NBER WORKING PAPER SERIES

THE EFFECT OF INHERITANCE RECEIPT ON RETIREMENT

Jeffrey R. Brown
Courtney C. Coile
Scott J. Weisbenner

Working Paper 12386
http://www.nber.org/papers/w12386

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 2006

We thank Michael Hurd, Erzo Luttmer, John Karl Scholz, Jim Poterba, and seminar participants at the NBER Summer Institute Workshop on Aging, University of Virginia, RAND, and the University of Wisconsin for very helpful comments. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

The Effect of Inheritance Receipt on Retirement
Jeffrey R. Brown, Courtney C. Coile and Scott J. Weisbenner
NBER Working Paper No. 12386
July 2006
JEL No. J14, J26

ABSTRACT

This paper uses the receipt of an inheritance to measure the effect of wealth shocks on retirement. Using the Health and Retirement Study (HRS), we first document that inheritance receipt is common among older workers – one in five households receives an inheritance over an eight-year period, with a median value of about $30,000. We find that inheritance receipt is associated with a significant increase in the probability of retirement. In particular, we find that receiving an inheritance increases the probability of retiring earlier than expected by 4.4 percentage points, or 12 percent relative to the baseline retirement rate, over an eight-year period. Importantly, this effect is stronger when the inheritance is unexpected and thus more likely to represent an exogenous shock to wealth.

Jeffrey R. Brown
Department of Finance
University of Illinois at Urbana-Champaign
340 Wohlers Hall, MC-706
1206 South Sixth Street
Champaign, IL 61820-6980
and NBER
brownjr@uiuc.edu

Courtney C. Coile
Department of Economics
Wellesley College
106 Central Street
Wellesley, MA 02481
and NBER
ccoile@wellesley.edu

Scott J. Weisbenner
Department of Finance
University of Illinois at Urbana-Champaign
304C David Kinley Hall
1407 West Gregory Drive
Urbana, IL 61801
and NBER
wesibenn@uiuc.edu

1. INTRODUCTION

A widely accepted principle of economic theory is that leisure is a normal good, and thus that positive wealth shocks can be expected to lead to reductions in lifetime labor supply. Yet it is difficult to obtain reliable empirical estimates of the wealth effect because wealth is often correlated with unobservable characteristics that affect labor supply, such as taste for leisure or risk aversion.[1] In this paper, we leverage the fact that an inheritance, particularly if it is unexpected, may generate a shock to wealth that allows one to identify the effect of wealth on retirement behavior.

Inheritances are also interesting in their own right because of their importance for many households. Brown and Weisbenner (2004) find that more than one in five households has received a substantial transfer. Strong returns in housing and equity markets over the past several decades have led some analysts to suggest that inherited wealth may become increasingly important in the coming decades. For example, Schervish and Havens (2003) predict that from 1998 to 2052, over $45 trillion of wealth (in 2002 dollars) will be transferred from final estates.[2]

In considering the effect of inheritance receipt on labor supply, it is particularly interesting to focus on retirement for several reasons. First, given the life expectancies of today's elderly, many households will receive inheritances when they are of near-retirement age. For example, among older households in the 2004 Survey of Consumer Finances who report ever having received an inheritance, more than half received one at ages 50-65.[3] Second, if workers have little flexibility along the hours dimension and most inheritances are too small to allow

[1] For surveys of the large literature estimating the effect of unearned income on labor supply, see Pencavel (1986), Blundell and MaCurdy (2000), and Killingsworth and Heckman (1986).

[2] Not all analysts agree with the idea that inheritances are likely to grow in importance as a source of wealth for future retirees. Gokhale and Kotlikoff (2000), for example, point out that for most households, inheritances are small relative to lifetime labor earnings.

[3] Authors' calculations.

young workers to retire immediately, the greatest labor supply response to inheritance receipt may lie in the retirement response of older workers. Third, there is strong general policy interest in understanding how wealth affects retirement behavior. For example, one of the pathways through which Social Security or private pension reform might influence retirement behavior is through wealth effects, and thus it is important for policy analysis to develop an empirical foundation for understanding wealth effects, as distinct from other pathways.

To our knowledge, there are only two previous studies (Holtz-Eakin et. al., 1993; Joulfaian and Wilhelm, 1994) that have tried to examine the effect of inheritance receipt on labor supply. Unfortunately, these two papers shed little light on the effect of inheritance receipt on the retirement decisions of older workers; the former uses a sample of younger workers only, while the latter obtains inconsistent results for older workers, with some specifications even suggesting that inheritance receipt *reduces* the likelihood of retirement. In addition, these studies are unable to distinguish between expected and unexpected inheritances. This distinction is potentially important in estimating wealth effects because if households who expect an inheritance adjust their behavior prior to actually receiving it, then an estimate that is based on total inheritances may underestimate of the true effect of wealth shocks on behavior.

In this paper, we explore the effect of inheritance receipt on retirement using data from the Health and Retirement Study (HRS) for the 1994 to 2002 period. We begin by providing descriptive statistics documenting the empirical importance of inheritances for this population and the accuracy of inheritance expectations. Turning to our main empirical analysis, we first simply estimate whether inheritance receipt increases the probability of labor force exit. However, because this initial approach is subject to a number of concerns about household expectations, we then turn to our preferred specification, which examines whether the receipt of

an inheritance – particularly an unexpected one – causes the individual to retire earlier than expected. By comparing actual inheritance receipt and retirement behavior to what the same individual expected at the beginning of the sample period, we are able to directly and indirectly control for most factors that might otherwise lead to a spurious correlation between inheritance receipt and retirement behavior.

We have several findings. First, we find that inheritances are empirically important for the young elderly. Over an eight-year period, approximately one in five households receives an inheritance; the median value of those inheritances is about $30,000. Many inheritances are unexpected, as indicated by respondent's self-reported probability of inheritance receipt at the beginning of the sample period, but for those who do expect to receive an inheritance, the received value is correlated with the conditional value of the expected inheritance. Second, we find that inheritance receipt is associated with a significant increase in the probability of retirement and that the magnitude of the response is increasing in the size of the inheritance. Third, we find that the effect of an inheritance is greater when the inheritance is unexpected, suggesting that previous estimates may underestimate the true effect of a wealth shock by combining expected and unexpected inheritances. Overall, our findings confirm the existence of non-trivial wealth effects on retirement behavior.

2. PREVIOUS LITERATURE

While there is a vast literature on how various financial considerations influence labor supply decisions, only a small number of studies have attempted to isolate the effect of a wealth shock on labor supply. Interestingly, the evidence from this literature is not uniformly supportive of wealth having a large effect. For example, while Imbens et. al. (2001) find that

lottery winners consume some of their winnings in the form of reduced labor earnings and that the effect is larger for older winners, Krueger and Pischke (1992) find little evidence of an increase in labor supply for workers in the Social Security "notch" cohort, who experienced a dramatic reduction in Social Security wealth due to a law change. Similarly, while Coronado and Perozek (2003) and Sevak (2001) find that unanticipated stock market gains led workers to retire earlier, Coile and Levine (2006) find no effect of stock market fluctuations on retirement.

Two earlier studies have examined the effect of inheritance receipt on labor supply. Holtz-Eakin et. al. (1993) use a sample of estate tax returns from the early 1980s matched to the income tax returns of recipients before and after inheritance receipt. They find that recipients are more likely to exit the labor force when they receive a larger inheritance. However, their sample is limited to recipients age 19 to 58, and because excluding most of the retirement age population, they are unable to observe how the inheritance influences subsequent retirement behavior. Using the Panel Survey of Income Dynamics, Joulfaian and Wilhelm (1994) find small effects of inheritance receipt on hours worked for prime-age workers. They find inconsistent effects on labor force exit by older workers, possibly due to a small sample size.

Our analysis is the first to use the HRS to estimate the effect of inheritance receipt on retirement. The HRS offers many advantages for the study of this question. First, there are a large number of inheritance recipients among older workers in the HRS, giving us the opportunity to improve upon the inconclusive results of the past literature. Second, we are able to include a richer set of covariates than was used in prior studies. Third, the HRS provides data on *ex ante* inheritance expectations, which we use to test whether the effect of inheritance receipt depends on whether the inheritance is anticipated. As authors of previous studies have noted, the inability to distinguish between inheritances that are expected and unexpected introduces a

potential downwards bias in estimates of wealth effects, as the adjustment to an expected inheritance may have already occurred prior to receipt. Finally, the HRS has data on retirement expectations, which we use to help control for unobserved characteristics that may be correlated with both inheritance receipt and retirement.

In addition to offering an appealing way to estimate wealth effects, studying the effect of inheritances on retirement is of more general interest due to the very small but growing literature on the effect of inheritance receipt on household behavior more generally. In addition to the two labor supply papers already discussed, Blanchflower and Oswald (1998) and Holtz-Eakin et. al. (1994a, 1994b) find that inheritance receipt is associated with an increased probability of becoming an entrepreneur. Joulfaian and Wilhelm (1994) also look at the effect of receipt on consumption. While there are numerous other papers focusing on inheritances, most of it has focused on implications for aggregate wealth accumulation[4] or on the reasons that households make bequests.[5] Studying the behavioral responses to inheritance *receipt* can help us to better understand the implications of these substantial intergenerational transfers for aggregate labor supply and savings behavior.

[4] Kotlikoff & Summers (1981) initiated this debate by arguing that most wealth is inherited, counter to implication of the life-cycle models of Modigliani & Brumberg (1954) and Ando & Modigliani (1963) that most wealth is saved. Subsequent articles have offered wide-ranging estimates of the share of net worth due to transfers and have clarified the reasons for the differences; see Modigliani (1988), Kotlikoff (1988), Kessler and Masson (1989), Gale & Scholz (1994), Gale & Slemrod (2000), and Brown and Weisbenner (2004).

[5] Some of the leading theories include that households derive utility from making a bequest (Yaari, 1964) or directly from their children's consumption (Barro, 1974), that parents use bequests to influence their children's behavior (Bernheim, Shleifer, and Summers, 1985), or that many bequests are unintentional (Davies, 1981). See Bernheim (1991), Wilhelm (1996), Perozek (1998), McGarry (1999) McGranahan (2000), Page (2003), and Light and McGarry (2004) for tests of these theories in the context of bequests and Cox (1987), Cox and Rank (1992), and McGarry and Schoeni (1995, 1997) for tests in the context of *inter vivos* gifts.

3. DATA AND DESCRIPTIVE STATISTICS ON INHERITANCES

The data set for the analysis is the Health and Retirement Study. The HRS began in 1992 as a survey of people who were ages 51-61 and their spouses, with re-interviews of these individuals every two years.[6] We use data from waves 2 through 6 (1994-2002) in the analysis because data on inheritance expectations is not available until wave 2.

The HRS provides richly detailed data on respondents' labor supply, health, and finances. For our purposes, a critical feature of the HRS is that it provides information on inheritances at each wave, including whether any inheritances were received since the last wave, the value of any inheritances received, the respondent's self-reported probability of receiving an inheritance over the next ten years, and the conditional value of the expected inheritance. Individuals who give a positive probability of inheritance receipt but are unable to provide a conditional value are asked a series of questions that allow for the value of the expected inheritance to be put into one of the following brackets: $0 to $10,000; $10,000 to $50,000; $50,000 to $250,000; $250,000 to $1,000,000; or over $1,000,000. The second important feature of the HRS is that we can follow the same individuals over time, which allows us to look at how behavior changes following inheritance receipt.

We begin our analysis with an overview of the empirical importance of inheritances for HRS workers nearing retirement age, the characteristics of inheritance recipients, and the accuracy of inheritance expectations.[7] We find that inheritance receipt is quite common in the HRS population: 5.4 percent of workers are in households that receive an inheritance over a two-

[6] Starting in 1998, additional birth cohorts were added to the HRS; however, this analysis focuses on the original HRS cohort. For some labor force and demographic variables, we make use of the RAND version of the HRS, a user-friendly subset of the data that offers cleaned and consistent variables.

[7] We defer detailed discussion of the samples used for these calculations until the next section of the paper. Calculations that refer to inheritance receipt over a two-year period are based on our "person-wave" sample, while calculations that refer to receipt over the full eight-year sample period are based on our "long-difference" sample.

year period as are 19.3 percent of workers over an eight-year period. When weighted by dollars received, the majority of inheritances come from parents (72 percent) or aunts and uncles (7 percent); source missing (15 percent) is the other significant category.

Many of these inheritances are quite substantial, as reported in Table 1. The mean and median values for inheritance received by workers over a two-year period are about $67,000 and $28,000, respectively, indicating that the distribution of inheritance values is highly skewed; indeed, one-quarter of inheritance recipients receive less than $10,000 while the top 5 percent receive inheritances in excess of $280,000.[8] Table 1 also shows the value of inheritances relative to net worth and household income. The median inheritance is equivalent to nearly 11 percent of net worth and four months of household income; the top 5 percent of inheritances are more than 1.5 times net worth or three years of household income.

Table 2 shows the characteristics of inheritance recipients and non-recipients in the HRS. Recipients are slightly younger, as might be expected, because younger people are more likely to have parents that are still alive. Recipients and non-recipients are equally likely to be female but recipients are more likely to be white and married. In general, recipients have higher socioeconomic status – they are in better health, have more education, and have higher household income and net worth prior to inheritance receipt.

Next, we turn to inheritance expectations. Figure 1 is a histogram showing the respondent's self-reported probability of receiving an inheritance over the next 10 years, as reported at in 1994. Nearly 60% of respondents report zero probability of receiving an inheritance. The focal responses of 50% chance and 100% change are the next most common

[8] The median value of inheritances shown on Table 3 is slightly higher, at $30,474. The reason for the difference is that the latter measure includes all inheritances received over an eight-year period rather than the two-year period shown here and thus captures instances where households receive multiple inheritances over the longer period.

answers, with about 10% of the sample selecting each of these responses, and the rest of the distribution is spread out fairly evenly.

Table 3 begins to assess the accuracy of inheritance expectations. We compare 1994 expectations of inheritance receipt during the next 10 years with actual inheritance receipt between 1994 and 2002, grouping respondents by expected probability of inheritance receipt. The third and fourth columns on the table show that the median conditional value of the expected inheritance and median value relative to household income rise with the expected probability of receipt.[9] The next column shows the fraction of each group who actually received an inheritance over an eight-year period. Among the 60 percent of the sample who said there was no chance of getting an inheritance, more than 10 percent of them did receive one and the median value was $17,554 or 35 percent of household income. The probability of receiving an inheritance rises with the probability of expecting one, but perhaps not as quickly as expected – fewer than 40 percent of those who said they were certain to get an inheritance in the next ten years actually received one over our eight-year sample period. The median value and value as a share of household income also generally rise with probability of receipt. It is interesting to note that by probability group, the median received inheritance is fairly similar to the median expected inheritance.

While the medians are similar, it may still be the case that many individuals under-estimate or over-estimate their inheritance. Tables 4a and 4b explore this point by generating a cross-tab of conditional expected and received inheritance values. Table 4a includes everyone in the sample (inheritance recipients and non-recipients), while Table 4b includes recipients only.

[9] For this table only, in cases where respondents reported a positive probability of inheritance receipt and could not provide a conditional value of the expected inheritance but did answer the bracket questions, we assign them a conditional value equal to the midpoint of the bracket (or $2,000,000 for the very few observations in the over $1,000,000 bracket). As discussed more below, we do not use these values in our empirical analysis.

The values on the diagonal, shown in bold, represent the fraction of the sample that accurately predicted their inheritance; we define the categories according to the values in the inheritance expectation bracket questions, allowing us to include people who could not provide a conditional value for the expected inheritance but did answer these questions.

Table 4a shows that for any conditional value of the expected inheritance, the vast majority of workers are in the first column, meaning that they received no inheritance. For example, among those who expected an inheritance of $10,000 to $50,000 within the next ten years, nearly two-thirds had not received an inheritance eight years later. This might make it seem that expectations and receipt are only loosely related, but Table 4b tells a somewhat different story. Among those who expected and received an inheritance, workers with a given conditional value are more likely to be in the diagonal cell (the conditional value matches the received value) than any of the other cells in their row. For example, of those who expected an inheritance of $10,000 to $50,000 and received an inheritance, 40 percent got an inheritance value in this range. Nonetheless, there are many workers in the off-diagonal cells as well, with inheritances both larger and smaller than expected. We make use of the fact that received inheritances are unexpectedly larger for some and smaller for others in the analysis below.

4. EMPIRICAL STRATEGY

There are numerous possible approaches to estimating the effect of inheritances on retirement, each with its own advantages and disadvantages. In particular, there are at least three dimensions along which the researcher must choose to specify the problem. First, one must needs to define the dependent variable of interest. Second, one must determine an appropriate

measure of inheritance receipt. Third, one must determine the time horizon over which to examine behavior.

In order to fully explore the robustness of our results, we adopt multiple approaches along each of these dimensions. To initially establish whether there is a correlation between inheritance receipt and retirement, we first define retirement as "exit the labor force" and run the following regression:

$$retire_{it} = \beta_0 + \beta_1 \text{inheritance}_{it} + \beta_2 X_{it} + \gamma_t + \varepsilon_{it} \qquad (1)$$

In our initial specification, retire_{it} is a dummy equal to 1 if the individual has exited the labor force since the previous wave, inheritance_{it} is a dummy variable equal to 1 if the household received an inheritance since the previous wave, and time horizon is a two-year wave of the HRS. Because retirement is the behavior of interest, the sample is limited to individuals who were working at the previous wave. If both spouses are in the labor force at the previous wave, both will be included in our regression. Because our measure of inheritance receipt is at the household level, we will cluster the standard errors on the household identifier to reflect any within household correlation in the response to the inheritance receipt. When using person-wave observations, we have 17,801 observations.[10]

X_{it} is a vector of demographic characteristics including age dummies, race/ethnicity, gender, marital status, a dummy for poor health status at the previous wave and the change in this dummy, a cubic in own earnings from the previous wave, a cubic in household income from

[10] As detailed below, in some specifications we make use of data on expectations of inheritance receipt, which are first asked at wave 2. To use a consistent sample throughout the analysis, we start our person-wave sample with persons working at wave 2 and observe whether they retire by wave 3. As our data extends through wave 6, each of the HRS' 12,652 respondents may provide up to 4 observations to the person-wave sample. Starting with a potential sample of 50,608 person-wave observations, the sample is selected as follows: we lose 12,426 observations because the individual died, left the sample, or was divorced or separated before wave 6; 4,603 observations because the individual did not report a probability of inheritance receipt; 1,018 observations because the individual failed to report a conditional value for the expected inheritance or answer the bracket questions, and 14,760 observations because the individual was not working at the previous wave.

the previous wave, and a cubic in lifetime wages[11], net worth at previous wave, education level dummies, pension type dummies, industry and occupation dummies, and region dummies. γ_t is a wave fixed effect.

As a second specification, we replace the inherit dummy with the dollar value of the inheritance to test whether the magnitude of the response is increasing with the size of the inheritance. A third specification scales the value of the inheritance by the household's income at the wave prior to receipt.

We will then alter our time horizon, and analyze the effect of inheritance receipt (using each of our three measures) during the entire sample period (1994-2002) on the labor force exit over this period. We refer to this as the "long-difference" estimation. In this approach, each individual contributes one observation to the sample, conditional on being in the labor force at wave 2.[12] The long-difference approach can potentially include longer-term responses to inheritance receipt, while the original approach will focus on more immediate responses. In addition, the long-difference approach matches up somewhat better with the questions about inheritance expectations, which ask about receipt over the next ten years. In our long-difference sample, we have 4,508 observations.

After discussing the above results in Table 5, we will then turn to our preferred specification in Table 6 that makes use of the expectations data in the HRS. In particular, we will introduce two innovations. First, we use as our new dependent variable whether or not the individual retired earlier than expected, where expectations about retirement are measured as of

[11] Lifetime wages are defined as the sum both spouses' real earnings from ages 25 – 50 based on Social Security administrative records. For those observations missing earnings records, we use the median earnings for that individual's gender and education group.

[12] The same sample selection criteria discussed for the person-wave sample apply here as well. For example, if the respondent dies before wave 6 or does not report a probability of inheritance receipt, he or she is not in the sample.

wave 1.[13] This approach allows us to control for a wide range of unobservable factors that might be correlated with both retirement behavior and inheritance receipt. For example, if individuals who receive inheritances also happen to have a stronger taste for leisure, then this information would already be incorporated into their expectations about retirement. By comparing actual to expected retirement dates, we can determine whether the receipt of an inheritance influenced this individual's behavior, while controlling for these other factors.

Second, we can regress this difference in actual and expected retirement date on measures of inheritance receipt that differentiate between expected and unexpected inheritances. This combination essentially allows us to examine the *change* in retirement (actual minus expected) on the *change* in inheritance. By comparing changes in retirement and inheritance expectations, we are controlling for numerous unobservable characteristics of the individual in much the same way that individual fixed effects would do.

5. REGRESSION RESULTS

5.1 Effects of Inheritance Receipt on Retirement

Our first regression results are shown in Table 5, with results for the person-wave sample in the first three columns and those for the long-difference sample in the last three columns.[14]

[13] We would have preferred to use retirement expectations as of wave 2, since our data on inheritance expectations comes from wave 2, but were unable to do so due to data limitations. To be specific, we use the variable r1rplnya from the RAND version of the HRS as our measure of the expected year of retirement. As explained in St. Clair et. al. (2004), this variable incorporates the answers to several questions about expected date of retirement in different parts of the survey in order to provide non-missing data for as many observations as possible. However, the HRS did not ask some of these questions in the wave 2 survey and thus the RAND data does not include a variable equivalent to r1rplnya for wave 2. For reference, we use the variable r6retyr from the RAND data as our measure of the actual date of retirement.

[14] In all regressions, standard errors are clustered at the household level to correct for arbitrary forms of serial correlation in the error term for members of the same household across survey waves.

The model is estimated as a linear probability model for ease of interpretation.[15] We first discuss the person-wave results. In specification 1, we find that receiving an inheritance is associated with a 2.4 percentage point increase in the probability of retirement over a two-year period, or 13 percent of the baseline retirement rate over a two-year period; the effect is statistically significant at the 10 percent level. In the next column, we test whether the response is increasing in the size of the inheritance by instead using the continuous value of the inheritance received.[16] This coefficient is positive and also significant at the 10 percent level. Increasing the value of the inheritance by $100,000 is found to increase the probability of retirement by 2.1 percentage points, or about 11 percent of the baseline retirement rate. In the final column, we use the inheritance value scaled by household income at the previous wave, as it may be that it is the size of the inheritance relative to household finances that matters. This variable also has a positive effect on retirement. The effect is not statistically significant, but the magnitude is quite similar to the other coefficients on the table: an increase in the inheritance value equal to household income (about $55,000 for the median household) raises the probability of retirement by 1.1 percentage points.

The second half of the table shows results for the long-difference sample, where the dependent variable is labor force exit over the full eight-year sample period. The results are quite similar to those already discussed, except that the inheritance dummy and inheritance value coefficients are now significant at the 5 percent level rather than the 10 percent level. The magnitudes of the coefficients are generally similar to those in the two-year change sample, though they are smaller relative to the baseline retirement rate in the long-difference sample. For

[15] We have also run all of our specifications using a probit model, and found the marginal effects to be very similar.

[16] To allow for the possibility of a non-linear effect of inheritances on retirement, we try including squared and cubic terms as well; however, these are never statistically different from zero and so the results are not shown here.

example, receiving an inheritance raises the probability of retirement over the eight-year period by 3.6 percentage points, or 7 percent relative to baseline retirement over an eight-year period, and increasing the value of the inheritance by $100,000 raises the probability of retirement by 3 percentage points, or about 5 percent relative to baseline retirement.

In results not shown, we have also assessed the robustness of the estimates in Table 5 to several alternative measures of labor supply. These include retirement defined based on the respondent's self-report of transitioning from being not retired to being partly or completely retired, the change in the self-reported probability of working past 62 (which may pick up changes in expected retirement behavior that have not yet been realized), the change in hours worked (which may pick up responses on the intensive as well as extensive margin), and labor force re-entry. In all cases the coefficients are of the expected sign, with inheritance receipt consistently reducing labor supply, and the effects are frequently statistically significant. We conclude that the estimated effects of inheritance receipt on labor supply are quite robust.

5.2 Results Using Expectations Data

Our results indicate that the wealth shock a household experiences when it receives an inheritance leads to a significant reduction in the labor supply of household members. There are, however, two limitations to these initial results. First, inheritance receipt is not random in the population. If, for example, individuals with wealthy parents are more likely to receive an inheritance and are also more likely to retire early even in the absence of an inheritance due to differences in both observable (e.g., education, income) and unobservable (e.g., financial knowledge, risk aversion) characteristics, then this would cause a spurious correlation between inheritance receipt and retirement. Second, the receipt of an inheritance may not actually

constitute a wealth shock for many households, because inheritances are often expected. Some of the households that expect an inheritance may have adjusted their labor supply prior to inheritance receipt (for example, by having one spouse retire early) and thus there may be no change in their behavior when the inheritance actually arrives. In this case, treating all inheritances as unexpected will tend to understate the true effect of wealth shocks on behavior.

To address both of these concerns, we make use of the rich data on expectations in the HRS. Specifically, we now define our dependent variable to be equal to one if the household retires earlier than expected, and zero otherwise. To create this variable, we make use of the individual's planned retirement year as reported in wave 1. Because some respondents did not answer these questions in the survey, the sample size is reduced from 4,508 to 2,502 observations.[17]

We also make use of expectations questions about inheritances in order to distinguish expected from unexpected inheritances. Even with the rich information in the HRS, it is not necessarily clear how to delineate between expected and unexpected inheritances. For example, an inheritance may be unexpected because the recipient did not expect to receive one at all, or it may be partially unexpected because the amount received was greater than expected.

Therefore, we first divide inheritance recipients by whether they expected any inheritance (expected probability greater than zero) or not, a simple but appealing way to identify a group of individuals for whom the inheritance was truly unexpected. Our calculations indicate that more

[17] Our retired earlier than expected dummy is 1 for people who are retired by wave 6 and did so earlier than their expected retirement date, 0 for those who are retired by wave 6 and retired on time or later than their expected retirement date, and 0 for those who are still working at wave 6 and have passed their planned retirement date. This variable is missing for those who do not report a planned retirement year (1,321 obs) or who have neither yet retired nor reached their planned retirement date (677 obs). There is no significant difference in the probability of inheritance receipt among those observations with missing values of the retired earlier than expected dummy and those with non-missing values.

than one-third of inheritance recipients had said there was no chance they would receive an inheritance over the next ten years.

Next, to incorporate the idea that an inheritance may constitute a surprise by its size rather than its arrival, we classify recipients by whether they received more than they expected, less than expected, or about what they expected. Since many of those who reported a positive probability of inheritance receipt could not give a conditional value of the inheritance but could answer questions that allow us to determine whether their expected inheritance falls in a particular range (e.g., $10,000 to $50,000), we define the more than expected dummy as receiving an inheritance that fell in a higher bracket than expected, and similarly for inheritances that were less than expected and about expected.[18]

The results of this analysis are shown on Table 6. For ease of comparison with earlier results, we first estimate models with our new dependent variable and the same inheritance variables used in Table 5. The coefficients on the prior inheritance variables are all significant at the 10 percent level or better, even the inheritance value scaled by household income, and are somewhat larger relative to the mean of the dependent variable than those for the long-difference sample on Table 5. For example, receiving an inheritance increases the probability of retiring earlier than expected by 4.4 percentage points, or 12 percent relative to the baseline. Increasing the value of the inheritance by $100,000 increases the probability of retirement by 4.5 percentage points.

[18] While it is tempting to try to decompose the *value* of the inheritance into its expected and unexpected components using the difference between the received value and the conditional value or expected value, such attempts are stymied by the large number of people who expect an inheritance but do not report its conditional value (about 40% of those who give a positive probability of inheritance receipt). Thus, it is not clear how much of their inheritance should be considered expected vs. unexpected. The approach we have adopted is, in our opinion, the cleanest way to test for differences between expected and unexpected inheritances given the available data.

The final three columns on the table display the results including our new right-hand side variables. When we include the two dummy variables for having received an expected or an unexpected inheritance in column 4, we fail to find a stronger effect of unexpected inheritances; its coefficient is somewhat larger than the coefficient on expected inheritances, but they are not statistically different from each other or individually different from zero.

One possible explanation for these findings, however, is that unexpected inheritances may be smaller than expected inheritances, so that the results in column 4 are confounding the size of the inheritance with whether it was a surprise. Indeed, the median expected inheritance is $40,135 while the median unexpected inheritance is $17,554. Thus, in column 5, we instead use as our key independent variables the value of the inheritance for those with expected inheritances and the value for those with unexpected inheritances. Now the expected result emerges. The effect of a given dollar amount of inheritance on the probability of retiring early is more than twice as large if the inheritance is unexpected, so that the effect of raising the inheritance value by $100,000 is to increase the probability of retiring early by 3.8 percentage points if the inheritance is expected or by 8.4 percentage points if it is unexpected. Each coefficient is individually significantly different from zero, but more importantly, the difference between the two coefficients is statistically significant at the 10 percent level.

In the final column of Table 6, we allow for the possibility that even an expected inheritance may be unexpected in its size by including dummy variables for whether the inheritance was more than expected, less than expected, or about what was expected (where expected means within the same "bracket," e.g. $10,000-$50,000). Here too the results suggest a stronger effect of unexpected inheritances. Receiving an inheritance that is larger than expected raises the probability of retiring early by 5.5 percentage points, and this effect is significant at the

10 percent level. The coefficient on receiving an inheritance that is less than expected is negative (but not different from zero) and the two coefficients are statistically different from each other at the 10 percent level. Overall, our results indicate that inheritances that are either entirely unexpected or unexpectedly large have larger effects on retirement than expected inheritances.

6. FURTHER DISCUSSION

While we have found support for our hypothesis that inheritances have larger effects when they are unanticipated, we pause to consider factors that might make it difficult to find a stronger effect of unexpected inheritances in the data.

One possible issue is that that there may be measurement error in respondents' self-reported probability of inheritance receipt and conditional value of the expected inheritance, so that our measures of expected and unexpected inheritances are both quite noisy. While it is undoubtedly the case that our delineation between expected and unexpected bequests is noisy, Tables 3 and 4 show that the subjective probability questions on inheritances contain useful information, as the self-reported probability of inheritance receipt is correlated with actual receipt and the received value is correlated with the conditional value. Furthermore, our measures are constructed so as to not rely very heavily on the specific probability of inheritance receipt or exact value of the expected inheritance. However, given our need to classify inheritances based on the bracket values, it is possible that inheritances are labeled "about as expected" when they are either far more or less than expected (e.g., if a respondent expects $100,000 and receives $225,000), or conversely classified as "more than expected" when in fact the unexpected component is not very large (e.g., if a respondent expects $45,000 and receives

$55,000). Thus, it is possible that the difference between the effect of expected and unexpected inheritances on retirement is larger than what we have found here.

Another potential factor that may affect the interpretation of our results is the role played by liquidity constraints. Workers who expect inheritances might wish to consume some of their inheritance prior to receipt and retire earlier, but be unable to do so because they cannot borrow against the inheritance and hold few assets or mostly illiquid assets. If so, this will tend to make the effect of expected and unexpected inheritances more similar.

To explore this, we experimented with three measures of liquidity constraints, including "has financial assets < $5,000," "has financial assets < $10,000," and "has financial assets < 20% of income." By interacting these with our measures of inheritance receipt, we can test whether there is a differential response to the inheritance based on liquidity. These results did not produce a consistent pattern of there being a stronger response to inheritance receipt by liquidity-constrained households.

These results, however, should not be interpreted as evidence that liquidity constraints are not important, for at least two reasons. First, our three measures are, admittedly, poor proxies for liquidity constraints. Indeed, the literature in this area suggests that good proxies for liquidity constraints are extremely difficult to find. In this context, the problem is made even more intractable by the fact that most proxies of liquidity constraints (such as measures of financial assets, levels of debt, etc.) may be endogenously determined with inheritance expectations. In other words, a household that is expecting an inheritance might save less and/or borrow more in an attempt to smooth out the consumption effects of the future bequest.

A final theory is that recipients may be reluctant to act upon as-yet-unrealized inheritances because inheritance receipt is uncertain. To use a common expression, "a bird in the

hand is worth more than a bird in the bush." Conceptually, it would be more appropriate to use the certainty equivalent of the expected inheritance as the portion that is expected. Unfortunately, calculating the certainty equivalent is not possible with the data available to us, as we would need to know the individual's full probability distribution of inheritance receipt, as well as parameters of the individual's utility function.[19] In sum, measurement error, liquidity constraints, and risk aversion over the size of the inheritance suggest that the difference between the effect of unexpected and expected inheritance receipt on behavior may well be even greater than what we find.

7. CONCLUSIONS

Inheritances represent a shock to wealth that may provide a useful way to estimate the effect of wealth on labor supply. Our paper provides new evidence on the effect of inheritance receipt on retirement using the HRS, which has a large number of inheritance recipients among its sample of older workers and includes data on ex-ante inheritance and retirement expectations.

We find that inheritance receipt is associated with a significant increase in the probability of retirement and that the effect is increasing in the size of the inheritance. These findings contrast with those of the previous literature, which failed to find large and consistent effects of inheritance receipt on retirement. We find that the effect is more than twice as large when the inheritance is unexpected, suggesting that earlier studies may have underestimated the wealth effect due to an inability to distinguish between expected and unexpected inheritances. Our

[19] We have conducted weaker tests of whether uncertainty matters based on the measure of risk aversion available in the data (based on answers to questions about income gambles), on the theory that those who are relatively less risk averse will be more willing to spend expected inheritances prior to receipt, so they will respond less to inheritance receipt than will the most risk averse individuals. However, we do not find any evidence that response to inheritance receipt depends on risk aversion.

findings may be of use to economists and policy makers seeking to project the effect of other wealth changes on retirement, such as those that might result from changes to Social Security.

A second contribution of our work is that we document that inheritance receipt is an important phenomenon for households nearing retirement age. About 20 percent of HRS respondents receive an inheritance over an eight-year period and these inheritances can be quite substantial, with a median value of about $30,000. When a household receives an inheritance, it can spend it in a variety of ways – by reducing labor supply and increasing the consumption of leisure, by increasing its consumption of goods and services, or by increasing transfers to family and friends via bequests or *inter vivos* gifts. Studying some of these other behavioral responses to inheritance receipt may be a fruitful area for future research.

REFERENCES

Abel, Andrew B., 1985. "Precautionary Savings and Accidental Bequests," *American Economic Review* 75, 777-791.

Ando, A. and F. Modigliani, 1963. "The `Life-Cycle' Hypothesis of Saving: Aggregate Implications and Test," *American Economic Review* 53, 55-84.

Barro, Robert J., 1974. "Are Government Bonds Net Wealth?" *Journal of Political Economy* 82, 1095-1117.

Blanchflower, David and Andrew J. Oswald, 1998. "What Makes an Entrepreneur? Evidence on Inheritance and Capital Constrains," *Journal of Labor Economics* 16: 26-60.

Bernheim, B. Douglas, Andrei Shleifer, and Lawrence H. Summers, 1985. "The Strategic Bequest Motive," *Journal of Political Economy* 93, 1045-1076.

Bernheim, B. Douglas, 1991. "How Strong Are Bequest Motives? Evidence Based on Estimates of the Demand for Life Insurance and Annuities," *Journal of Political Economy* 99, 899-927.

Blundell, Richard and Thomas MaCurdy (2000). "Labor Supply," in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*. Amsterdam: North-Holland.

Brown, Jeffrey R. and Scott J. Weisbenner, 2004. "Intergenerational Transfers and Savings Behavior," in Perspectives on the Economics of Aging, David A. Wise, ed. (Chicago: University of Chicago Press).

Coile, Courtney C. and Phillip B. Levine. "Bulls, Bears, and Retirement Behavior." *Industrial and Labor Relations Review* 59(3):408-429, April 2006.

Coronado, Julia and Maria Perozek (2003). "Wealth Effects and the Consumption of Leisure: Retirement Decisions During the Stock Market Boom of the 1990s," Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series #2003-20.

Cox, Donald, 1987. "Motives for Private Income Transfers," *Journal of Political Economy* 95, 508-546.

Cox, Donald and Mark R. Rank, 1992. "Inter-Vivos Transfers and Intergenerational Exchange," *The Review of Economics and Statistics* 74, 305-314.

Gale, W., and J. Scholz, 1994. "Intergenerational Transfers and the Accumulation of Wealth," *Journal of Economic Perspectives* 8, 145-160.

Gale and Slemrod, 2000. "Rethinking the Estate and Gift Tax: Overview," in W. Gale and J. Slemrod, eds., Rethinking Estate and Gift Taxation (Washington, D.C.: Brookings Institution).

Gokhale, Jagadeesh and Lawrence Kotlikoff, 2002. "The Impact of Social Security and Other Factors on the Distribution of Wealth," in Martin Feldstein (ed.), The Distributions Aspects of Social Security and Social Security Reform. Chicago: University of Chicago Press.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen, 1993. "The Carnegie Conjecture: Some Empirical Evidence," *Quarterly Journal of Economics* 108, 413-435.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen, 1994a. "Sticking It Out: Entrepreneurial Survival and Liquidity Constraints," *Journal of Political Economy*, 53-75.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen, 1994b. "Entrepreneurial Decisions and Liquidity Constraints," *RAND Journal of Economics* 25, 334-347.

Imbens, Guido W., Donald B. Rubin, and Bruce I. Sacerdote, 2001. "Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery Players." *American Economic Review,* Vol. 91, No. 4 (September), pp. 778–94.

Joulfaian, David and Mark O. Wilhelm, 1994. "Inheritance and Labor Supply," *Journal of Human Resources* 29, 1205-1234.

Kessler , D., and A. Masson, 1989. "Bequest and Wealth Accumulation: Are Some Pieces of the Puzzle Missing?," *Journal of Economic Perspectives* 3, 141-152.

Killingsworth, Mark and James Heckman (1986). "Female Labor Supply: A Survey," in Orley Ashenfelter and Richard Layard (eds.), *Handbook of Labor Economics*. Amsterdam: North-Holland.

Kotlikoff, L., and L. Summers, 1981. "The Role of Intergenerational Transfers in Aggregate Capital Accumulation," *Journal of Political Economy* 89, 706-732.

Kotlikoff, L., 1988. "Intergenerational Transfers and Savings," *Journal of Economic Perspectives* 2, 41-58.

Light, Audrey and Kathleen McGarry, (2004, forthcoming). "Why Parents Play Favorites: Explanations for Unequal Bequests," *American Economic Review*.

McGarry, Kathleen M. and Robert F. Schoeni, 1995. "Transfer Behavior: Measurement and the Redistribution of Resources within the Family," *Journal of Human Resources* 30: s184-226.

McGarry, Kathleen M. and Robert F. Schoeni, 1997. "Transfer Behavior within the Family: Results from the Asset and Health Dynamics Survey," *The Journals of Gerontology* 52B: 82-92.

McGarry, Kathleen M., 1999. "Inter Vivos Transfers and Intended Bequests," *Journal of Public Economics* 73: 321-351.

McGranaham, Leslie, 2000. "Charity and the Bequest Motive: Evidence from Seventeenth-Century Wills," *Journal of Political Economy* 108, 1270-1291.

Modigliani, F. and R. Brumberg, 1954. "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data," in K. Kurihara, ed., Post-Keynesian Economics (New Brunswick, NJ: Rutgers University Press).

Modigliani, F., 1988. "The Role of Intergenerational Transfers and Life Cycle Saving in the Accumulation of Wealth," *Journal of Economic Perspectives* 2, 15-40.

Pencavel, John, 1986. "Labor Supply of Men: A Survey," in Orley Ashenfelter and Richard Layard (eds.), *Handbook of Labor Economics*. Amsterdam: North-Holland.

Perozek, Maria G., 1998. "A Reexamination of the Strategic Bequest Motive," *Journal of Political Economy* 106, 423-445.

Schervish, Paul G. and John J. Havens, 2003. "Gifts and Bequests: Family or Philanthropic Organizations?" in Alicia H. Munnell and Annika Sunden (eds.), *Death and Dollars: The Role of Gifts and Bequests in America.* Washington, D.C.: Brookings Institution Press.

Sevak, Purvi. 2001. "Wealth Shocks and Retirement Timing: Evidence from the Nineties." Michigan Retirement Research Center, Working Paper WP00D1.

St. Clair, Patricia, et. al. 2004. "RAND HRS Data Documentation, Version D," mimeo, RAND Corporation.

Wilhelm, Mark O., 1996. "Bequest Behavior and the Effect of Heirs' Earnings: Testing the Altruistic Model of Bequests," *American Economic Review* 86, 874-892.

Yaari, Menahem E, 1965. "Uncertain Lifetimes, Life Insurance, and the Theory of the Consumer," *Review of Economic Studies* 32, 137-150.

Table 1: Value of Inheritances Received
HRS Person-Wave Sample

	Value	Value/ Net Worth	Value/ Household Income
Mean	67,068	0.520	0.932
5th %ile	1,620	0.005	0.025
10th %ile	3,311	0.010	0.050
25th %ile	9,444	0.039	0.144
50th %ile	28,343	0.108	0.370
75th %ile	72,857	0.331	1.020
90th %ile	166,256	0.885	2.178
95th %ile	280,218	1.660	3.458
Number of Obs	958	956	956

Note: Values are reported in $2002.

Table 2: Characteristics of Inheritance Recipients,
HRS Person-Wave Sample

Characteristic	Recipients	Non-Recipients	Significant Difference?
Age	59.3	59.6	Yes (*)
Female	0.539	0.545	No
Non-white	0.079	0.174	Yes
Hispanic	0.023	0.072	Yes
Married	0.867	0.811	Yes
Poor Health	0.075	0.130	Yes
Education: HS Dropout	0.089	0.183	Yes
Education: HS Graduate	0.338	0.381	Yes
Education: Some College	0.238	0.217	No
Education: College Graduate	0.335	0.218	Yes
Pension Dummy	0.559	0.538	No
Net Worth at Previous Wave (median)	243,165	153,930	Yes
Household Income at Prev Wave (median)	54,973	71,834	Yes
Number of Observations	955	16,843	

Note: * indicates that the difference is statistical significance at the 10% level. All other differences are statistically significant at the 5% level.

Table 3: Expected vs. Received Inheritances
HRS Long-Difference Sample

Prob of Inheritance Receipt in 1994	% of Sample	Median Cond. Value of Expected Inheritance	Median of Cond. Value of Expected Inheritance/ HH Income	% Who Received Inheritance by 2002	Median Value of Inheritance Received	Median of Inheritance/ 1994 HH Income
0	0.598	0	0.000	0.109	17,554	0.350
.01-.25	0.113	12,139	0.226	0.181	18,021	0.339
.26-.49	0.020	24,278	0.420	0.190	17,199	0.486
0.50	0.083	36,417	0.617	0.245	39,231	0.597
.51-.75	0.042	36,417	0.667	0.329	35,728	0.618
.76-.99	0.054	60,695	0.872	0.367	63,219	0.741
1	0.088	60,695	0.893	0.388	48,592	0.708
All	1.000	0	0.000	0.178	30,474	0.500

Note: Values are reported in $2002. The two final columns are conditional on receipt of an inheritance.

Table 4a: Cross-Tabulation of Conditional Expected vs. Received Inheritances
HRS Long-Difference Sample: Full Sample

Cond. Exp. Inh. Value	Actual Inheritance Value 0	>0 to 10K	>10K to 50K	>50K to 250K	>250K to 1M	>1M	Total Obs
0	**86.8**	5.2	5.3	2.4	0.4	0.0	4,204
>0 to 10K	73.6	**11.2**	9.9	4.6	0.9	0.0	924
>10K to 50K	64.6	7.1	**14.6**	11.8	1.8	0.0	1,154
>50K to 250K	57.2	4.3	11.7	**21.1**	5.5	0.2	622
>250K to 1M	59.3	4.4	8.0	8.0	**15.0**	5.3	113
>1M	80.0	10.0	0.0	10.0	0.0	**0.0**	10
Total							7,207

Note: Row percentages are shown in each cell; the total number of people in each row is shown in the last column.

Table 4b: Cross-Tabulation of Conditional Expected vs. Received Inheritances
HRS Long-Difference Sample: Inheritance Recipients

Cond. Exp. Inh. Value	Actual Inheritance Value >0 to 10K	>10K to 50K	>50K to 250K	>250K to 1M	>1M	Total Obs
0	39.7	38.4	18.6	3.3	0.0	456
>0 to 10K	**43.6**	35.2	17.3	4.0	0.0	202
>10K to 50K	20.4	**39.8**	34.1	5.7	0.0	334
>50K to 250K	8.7	26.2	**51.4**	13.3	0.5	218
>250K to 1M	13.5	16.2	24.3	**29.7**	16.2	37
>1M	50.0	0.0	50.0	0.0	**0.0**	2
Total						1,249

Note: Row percentages are shown in each cell; the total number of people in each row is shown in the last column.

Table 5: Effect of Inheritance Receipt on Retirement

Variable	Depend Var: Labor Force Exit					
	(1)	(2)	(3)	(4)	(5)	(6)
	Person-Wave Sample			Long-Difference Sample		
Inheritance Flag	0.0241 *			0.0360 **		
	(.0132)			(.0187)		
Inheritance Value		0.0210 *			0.0295 **	
		(.0108)			(.0074)	
Inh Value / HH Income			0.0111			0.0107
			(.0078)			(.0076)
# of Obs	17,801	17,801	17,733	4,508	4,508	4,485
Mean of Depend Var	0.192	0.192	0.192	0.541	0.541	0.541

Note:
1) The sample is limited to individuals who were working at the previous wave. The two-year change and long-difference samples are described in more detail in the text.
2) Inheritance value is measured in 100,000s of $2002.
3) All regressions include controls for age, gender, marital status, race, education, current and lifetime income, net worth, health status, pension type, industry, occupation, region, and wave; see text for details.
4) * indicates significance at the 10% level, ** indicates significance at the 5% level.

Table 6: Effect of Expected vs. Unexpected Inheritance Receipt on Retirement
Long-Difference Sample

Variable	Depend Var: Retire Earlier Than Expected					
	(1)	(2)	(3)	(4)	(5)	(6)
Inh Flag	0.0442 *					
	(.0250)					
Inh Value		0.0448 **				
		(.0121)				
Inh Value / HH Income			0.0359 **			
			(.0078)			
Inh Flag - Expected				0.0379		
				(.0310)		
Inh Flag - Unexpected				0.0536		
				(.0364)		
Inh Value - Expected					0.0383 **	
					(.0126)	
Inh Value - Unexpected					0.0836 **	
					(.0229)	
Inh Flag - Amt Expected						0.0678
						(.0453)
Inh Flag - Amt More						0.0547 *
						(.0303)
Inh Flag - Amt Less						-0.0622
						(.0623)
# of obs	2,502	2,502	2,488	2,502	2,502	2,502
Mean of Depend Var	0.382	0.382	0.382	0.382	0.382	0.382
F-test: Exp=Unexp (or Amt More=Amt Less)				0.726	0.079	0.083

Note:
1) The sample is limited to individuals who were working at the wave 2 and provided an expected retirement date at wave 1. The long-difference sample is described in more detail in the text.
2) Inheritance value is measured in 100,000s of $2002.
3) All regressions include controls for age, gender, marital status, race, education, current and lifetime income, net worth, health status, pension type, industry, occupation, region, and wave; see text for details.
4) * indicates significance at the 10% level, ** indicates significance at the 5% level.

Figure 1: Distribution of Expected Probability of Inheritance Receipt (1994 value)