

Changes in Stockholding Behavior: Evidence from Household Survey Data

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Abstract

This paper investigates the factors that cause households to switch between stockholding and non-stockholding using a household-level data set covering a period of 12 years. We find that there is a surprising amount of turnover; a large number of households switch back and forth between stockholding and non-stockholding several times during the sample period. We show evidence that this is in part a reaction to changes in stock prices over the period.

Keywords: Asset Allocation, Stock Turnover; JEL Codes: G11, G10, G18, H55

1. Introduction

One of the puzzles of asset allocation is why so few people hold stock. Haliassos and Bertaut (1995) find that 75% of United States households do not hold stock directly and show that empirically it is difficult to find traditional financial factors that would explain this. This paper takes advantage of a panel data set to look at the role that turnover has to play in average stockholding. First, we find that the aggregate data hides the fact that there is a large amount of turnover as households switch between holding stock and not, and furthermore, that an appreciable part of this turnover consists of individuals moving back and forth between the two states. The stockholding puzzle is really a two-part puzzle, why some people never choose to hold stock, and why some people hold stock on an inconsistent basis.

We take advantage of the detail of our data set to test whether turnover is related to household characteristics. In addition, the sample period (1992-2002) was characterized by substantial movement in stock prices, with both sustained increases and decreases. To determine if this affected stockholding we run regressions of switches in the stockholding state on a variety of demographic and economic variables and the lagged change in the SP500 stock index. We find that when the S&P500 increased, households were indeed more likely to switch from not holding stock to holding stock, and less likely to switch in the other direction. This switching behavior is related to the results found by Odean (1999) and Barber and Odean (2000). Using data provided by a discount brokerage, they find that trading by individuals is excessive and that this trading leads to lower net returns. Odean (1999) also finds that the buying and selling of individual stocks is responsive to price changes, but not in the direction of a momentum effect. Rather, increased buying is associated with large absolute price changes in a stock and increased selling is associated with price increases. In our data we do find evidence of a momentum effect. Price changes are positively correlated with the desire to invest in stock. Of course, our data set differs from that used by Odean (1999) in two fundamental ways. It covers a longer horizon at a lower frequency (six survey waves covering 12 years) and it focuses on a broader and older

population who may have lower average financial sophistication than traders at a discount brokerage.

Despite the prediction of the model of investment given by Samuelson (1969), that all households should hold at least some stock in every period, a large number of households do not (Haliassos and Bertaut, 1995). Several reasons have been given for this “stock participation” puzzle such as fixed or variable transactions costs for participating in the stock market or information costs associated with purchasing unfamiliar securities (e.g. Vissing-Jorgenson, 1999, 2002). When looking at factors that affect the stockholding decision empirically, studies have taken two different approaches. One approach is to use the share of wealth held as stock as a measure of stockholding. The disadvantage of this is that the amount is very sensitive to movement in stock prices, even (or especially) if households are not active managers of their portfolios. An alternate measure of typical household behavior may be the simpler question of whether they hold stock or not. This measure ties directly to the stock participation puzzle. Papers that have used this measure when investigating stockholding include Bertaut and Starr-McCluer (2000), Kullman and Seigel (2003), Rosen and Wu (2004), Berkowitz and Qui (2003) and Haliassos and Bertaut (1995).

A variety of data sets have been used to investigate stockholding. We use the Health and Retirement Study (HRS). The HRS is a national panel data set collected by the Institute for Social Research at the University of Michigan with a focus on the evolution of health, income and wealth over time, particularly as it relates to retirement. This data set has been used before to examine other issues of investing behavior (Rosen and Wu, 2004, and Berkowitz and Qui, 2003, for the effects of health on stockholding; Kezdi and Willis, 2002, for the effect of optimism on stockholding; and Hariharan, Chapman and Domian, 2000, for bond holding). The contribution of our paper is to take advantage of the panel aspects of the data set to examine changes in stockholding behavior from interview to interview.

Detailed questions in the HRS were asked on health status, mental state and abilities, retirement plans, and employment history, along with additional questions on asset holding and expectations for the future. Some data are sampled at the household level and other information at the individual level. Financial data are recorded at the household level, which is our unit of analysis. The initial sample consisted of over 12,600 persons in 7,600 households with over-samples of Hispanics, Blacks, and Florida residents. The individuals chosen for the HRS were born between the years 1931 and 1942 so as to be nearing retirement at the start of the survey in 1992. Individuals born between those years are called “age-eligible” and each household chosen for interviewing must have one age-eligible member. However, an age-eligible member may be married to someone who is outside that age range.

The same households are interviewed in each wave. Currently, the survey consists of six waves, for the years: 1992, 1994, 1996, 1998, 2000, and 2002. We have sampled the data by determining for each household in 1992 a “primary individual”. For single households, this is the age-eligible individual. For paired households with more than one age-eligible individual, the primary individual was chosen randomly. By following specific individuals, we avoid potential problems associated from additional individuals entering the sample mid-survey due to marriages and the splitting of households.

2. Stockholding Turnover

Before turning to the regressions, we will tabulate the data to show the broad characteristics of turnover behavior. The HRS reports wealth by asset category for non-retirement funds. Our shareholding measure is constructed as a 0-1 variable indicating whether the individual holds stock or not in non-retirement accounts. The lack of detailed information on asset allocation decisions in retirement accounts is a limitation of the data set. Because of this, our average percentage of households that hold stock underestimates the true amount; however, the focus of this paper is on changes in behavior. Table 1 shows the number of households who held stock in their non-retirement accounts in each of the survey years. The number of people

responding in each wave drops noticeably over time due to households falling out of the survey. We find that there is a small drop in stockholding in 1996, otherwise, stockholding does not change dramatically over this period. However, this relative stability of stockholding over time hides the fact that there still are a large number of individuals moving in and out of stock. Being able to find this is one advantage of using household-level panel data rather than aggregate data. The last column of Table 1 reports the number of households that report holding stock in any of the six waves. The fraction of households that have ever held stock - 42% - is substantially larger than the fraction holding stock in any single year.

Table 2 shows the magnitude of the turnover between survey years. To be included in this table, households must be in the survey in two consecutive waves (so the population in Table 2 in any given wave is smaller than in Table 1 - which includes households that drop out of the survey at some point). As can be seen, there is a substantial amount of movement in both directions: stockholders selling stock and non-stockholders acquiring stock. Furthermore, the amount of turnover found here underestimates the actual amount of turnover since households could change their portfolio allocations several times between waves. While the percentage of households moving into stock is smaller, the number of households without stock is larger, so the flows in and out are roughly comparable, resulting in the fraction holding stock declining only slightly over the survey period.

We can develop this further and ask if this reflects a number of one-time switches by households, or if instead a smaller number of households make a large number of changes. One of the advantages of using a panel data set is that we can follow the behavior of individual households over time. Table 3 categorizes households by the number of times they switch stockholding behavior, both into and out of stock. Only households that held stock in at least one wave are included, so that 0 indicates that the household held stock in all waves of the sample. As can be seen, while the majority of households only change their holding 0 or 1 time, a significant number of households do change their holdings more than once. Three households

even report switching back and forth each wave. Part of the reason that households may exhibit a small number of switches is because they are only in the survey for a few waves. To make the time horizon more comparable across households, in column 2 we report the values only for households that report financial holdings for all six waves. This changes the proportions significantly; households that change holdings two or more times become a larger fraction (43%) of total households. It seems that an appreciable amount of the turnover in Tables 1 and 2 is reflecting the same households moving in and out of stock.

3. S&P 500 and Changes in Stockholding

The decision to change stockholding is a function of both changes in the environment, such as movement in stock prices, and a willingness or desire to switch holdings when circumstances change. In particular, stock prices showed a rapid increase and then decrease during the sample period, which may have influenced desired portfolio allocations. In this section, we test for the effect of changes in stock prices while assessing how economic factors such as education or wealth affect the probability of changing. Kezdi and Willis (2002) use change regressions with the HRS data and we can modify those regressions to take into account the effect of changes in the S&P500.

Table 4 summarizes the independent variables used in the regressions. The sample is for households who report all information and so could be included in the regressions. The actual sample in each regression depends on whether the individual fits the particular pattern of buying or selling stock. The high mean for financial wealth is somewhat deceptive as it is driven by a small number of extremely wealthy households. Median wealth is only \$24,000. “Average Age” is calculated as the individual’s age for single households and the average age for married households. “Average Education” is measured in number of years of school. “Health Status” is self-reported on a scale of 1 to 5 with 1 being best. “Black” and “Single Female” are 1-0 dummy variables

Table 5 reports the results of regressions examining switches in stockholding. Column 1 reports the results of the regression for households moving into stock (the “Become Stockholder” regression). The dependent variable is constructed as a 0-1 variable, taking the value of 1 in period t if in period t the household did not own stock and in period $t+1$ they did. It takes the value of 0 in t if the household did not own stock in periods t and $t+1$. If the household held stock in period t , it is dropped from the regression since it cannot be a “new buyer”. Column 2 repeats the regression but is restricted to households that held stock in at least one period (in other words, the regression excludes households that did not hold stock at $t+1$ because they never held stock). Column 3 reports the equivalent regression for households selling stock (the “Become-Non-Stockholder” regression), where 1 is to sell stock and 0 is to continue to hold stock. Households that did not hold stock in the first period are dropped from the regression since they cannot be sellers of stock. Factors that bias households towards stock should mean that they are more likely to buy stock and less likely to sell, leading to opposite signs for the coefficients across the Become-Stockholder and Become-Non-Stockholder regressions, while factors that lead to more movement back and forth, everything else being equal, should produce positive coefficients in both types of regressions. Since the independent variables are binary 0-1 variables, the equations were estimated as probit regressions.

A number of the economic and demographic controls are highly statistically significant. Higher wealth makes a household more likely to buy stock and less likely to sell. Wealth could be important if it is associated with greater financial sophistication or with the amount of stock held. The average amount of stock held is lower for households becoming stockholders (measured the period they acquire stock) and for householders becoming non-stockholders (measured before they sell off their stock) than they are for all households holding stock, although the average fractions of stock held for both groups is quite close to the fraction for all stockholding households. However, the amount of stock, which is closely related to wealth, was not found to be statistically significant when added to the become-non-stockholder regression

(which is the applicable one since every household in the regression holds stock in at least one period).

Education is significant for the all-households regression but not for the “stockholders” regression. Basically what this is capturing is that households that never held stock over the 12 years tend to have lower average levels of education. The same effect shows up for Black households. On the other hand, higher-educated households are less likely to sell off their stock if they have it, while Black households are more likely to do so. Older households tend to be less likely to buy stock, if they do not already have it, but do not show a greater likelihood to sell it, if they already have it. Married households seem to have a greater willingness to move into stock, but there is no statistically significant difference between male and female single households. Larger values of the health status variable (indicating worse health) causes households to be less likely to buy and more likely to sell, supporting the results of Rosen and Wu (2004).

The stock-price variable is constructed as the one-year log difference in the S&P 500 *ending* at time t . By lagging the stock price change (remembering that households are measured as switching between waves t and $t+1$) we can avoid issues of endogeneity, in this case, the fact that households moving into stock might cause stock prices to increase. The coefficient on the S&P500 terms is positive and highly significant for both Become-Stockholder regressions and negative and highly significant for the Become-Non-Stockholder regression. If stock prices increased since the last wave, it made households more likely to move into stock and less likely to get rid of their stock. The movement in and out of stock during the period 1992-2002 does in part reflect the fact that we had a reversal in stock prices, and that households responded to that reversal.

4. Conclusion

The stock market participation puzzle is not only an interesting theoretical question, it has practical importance. There has been a pronounced shift to self-directed retirement plans in the US, where the returns to those plans will depend on the asset allocation decisions made by the

households themselves. Households that invest in stock will face more risk, but households that do not invest in stock will miss out on the higher expected returns associated with equity. Furthermore, individuals who are excessively responsive to economic circumstances, and trade “too much” in the sense of Barber and Odean (2000), are likely to also see lower returns. Understanding why individuals make the investment decisions they do is an important question for both private investors and public policy. This paper has looked at one aspect of that decision.

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Table 1. Households holding stock.

	1992	1994	1996	1998	2000	2002	Ever
No	5,336	4,637	4,306	4,077	3,800	3,682	4,266
Yes	1,926	1,979	1,297	1,229	1,151	1,036	3,067
Total	7,262	6,616	5,603	5,306	4,951	4,718	7,333
% Hold Stock	0.27	0.30	0.23	0.23	0.23	0.21	0.42

Note. The table shows the number of households (Total), the number holding stock in a non-retirement account (Yes), the number not holding stock (No), and the percentage of households holding stock (% Hold Stock), in each of the survey years. The last column (Ever) shows the number of households holding stock in at least one wave. Data is from the Health and Retirement Study.

Table 2. Transitions between stockholding and non-stockholding.

	1992- 1994	1994- 1996	1996- 1998	1998- 2000	2000- 2002
Fraction holding stock in the starting year	0.27	0.26	0.23	0.23	0.23
Fraction of stockholders dropping stock	0.22	0.29	0.24	0.25	0.27
Fraction of non-stockholders getting stock	0.12	0.06	0.06	0.07	0.07

Note. Columns represent two adjacent waves of the survey. The table reports the fraction of households that (1) hold stock in the first wave, (2) hold stock in the first wave but not the second wave, and (3) do not hold stock in the first wave but do hold stock in the second wave. Households must have reported their stockholding in both waves to be included. Data is from the Health and Retirement Study.

Table 3. Number of switches in stockholding state.

Switches	Households held stock at least once in survey	Households held stock at least once and reported in all waves of the survey
0	1,129	314
1	1,073	452
2	635	398
3	181	140
4	46	43
5	3	3

Note. The table categorizes households by the number of times they switch stockholding state. Switches are calculated as the total number of times a household either changes from stockholding to non-stockholding or from non-stockholding to stockholding across the six waves of the survey. To be included, households must have reported holding stock in at least one wave, and for the last column, have reported in all six waves. Data is from the Health and Retirement Study.

Table 4. Summary Statistics

Variable Name	Mean	Standard Deviation
Financial Wealth*	1,019,996	1.2x10 ⁷
Log Financial Wealth	9.69	2.61
Average Education	12.6	2.6
Average Health	2.6	1.0
Average Age	59.5	5.4
Black	0.13	0.33
Single Female	0.22	0.42
Married	0.68	0.47

Note. Summary statistics for households reporting all variables. Wealth is measured in dollars. Education and Age are measured in number of years. Health is self-reported health status on a 1-to-5 scale (1 being best). For single households, averages take the value for the individual. Black, Single Female, and Married take the value of 1 or 0. Data is from the Health and Retirement Study.

* Median value is \$24,000.

Table 5. Switches-in-Stockholding Regressions

	Become Stockholder		Become Non-Stockholder
	All Households	Have held stock at least once	All Households
Log Financial Wealth	0.12*** (0.00)	0.06*** (0.00)	-0.16*** (0.00)
Average Education	0.07*** (0.00)	0.01 (0.54)	-0.07*** (0.00)
Average Health	-0.12*** (0.00)	-0.07** (0.01)	0.08*** (0.00)
Average Age	-0.01*** (0.00)	-0.02*** (0.00)	-0.00 (0.91)
Black	-0.36*** (0.00)	-0.01 (0.91)	0.55*** (0.00)
Single Female	-0.05 (0.48)	-0.13 (0.16)	0.10 (0.22)
Married	0.18*** (0.00)	-0.02 (0.77)	0.03 (0.63)
DSP500	0.42*** (0.00)	0.58*** (0.00)	-0.51*** (0.00)
Constant	-2.26*** (0.00)	0.24 (0.47)	1.80*** (0.00)
N	11948	3482	5624
Adj. R ²	0.11	0.02	0.06

Note. Probit regressions of change in stockholding status across two consecutive waves of the survey. The sample for the become-stockholder regression consists of households that did not hold stock in one wave, and then either did or did not hold stock in the following wave (taking the value of 1 or 0, respectively). The sample for the become-non-stockholder regression consists of households that did hold stock in one wave, and then either did or did not hold stock in the following wave (taking the value of 0 or 1, respectively). Wealth is measured in dollars. Education and Age are measured in number of years. Health is self-reported health status on a 1- to-5 scale (1 being best). For single households, averages take the value for the individual. Black, Single Female, and Married take the value of 1 or 0. DSP500 is the log difference in the S&P500 index over the previous year. The regressions use data pooled across all six waves. Data is from the Health and Retirement Study. “P-values” are in parentheses. Significance is also indicated at 1% (***), 5% (**), and 10% (*) levels.