Precautionary Saving and the Accumulation of Wealth

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Abstract

In this paper, I estimate the extent of precautionary accumulation using data from a new survey: the US Health and Retirement Study, which samples older households. I account for many determinants of wealth, not only past economic circumstances and expectations about future resources, but also individual preferences, such as risk aversion and impatience. In addition and most importantly, I account for risk using subjective data on the probability of job loss in the future.

I find evidence in favor of precautionary saving. While the precautionary saving motive does not give rise to a lot of wealth, many households make provisions to insure against earnings risk. Thus, precautionary saving continues to affect accumulation even at late stages of the life cycle.

Keywords: Subjective expectations; earnings variance; precautionary motive.

JEL classification: D91, E21, C21.

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Introduction

The life cycle-permanent income model has been the primary theoretical framework for research on saving. The basic intuition of the model is that households should smooth consumption over the life cycle. They should, therefore, save prior to retirement to offset the decline in future income and start drawing-down wealth when they retire. Other theoretical predictions can be added to the model, particularly when accompanied by the assumption of rational expectations.[1]

There have been several criticisms of this framework. Many studies have found that households do not draw-down wealth after retirement. Most importantly, when looking at micro data on wealth accumulation, one notices a great amount of heterogeneity among households, even within the same age group. Individual wealth holdings also appear to be highly volatile, with large fractions of households moving from one wealth decile to another over a relatively short period of time. It is difficult to rationalize these findings inside the framework of the simple life cycle model.

A new and promising extension to the model, which has become known as the theory of precautionary saving, has emphasized that saving serves not only to spread resources over the life cycle, but also to insure against uncertain events, such as shocks to income. This theory provides many useful insights about the behavior of saving and may reconcile some of the puzzles about saving.

Results from simulations show that precautionary accumulation can be very important. Caballero (1991) finds that precautionary saving can generate high levels of wealth. Similarly, Skinner (1988) calculates that about 56% of an individual's lifetime wealth can be explained by precautionary saving. However, the empirical evidence from micro data has mixed results. On the one hand, Carroll and Samwick (1998) find that the precautionary motive can explain as much as half of wealth accumulation. On the other hand, Guiso, Jappelli, and Terlizzese (1992) and Dynan (1993) find only limited support in favor of the precautionary motive. While the theory is promising from a theoretical point of view, the empirical work faces many difficulties. The central difficulty is how to accurately measure the amount of risk that households face. In addition, there are very few data sets that report the information necessary to perform a test of precautionary saving.

In this paper, I use data from a new U.S. data set, the Health and Retirement Study (HRS). The HRS offers three critical pieces of information to researchers: data on earnings and earnings history, data on wealth and saving, and data on subjective expectations about future events. Given this rich set of information, I can perform much stronger tests of the precautionary saving motive than previous works on this topic.

The contributions of this paper are as follows. First, I use a measure of subjective earnings variance and avoid many of the problems that derive from constructing a measure of income variation. Second, I can rely not only on an accurate measure of wealth, but also on a series of controls that are important for explaining wealth holdings. For example, the HRS provides information on past shocks, such as past unemployment spells. Households who have experienced unemployment in the past are more likely to be unemployed in the future but, at the same time, are also more likely to have low wealth (particularly when shocks are recent). This may distort results against finding evidence in favor of precautionary saving. Third, I can account properly for household resources. I have information, not only on private wealth, but also on whether households have pensions and the amount of pension wealth they have. In addition, I can account for expectations about future resources, such as changes in Social Security in the future and capital gain on the house. Finally, I can account for other forms of support, such as insurance within the family and the possibility of receiving financial support from relatives and friends. This information is important to obtain accurate estimates of the precautionary saving motive.

The paper is organized as follows: In Section 2, I review the empirical predictions of the model and past works on precautionary saving. In Sections 3 and 4, I report the empirical facts on household wealth and I present the empirical work. In Section 5, I report the empirical estimates of the extent of precautionary accumulation. In Section 6, I provide concluding remarks.

Review of the Literature

One of the principal lessons that we have learned in the past decade is that the intuition derived from a life cycle-permanent income model with certainty equivalence can be highly misleading in the presence of even a small amount of uncertainty. If agents display prudence (that is, the third derivative of the utility function is positive), uncertainty can have strong effects on behavior. Most relevant for the empirical work is the fact that, not just the mean, but also the variance of income (and potentially higher moments of the income distribution) play a role in explaining wealth accumulation.[2]

As illustrated in Zeldes (1989), Caballero (1991), Deaton (1992), and Browning and Lusardi (1996), among others, precautionary saving can help solve many empirical puzzles. For example, it can explain why households tend to save more when they are young than is predicted by the life cycle-permanent income model. This helps reconcile the findings of consumption and

income moving together in the early part of the life cycle. It can also explain why older households do not draw down wealth as much as would be expected theoretically. Additionally, Carroll (1992) shows that precautionary saving can explain why consumption tracks income over the *entire* life-cycle.

One of the most critical problems of many studies of precautionary saving is how to obtain a good measure of uncertainty/risk. As discussed at length in Browning and Lusardi (1996), one needs to identify some observable and exogenous sources of risk that vary significantly across the population. Some authors have estimated the variance of future income by assuming a particular income process and using large data sets on income.[3] However, this approach is sensitive to the presence of measurement error in income, to the choice of the income process used in the empirical estimation, and to how much the consumer knows that the econometrician does not. Another approach is to proxy risk with the variance of consumption, as in Dynan (1993) and Kuehlwein (1991). This is still problematic, since it does not solve the problem of measurement error and is dependent on the durability of the consumption measure used in the estimation. Other authors, such as Skinner (1988), have used proxies for risk such as the occupation of the head of the household. This can be unsatisfactory if people select themselves into occupations on the basis of their degree of risk aversion.[4]

Another approach has been the one used by Guiso, Jappelli and Terlizzese (1992), which is based on direct survey questions. They use data on subjective expectations about future income from the Italian Survey of Household Income and Wealth (SHIW). This data set provides information on the distribution of nominal earnings changes in the year following the interview and it is possible to calculate a measure of the subjective variance of earnings. This approach is rather clever and gets around many of the problems mentioned above concerning the measurement of income variance and, in particular, the problem of the information available to households. While subjective data have problems of their own, they nevertheless provide important information to assess (or at least bound) the importance of the precautionary saving motive.

In this paper, I use the subjective probabilities of job loss provided in the HRS to construct a measure of earnings variance. As far as I know, this paper is one of the few applications of subjective data to the estimation of precautionary saving in the United States.[5] An additional contribution is that by looking at a group of the population (older heads of households) for whom income risk should be relatively small, I can assess the real importance of the precautionary saving motive. If this motive can be detected in this segment of the population, it is likely to be very relevant for the population at large.

Some Empirical Facts about Wealth Holdings of Older Households

In this section, I report some of the basic empirical facts about household wealth holdings. This analysis aims to illustrate some of the problems of estimating the extent of precautionary accumulation in micro data and forms the basis for the empirical work. There are several pitfalls in estimating precautionary saving, as will be illustrated below. In this study, I use data from the HRS, a new panel data set that started in 1992 and that has been conducted at the University of Michigan. This survey provides detailed information on wealth and the retirement process, with a focus on health, disability, labor market, and economic and psycho-social factors. The age range of at least one member in the household is restricted to those who are 51-61 years old (in 1992).

It is important to note a significant methodological advance in the HRS and the difference this advance makes in the quality of wealth and income data. The advance pertains to the treatment of missing income and wealth data. It is well known that missing data represent a major problem in the measurement of wealth. The HRS uses bracketing or unfolding techniques to reduce the size of the missing data problem.[6] Consequently, the wealth data tend to be rather accurate in this data set and this represents a major advantage for performing empirical work on precautionary saving.

In Table 1, I consider the sample of households in the first wave of the HRS, exclude those whose respondents are partially or fully retired, and those with respondents younger than 50 or older than 61.[7] I report weighted statistics of liquid net worth, the amount of wealth held in IRAs and Keoghs and in housing equity, and total household net worth.[8] Liquid net worth is defined as the sum of checking and saving accounts, bonds, stocks, and other assets, minus short-term debt. Total net worth is obtained by adding liquid net worth to IRAs and Keoghs, home equity, other real estate, business equity, and vehicles. All values are in 1992 dollars.

Both liquid and total net worth have a wide distribution. Considerable differences in wealth are to be expected because income varies widely. But the actual variation, from $850 in net worth for households at the 10^{th} percentile to $475,000 in the 90^{th} percentile, is far larger than income differences could explain. What is also striking is the percentage of households that have little or no wealth even late in the life cycle. A quarter of the population has less than $30,000 in total wealth. Most important for precautionary saving models is the fact that households have also little or no liquid assets. For example, the median amount of liquid net worth is $6,000 and many report zero or negative liquid net worth. [9]

Table 1 also shows that housing and IRAs and Keoghs are major vehicles of accumulation. Many households own a home, and home equity represents a large share of total net worth for the median household. Approximately 41% of households have retirement savings (IRAs and Keoghs), and those that own retirement savings usually report sizable amounts in those accounts. It is clear that these two assets play an important role in the portfolios of these older households.

In Table 2, I report wealth holdings across some observable household characteristics, such as education, race and ethnicity, and marital status, which could serve as crude proxies for permanent income. Even when considering this classification, disparities in wealth remain huge. Wealth holdings are very low for households whose financial respondent has less than a high school education, and such is also the case for black households. Median wealth holdings of married couples are 3.5 times as high as respondents who never married, and are also substantially higher than the wealth holdings of separated and divorced respondents. When one takes a restricted measure of wealth such as liquid assets, the scenario worsens considerably: many of the above mentioned households have little or zero holdings of liquid assets.[10] Given the information on the components of wealth provided in the HRS, one can examine the levels as well as the composition of household portfolios (Table 3). I have already mentioned the importance of housing and retirements assets for many of these older households, and Table 3 shows that these assets are concentrated among households whose financial respondent has a high school degree or higher education. Other assets, such as stocks, are also heavily concentrated among households whose head has a high education.

The data also show that portfolios are usually concentrated on a few assets. For example, for more than 40% of families, portfolios of liquid assets (which, as before, include checking or saving accounts, short term bonds, bonds, stocks, IRAs and Keoghs, and other assets) are composed of zero or one asset. Considering the total portfolio (which adds business equity, real estate, and housing equity to liquid assets) 38% have a portfolio composed of a maximum of two assets. Thus, many households own a home and one other (financial) asset only.

Apart from private assets, many households are covered by pensions. In the sample, approximately 49% of individuals are covered by pensions, and the proportion increases when considering families rather than individuals. However, the coverage varies substantially across education groups.

The problem in estimating the importance of precautionary saving is that it is not obvious which measure of wealth to consider in the empirical work. On the one hand, it seems plausible that households who have a precautionary saving motive will accumulate and maintain a stock of relatively liquid assets. On the other hand, given the importance of housing in many household portfolios, and the development of the home equity line of credit in the 1980s, which has made housing equity rather liquid, it is worth considering a more comprehensive measure of household resources. As illustrated in the previous tables, many households hold very little in terms of liquid assets and the levels are so low that, taken at face value, they represent evidence for rather limited precautionary accumulation.

As reported in Tables 1 and 3, other important assets in many household portfolios are IRAs and Keoghs. There are limitations and penalties in using those assets, but they are relevant vehicles of accumulation, in particular for this age group. Even though there are issues in using these assets at face value (a quick liquidation leads to a loss), not including them in the calculation of household wealth implies leaving out an important and sizable component of wealth, in particular for families with high school or more education.

Another asset component that deserves attention is business equity. While the self-employed may have a strong precautionary saving motive, the amount of wealth in business equity may also reflect other motives to save. In addition, business equity may be hard to liquidate quickly and/or at market values. Note that while self-employed are not a large proportion of the population, they account to for a very large share of wealth.

Not just assets, but also liabilities deserve consideration. For example, the treatment of debt is potentially an issue. Households may just need to service the debt, and perhaps only that amount should be subtracted from total assets. In addition, the possibility of borrowing when shocks hit can substantially reduce the need for precautionary accumulation.

In the empirical work, I estimate the importance of precautionary saving using several definitions of wealth. I use a measure of financial net worth, which is defined as the sum of liquid net worth and IRAs and Keoghs. Additionally, I use total net worth, which includes all available resources to the household. In the final sample, I have excluded the self-employed since they do not report information on the probability of job loss. Some households continue to report positive amounts in business equity, but overall business equity does not account for a large share of wealth once the self-employed are excluded. These measures have the advantage that I can compare results with previous work. However, given the problems in defining wealth properly mentioned above, I also experiment with different measures of wealth.

Past Shocks, Future Resources, and Individual Preferences

The HRS provides a richness of information about many of the variables that have an effect on wealth accumulation. Note that this information is rarely available in other data sets, forcing researchers to often make restrictive assumptions, for example, about the expectations of households and/or what is included in the household's information set. Even though the precautionary saving model focuses on the variance of income (or other measures of risk), to powerfully test the predictions of any models of intertemporal optimization, one needs information on household resources over the entire life cycle, as well as on preferences. I now

turn to three sets of variables that I can use in my empirical work and that are important for assessing the importance of precautionary saving: data on past economic circumstances, on subjective expectations about the future, and on individual preferences.

Past Economic Circumstances

One of the reasons why household wealth holdings are so heterogeneous and, in particular, so low is perhaps because of past experiences in the labor market. In the HRS, respondents are asked whether they have been unemployed in the past. In addition, respondents are asked whether there have been any large unexpected expenses or events that have made it difficult to meet financial goals over the past 20 years. Many households have responded affirmatively to this question and among the reasons listed in that section, the most frequent ones are health expenses, followed by loss of income due to unemployment or health conditions (and divorce or separation). This again emphasizes that unemployment is a rather important event in explaining past shocks that can, in turn, affect household wealth holdings. It is important to be able to account for past unemployment, in particular if households that experienced unemployment in the past are also more likely to be unemployed in the future.

On the opposite end, wealth could be large because of inheritances and other transfers. The HRS provides information on several sources of money received by households in the past. For example, it reports data on inheritances (or assets in the form of a trust), money (totaling at least $10,000 or more) received from relatives, and money from life insurance settlements. While not many households receive inheritances or money from relatives and insurance companies, it is also the case that the ones that do usually receive large amounts. In short, circumstances of the past can go a long way in explaining the differences among wealth holdings of people of similar age and income. Again, it is desirable to control for those past circumstances, in particular if households who received transfers are less likely to experience shocks in the labor market.

Subjective Expectations about the Future

The act of saving and wealth accumulation is inherently related to the future. It is very limiting and perhaps impossible to address saving without knowing what an individual expects about the future. The HRS provides information on subjective expectations about future events, as will be explained below. While it would be possible to attribute to individuals the objective probabilities of some events, it is also the case that population probabilities may not accurately reflect the probabilities of single individuals with specific characteristics, and may not be very effective in explaining the wide heterogeneity of wealth holdings that we observe empirically.

A few studies have looked at subjective data and examined whether it conforms to realizations.[11] Given that the time dimension of the HRS is still short and that other authors have already performed an evaluation of subjective expectations, I will not perform a similar analysis here. The importance of these variables lies not just in the rationality of the decision process or in the amount of information that the individual collects, but in the fact that they convey information to the econometrician on how the individual perceives the future, which is, in turn, what affects decision making.

One important variable in explaining wealth accumulation is individual longevity. In the HRS, respondents were asked to evaluate the probability of surviving up to age 75 and age 85.[12] When looking at my sample, more than half of the respondents report a high probability (greater than 0.5) of surviving up to age 75. Thus, for many individuals, retiring at age 65 would imply they still have a good chance of at least 10 or more years in front of them.

Respondents were also asked about the probabilities that Congress will change Social Security so that it becomes less generous, and the probabilities that housing prices in their neighborhood will go up faster than prices in general over the next 10 years. This is relevant in explaining wealth since both components are important parts of household total resources (see, also, Table 3). The majority of households report probabilities higher than 0.5 that the Social Security system will become less generous, even though blacks and low educated people are less likely to report high probabilities. Many respondents do not expect big increases in the price of their home. Interestingly, renters are more likely to expect an increase than home-owners. Individuals with low education are also more likely to expect an increase in home prices.

Even though it is only a categorical question, respondents are also asked how they expect their real earnings to change over the next several years (i.e., to go up, go down, or remain the same). Most importantly, respondents are asked about the probability of losing their job next year and the probability that health will affect their work activity in the next ten years. This information is used to calculate permanent income, and, as explained in more detail in Section 5, to calculate a measure of earnings variance.

An additional variable to understand saving behavior is whether or not households are well informed or have looked for information concerning their future economic status. In the empirical work, I use information on whether households have asked the Social Security administration to calculate their retirement benefits. This variable also serves as a proxy for attitudes towards saving.

Individual Preferences: Risk Aversion, Time Preferences, and the Bequest Motive

Another innovation of the HRS is that it reports information on a set of psychological characteristics, from which we can gain useful information about behavior. Specifically, it contains some unique questions that allow the researcher to evaluate an

important preference parameter: the coefficient of risk aversion. As reported in many theoretical models of precautionary saving, this parameter plays a pivotal role in determining the size of precautionary accumulation. Depending on the answers to these questions,[13] it is possible to separate the respondents into four distinct preference categories. Barsky, Kimball, Juster and Shapiro (1997) have analyzed this variable and found that it has some predictive power for choices over risky behaviors. While, as these authors already recognize, there can be problems with the wording of the questions, this variable can serve as a proxy for risk aversion.

An important reason why households hold little wealth is that they discount the future heavily. As explained by a few authors (Deaton (1992), and Carroll (1992, 1997)), impatience combined with prudence give rise to models of precautionary saving which have become known as the "buffer-stock" model. I use information on heavy smoking, heavy drinking, and no regular exercise to account for differences in the rate of time preference across households.[14] These variables may capture general attitudes toward the future or, alternatively, features of the individual personality, which are less conducive to saving.

There can be other motives to save other than to insure against risk and to provide for retirement. For example, individuals may care about their offspring. In the HRS, respondents are asked whether they expect to leave a sizable inheritance to their heirs.[15] In addition, I can proxy for the probability of receiving bequests in the future by using information on whether parents (at least one parent) are still alive. I also add the education of the parents to proxy for parental wealth.

Empirical Estimates

The empirical analysis of the precautionary saving model is based on a regression of wealth (normalized by permanent income) on a set of household characteristics. One additional term that is considered in explaining wealth is the uncertainty about income, as measured by the variance of earnings. The empirical work aims to assess whether there is a positive and significant relationship between uncertainty and wealth, even after accounting for many variables that affect household accumulation. While there can be many sources of uncertainty that households care for, in this paper I focus on earnings uncertainty only.

It is worth mentioning that it is undoubtedly hard to estimate the extent of precautionary accumulation in this sample. First, there are several motives for saving for these households, for example retirement and bequest motives in addition to precautionary motives, and it is hard to disentangle and account for all these motives. Second, the specific age group under consideration does not lead to estimates that can be generalized to the entire population. Nevertheless, finding evidence of precautionary saving among households near retirement represents a strong test to assess the strength and importance of this motive.

As far as the empirical estimation is concerned, there are two major issues that need to be considered to accurately evaluate the importance of the precautionary saving motive. The first one is the measure of income risk to be used in the empirical work. The second is the fact that there are other ways to insure against income risk in addition to holding wealth. I examine each of them in turn.

A Subjective Measure of Income Risk

In the HRS, respondents are asked to evaluate the chances that they will lose their job in the next year. The question is as follows: "Sometimes people are permanently laid off from jobs they want to keep. On a scale from 0 to 10 where 0 equals absolutely no chance and 10 equals absolutely certain, how likely is it that you will lose your job during the next year?" While earnings risk may be small for respondents in this age group at or after the peak of their career, it is also the case that losing a job can have a dramatic effect. Decreases in income in the final stage of the working life are problematic when employees have defined benefit pensions that depend heavily on the last years of work. In addition, as Diamond and Hausman (1994) and Hausman and Paquette (1987) report, job loss is a strong predictor of involuntary retirement for older men. Thus, even though the question refers to job loss in the next year, it is likely to capture permanent rather than transitory shocks to income. This makes it a particularly useful variable to evaluate precautionary accumulation.

As mentioned before, other authors have evaluated subjective data in the HRS and found that it contains useful information to explain behavior. In Lusardi (1998), I examine in detail the expectations about job loss. I find that the responses to this question are sensible. Many respondents report that the odds of losing their job next year are low. In addition, these expectations correlate with relevant economic variables in the expected way. For example, the odds of job loss are highly correlated with whether the respondent belongs to a union, and with past unemployment. The odds are higher when the respondent does not work full time, i.e., he/she works for less than 30 weeks, or works less than 25 hours in a week. Furthermore, the odds of job loss are negatively related with the number of years spent at the respondent's current employer.

From the responses to this question, it is possible to derive a measure of income variance. Assuming that the (unemployment insurance) replacement rate is zero and that there are no changes in earnings if the respondent does not lose the job, it is easy to show that the variance of earnings is equal to $p(1-p)Y^2$, where p is the subjective probability of losing the job and Y is earnings. If the replacement rate is equal to α, the variance of income simply becomes $p(1-p)(1-\alpha)^2Y^2$. In the empirical work, I have considered the earnings of the respondent in the construction of the variance of income. I have also experimented with different values for α.[16]

Forms of Insurance Against Risk

There are several possible reasons why households do not accumulate as much as the theory would predict. For example, some insurance can be provided within the family.[17] The HRS provides an opportunity to gain some insight into this issue. The survey asks respondents if they have relatives or friends that would be both willing and able to help out over a long period of time in case they run into severe financial problems in the future. The question here is somewhat limited, but it is useful to be able to control for households who have access to some form of support.

Additionally, households with more than one earner could face less income risk since there can be risk pooling among earners, at least in the case where spouses' earnings are not perfectly correlated. I account for this fact in the empirical work. The implicit assumption I make is that labor supply decisions are exogenous and do not respond to the amount of risk faced by households or to household preferences, such as risk aversion.

Workers could also selected themselves into jobs that offer job security. In Lusardi (1997), I find that job security is an important determinant of job choice. Even when using subjective information, one has to worry about the fact that earnings variance is reported to be low not because of exogenous variation in the job market, but because of workers' behavior and attitude towards risk. I account for this potential problem by performing instrumental variables (IV) estimation.

The Extent of Precautionary Accumulation

Table 4 reports descriptive statistics of the sample. OLS estimates for different measures of wealth are reported in Tables 5a and 6a. To construct the final sample, in addition to the exclusions mentioned before (age and retirement status), I delete those households that report missing information on the variables of interest. Since wealth has such a wide distribution and outliers can affect the estimates, I trim the distribution and exclude the top and bottom 1% of the distribution. Additionally, I use estimators such as median estimators that can better account for outliers (Tables 5b and 6b). The final sample is composed of 3,259 observations.

An improvement of these empirical estimates with respect to existing works is represented by the set of variables I use to control for observable differences across households. While other researchers have restricted the set to some simple demographics such as age, family size, education, marital status, and race, I can improve upon this set considerably using HRS data. I include many demographics (which include health status and country of origin), as well as proxies for preference parameters such as attitudes toward risk, the strength of the bequest motive, and the rate of time preferences. I also account for whether households have asked

the Social Security administration to calculate their retirement benefits. It is important to be able to account for the heterogeneity present in the data, particularly if omitting important variables could lead to poor estimates of the precautionary saving motive.

I calculate permanent income by estimating an age-earnings profile using the information on income and demographics,[18] as well as subjective information on how income will change in the future. I have used the subjective probability that households will lose their job next year, the subjective probability that health will affect work activity in the next ten years, and additionally, an indicator of whether income is expected to go up, go down or remain the same over the next several years.

The empirical estimates show that, even accounting for permanent income and many demographics, past shocks are important determinants of wealth holdings.[19] Households whose head suffered shocks in the past have significantly less financial and total net worth. In particular, households who suffered periods of unemployment have lower net worth. As mentioned before, it is important to account for households who have already suffered unemployment shocks. They have low net worth (shocks depleted their stocks of assets), but also have a high risk of losing their job in the future.[20] Households who experienced positive shocks, such as the ones who received inheritances, money from relatives and friends, or from an insurance settlement, have significantly higher ratios of financial and total net worth to permanent income.

As far as the information about preferences is concerned, the results are consistent with the basic theory of intertemporal optimization. Respondents with short horizons (in particular the ones that smoke heavily and do not exercise regularly) accumulate less wealth. The dummies for risk aversion are not statistically significant in the OLS regression. However, the median estimates for total net worth indicate that households whose head is (moderately) risk averse accumulate more wealth than households whose head displays low risk aversion. Respondents that report having a bequest motive accumulate more wealth. Respondents who are well informed about their Social Security benefits also have more wealth.

As far as expectations about the future are concerned, households who expect housing prices to go up in the future accumulate less financial and total net worth. Households who may receive a bequest in the future (parents are still alive) accumulate less wealth, even though this effect is not statistically significant.

The important estimates are the ones related to the coefficient of earnings variance. In accordance with the theory of precautionary saving, the estimates are positive and statistically significant. The estimates are statistically significant across estimation methods (OLS and median regressions) and increase (slightly) in magnitude when considering median regressions (for total net worth) which are less affected by outliers. Evaluated at the sample means, the coefficient estimates show that the contribution of precautionary saving to accumulation (measured by the ratio of total net worth to permanent income) ranges from 2.7% to 3.9%

(OLS and median estimates respectively). In the case of financial net worth, the extent of precautionary accumulation is approximately 3.7%.[21]

These estimates are reasonable. One has to note that the risk of losing the job is important, but not very high for a large part of these respondents who, given their age range, have high levels of experience and long tenures and are not much exposed to this risk. In addition, households who have accumulated saving for retirement already have a buffer against shocks.

Robustness and Sensitivity Checks

One potential objection to these estimates is that these regressions do not take into account the fact that many households may have accumulated large amounts of wealth in pensions and pension funds. In the occurrence of unemployment, some workers may perhaps opt for (early) retirement. To account for this fact, I have added to the regression a dummy for whether or not the financial respondent has a pension.[22] A major advantage of the HRS, as mentioned before, is that it is possible to calculate a measure of pension wealth.[23] Two interesting results emerge from the estimates. First, households with pensions accumulate more financial and total net worth than households without pensions. This result is stronger when using the pension value rather than the pension dummy, and when considering total net worth. Second, the coefficient of the variance of earnings continues to remain positive and statistically significant even when considering pensions (column 2 in Tables 5a-b, 6a-b).

In addition, I have also controlled for whether households have relatives and friends that can provide help in case they run into severe financial problems in the future. The estimates are not statistically significant in the OLS estimation, while the robust estimates show that households who can rely on help accumulate more rather than less wealth (column 3 in Table 5a-b, 6a-b). In Table 7, I also interact the variance of earnings with a dummy for whether or not households can rely on help from relatives and friends. The interaction term is not statistically significant.

I have also considered other interactions to obtain more accurate estimates of the precautionary saving motive (see Table 7).[24] For example, the extent of precautionary accumulation is expected to decrease with age. The interaction term of the variance of earnings with a dummy if respondents are less than 54 years old is positive and statistically significant. I have also considered the interaction with the dummy for high risk aversion. According to the precautionary saving model, households whose respondents are more risk averse should have higher precautionary accumulation. The interaction term is, however, not statistically significant. Finally, I have considered the interaction between the variance of earnings and the number of earners in the household (I use a dummy variable equal to one if there is only one earner in the household). The interaction term is positive but not statistically significant.

Overall, these estimates suggest that a precautionary saving motive exists even among older households. This motive declines with age and it is not related to the number of earners in the household. The estimates also suggest that the possibility of receiving support from relatives and friends does not crowd-out precautionary savings.

I have also experimented with different measures of wealth. First, I have considered a measure of liquid financial assets, which excludes IRAs and Keoghs. Second, I have experimented with measures of total net worth that exclude any business equity. Third, I have subtracted a fixed share of debt (i.e., 20%) from total net worth, and fixed shares from IRAs and Keoghs (from 20% to 30% of their reported values).

The estimates indicate that precautionary saving is not concentrated among liquid assets. If anything, it is hard to find much evidence of precautionary accumulation using a restricted measure of accumulation. This suggests that many households may consider their investment in housing equity as a potential buffer against shocks. This is consistent with the evidence provided in Skinner (1996) that housing equity plays an important role in insuring against risk. Other measures of accumulation do not give different results.[25] The extent of precautionary accumulation remains low and, generally, below 5% of the chosen measure of accumulation.

Discussion

There exists much evidence that precautionary saving is an important motive for saving. Using data on saving motives in the Survey of Consumer Finances, Kennickell (1995) shows that precautionary saving is the motive indicated most often by respondents, even among the older ones. The important question, however, is whether this motive gives rise to much wealth. There exists a mounting set of evidence that, when using subjective measures of income variance, the extent of precautionary accumulation is rather small. In the original paper by Guiso, Jappelli and Terlizzese (1992), the extent of precautionary accumulation among Italian households was approximately 2%. My results for U.S. households in the age range 50-61 suggest that the extent of precautionary accumulation ranges from 2 to 5%, depending on the measure of wealth accumulation one considers.

These estimates are consistent with other preliminary works on precautionary saving that also use subjective data to calculate the variance of income. Following the experience of the Italian SHIW and the US HRS, other data sets have included questions aimed to calculate a subjective measure of income variance. Such questions have been inserted, for example, in the Duch CentERdata panel and in the French INSEE Survey on Wealth. Preliminary evidence using French data on subjective earning variance suggests that precautionary saving explains approximately 6% of total and financial net worth.[26]

The estimates in this paper are also consistent with evidence using subjective data directly on precautionary wealth. Kennickell and Lusardi (2000) use data from the 1995 Survey of Consumer Finances, which reports subjective information on how much precautionary wealth households need to have to face emergencies and shocks. They find that for the majority of U.S. households, precautionary accumulation does not represent a large share of total wealth. Their estimates point to values around 8% of total net worth.

Even though, as mentioned before, there are several advantages in using subjective data, there are also potential objections to the use of subjective measures of earnings variance in the empirical estimation. This variable is constructed using the probabilities as perceived by the individual respondent. First, it is impossible to exclude some measurement errors; some respondents may not interpret the question correctly or not take enough care to answer it properly. Second and most importantly, these answers may simply reflect some underlying individual fixed-effect that is responsible for the relationship between wealth and risk. As mentioned before, people less prone to risk may select jobs with higher security, and thus report that the probability of losing their job is low, but at the same time save more.[27] One way to overcome this problem is to find an instrument correlated with risk but uncorrelated with the underlying preference parameter and perform IV estimation rather than simply OLS estimation, as will be reported below.

Instrumental Variables Estimation

It is hard to find good instruments for the subjective variance. As in Lusardi (1997) and Engen and Gruber (1995), I use state unemployment rates as an instrument.[28] The implicit assumption is that workers do not move across states to minimize the probability of being unemployed. I use not only the unemployment rate across states, but also higher terms (up to the power of five) to capture potential non-linearities. While the first stage regression indicates that these variables have explanatory power in addition to other controls that appear in the wealth equation, the predictive power is low (the F-value on the excluded instruments is 3.80 and the adjusted R-squared of the first stage regression on the excluded instruments is less than 0.01). I have considered another instrument set (columns 2 and 4 in Table 8) where I add other variables to the instrument set, such as the unemployment rate across race and age, and the unemployment rate across gender and age. I have also added a dummy for whether workers are in small firms (less than 20 employees). The predictive power of the first stage increases significantly and the estimate may thus be more reliable. The over-identification test is not rejected for total net worth, but it is rejected for financial wealth. Thus, the estimates should be taken with caution.

The IV estimates indicate that the extent of precautionary accumulation is higher than reported in the OLS estimates and, taking as a reference the more comprehensive instrument set, it can explain approximately 30% of total net worth (Table 8). The estimates for precautionary saving become larger for financial wealth than in the OLS case, but they are not statistically significant, again suggesting that precautionary saving is not concentrated in liquid or financial assets.

Conclusions

In this paper, I estimate the extent of the precautionary saving motive using data from a sample of older households. In the empirical work, I use a rich set of controls, and I account not only for past economic circumstances, such as shocks to income, but also for expectations about the future, and for individual preferences. Additionally, I construct a measure of earnings risk using subjective data on the probability of job loss. This allows me to obtain accurate estimates of the precautionary saving motive.

I find evidence in favor of precautionary savings. Many older households make provisions to insure against earnings risk. Thus, precautionary saving continues to affect accumulation even at late stages of the life cycle. Precautionary accumulation, however, explains only a limited portion of wealth, i.e. up to 30% of total net worth. Future research will explore whether other forms of risk (health and longevity) also play a role in explaining household wealth holdings.

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Endnotes

[1] See the review in Browning and Lusardi (1996).

[2] See, for example, Kimball (1990) and Caballero (1990,1991).

[3] See, among others, Carroll and Samwick (1998), Kazarosian (1997), and Hubbard, Skinner and Zeldes (1995).

[4] See the empirical evidence of Lusardi (1997).

[5] See, also, Lusardi (1998). In that paper, I provide mainly an analysis of the subjective measure of earning variance, which can be derived using HRS data, as well as some preliminary estimates of precautionary accumulation. The contributions of the current work with respect to that earlier short paper are several. The empirical estimates are performed using a much richer set of controls and, in particular, using pension wealth data. I also account for insurance within the family. Most importantly, I account for many of the problems of using subjective measures of risk by performing instrumental variables estimation.

[6] The use of these techniques has been examined in Juster and Smith (1997), who report that they have been very successful. In addition, Smith (1995) reports that these techniques substantially increase the estimates of net worth and reduce the likelihood of bias in wealth estimates.

[7] The "respondent"refers to the financially knowledgeable person in the household.

[8] Note that the HRS oversamples blacks and Hispanics as well as households from Florida; therefore, I use household weights to obtain statistics representative of the population.

[9] See, also, Poterba, Venti, and Wise (1994) and Smith (1995).

[10] These findings confirm the results of previous studies. For example, Hubbard, Skinner and Zeldes (1995) estimate a model of precautionary saving using data from the Panel Study of Income Dynamics and note that households with low educational attainments have very low pre-retirement wealth—much too low, according to the authors—to be consistent with the predictions of the life cycle model. On the other hand, most households headed by a college graduate have substantial assets near retirement. Smith (1994,1995) uses preliminary releases of the HRS and reports similar findings. Engen and Gruber (1995) estimate a model of precautionary saving using wealth data from the Survey of Income and Program Participation. They use a measure of gross financial assets but report that the median value across the population is as little as $1,600.

[11] See, for example, Bernheim (1988), Hurd and McGarry (1995), and Honing (1995).

[12] Hurd and McGarry (1995) provide a very detailed investigation of the responses to these questions. They show that responses aggregate to population probabilities, and that they correlate with known risk factors in an appropriate way. For example, women report much higher expected longevity than men, and smokers and heavy drinkers report a much lower probability of survival. Consistent with the epidemiological data, respondents with high longevity parents report having a higher probability of surviving to an older age. Additionally, Hurd and McGarry (1996) examine these probabilities across the HRS waves and find that they change in a systematic way with the arrival of new information and accurately predict mortality outcomes across waves.

[13] The wording of the question is: "Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance it will double your (family) income and a 50-50 chance that it will cut your (family) income by a third. Would you take the new job?" If the answer to this question is yes, then the interviewer continues: "Suppose the chances were 50-50 that it would double your (family) income, and 50-50 that it would cut it in half. Would you still take the new job?" If the answer to the first question is no, then the interviewer continues: "Suppose the chances were 50-50 that it would double your (family) income and 50-50 that it would cut it by 20 percent. Would you then take the new job?"

[14] Heavy smoking is defined as smoking 20 cigarettes or more a day, heavy drinking is defined as having 3 or more drinks a day.

[15] The list of answers is: yes, definitely; yes, probably; yes, possibly; probably not; no, definitely.

[16] Note that I normalized the variance of earnings by dividing by permanent income.

[17] Similarly, Hubbard, Skinner and Zeldes (1995) pursue the fact that many government programs provide a floor to consumption and also a disincentive to save.

[18] I use age, sex, and marital status in addition to education and occupation dummies that are interacted with age. I use dummies for whether the respondent belongs to a union, works in a small firm (less than 20 employees), and whether he/she works full time. Since the age range is only 10 years, I have not accounted for cohort effects in income.

[19] The demographics have the expected sign. Whites have higher wealth (financial and total wealth) to permanent income ratios, while blacks have lower ratios than Hispanics. Married couples have higher net worth to permanent income ratios than singles. Those households whose head has a high school or higher education also report higher ratios. In addition, households whose respondents report being in excellent or good health have higher wealth to permanent income ratios than households whose respondents report poor health.

[20] Lusardi (1998) shows that respondents that have been unemployed in the past report higher odds of losing their job in the next year.

[21] These results are obtained using a replacement rate of zero, but I have experimented using different values of the replacement rate and results barely change.

[22] For brevity, these estimates are not reported but are available upon request.

[23]For a detailed explanation of the construction of the pension data, see Venti and Wise (1997).

[24] For brevity, I only report the median regressions for total net worth. Results for financial net worth are rather similar and are available from the author upon request.

[25] For brevity, estimates are not reported but are available from the author upon request.

[26] See Arrondel (2000).

[27]See the critique of Lusardi (1997) to the estimates of Guiso, Jappelli and Terlizzese (1992).

[28] I have obtained authorization from the HRS to use state identifiers, which are not available to public users of the data. The unemployment data is from the BLS Bulletins.