Household Stock Market Participation During the Great Financial Crisis

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Final version: February 2019

Abstract

Using the Panel Study of Income Dynamics, this paper studies American households' stock market participation in 2007–2009, a period that saw a major stock market downswing. After controlling for standard household characteristics, we estimate that the stock ownership in 2009 dropped 3.5 percentage points – a 7% decline – compared to that in 2007. We find evidence that less-educated households, poor households and households with nonwhite household heads are more likely to drop out of the market after the market crash. We also compare the change in the stock ownership during the crisis period with other 2-year periods over 2003–2013.

JEL classification: G01; G11

Keywords: Household portfolios; Stock market participation; Financial crisis

*I thank Michael Ehrmann, Jianjian Jin, Katsiaryna Kartashova, Kyre Lahtinen, Fuchun Li, conference participants at the Financial Management Association annual meeting and the Canadian Economics Association annual meeting, and seminar participants at NTU, Saint Mary's University and Statistics Canada for helpful comments. I am particularly thankful to the Editor and two anonymous referees for their insightful comments that helped to improve the paper. Please address correspondence to: Jie Zhou, Department of Economics, University of Winnipeg, 515 Portage Avenue, Winnipeg, Manitoba, Canada R3B 2E9. Tel.: +1-204-7869394; E-mail: j.zhou@uwinnipeg.ca.

1 Introduction

The stock market crash in 2008 and the subsequent financial crisis had a significant impact on the balance sheets of stock market participants. These market participants also reacted to the market shock. Since households' stockholding behavior has wide-ranging implications for understanding both the allocation of risk in financial markets and the distribution of wealth, it is important to study the experiences of households during the crisis period. Moreover, the economic significance of individual households' stockholding behavior rises because of an increasing self-responsibility for building up retirement wealth.

In this paper, we study American households' stock market participation during the great financial crisis. In particular, we are interested in the following questions that pertain to the period 2007–2009: Were there significant changes in stock ownership during the period? How persistent was the participation status during the period? Which household characteristics were associated with stock ownership?

We use the Panel Study of Income Dynamics (PSID) to address these questions. We focus on the 2007 and the 2009 waves of PSID. These two consecutive surveys cover the years both before and after the stock market crash in 2008, which provides an opportunity to determine whether this event influenced individual households' stock market participation decisions during the crisis period. To put the change of stock ownership in context, we also compute the changes in other 2-year periods both before and after the crisis over the period 2003–2013 using the PSID. We have the following key findings.

First, the stock market participation rate dropped significantly after the market crash. Households can hold stocks in both retirement accounts and non-retirement accounts.[1] In both 2007 and 2009, slightly less than half of our sample households (a balanced panel) participated in the stock market (in either type of account or both). The overall stock market participation rate dropped 2.6 percentage points during the crisis period, from 49.0% in 2007 to 46.4% in 2009. This change represents the largest drop in stock ownership in more than a decade (2003–2013), and is statistically significant.

[1]Retirement accounts refer to Individual Retirement Accounts (IRAs) and employer-based pension plans. All other financial accounts are defined as non-retirement accounts, for example, brokerage accounts.

Although the majority of households exhibited the same participation status in 2007–2009, many households switched their stockholding status. There are more households that exited the stock market than began owning stocks during the period. For example, in non-retirement accounts, 31.3% of stock owners in 2007 became non-stock owners in 2009, while 8.3% of non-stock owners in 2007 became stockholders in 2009.

To further gauge the impact of the financial crisis on stock ownership, we pool the 2007 and the 2009 sample households together and estimate a probit model. We find that after controlling for standard household characteristics, the estimated effect of the year 2009 dummy variable suggests that the overall stock ownership in 2009 dropped 3.5 percentage points – a 7% decline – compared to that in 2007, which is statistically significant at the 1% level.

Second, we explore which households dropped out of the stock market in the 2009 survey conditional on owning stocks in the 2007 survey. We find that less-educated households, poor households and households with nonwhite household heads are more likely to drop out of the market after the market crash. Previous studies, such as Malmendier and Nagel (2011) and Ampudia and Ehrmann (2017), have suggested that large shocks in the stock market can have a long-lasting impact on investors' risk perceptions and risk-taking behavior. We expect that the decision to exit the stock market during the crisis by these households could have a large impact on the long-term performance of their portfolios and wealth accumulation, since these households are likely to remain out of the stock market and miss the potential gains when the market recovers.

Third, the financial crisis has little impact on the major relationships between household characteristics and stock ownership. Using the 2007 and the 2009 PSID, we estimate a bivariate probit model to gain a better understanding of the determinants of stock ownership during the crisis period. Our results show that in both years, education and wealth (both financial and non-financial) have a large and significant impact on the probability of stock ownership. Better-educated households and wealthy households are more likely to own stocks. The probability of holding stocks is also higher for households with heads that are white or households that own their houses. These results are broadly consistent

with previous research on stock market participation that uses different datasets covering different time periods.[2]

This paper is related to the large literature on household finance.[3] In particular, a number of recent studies have examined household behavior during the great financial crisis. Hudomiet, Kezdi, and Willis (2011) use Health and Retirement Study data to study the impact of the stock market crash of 2008 on American households' expectations about the returns on the stock market index. They find that cross-sectional heterogeneity in expected returns, an indicator of the amount of disagreement, increased substantially with the stock market crash. Tang, Mitchell, and Utkus (2011) examine investors' trading behavior in 401(k) plans during the recent financial crisis. Weber, Weber, and Nosic (2013) survey U.K. online-brokerage customers at 3-month intervals between September 2008 and June 2009. They find that risk taking by these investors changed substantially during the period, as did return and risk expectations. Using a Dutch data set, Hoffmann, Post, and Pennings (2013) measure individual investors' perceptions on their expectations for stock-market returns, their risk tolerance, and their risk perceptions during the financial crisis, while Bucher-Koenen and Ziegelmeyer (2014), Dorn and Weber (2013) and Necker and Ziegelmeyer (2016) all examine German data.

As a complement to this empirical literature, we document the changes in stock ownership for American households in 2003–2013 using the PSID data. The PSID is a longitudinal study of a representative sample of U.S. individuals and the families in which they reside. It gathers data on demographics, employment, income, wealth and numerous other topics. The PSID is a natural candidate for tracking changes in stock market participation status because of its panel structure.[4] We show that the financial crisis has a significant negative

[2]See Mankiw and Zeldes (1991), Haliassos and Bertaut (1995), Bertaut (1998), Vissing-Jorgensen (2002), and Calvet, Campbell, and Sodini (2009).

[3]See Mankiw and Zeldes (1991), Bertaut (1998), Guiso, Haliassos, and Jappelli (2002), Ameriks and Zeldes (2004), Campbell (2006), Calvet, Campbell, and Sodini (2009), and Bilias, Georgarakos, and Haliassos (2010). Guiso and Sodini (2013) provide an excellent survey.

[4]Another data source for studying American household finances is the Survey of Consumer Finances (SCF) conducted by the Federal Reserve Board (FRB). The SCF is a triennial cross-sectional survey, which provides detailed information on household balance sheets and other socioeconomic variables. To examine

impact on American households' stock market participation decisions. Less-educated households, poor households and households with nonwhite household heads are more likely to drop out of the stock market following the market crash. This finding has important implications for better understanding how a major financial market shock affects the allocation of risk among households, and its potential impact on households' wealth accumulation.

The remainder of this paper is organized as follows. Section 2 provides a literature review that motivates our hypotheses on household stock market participation. Section 3 describes the data. Section 4 presents the results regarding stock market participation, and Section 5 concludes.

2 Hypotheses

In this section we present related literature and develop our hypotheses about household stock market participation during the financial crisis.

Classic portfolio theory assumes that individual investors' risk taking depends on investors' risk attitude and their estimates about the expected return and its variance (Markowitz (1952)). Previous evidence suggests that both return and risk expectations can vary substantially over time, as a result of macroeconomic events or individually experienced gains or losses (Shiller, Kon-Ya, and Tsutsui (1996), Glaser and Weber (2005), Hoffmann, Post, and Pennings (2013), and Weber, Weber, and Nosic (2013)). Investors' risk attitude may also change with macroeconomic conditions and large events in the financial market (Sahm (2007), and Guiso, Sapienza, and Zingales (2018)). For example, Guiso, Sapienza, and Zingales (2018) find that the risk aversion of an Italian bank's clients increased substantially after the financial crisis.

The recent financial crisis could be expected to lower investors' return expectations and risk tolerance, increase their risk perceptions, and adversely affect their stock market participation and risk-taking behavior.

the effects of the great financial crisis and consequent recession on the household sector, the FRB conducted a follow-up survey in 2009 for families that had participated in the 2007 SCF. Bricker, Bucks, Kennickell, Mach, and Moore (2011) report the changes in family finances using the special panel SCF of 2007-2009.

Previous studies by Basak and Cuoco (1998), Vissing-Jorgensen (2002), Haliassos and Michaelides (2003), and Alan (2006) have suggested that stock market participation costs could significantly discourage stock ownership. The stock market participation costs represent a combination of explicit and implicit hurdles such as information acquisition about investment opportunities, more complicated tax filing, and the value of time spent to learn how to trade and rebalance a portfolio. A common finding in the literature, that wealth and education attainment have a positive and statistically significant impact on stock market participation, is consistent with the argument of participation costs.

During the financial crisis, household wealth was hit hard as many households suffered great losses in the stock market. For our PSID sample households, median and mean net worth fell about 15%, respectively, in 2007–09.[5] If there are per-period costs of stock market participation, the participation constraint will become binding for some poor households and less-educated households who are not financially sophisticated. Hence, poor households and less-educated households are more likely to drop out of the stock market during a crisis.

Based on the discussion above, we hypothesize that:

H_1. The overall stock market participation rate drops due to a financial crisis.

H_2. Poor households and less-educated households are more likely to drop out of the stock market during a financial crisis.

3 Data

The data set used in this paper is the PSID, which has a panel structure. The PSID gathers data on demographics, employment, income, wealth and numerous other topics for American households. The data were collected annually from 1968–1997 and biennially after 1997. Because we are interested in the changes in household stock market participation during the great financial crisis, we focus on the 2007 and the 2009 PSID.[6] These two consecutive

[5] If we focus on those households having retirement accounts in 2007 in the PSID data, we find that the average wealth in retirement accounts fell from $127,663 in 2007 to $93,546 in 2009, and the median fell from $40,000 in 2007 to $23,000 in 2009. This finding suggests that many households suffered significant losses in their retirement accounts during the 2-year period in 2007–09.

[6] In each survey year, about 90% of households were interviewed in March–July.

surveys cover the period both before and after the stock market crash in 2008. We also briefly look at the periods before 2007 and after 2009 (i.e., 2003–2005, 2005–2007, 2009–2011, and 2011–2013) to compare the changes in stock ownership over time.

For the purpose of our study, households in the 2007 and the 2009 PSID are included in the sample if they satisfy the following five criteria. The first criterion is that the household was interviewed in both the 2007 and the 2009 surveys. Second, there was no change in the head of the household.[7] Third, wealth can be observed for the household. To find the wealth of a household, we require that either the value of each asset class is given by the respondent or that it can be estimated using the information provided by the respondent.[8] Fourth, the household had positive financial assets in at least one of the two surveys. Households with zero financial assets in both surveys are excluded so as not to equate stock market non-participation with the decision to hold no assets at all (or the inability to do so). Fifth, the household was not part of the Survey of Economic Opportunity (SEO) sample. The PSID sample consists of two independent subsamples of the U.S. population — the Survey Research Center sample, which is a cross-sectional national sample, and the SEO sample, which is a national sample of low-income families. We drop all SEO sample households and focus on the cross-sectional national sample in this study.

[7]Within each wave of the PSID, each household has one and only one Head. Originally, if the household contained a husband-wife pair, the husband was arbitrarily designated the Head to conform with Census Bureau definitions in effect at the time the PSID began. The person designated as Head may change over time as a result of other changes affecting the family. When a new Head must be chosen, the following rules apply: The Head of the household must be at least 18 years old and the person with the most financial responsibility for the household. If this person is female and she has a spouse or partner in the household, then he is designated as Head. If she has a boyfriend with whom she has been living for at least one year, then he is Head. However, if the husband or boyfriend is incapacitated and unable to fulfill the functions of Head, then the household will have a female Head.

[8]For example, the respondent does not give the exact amount of a certain type of asset but provides a range for the value of the asset. We then replace the missing value with the average of the range. We further drop one observation (ER42002=1748) due to the suspicious value of its other real estate. In 2007, the value was $1 million for the household, but it became $100 million in 2009. Appendix A provides more details on household assets and debts, which we use to compute wealth. Appendix B compares household characteristics across households with and without wealth information.

The non-SEO PSID sample includes 5,877 households in 2007 and 6,083 households in 2009, respectively. The first four sample selection criteria further reduce the sample size, so that our main sample contains 4,140 households in each survey.

4 Stock Market Participation in PSID

By looking at the same households two years apart, in 2007 and 2009, we can observe the stockholding decisions of those households that held stocks in both 2007 and 2009, those households who abstained from stock market participation in both years, and those households who changed their stockholding status. This period is of particular interest because it covers the years both before and after the stock market crash in 2008. We would like to address several questions, such as the following: Were there significant changes in stock ownership during the period under consideration? How persistent was the participation status of households in the stock market? How did household characteristics and major life changes affect stock ownership?

4.1 Changes in Stock Market Participation

The various financial accounts owned by households can be classified into two broad categories: retirement accounts and non-retirement accounts. Retirement accounts refer to IRAs and employer-based pension plans. Non-retirement accounts are other financial accounts including checking accounts, savings accounts, brokerage accounts and so on. In non-retirement accounts, households can invest in virtually any asset, including stocks, bonds, mutual funds and other types of asset. Retirement accounts also require active decisions by eligible households. These households need to make decisions about whether to participate in the account, how much to contribute and how to invest their money in retirement accounts. In principle, funds in employer-sponsored defined contribution plans can be invested in a similarly broad way as in non-retirement accounts, but, in practice, employers provide investment menus, which typically include equity funds and other types of funds, to plan participants. In summary, households can hold stocks in both non-retirement accounts and retirement accounts, provided that they have these accounts.

We find that U.S. household stock ownership rate dropped after the market crash in 2008. Considering stocks held across all accounts (i.e., in either type of account or both), the percentage of households owning stocks was 49.0% in 2007, and it decreased to 46.4% in 2009.[9] The drop of 2.6 percentage points is statistically different from zero at the 1% level. The stock market participation rate also dropped in non-retirement accounts (from 25.2% in 2007 to 23.5% in 2009).[10] The stock ownership across all accounts is much higher than that in non-retirement accounts, reflecting the fact that many households hold stocks through retirement accounts. Normally, employer-based pension plans provide uniform and simple vehicles (i.e., investment menus that typically include equity funds and other types of funds) for employees to make investment choices, which makes it easier to access the stock market than is the case in non-retirement accounts.

One may wonder how large the change in stock market participation during the financial crisis was relative to a "typical" change in a 2-year period. To put the decline of stock market participation during the crisis period in context, we employ PSID data from the survey years before 2007 and after 2009. Following the same criteria in 2007–2009, we constructed balanced panels of households in the periods 2003–2005, 2005–2007, 2009–2011, and 2011–2013.[11]

Table 1 reports the changes in stock ownership in these five 2-year periods. We see that household stock ownership registered the biggest decline (-2.6 p.p.) in a decade during the crisis period 2007–2009. Immediately before the crisis, there was an increase (+3.3 p.p.) in the proportion of U.S. households participating in the stock market in 2005–2007. Right after the crisis and comparing 2009 to 2011, the stock ownership rate further dropped 0.3

[9]Our finding that about half of U.S. households participating in the stock market is consistent with existing literature. It is well-known that this empirical finding is in contrast to the prediction of standard models, which suggest that, given the equity premium and conventional preferences (e.g., CRRA preferences), all households with positive savings should participate in the stock market. Among potential resolutions of the participation puzzle, Basak and Cuoco (1998), Haliassos and Michaelides (2003), and Alan (2006) have suggested that entry costs and/or per-period costs could significantly discourage stock market participation.

[10]The drop in the participation rate in non-retirement accounts is also statistically significant.

[11]We do not require households to be present in all years from 2003 to 2013, so the samples for these 2-year periods considered are not identical.

p.p. in 2011, but it rebounded in the period 2011–2013 as the stock market rallied.

[Table 1]

4.2 Persistency of Stock Ownership

How persistent is stock ownership during the crisis period? Table 2 presents a breakdown of households according to their combination of stock market participation status (across all accounts) in both 2007 and 2009. The table suggests that stock ownership is highly persistent, as 77.4% of sample households exhibited the same participation status in both surveys. The remaining 22.6% of households switched their stockholding status, with more having exited from the stock market (12.6%) than having switched into stock ownership (10.0%). We note that the likelihood of a stock owner becoming a non-stock owner (25.7%) was higher than the probability of someone who owned no stock in 2007 becoming a stockholder in 2009 (19.6%).

By looking at stock market participation status in non-retirement accounts only, Table 3 also shows a tendency of the vast majority of households (85.9%) to exhibit the same participation status over the period under consideration. Whereas 7.9% of the surveyed households held stocks in non-retirement accounts in the 2007 survey but not in the 2009 survey, 6.2% had moved in the opposite direction. Again, the likelihood of a stock owner becoming a non-stock owner was higher than the probability of someone who owned no stock in 2007 becoming a stockholder in 2009.

[Table 2]

[Table 3]

4.3 What Determines Stock Market Participation?

In this section, we examine which household characteristics and major life changes are associated with stock market participation. We first provide the summary statistics for the PSID sample households, and then estimate a bivariate probit model of stock ownership in

2007 and 2009. Finally, we pool the 2007 and the 2009 samples together and examine the effect of the 2009 dummy variable on stock ownership using a probit model.

4.3.1 Sample Characteristics

Table 4 shows the summary statistics (mean and median) for our sample households in the 2007 and the 2009 PSID. The statistics for age, race, gender, education and marital status refer to the household heads. The other variables are reported at the household level. By grouping households based on their stock market participation status across all accounts, Table 4 shows that households that own stocks are considerably different from non-stock owners in many dimensions.

[Table 4]

The data reveal that stockholders are both considerably wealthier and better educated than non-stock owners. The very limited wealth of many non-participants suggests that they may have little incentive to optimize their portfolios, or that they may be discouraged from doing so by fairly small fixed costs. Stock owners also tend to have higher labor income and they are more likely to be homeowners and to have private pension coverage. These differences between stock owners and non-stock owners are found in both the 2007 and the 2009 surveys. If we consider only non-retirement accounts and we divide households into stock owners and non-stock owners, we obtain very similar results.

4.3.2 Results from the 2007 and 2009 Bivariate Probits

Following Bertaut (1998), we estimate a bivariate probit model of stock ownership using the panel data from the 2007 and 2009 PSID. This specification allows for the common influences of unobservable factors on stock market participation in both survey years, and it also permits potentially different effects of the observable characteristics in the two surveys.

Let there be two binary dependent variables Y_j, $j = 1, 2$. Each is generated by a probit equation, and the two equations' errors are correlated. Thus, we have the following model:

$$Y_1^* = X_1\beta_1 + \varepsilon_1, \tag{4.1}$$

$$Y_2^* = X_2\beta_2 + \varepsilon_2, \tag{4.2}$$

where the Y_j^* are unobservable, and are related to the binary dependent variables Y_j by the rule

$$Y_j = \begin{cases} 1 & \text{if } Y_j^* > 0 \\ 0 & \text{if } Y_j^* \leq 0 \end{cases} \qquad j = 1, 2. \tag{4.3}$$

We examine stock ownership across all accounts first. The first equation of the bivariate probit specification models the probability that a household held stocks in the 2007 survey, while the second equation models the probability that a household owned stocks in the 2009 survey. We include the following household characteristics as explanatory variables: age, race, gender, education, marital status, employment status, the number of children under age 18, labor income, financial net worth, non-financial net worth, home ownership, private business ownership, and location (i.e., whether in rural areas).[12] The variables age, race, gender, education, marital status and employment status refer to household heads. Other variables refer to the households in their entirety. In the second equation, to capture major life changes in 2007–09, we further include a few dummy variables as explanatory variables, for example, a change in marital status in 2007–09 and whether the household bought real estate in 2007–09.[13]

Table 5 presents the marginal effects of our bivariate probit regressions.[14] To begin, we look at the 2007 survey which is conducted before the financial crisis. A number of observations are noteworthy. First, age seems to have little impact on stock ownership, but race and education have a significant impact on stock ownership. The probability of holding stocks is four percentage points higher for households with heads that are white. Education has an even larger effect: whereas households with heads that have a college

[12]Unfortunately, the PSID does not provide information on risk attitude and return expectations, which is a drawback of the data. A few papers have used other datasets to study how households' risk attitude and return expectations are influenced by the crisis in 2008/2009; see Hudomiet, Kezdi, and Willis (2011), Hoffmann, Post, and Pennings (2013), and Necker and Ziegelmeyer (2016).

[13]Following Brunnermeier and Nagel (2008), we do not use sample weights in the regressions. However, all marginal effects reported are weighted. In Appendix C, we show that weighted regressions produce similar results as in unweighted regressions.

[14]Estimates are marginal effects evaluated at sample averages of the explanatory variables.

(COL) education are 6.4% more likely to own stocks than households with heads having a high school education, households with heads that have less than a high school (LTHS) education are 9.4% less likely to own stocks. Both effects are statistically significant at the 1% level. This likely reflects the fact that education is strongly positively correlated with financial literacy and that financial literacy affects financial decision-making including whether to invest in stocks (Lusardi and Mitchell (2007), van Rooij, Lusardi, and Alessie (2011)). Second, the probability of stock ownership decreases with the number of children under age 18 and increases with labor income, financial net worth, and non-financial net worth. In particular, the impact of wealth on stock ownership is highly significant and economically large. For example, the marginal effect of ln(financial net worth) is 0.0057 in 2007. This implies that an increase in the financial net worth of $22,000 will increase the probability of stock ownership by 5.7%. Third, the effects of home ownership and private business ownership on stock ownership are significantly positive.[15] Finally, marriage also has a positive and significant impact on stock ownership.

Overall, our results from the 2007 survey are consistent with previous research on stock market participation (Mankiw and Zeldes (1991), Haliassos and Bertaut (1995), Bertaut (1998), Vissing-Jorgensen (2002), Calvet, Campbell, and Sodini (2009), and Bilias, Georgarakos, and Haliassos (2010)). These studies also find that the effects of income, wealth, education attainment and race (white) on stock market participation are positive and statistically significant.[16]

[Table 5]

The results in the 2007 survey largely hold true in the 2009 survey.[17] This suggests that the crisis has little impact on the main relationships between household characteristics and

[15]Households with private businesses are more likely to hold stocks than those without private businesses. It could be that households of the former type are interested in using stocks to diversify the idiosyncratic risk of their businesses, or that acquiring information about specific firms and their prospects is easier for them.

[16]One caveat in this literature is that some relationships can suffer from endogeneity bias. For example, if stock ownership increases wealth, it will lead to an upward bias for the estimated effect of wealth.

[17]The estimated correlation between the error terms in the model, ρ, is 0.57.

stock ownership. In the 2009 survey, race, education, income, wealth and home ownership still had large and significant impacts on the probability of stock ownership.[18] We also note that major life changes in 2007–09 including changes in marital status and retirement status did not have a significant impact on stock ownership in 2009. For households that bought real estate in 2007–09, they were less likely to own stocks in 2009.

Next, we look at stock ownership in non-retirement accounts. We estimate a similar bivariate probit model, but the first equation now models the probability that a household held stocks in non-retirement accounts in the 2007 survey, while the second equation models the probability of a household owning stocks in non-retirement accounts in the 2009 survey. Table 6 reports the results. We find that most of the results presented in Table 5, where we look at stock ownership across all accounts, are also valid in Table 6. Perhaps one important change is the impact of marriage: whereas it has a positive and significant impact on stock ownership across all accounts, the impact of marriage on stock ownership in non-retirement accounts is very small and not significant.

[Table 6]

4.3.3 Results from the 2007 and 2009 Probit

Finally, we pool the 2007 and the 2009 samples together to examine how stock ownership across all accounts has changed after the financial crisis. We estimate a probit model of stock ownership, in which explanatory variables include standard household characteristics. To gauge the potential changing stock ownership from survey to survey, we also include a 0–1 year dummy variable in the estimation. The year dummy variable takes a value of 1 for the 2009 households and 0 for the 2007 households. Our main interest in this exercise is the impact of the year dummy variable.

Table 7 presents the marginal effects of the probit model. We find that race, education, income, wealth, and home ownership have significant impact on stock ownership. More importantly, the marginal effect of the year 2009 dummy variable is significantly negative.

[18] However, gender and the number of children had a smaller impact and became less significant in 2009 than in 2007.

Compared to that in 2007, the stock ownership rate dropped 3.5 percentage points in 2009 for the PSID sample households after controlling for standard household characteristics. This decline is statistically significant at the 1% level.

[Table 7]

Combining the results in Table 7 and Table 1, in which we document the changes in household stock ownership over the period 2003–2013, we find evidence in support of hypothesis H_1. That is, the overall stock market participation rate drops due to the financial crisis. Next, we examine which households dropped out of the stock market during the financial crisis period.

4.4 Stock Market Exit after a Market Crash

This section tries to explore which households dropped out of the market in the 2009 survey conditional on owning stocks in the 2007 survey.[19]

We first examine this issue across all accounts. We introduce a probit model, in which the dependent variable measures whether a household completely dropped out of the stock market in 2009 (i.e., the household did not hold stocks in any account) conditional on owning stocks in 2007. The reduced sample now contains only those households that held stocks in the 2007 survey. In total there are 2,028 such households. As before, we include household characteristics and dummy variables for major life changes in 2007–09 as explanatory variables.

Table 8 presents the marginal effects on the estimated probability of a household dropping out of the stock market in the 2009 survey. A household's education and financial net worth had a large and significant impact on the exit decision. For example, compared to households with heads who were high school graduates, households with heads having less than a high school education were 13.6% more likely to drop out of the market, while households with heads having a college education were 11.7% less likely to exit the market.

[19]Similarly, we also estimate a probit model for other 2-year periods (i.e., 2003–2005, 2005–2007, 2009–2011, and 2011–2013). We consistently find that race, education and wealth have significant impacts on stock market exit. Appendix C provides the results from the 2005–2007 PSID.

Households with heads who were white and households that owned their houses also had a significantly lower probability of dropping out of the market.

[Table 8]

To summarize, Table 8 suggests that, for those households that held stocks in the 2007 survey, less-educated households, poor households and households with nonwhite household heads are the ones that dropped out of the market after the market crash. This supports the hypothesis H_2. One explanation of this finding is the stock market participation costs. During the financial crisis, many households suffered great losses in the stock market. If there are per-period costs of stock market participation (e.g., information acquisition about investment opportunities and the value of time spent to trade and rebalance a portfolio), some poor households and less-educated households will find it too costly to stay in the stock market and may choose to exit the market. Other possible explanations include financial sophistication and access to financial advice. Wealthy, educated investors have a higher financial literacy. They tend to hold better diversified portfolios and invest more efficiently than others (e.g., Vissing-Jorgensen (2004), Calvet, Campbell, and Sodini (2007), Calvet, Campbell, and Sodini (2009)). These households may be able to avoid some of the losses in their stock value during the market downturn compared to those households holding poorly diversified stock portfolios. Moreover, more wealthy households have better access to financial advice than poor households. All these factors could contribute to the finding that disadvantaged households (i.e., less-educated households, poor households and households with nonwhite household heads) are more likely to exit the stock market.

Similarly, Table 9 presents the marginal effects on the estimated probability of a household dropping out of the stock market in non-retirement accounts in the 2009 survey conditional on holding stocks in non-retirement accounts in the 2007 survey.[20] For stockholders in non-retirement accounts in 2007, our results also show that less-educated households and households with nonwhite household heads are more likely to exit the market, while households with greater financial net worth are less likely to drop out of the stock market.

[20]Here we examine stock market exit in non-retirement accounts. These households could hold stocks in retirement accounts.

[Table 9]

5 Conclusion

Using the PSID data, we document household stock market participation behavior during the great financial crisis (2007–09). Although stock ownership is generally persistent, many households adjusted their stockholding status during this period. We compare the change in stock ownership in the crisis period to those before and after the crisis (2003–05, 2005–07, 2009-11, and 2011-13). We also pool the 2007 and the 2009 samples together and estimate a probit model to gauge the impact of the financial crisis on stock ownership. After controlling for standard household characteristics, the estimated effect of the year 2009 dummy variable suggests that the stock ownership in 2009 dropped 3.5 percentage points – a 7% decline – compared to that in 2007, which is highly significant. We find evidence that less-educated households, poor households and households with nonwhite household heads are the ones that dropped out of the market after the market crash. Changes in portfolios made by households during the crisis period will certainly affect their future wealth accumulation and the allocation of risk in financial markets. The impact of these changes is an interesting topic for future research.

Appendix

A. Data: Panel Study of Income Dynamics

Households' wealth data are available from the Panel Study of Income Dynamics (PSID) supplemental wealth file in all the waves (2003–2013) used in this study. We look at both financial assets and non-financial assets.

As an example, financial assets in the 2007 PSID include the following broad categories: (1) W28 (money in checking or savings accounts, money market funds, certificates of deposit, government savings bonds and Treasury bills); (2) W16 (equity in stock, which includes shares of stock in publicly held corporations, mutual funds and investment trusts, but not stocks in employer-based pensions or Individual Retirement Accounts (IRAs)); (3) W22 (equity in private annuities or IRAs); (4) W34 (other assets, including bond funds, cash value in a life insurance policy, a valuable collection for investment purposes, and rights in a trust or estate). Financial net worth is the sum of W28, W16, W22 and W34 net of W39.[21]

Non-financial net worth is the sum of home equity (calculated as the home value minus the remaining mortgage), equity in other real estate (W2), equity in vehicles (W6) and equity in private businesses or farms (W11).

Labor income is defined as the sum of all types of labor income components, including wages and salaries, bonuses, overtime pay, tips, commissions, and the labor part of business income for all members in a household.

We construct measures of stock ownership for each sample household. PSID respondents directly report the total dollar value of their direct stockholdings, their stocks held in mutual funds and investment trusts (W16). Thus, a positive value of W16 implies that the household owns stocks in non-retirement accounts. PSID households can also hold stocks in retirement accounts, such as IRAs and employer-based pension plans. However, the dollar value of stocks in retirement accounts is not directly available. Instead, respondents are asked how the funds in their retirement accounts are invested. For example, the question on

[21] W39 measures the value of a household's debt, which includes credit card charges, student loans, medical or legal bills, and loans from relatives, but excludes mortgage or vehicle loans.

the allocation of defined contribution pension plans for the current main job (for both the household's head and his or her spouse) asks the following question: Are the funds invested mostly in stocks or mostly in bonds and annuities, some of each, or what? Respondents can choose from the following three answers: (1) Mostly (or all) stocks, (2) Some of each, or (3) Mostly (or all) bonds and annuities. Thus, stock ownership in retirement accounts can be inferred from these categorical responses. In practice, we classify a household as a stock owner in retirement accounts if the answer is "(1)" or "(2)."

B. Households With And Without Wealth Information

One of our sample selection criteria is that wealth information is available for the household. Table B compares household characteristics for two groups of households: the main sample in the analysis (wealth information is available for these households) and households without wealth information (these households are dropped in the analysis). The variables age, race, gender, grade (years in school), marital status and employment status refer to household heads, while other variables refer to the households in their entirety. It appears that these observable characteristics are broadly consistent for the two groups of households. The main difference between them is that on average households without wealth information are older and have higher home ownership rate and private business ownership rate.

C. Robustness Checks

Sampling weights — We follow Brunnermeier and Nagel (2008) and do not use sample weights in our regressions, despite the fact that households have different sampling weights in the PSID. But it turns out that we also obtain similar results if we weight households by the PSID sample weights in the regressions, as shown in Table C.1.

Table C.1 presents the marginal effects of our bivariate probit regressions regarding stock ownership across all accounts. Columns one and four report the results of our regressions without using sample weights (i.e., the results in Table 5 of the paper). Columns two and five show the results using the 2007 PSID weights, while columns three and six report the results using the 2009 PSID weights. Weighted regressions produce similar results as reported in

Table B Comparison between Households With And Without Wealth Information

	Households with wealth info. (main sample)	Households without wealth info. (dropped observations)
Age (mean)	48.1	53.6
Race: White	87.0%	83.0%
Gender: Male	80.1%	78.1%
Grade (mean)	13.5	13.4
Married	66.6%	67.6%
Number of children (mean)	0.7	0.6
Labor income (mean)	72236.5	71719.2
Owns home	70.6%	75.7%
Owns business	14.0%	24.6%
Location: completely rural	3.6%	3.9%
Unemployed	5.7%	5.6%

Table 5, particularly for those key variables such as race, education, and financial net worth. The same is true for the regressions regarding stock ownership in non-retirement accounts (not tabulated).

Stock market exit in other 2-year periods — Table C.2 presents the marginal effects on the estimated probability of a household dropping out of the stock market in the 2007 survey conditional on owning stocks in the 2005 survey. We find that race, education and wealth have significant impacts on stock market exit. The same is true for the regressions regarding stock market exit in other 2-year periods (not tabulated).

Table C.1 Bivariate Probit of Stock Market Participation Across All Accounts: Marginal Effects

	Own stock in 2007			Own stock in 2009		
	Not using weights	**2007 weights**	**2009 weights**	Not using weights	**2007 weights**	**2009 weights**
Age < 35	-0.0129	-0.0122	-0.0115	0.0034	0.0066	0.0100
Age 35–44	0.0029	0.0012	0.0008	-0.0206	-0.0243	-0.0251
Age 45–54	-0.0092	-0.0135	-0.0138	-0.0192	-0.0170	-0.0184
Age 65–74	-0.0030	-0.0095	-0.0094	-0.0276	-0.0392	-0.0409
Age 75 and over	0.0115	-0.0022	-0.0030	0.0144	0.0012	0.0002
Race: White	0.0428	0.0484	0.0475	0.0573	0.0656	0.0661
Gender: Male	0.0189	0.0013	0.0013	0.0098	0.0019	-0.0037
Education: COL	0.0640	0.0627	0.0640	0.0857	0.0855	0.0858
Education: LTHS	-0.0944	-0.0916	-0.0911	-0.1235	-0.1425	-0.1419
No. of children	-0.0136	-0.0151	-0.0148	-0.0082	-0.0077	-0.0074
Ln (Labor income)	0.0095	0.0084	0.0082	0.0102	0.0083	0.0083
Ln (Financial net worth)	0.0057	0.0061	0.0060	0.0063	0.0069	0.0071
Ln (Non-financial net worth)	0.0036	0.0029	0.0027	0.0031	0.0038	0.0035
Household owns home	0.0584	0.0554	0.0567	0.0755	0.0695	0.0731
Household owns business	0.0201	0.0218	0.0228	0.0068	0.0059	0.0078
Location: completely rural	-0.0284	-0.0176	-0.0144	-0.0312	-0.0450	-0.0425
Unemployed	-0.0404	-0.0476	-0.0508	-0.0088	-0.0101	-0.0093
Retired in 2007 survey	0.0177	0.0183	0.0179			
Married in 2007 survey	0.0319	0.0416	0.0418			
Remained married to same in 2007–09				0.0282	0.0354	0.0370
Became married in 2007–09				-0.0150	-0.0125	-0.0141
Divorced/widowed/separated 2007–09				0.0146	0.0205	0.0090
Became retired in 2007–09				-0.0103	-0.0138	-0.0116
Remained retired in 2007–09				0.0328	0.0298	0.0320
Bought real estate in 2007–09				-0.0270	-0.0274	-0.0230
Sold real estate in 2007–09				0.0099	0.0028	0.0023
Received inheritance in 2007–09				0.0286	0.0266	0.0246
Put money into business in 2007–09				-0.0139	-0.0057	-0.0077
Sold part or all of business in 2007–09				0.0254	0.0114	0.0172

Table C.2 Probit Model of Stock Market Exit in 2007 PSID: Marginal Effects

	Exit in 2007: All Accounts		
	Marg. Effect	Standard Error	
Age < 35	-0.0040	0.0319	
Age 35–44	-0.0115	0.0323	
Age 45–54	0.0213	0.0278	
Age 65–74	0.0040	0.0418	
Age 75 and over	0.0215	0.0494	
Race: White	-0.0510	0.0294	*
Gender: Male	-0.0187	0.0358	
Education: COL	-0.0512	0.0182	***
Education: LTHS	0.0990	0.0356	***
No. of children	0.0212	0.0102	**
Ln (Labor income)	-0.0061	0.0045	
Ln (Financial net worth)	-0.0109	0.0010	***
Ln (Non-financial net worth)	-0.0065	0.0037	*
Household owns home	-0.0303	0.0287	
Household owns business	-0.0567	0.0297	*
Location: completely rural	0.0901	0.0472	*
Unemployed	0.1142	0.0570	**
Remained married to same in 2005–07	-0.0313	0.0328	
Became married in 2005–07	-0.0233	0.0553	
Divorced/widowed/separated 2005–07	0.0016	0.0860	
Became retired in 2005–07	0.0454	0.0572	
Remained retired in 2005–07	-0.0002	0.0493	
Bought real estate in 2005–07	-0.0141	0.0300	
Sold real estate in 2005–07	-0.0506	0.0289	*
Received inheritance in 2005–07	-0.0485	0.0390	
Put money into business in 2005–07	0.0350	0.0396	
Sold part or all of business in 2005–07	0.0540	0.0826	

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Table 1: Changes in Stock Ownership in PSID

Period	2003–2005	2005–2007	2007–2009	2009–2011	2011–2013
Change in stock ownership (p.p.)	-0.9	+3.3	-2.6	-0.3	+3.2

Notes: This table shows the change in stock ownership (in percentage points) at the end of a period relative to the ownership rate at the beginning of the period using balanced PSID panel of 2003–2005, 2005–2007, 2007–2009, 2009–2011, and 2011–2013. Stock ownership refers to directly held stocks, stocks in mutual funds and investment trusts, as well as stocks in retirement accounts (i.e., IRAs and employer-based pensions). The overall stock ownership rate fluctuated between 45 percent and 49 percent in 2003–2013.

Table 2: Persistency of Stock Ownership Across All Accounts: 2007 and 2009 PSID

	2009		
2007	Non-stock owner	Stock owner	All
Non-stock owner	41.0%	10.0%	51.0%
Stock owner	12.6%	36.4%	49.0%
All	53.6%	46.4%	100.0%

Notes: Balanced PSID panel 2007–2009 (number of observations: 4,140). Stock ownership refers to directly held stocks, stocks in mutual funds and investment trusts, as well as stocks in retirement accounts (i.e., IRAs and employer-based pensions).

Table 3: Persistency of Stock Ownership in Non-retirement Accounts: 2007 and 2009 PSID

	2009		
2007	Non-stock owner	Stock owner	All
Non-stock owner	68.6%	6.2%	74.8%
Stock owner	7.9%	17.3%	25.2%
All	76.5%	23.5%	100.0%

Notes: Balanced PSID panel 2007–2009 (number of observations: 4,140). Stock ownership refers to directly held stocks, stocks in mutual funds and investment trusts, but not stocks in retirement accounts (i.e., IRAs and employer-based pensions).

Table 4: Sample Statistics

	2007				2009			
	Non-stock owner		Stock owner		Non-stock owner		Stock owner	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Age	44.26	41	48.00	48	46.95	45	49.40	49
Race: White	0.83	1	0.92	1	0.83	1	0.92	1
Gender: Male	0.73	1	0.87	1	0.75	1	0.86	1
Grade	12.69	12	14.31	14	12.71	12	14.39	15
Married	0.56	1	0.77	1	0.58	1	0.76	1
No. of children	0.78	0	0.67	0	0.77	0	0.68	0
Labor income	44318	36000	90863	74500	49225	40000	98818	79500
Financial net worth	13628	100	224773	47500	17930	150	211011	53700
Non-financial net worth	111620	27150	389713	138500	106052	25000	343084	117800
Household owns home	0.54	1	0.84	1	0.58	1	0.85	1
Household owns business	0.09	0	0.18	0	0.11	0	0.17	0
Covered by private pension	0.38	0	0.72	1	0.36	0	0.69	1
No. of observations	2112		2028		2219		1921	

Notes: Balanced PSID panel 2007–2009 (number of observations: 4,140). Stock ownership refers to stocks across all accounts (i.e., non-retirement accounts and retirement accounts). The variables age, race, gender, education and married status refer to the household heads. The other variables are reported at the household level. The maximum grade is 17, which represents at least some post-graduate work.

Table 5: Bivariate Probit of Stock Market Participation Across All Accounts: 2007 and 2009 PSID

	Own in 2007			Own in 2009		
	Marginal Effect	Standard Error		Marginal Effect	Standard Error	
Age < 35	-0.0129	0.0106		0.0034	0.0125	
Age 35–44	0.0029	0.0115		-0.0206	0.0128	
Age 45–54	-0.0092	0.0103		-0.0192	0.0115	*
Age 65–74	-0.0030	0.0154		-0.0276	0.0168	
Age 75 and over	0.0115	0.0185		0.0144	0.0204	
Race: White	0.0428	0.0095	***	0.0573	0.0112	***
Gender: Male	0.0189	0.0111	*	0.0098	0.0133	
Education: COL	0.0640	0.0064	***	0.0857	0.0070	***
Education: LTHS	-0.0944	0.0134	***	-0.1235	0.0186	***
No. of children	-0.0136	0.0033	***	-0.0082	0.0039	**
Ln (Labor income)	0.0095	0.0015	***	0.0102	0.0016	***
Ln (Financial net worth)	0.0057	0.0004	***	0.0063	0.0004	***
Ln (Non-financial net worth)	0.0036	0.0011	***	0.0031	0.0008	***
Household owns home	0.0584	0.0084	***	0.0755	0.0093	***
Household owns business	0.0201	0.0091	**	0.0068	0.0116	
Location: completely rural	-0.0284	0.0166	*	-0.0312	0.0192	
Unemployed	-0.0404	0.0195	**	-0.0088	0.0151	
Retired in 2007 survey	0.0177	0.0156				
Married in 2007 survey	0.0319	0.0098	***			
Remained married to same in 2007–09				0.0282	0.0124	**
Became married in 2007–09				-0.0150	0.0201	
Divorced/widowed/separated 2007–09				0.0146	0.0256	
Became retired in 2007–09				-0.0103	0.0185	
Remained retired in 2007–09				0.0328	0.0186	*
Bought real estate in 2007–09				-0.0270	0.0125	**
Sold real estate in 2007–09				0.0099	0.0148	
Received inheritance in 2007–09				0.0286	0.0158	*
Put money into business in 2007–09				-0.0139	0.0169	
Sold part or all of business in 2007–09				0.0254	0.0462	
No. of observations: 4140	ρ: 0.5720 (s.e. 0.0211)			Log likelihood: -4223.1680		

Notes: The first equation of the bivariate probit specification models the probability that a household held stocks across all accounts in the 2007 survey, while the second equation models the probability that a household held stocks across all accounts in the 2009 survey. The specification allows for the common influences of unobservable factors on both decisions, and it also permits potentially different effects of the observable characteristics in the two surveys. Ownership of stocks regards shares of stocks held in all accounts. Variables correspond to the year in question. Marginal effects, averaged across households, refer to the changes in the probabilities of owning stocks in each of the two surveys caused by the changes in regressors. The regression controls for labor income, financial net worth, and non-financial net worth by means of logarithms using the transformation $y=\ln(x)$ if $x\geq 1$, $y=-\ln(|x|)$ if $x\leq -1$, and $y=0$ if $-1<x<1$. *** (**, *) stands for statistically significant at the 1 (5, 10) percent level.

Table 6: Bivariate Probit of Stock Market Participation in Non-retirement Accounts: 2007 and 2009 PSID

	Own in 2007			Own in 2009		
	Marginal Effect	Standard Error		Marginal Effect	Standard Error	
Age < 35	0.0048	0.0079		0.0005	0.0092	
Age 35–44	0.0048	0.0084		-0.0113	0.0094	
Age 45–54	-0.0037	0.0072		-0.0122	0.0082	
Age 65–74	0.0071	0.0104		-0.0030	0.0115	
Age 75 and over	0.0294	0.0127	**	0.0304	0.0139	**
Race: White	0.0236	0.0079	***	0.0476	0.0097	***
Gender: Male	0.0196	0.0089	**	0.0011	0.0105	
Education: COL	0.0476	0.0046	***	0.0556	0.0053	***
Education: LTHS	-0.0527	0.0117	***	-0.0871	0.0169	***
No. of children	-0.0087	0.0027	***	-0.0061	0.0031	**
Ln (Labor income)	0.0028	0.0011	***	0.0023	0.0011	**
Ln (Financial net worth)	0.0050	0.0003	***	0.0046	0.0003	***
Ln (Non-financial net worth)	0.0038	0.0009	***	0.0017	0.0006	***
Household owns home	0.0208	0.0071	***	0.0418	0.0076	***
Household owns business	0.0165	0.0061	***	0.0126	0.0078	
Location: completely rural	-0.0203	0.0138		-0.0393	0.0163	**
Unemployed	0.0044	0.0142		0.0147	0.0120	
Retired in 2007 survey	0.0258	0.0106	**			
Married in 2007 survey	0.0054	0.0077				
Remained married to same in 2007–09				0.0055	0.0096	
Became married in 2007–09				-0.0136	0.0159	
Divorced/widowed/separated 2007–09				0.0359	0.0193	*
Became retired in 2007–09				-0.0066	0.0122	
Remained retired in 2007–09				0.0319	0.0126	**
Bought real estate in 2007–09				-0.0003	0.0090	
Sold real estate in 2007–09				0.0043	0.0100	
Received inheritance in 2007–09				0.0175	0.0096	*
Put money into business in 2007–09				0.0068	0.0110	
Sold part or all of business in 2007–09				0.0292	0.0246	
No. of observations: 4140	ρ: 0.7312 (s.e. 0.0179)			Log likelihood: -3265.6041		

Notes: The first equation of the bivariate probit specification models the probability that a household held stocks in non-retirement accounts in the 2007 survey, while the second equation models the probability that a household held stocks in non-retirement accounts in the 2009 survey. The specification allows for the common influences of unobservable factors on both decisions, and it also permits potentially different effects of the observable characteristics in the two surveys. Ownership of stocks refers to directly held stocks, stocks in mutual funds and investment trusts — not including stocks held in retirement accounts (IRAs and employer-based pensions). *** (**, *) stands for statistically significant at the 1 (5, 10) percent level. Also see the Notes in Table 5.

Table 7: Probit of Stock Market Participation Across All Accounts: Pooled Sample

	Own stock		
	Marg. Effect	Standard Error	
Age < 35	-0.0047	0.0187	
Age 35–44	-0.0028	0.0198	
Age 45–54	-0.0227	0.0177	
Age 65–74	-0.0253	0.0255	
Age 75 and over	0.0450	0.0308	
Race: White	0.0933	0.0165	***
Gender: Male	0.0228	0.0194	
Education: COL	0.1613	0.0108	***
Education: LTHS	-0.2190	0.0246	***
No. of children	-0.0243	0.0057	***
Ln (Labor income)	0.0196	0.0023	***
Ln (Financial net worth)	0.0132	0.0006	***
Ln (Non-financial net worth)	0.0066	0.0014	***
Household owns home	0.1410	0.0139	***
Household owns business	0.0207	0.0158	
Location: completely rural	-0.0568	0.0298	*
Unemployed	-0.0478	0.0258	*
Retired	0.0248	0.0231	
Married	0.0628	0.0171	***
Year dummy: 2009	**-0.0345**	0.0076	***
No. of observations: 8280	Log pseudolikelihood: -4483.7387		

Notes: This table shows the results of a probit model of stock ownership when we pool the 2007 and the 2009 PSID sample households together. Ownership of stocks regards shares of stocks held in all accounts. Marginal effects, averaged across households, refer to the changes in the probabilities of owning stocks caused by the changes in regressors. We report clustered standard errors at household level. The regression controls for labor income, financial net worth, and non-financial net worth by means of logarithms using the transformation $y=\ln(x)$ if $x\geq 1$, $y=-\ln(|x|)$ if $x\leq -1$, and $y=0$ if $-1<x<1$. *** (**, *) stands for statistically significant at the 1 (5, 10) percent level.

Table 8: Stock Market Exit in 2009 PSID

	Exit in 2009: All Accounts		
	Marg. Effect	Standard Error	
Age < 35	-0.0128	0.0322	
Age 35–44	0.0413	0.0321	
Age 45–54	0.0333	0.0282	
Age 65–74	0.0824	0.0406	**
Age 75 and over	0.0132	0.0529	
Race: White	-0.0826	0.0297	***
Gender: Male	0.0267	0.0379	
Education: COL	-0.1168	0.0177	***
Education: LTHS	0.1358	0.0574	**
No. of children	0.0022	0.0109	
Ln (Labor income)	-0.0046	0.0045	
Ln (Financial net worth)	-0.0117	0.0010	***
Ln (Non-financial net worth)	-0.0027	0.0021	
Household owns home	-0.0925	0.0265	***
Household owns business	-0.0266	0.0276	
Location: completely rural	0.0139	0.0518	
Unemployed	0.0516	0.0446	
Remained married to same in 2007–09	-0.0266	0.0335	
Became married in 2007–09	0.0398	0.0634	
Divorced/widowed/separated 2007–09	0.0472	0.0694	
Became retired in 2007–09	0.0435	0.0444	
Remained retired in 2007–09	-0.0324	0.0480	
Bought real estate in 2007–09	0.0664	0.0333	**
Sold real estate in 2007–09	-0.0126	0.0369	
Received inheritance in 2007–09	-0.0408	0.0396	
Put money into business in 2007–09	0.0151	0.0427	
Sold part or all of business in 2007–09	-0.0855	0.1063	
No. of observations: 2028	Log likelihood: -1006.2692		

Notes: This table shows the results of a probit model, in which the dependent variable measures whether a household dropped out of the stock market (across all accounts) in the 2009 survey conditional on owning stocks in the 2007 survey. Marginal effects, averaged across households, refer to the changes in the probabilities of exiting the stock market caused by the changes in regressors. The regression controls for labor income, financial net worth, and non-financial net worth by means of logarithms using the transformation $y=\ln(x)$ if $x\geq 1$, $y=-\ln(|x|)$ if $x\leq -1$, and $y=0$ if $-1<x<1$. *** (**, *) stands for statistically significant at the 1 (5, 10) percent level.

Table 9: Stock Market Exit in Non-retirement Accounts: 2009 PSID

	Exit in 2009: Non-retirement Accounts		
	Marg. Effect	Standard Error	
Age < 35	0.0386	0.0514	
Age 35–44	0.0742	0.0504	
Age 45–54	0.0411	0.0426	
Age 65–74	0.0610	0.0572	
Age 75 and over	0.0148	0.0684	
Race: White	-0.1049	0.0513	**
Gender: Male	-0.0033	0.0610	
Education: COL	-0.1080	0.0281	***
Education: LTHS	0.2248	0.1010	**
No. of children	-0.0059	0.0182	
Ln (Labor income)	0.0041	0.0058	
Ln (Financial net worth)	-0.0118	0.0019	***
Ln (Non-financial net worth)	-0.0017	0.0037	
Household owns home	-0.0435	0.0443	
Household owns business	-0.0185	0.0402	
Location: completely rural	-0.0211	0.0852	
Unemployed	-0.1436	0.0853	*
Remained married to same in 2007–09	0.0468	0.0526	
Became married in 2007–09	0.0680	0.0937	
Divorced/widowed/separated 2007–09	-0.1106	0.1302	
Became retired in 2007–09	0.0645	0.0635	
Remained retired in 2007–09	-0.0249	0.0629	
Bought real estate in 2007–09	-0.0404	0.0552	
Sold real estate in 2007–09	-0.0328	0.0552	
Received inheritance in 2007–09	0.0047	0.0525	
Put money into business in 2007–09	0.0443	0.0572	
Sold part or all of business in 2007–09	0.0627	0.1212	
No. of observations: 1043	Log likelihood: -599.6312		

Notes: This table shows the results of a probit model, in which the dependent variable measures whether a household dropped out of the stock market in non-retirement accounts in the 2009 survey conditional on owning stocks in non-retirement accounts in the 2007 survey. Marginal effects, averaged across households, refer to the changes in the probabilities of exiting the stock market caused by the changes in regressors. The regression controls for labor income, financial net worth, and non-financial net worth by means of logarithms using the transformation $y=\ln(x)$ if $x\geq 1$, $y=-\ln(|x|)$ if $x\leq -1$, and $y=0$ if $-1<x<1$. *** (**, *) stands for statistically significant at the 1 (5, 10) percent level.