M_{i,t})\approx 1$, the log mortality rate is approximately linear in the covariates and marginal effects are closely estimated by $\exp(\hat{\beta}) - 1$.

4.3. Other outcomes

Most dependent variables, other than mortality, are dichotomous. The predicted effects of inheritances on these outcomes are estimated using linear probability models (LPM) corresponding to Equation (1′). Probit models (not shown) yield similar marginal effects. There are up to seven observations per individual (with missing values where death or attrition precedes the interview date). To account for this, we calculate robust standard errors, after clustering at the individual level. OOP medical spending and alcohol use are analyzed using a two-part model that separately estimates the determinants of positive use and the amounts conditional on such use (Duan *et al.*, 1983; Madden, 2008). The participation equation is estimated as an LPM model equivalent to (1′). The conditional use specification is semi-log, taking the form:

$$Ln(Y_{i,t}|Y_{i,t}>0) = X_i b + Any\ Inherit_{i,t}c + Inherit \geq \$10\,000_{i,t}d + \mu_{i,t}, \tag{4}$$

with the impact of a large inheritance shock estimated as $\exp(\hat{d}) - 1$.

Two alternative estimation strategies deserve mention. First, as discussed, some earlier research employs IV strategies, using inheritances as instruments for wealth shocks. While such estimates are of potential interest, we view the direct estimates shown below to be informative. However, for comparison purposes, we also estimated a series of IV models, using inheritance as an instrument for household income. The results were almost identical to those reported below. Second, a number of studies (e.g. van Ours, 2003; van Ours and Williams, 2009; Høgelund *et al.*, 2010) have used the 'timing-of-events' bivariate duration method developed by Abbring and van den Berg (2003) to model a situation where a specified event (e.g. receipt of a bequest at some age) may affect a subsequent outcome (e.g. mortality at some age). Although we view this method as potentially promising, it also has potential problems and we leave it as a subject for future research.

5. RESULTS

5.1. Mortality rates

The results for mortality hazard rates are displayed in Table III. As discussed, the coefficient on *Inherit* ≥ $10 000 provides our best estimate of the true wealth effect, with that on *Any Inherit* indicating the role of confounding factors remaining after the inclusion of the supplementary regressors. The estimated inheritance effects will still be biased if there are systematic differences in the unobserved characteristics of persons obtaining large and small inheritances, holding other explanatory variables constant. Such confounding is likely to be particularly severe in models with parsimonious controls and

Table III. Predicted effect of inheritance receipt on mortality

	(1)	(2)	(3)	(4)	(5)
Inheritance ≥ $10 000	−0.1350	−0.1816	−0.0866	−0.0266	0.0278
	(0.2478)	(0.2479)	(0.2497)	(0.2534)	(0.2543)
Any inheritance	−0.2962	−0.2222	−0.1909	−0.1503	−0.1913
	(0.2177)	(0.2178)	(0.2199)	(0.2246)	(0.2251)
Female		−0.4677***	−0.5806***	−0.6575***	−0.5899***
		(0.0714)	(0.0744)	(0.0772)	(0.0776)
Age at survey wave		−0.0429	−0.1156	−0.2046	−0.1940
		(0.1240)	(0.1263)	(0.1271)	(0.1281)
Age squared		0.0968	0.1489	0.2084**	0.2086**
		(0.0938)	(0.0955)	(0.0964)	(0.0971)
Mother died since last wave			0.1317	0.1577	0.1787
			(0.1539)	(0.1553)	(0.1552)
Father died since last wave			−0.4556	−0.4345	−0.4089
			(0.2944)	(0.2936)	(0.2916)
Cohabits			−0.3198	−0.2896	−0.3066
			(0.4264)	(0.4057)	(0.3931)
Separated/divorced			0.3714	0.3182	0.2994
			(0.3473)	(0.3493)	(0.3470)
Widowed			0.0295	−0.0542	−0.1435
			(0.2444)	(0.2560)	(0.2575)
Never married			0.4281***	0.2050*	0.1040
			(0.1067)	(0.1128)	(0.1145)
Less than high school			0.5084***	0.3318**	0.2109
			(0.1487)	(0.1507)	(0.1568)
GED			0.2042	−0.0160	0.0640
			(0.2257)	(0.2252)	(0.2157)
Some college			0.3244***	0.0187	−0.0218
			(0.0873)	(0.0914)	(0.0917)
College graduate			0.0289	−0.0563	−0.0663
			(0.1568)	(0.1571)	(0.1574)
Log of household income				0.0953	0.1051
				(0.1014)	(0.1030)
Very good health				−0.1275	−0.0154
				(0.1195)	(0.1199)
Good health				−0.0369*	−0.0340
				(0.0197)	(0.0210)
Fair health				0.4725***	0.4209***
				(0.1302)	(0.1303)
Poor health				0.8661***	0.7889***
				(0.1246)	(0.1244)
Smoker					1.3916***

Note: Robust standard errors, clustered by individual, are in parentheses. Table shows the results of discrete time hazard models, with sample weights incorporated ($n = 31\,002$). All supplementary regressors, except parental death, are measured at baseline (in 1992). Reference group includes high school graduates in excellent health (in 1992). Wave fixed effects are included in all regressions. Models (3) through (5) also include controls for missing values of parental death (since the last wave), and specification (5) also contains covariates for BMI in the ranges: ≤18.5, 25 to 29.9, 30 to 39.9, and ≥40. The mean between survey wave mortality hazard rate is 2.9%. *Significant at 10%, **significant at 5%, ***significant at 1% level.

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so we anticipate that the large inheritance coefficient will change as we move from less to more fully specified models.

Column (1) of Table III holds constant only the two inheritance variables. The large negative coefficient on *Any Inherit* provides evidence of remaining heterogeneity, as anticipated since inheritance receivers are favorably selected and this specification contains no other controls. Large bequests are associated with a substantial but imprecisely estimated (and insignificant) 13% reduction in mortality hazard rates.

The predicted inheritance effect rises to an estimated 17% reduction in the mortality hazard, when age and sex are controlled for (see column 2). This occurs because age is positively correlated with both inheritances and death. By contrast, the coefficient is attenuated when adding controls for other demographic characteristics, recent parental death and baseline health status (models 3 and 4). In the most comprehensive specification (column 5), which also holds constant baseline smoking and body weight, substantial bequests are correlated with a statistically insignificant 2.8% *increase* in the mortality hazard.[10] Thus, there is no evidence that inheritances substantially reduce deaths, after accounting for important sources of heterogeneity, although large standard errors imply that all such conclusions are tentative.[11]

5.2. Health indicators

The data hint at the possibility that bequests lead to improvements in the health-related quality-of-life. This can be seen in Table IV, which summarizes results for the five health indicators. Here, and throughout the remaining analysis, we report findings for models corresponding to column (5) of Table III. The point estimates suggest that inheritances are associated with an increased likelihood of 'excellent' overall health and lower rates of ADLs, IADLs and depression; the parameter estimate for fair/poor health is zero. Three of the predicted changes (for excellent self-assessed health, ADLs and depression) are 5 to 8% as large as the dependent variable mean, whereas the coefficient on IADLs corresponds to nearly 20% of baseline.[12] The parameter estimates for *Any Inherit* again generally point to favorable inheritance selection (although most are not statistically significant) and the supplementary covariates usually have the expected signs.

However, there are at least two reasons to be cautious about placing a strong causal interpretation on these results. First, the standard errors are large: we never come close to rejecting the hypothesis of no health effect at conventional levels of statistical significance. Second, the issue of uncontrolled for heterogeneity remains a concern, even in our most comprehensive models. Specifically, the magnitude of the *Inherit* $\geq$ \$10 000 coefficient declines as we more fully account for observables, leaving the possibility that the addition of further controls would move the point estimate even closer to zero.

5.3. Medical care

Positive wealth shocks are predicted to increase personal (OOP) expenditures on medical care, if the latter is a normal good. Table V confirms this expectation. Inheritances raise the probability of positive OOP spending, but the effect is small and statistically insignificant because the vast majority (over 90%) of the sample has some expenditure (column 1). The results in column (2) are more dramatic, showing

[10]The sign of the large bequest parameter estimate switches from negative to positive when moving from column (4) to (5) because smokers have high mortality rates and probabilities of receiving small inheritances but relatively infrequently obtain large ones.

[11]Coefficients on the supplementary covariates are generally in the expected directions. Mortality hazard rates are relatively high for males, older sample members, smokers, those in poor initial health and underweight or severely obese individuals. Education and income do not have strong predicted effects in the most comprehensive model, largely because baseline health – which is influenced by income and education – has already been controlled for. The coefficient on *Any Inherit*is generally attenuated by including additional covariates, as expected since it captures the effects of omitted variables.

[12]A possible reason for the increase in 'excellent' health is that high-income individuals may over-report the probability of being in the best self-reported health categories. Etilé and Milcent (2006) provide evidence for this and recommend that such biases can be avoided by using a dichotomous variable distinguishing between poor and all better health statuses. In these models the large inheritance coefficient is -0.0033 with a standard error of 0.0102, suggesting no health effect.

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Table IV. Predicted effect of inheritance receipt on health outcomes

	Fair/poor health	Excellent health	ADL	IADL	Depressed
	(1)	(2)	(3)	(4)	(5)
Inheritance ≥ \$10 000	0.0001	0.0103	−0.0065	−0.0100	−0.0139
	(0.0169)	(0.0165)	(0.0132)	(0.0114)	(0.0184)
Any inheritance	−0.0224	0.0023	−0.0034	0.0071	0.0037
	(0.0152)	(0.0144)	(0.0119)	(0.0107)	(0.0171)
Dependent variable mean	0.2492	0.1391	0.1167	0.0513	0.1998

Note: Robust standard errors, clustered by individual, are in parentheses. Table shows the results of linear probability models, with sample weights incorporated. The sample size is 36 618, except for columns (3), (4) and (5), where it is 36 621, 36 615 and 34 343. The estimates also control for the same supplementary covariates as in model (5) of Table III.

Table V. Predicted effect of inheritance receipt on medical care and expenditures

	Positive OOP	Log(OOP) If > 0	Visited dentist	Prescrip- tion use	Outpatient care	Nursing home	Home healthcare	Visited doctor	Hospital Episode
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inheritance ≥ \$10 000	0.0134	0.2100***	0.0866***	0.0357	0.0065	0.0020	0.0120*	0.0034	0.0073
	(0.0117)	(0.0724)	(0.0261)	(0.0238)	(0.0164)	(0.0042)	(0.0069)	(0.0103)	(0.0166)
Any inheritance	0.0263**	−0.0365	0.0131	−0.0039	0.0335**	−0.0034	0.00	0.0142	−0.0034
	(0.0111)	(0.0659)	(0.0246)	(0.0216)	(0.0145)	(0.0035)	(0.0058)	(0.0097)	(0.0149)
Dependent variable mean	0.8916	7.0120	0.6358	0.7420	0.1954	0.0131	0.0443	0.9300	0.2243
N	36 729	32 566	29 976	36 701	29 973	36 705	36 625	36 497	36685

Note: See notes on Tables III and IV for additional details on estimation process and supplementary covariates. OOP refers to out-of-pocket medical expenditure. All dependent variables, other than the log of out-of-pocket spending, are dichotomous with estimates obtained from linear probability models. See the text for additional details on definitions of the dependent variables. *Significant at 10%, **significant at 5%, ***significant at 1% level.

that such bequests increase expected OOP spending, conditional on positive amounts, by a highly significant 23.3%.

The remainder of Table V demonstrates that the inheritances are associated with higher use of the seven health services examined, although many estimates are statistically insignificant. Most notably, bequests raise the predicted probability of dental care by 8.7 percentage points, on a base of 64%, and home healthcare by 1.2 points on a base of 4.4%. Both are likely to have a large discretionary component that is plausibly affected by bequest-related wealth shocks. By contrast, inpatient hospitalizations are expected to be less sensitive to economic circumstances and so it is no surprise that the inheritance effects are small (0.7 points on a base of 22%) and insignificant. Growth in the predicted probability of doctor visits or prescription drug use is also tiny – 0.3 and 0.4 percentage points on sample averages of 93.0 and 72.4% – probably because these are so common (and we do not measure changes at the intensive margin), whereas the expected rise in outpatient and nursing home care is sizeable (0.7 and 0.2 percentage points on a base of 19.5 and 1.3%) but imprecisely estimated.

These results suggest that the inheritance receivers use some of their new wealth to purchase of medical care, particularly those types with a substantial discretionary component.

5.4. Health behaviors

Table VI investigates how inheritances affect alcohol use. Bequests predict a statistically significant 10 percentage point increase in the probability of drinking (on a base of 51%), with a significant 11% rise in consumption conditional on some use. The health effects of this change are not transparent, since light drinking may protect from some health problems (Reynolds *et al*., 2003), whereas heavy use is likely to be harmful. However, the remainder of the table shows that recreational drinking grows the most: the

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Table VI. Predicted effect of inheritance receipt on alcohol use

			Weekly alcohol consumption		
	Current Drinker	Log (♯ drinks per day) if > 0	1–7 Drinks	1–14 Drinks	> 14 Drinks
	(1)	(2)	(3)	(4)	(5)
Inheritance ≥ \$10 000	0.1010***	0.1070**	0.0626**	0.102***	0.0169
	(0.0311)	(0.0440)	(0.0280)	(0.0317)	(0.0120)
			−0.0127	−0.0190	−0.00294
Any inheritance	−0.0257	−0.1380***	(0.0245)	(0.0283)	(0.0105)
	(0.0285)	(0.0402)	0.0626**	0.102***	0.0169
Dependent variable mean	0.5127	0.5616	0.2442	0.3143	0.0398
N	36 630	9834	27 674	27 674	27 674

Note: See notes on Tables III and IV for additional details on estimation process and supplementary covariates. All dependent variables, other than log(♯drinks/day), are dichotomous with estimates obtained from linear probability models. See the text for additional details on definitions of the dependent variables. Information on the number of alcoholic beverages consumed is not available in wave 2 (1994), reducing the sample size in the last four columns. *Significant at 10%, **significant at 5%, ***significant at 1% level.

Table VII. Predicted effect of inheritance receipt on exercise, smoking and body weight

	Vigorous exercise	Current smoker	Obese (BMI ≥ 30)	Severely obese (BMI ≥ 35)
	(1)	(2)	(3)	(4)
Inheritance ≥ \$10 000	0.0098	0.0043	−0.0287	−0.0123
	(0.0292)	(0.0180)	(0.0199)	(0.0116)
Any inheritance	−0.0123	−0.0137	0.0213	0.0104
	(0.0257)	(0.0159)	(0.0185)	(0.0108)
Dependent variable mean	0.4840	0.2129	0.2576	0.0762
N	21 471	33 124	36 116	36 116

Note: See notes on Tables III and IV for additional details on estimation process and supplementary covariates. All dependent variables are dichotomous with estimates obtained from linear probability models. See the text for additional details on definitions of the dependent variables.

predicted probability of consuming 1–7 or 1–14 drinks per week rises 6.3 and 10.2 percentage points, compared with a 1.7 point growth in consumption of more than 14 alcoholic beverages weekly.[13]

The findings for the other behaviors – exercise, smoking and obesity – are ambiguous but most often suggest that inheritance shocks change lifestyles in ways likely to improve health. Specifically, as shown in Table VII, bequests over \$10 000 have little impact on exercise or smoking but predict substantial, although imprecisely estimated, decreases in obesity and severe obesity (2.9 and 1.2 percentage points on a base of 25.8 and 7.6%).

As discussed, the frequently substantial coefficients on *Any Inherit* suggest remaining heterogeneity bias. For instance, *ceteris paribus*, bequest receivers have low rates of drinking, smoking and exercise but may be slightly more often obese.

5.5. Gender differences

We investigated whether bequests affect men and women differently. Although large standard errors make it difficult to draw firm conclusions, the results (not shown) raise the possibility of more favorable consequences for males. Inheritances predict a sizeable (but statistically insignificant) 43% increase in the

[13]Although the estimated rise in the probability of drinking more than 14 drinks per drink is large relative to the (small) base level, it is the absolute not relative increases in the probabilities of light versus heavy drinking that are important for evaluating how changes in alcohol consumption affect average health.

mortality hazard rate of women versus a 16% reduction for men. The point estimates further suggest a substantial fall in ADLs, IADLs and depression for males (with the last two being statistically significant), compared with increases in all three outcomes for females. Positive wealth shocks are estimated to raise the overall use of medical care for both men and women, with larger effects for the females. Conditional on positive amounts, inheritances were associated with a 30.1% growth in OOP spending for women versus 15.5% for men. Finally, bequests increase predicted drinking for both sexes, with larger growth in light consumption for women than men. There were no consistent gender differences for exercise, smoking or body weight, and none of these inheritance effects approached statistical significance.

6. DISCUSSION

Our analysis suggests that the positive wealth shocks resulting from inheritances fail to reduce mortality, and might be associated with increased death rates. Nor is there convincing evidence of improvements in other measures of health. This is not a complete surprise since previous quasi-experimental analyses obtained mixed results, often finding that positive income or wealth shocks had no impact or adverse effects on health. Nevertheless, economic theory predicts beneficial consequences and our efforts to provide mechanisms for the observed effects are not particularly successful. Most potential moderating factors examined seem likely to improve health (i.e. greater use of medical care, increases in light alcohol and decreased obesity).

We tested the robustness of our findings to a variety of alternative specifications. To allow for the possibility that inheritances only gradually improve health, we estimated models examining how self-assessed health was related to inheritances received 2, 4, 6, 8, 10, 12 or 14 years earlier, among persons remaining in the sample at the wave 8 interview. These failed to show any clear pattern and, in particular, did not provide consistent evidence of stronger health effects for inheritances received further in the past.

We investigated sensitivity of the results to use of the $10 000 threshold defining 'large' inheritances through specifications where the cut point was $3000, $5000 $7000 or $20 000. Qualitatively similar results were almost always obtained. The one exception was that substantial inheritances predicted implausibly big (but still insignificant) 27 and 24% increases in mortality using the $3000 and $5000 boundaries. We cannot explain these results (indicating strong negative wealth effects on health) but note that they were obtained in specifications with very few persons classified as receiving 'small' inheritances (e.g. less than 1% of observations using the $3000 standard).

Positive wealth shocks of a given size might have different effects on poor than wealthy individuals, since the change in relative economic well being is larger for the former group. We addressed this through models measuring inheritance size as a proportion of baseline household incomes (with the analysis limited to persons not retired in 1992). Although the results were somewhat sensitive to the threshold dividing 'large' and 'small' inheritances, there was never consistent evidence of large and statistically significant health effects.[14] That said, wealth shocks might have more beneficial effects on the less well off but who relatively rarely receive inheritances and so are seldom in the treatment group we analyze.

Inheritances might have few effects on health because they are fully anticipated and so do not represent true shocks. We view this as unlikely, since neither the timing nor amount of bequests are known in advance, and many individuals might be reluctant to alter their spending before inheritances are actually received.[15] Nevertheless, we investigated this issue by defining inheritances as 'expected' for individuals

[14]For instance, results similar to those above were obtained when setting the inheritance threshold at 10% of annual (baseline) income. Conversely, using an 18% threshold, large bequests predicted much smaller (statistically insignificant) increases in out-of-pocket health-care spending or in the use of specific medical services.

[15]There is direct evidence that individuals have limited ability to predict future inheritances. Just 51% of respondents stating, in 1994, that they had a 100% probability of inheriting during the next 10 years actually obtained a bequest by 2006 (conditional on surviving until then). At the other extreme, most (68%) of the HRS sample claimed to have no possibility of obtaining an inheritance but 12% of this group actually received one by 2006.

reporting (in 1994) that their subjective probability of obtaining a bequest during the next 10 years was at least 50 on a 100 point scale (and unexpected otherwise) and estimating the effects on health status and medical care utilization in 2006. These revealed qualitatively similar predicted effects of expected and unexpected inheritances for most outcomes, suggesting that bequest expectations are inaccurate, individuals do not treat expected inheritances like other sources of wealth, or that health is unaffected by them.[16]

Another possibility is that bequests increase medical insurance coverage, presumably with a positive impact on health, but that this is partially or fully offset by the adoption of less healthy behaviors. We examined this through models with four added controls for health insurance coverage (Medicare, Medicaid and private insurance through oneself or a spouse). The inheritance results were largely unaffected.

The main results were robust to several other specification checks. We tested for but uncovered no consistent evidence of uncontrolled for differences in the health *trends* of inheritance receivers and non-receivers.[17] Some specifications divided large inheritances into four separate categories ($10 001–$25 000, $25 001–$100 000, $100 001–$$250 000, > $250 000). We also experimented with fixed-effect estimates as an alternative method of controlling for heterogeneity. Our main conclusions remained unchanged.

We are left to conclude that the wealth shocks resulting from bequests have negligible impacts on mortality, although with some possibility of improvements in other measures of health. The main specifications indicate that OOP health expenditures and the use of medical services, particularly discretionary components such as dental or home health care, do increase. Alcohol consumption also rises, probably with beneficial effects on health, since the change is dominated by growth in light rather than heavy drinking. The data suggest, although not conclusively, that obesity and severe obesity decline, which should yield health benefits.

Many of our estimates are large in magnitude but imprecisely estimated, raising the issue of limited statistical power. However, it is noteworthy that we did find substantial and significant effects for OOP medical spending and some types of health care (dental visits and home healthcare) likely to have a strong discretionary component. The average sample member spends about $1250 per year OOP on medical care and an inheritance of $10 000 or more is predicted to raise this by around $300. Such an increase might not be sufficient to have big effects on overall health or mortality but, particularly when used for purposes such as dental care, might improve quality-of-life in ways that we poorly measure.

Even if the health is unrelated to income or wealth for the *HRS* age group, the latter could be important earlier in the lifecycle. To shed light on this, we separately examined results for persons below age 65 versus 65 and over. Inheritances might have weaker health benefits for the older group since virtually all of them are covered by Medicare, whereas their younger counterparts generally are not. Consistent with this, bequests were associated with larger reductions in deaths and bigger improvements in all measures of health for those under 65, although the estimates were again imprecise. Interestingly, OOP health spending increased by similar amounts for both age groups, in part because seniors had large increases in the types of medical care (such as dental visits) not covered under Medicare.

APPENDIX A

Descriptive statistics for selected variables is shown in Table AI.

[16]For instance, expected and unexpected inheritances raise OOP health-care spending and drinking by similar amounts. However, unexpected bequests may have larger positive (negative) effects on dental visits (obesity prevalence) and, if anything, more detrimental consequences for self-assessed health.

[17]To accomplish this, we selected individuals surviving through the eighth survey wave who had not received an inheritance by wave four (1998). We then examined, but found no evidence of, differences in changes in self-assessed health between waves one and four (prior to potential inheritance receipt), as a function of whether or not a bequest was obtained between waves four and eight. Specifically, the health of large inheritance receivers deteriorated slightly (between waves one and four) relative to non-receivers but this was entirely due to their superior health at baseline. Controlling for health in 1992, the relative health of receivers trended slightly upwards between waves one and four. None of these differences approached statistical significance.

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Table AI. Descriptive statistics for selected variables

	All	Females	Males
Baseline (*1992*) *control variables*			
Female	0.5290	1.0000	0.0000
Less than high school	0.2417	0.2420	0.2414
GED	0.0577	0.0486	0.0680
High school graduate	0.3427	0.3833	0.2971
Some college	0.1924	0.1989	0.1852
College graduate	0.1654	0.1272	0.2084
Cohabits	0.0205	0.0181	0.0232
Separate/divorced	0.0976	0.1188	0.0737
Widowed	0.0444	0.0736	0.0118
Never married	0.0220	0.0228	0.0212
Married	0.8154	0.7667	0.8702
Log(household income)	10.3377	10.2292	10.4595
Self reported health			
Excellent	0.2379	0.2446	0.2304
Very good	0.2827	0.2949	0.2690
Good	0.2701	0.2525	0.2898
Fair	0.1315	0.1388	0.1233
Smoker	0.2506	0.2412	0.2613
Death of parent since last survey			
Mother	0.0470	0.0445	0.0478
Father	0.0322	0.0254	0.0337
Dependent variables (*in 2006*)			
Died By 2006 Survey	0.1942	0.1435	0.2511
Fair/worse self-reported health	0.2764	0.2798	0.2720
Excellent self-reported health	0.1070	0.1034	0.1115
ADL	0.1347	0.1401	0.1278
IADL	0.0607	0.0500	0.0745
Depressed (CESD Score$\geq$3)	0.1953	0.2691	0.2371
Positive OOP medical expenditure	0.9191	0.9302	0.9049
Log(OOP) conditional on OOP$>$0	7.3455	7.3715	7.3112
	(1.3672)	(1.3659)	(1.3685)
Hospital episode	0.2636	0.2507	0.2801
Outpatient care	0.2377	0.2245	0.2546
Nursing home	0.0236	0.0296	0.0158
Home health care	0.0657	0.0646	0.0672
Visited doctor	0.9533	0.9632	0.9407
Prescription use	0.8583	0.8688	0.8449
Visited dentist	0.6372	0.6523	0.6178
Obese (BMI$\geq$30)	0.3024	0.3153	0.2860
Severely obese (BMI$\geq$35)	0.1038	0.1228	0.0797
Current drinker	0.5193	0.4621	0.5927
Log(# drinks/day) conditional on drinking	0.4922	0.3344	0.6229
	(0.5483)	(0.4361)	(0.5956)
1–7 drinks per day	0.2839	0.1744	0.2631
1–14 drinks per day	0.3584	0.1997	0.3145
Smoker	0.2238	0.2712	0.1809
Vigorous exercise	0.4490	0.3992	0.5096

Note: Sample is limited to whites providing data through 2006. Sample sizes are 5217, 2760 and 2457 for all whites, white females and white males. Standard deviations are in parenthesis. Log incomes are calculated by adding $1 to the value for persons reporting no income. Activity daily living (ADL) limitation if the respondent answers yes to having difficulty bathing, eating, moving from bed-to-chair, or walking by self. Instrumental activity of daily living (IADL) limitation if the respondent answers yes to having difficulty using telephone, shopping, managing money, preparing meals, or taking medication. Depression refers to scores of 3 or higher on the 8-item Center for Epidemiologic Studies Depression (CESD) scale. 'OOP' refers to out-of-pocket medical expenditure. Current drinking refers to the consumption of alcoholic beverages within the last three months. Vigorous exercise refers to vigorous exercise three or more times per week. All baseline variables are measured in 1992, except for depression and smoking, where the data were first collected in 1994. The outcomes refer to values in 2006, except for vigorous exercise where questions were lacking in 2006 and so the variable refers to 2004.

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