Ephemeral Experiences, Long Lived Impact : Disasters and Portfolio Choice*

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Abstract

We investigate whether individual experiences of natural disasters affect portfolio choice. Using data from the National Longitudinal Survey of Youth 1979 Cohort, we show that past disaster experiences which are fleeting and last less than five days on average, have an economically significant effect lowering an individual's risky asset market participation, and the share of risky assets in the portfolio. Results control for age, year effects and household demographics and most recent disasters trigger stronger effects. These effects are observed mainly for exposure to severe natural disasters and persist even after the individual relocates to a new geographic area, not vulnerable to disasters. Individuals who live in a disaster prone area do not display this behavior unless they experience a disaster first hand. We find that individuals become risk averse and have lower expectation of future returns (but not volatility of returns) after disaster experiences. A quantitative decomposition of the disaster effect on portfolio choice shows that 45% of the effect is due to change in expectations and 55% of the effect is due to changes in risk aversion. Our results are consistent with a view that even transient but salient life experiences can affect an individual's preferences and tastes in dynamically meaningful ways.

Keywords: Portfolio Choice, Natural Disasters, Risk taking, Preferences

JEL CLASSIFICATIONS: D81,G11,O12

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Economic models routinely assume individuals whose preferences are unaltered by their economic experiences and their beliefs shaped by rational expectations. The psychology literature on the other hand argues that personal experiences in addition to statistical information or education exert a great influence over preferences and beliefs. Motivated by this, a burgeoning literature[1] documents that individuals' economic experiences such as Great Depression affect their future financial decisions. Malmendier and Nagel (2011) shows that investors' past stock and bond market lifetime experiences (such as low returns) during larger shocks such as the Great Depression or over long periods of time (Decades of 50's and 60's vs. the 70's and 80's) affect their future risk taking. Another branch of literature[2] examines the relation between non economic experiences and financial decisions. Non economic experiences may have an economic consequences but are not directly related to financial variables, for instance, natural disasters or military experiences.

We examine and show empirically, that investors' personal experiences in natural disasters that are transient (exposure with a median duration of 5 days[3]) nevertheless have a long lasting future impact on their portfolio choices. Individuals take lower financial risk by participating less in the bond and stock markets and invest a smaller fraction of their wealth in these assets. This behavior persists even after individuals have moved to a new

[1] See Malmendier and Nagel (2011), Malmendier and Nagel (2013), Malmendier, Tate, and Yan (2011), Knpfer, Rantapuska, and Sarvimki (2014), Benartzi (2001), Choi et al. (2009), Anagol, Balasubramaniam, and Ramadorai (2015), and Kaustia and Knupfer (2008)

[2] See Cameron and Shah (2013), Bernile, Bhagwat, and Rau (2014), Malmendier, Tate, and Yan (2011), Callen et al. (2014), Hirshleifer and Shumway (2003) and Kamstra, Kramer, and Levi (2000)

[3] See the lower part of Panel B in Figure 1

geographical area that is low disaster prone (based on past data) and have had a chance of revising their beliefs (e.g. A person exposed to hurricanes in Florida moving to Arizona, where such a future disaster is unlikely to occur). This result suggests that these effects are likely driven by endogenous preference formation (transient natural disasters make individuals more risk averse or lead to changes in tastes for different types of assets). Investors living in disaster prone areas not subject to an actual disaster invest in risky asset markets at a far higher rate than their counterparts in the same geography who actually experienced a natural disaster. This implies individual preferences on assets are likely affected by actual disaster experiences and not just through education or statistical data.

The literature has shown that salient long lived macro economic shocks such as the Great Depression and stock market return shocks affect financial decision making (Malmendier and Nagel, 2011). Individuals are most affected by early childhood life exposure to shocks (Jr, 1999). If these shocks are to economic objects such as inflation, then these individuals differ systematically in their beliefs of these economic objects shaped by their experiences. Thus experiences affect future beliefs (Malmendier and Nagel, 2013). The contribution of this paper is to show that (1) given even non economic life experiences, even if they are fleeting in nature and occurring in one′s adulthood can have long lasting effects on economic choices (2) life experiences can also affect ones preferences and tastes in a dynamic manner, complementing the effect of experiences on future beliefs. The latter effect is consistent with evidence that fearful recollections of individuals exposed to violence in Afghanistan triggers changes in risk and certainty preferences (Callen et al., 2014). We further contribute to the literature by showing that (1) *Changes* in risk aversion of individuals are affected by *changes* in their disaster experiences and (2) Individual expectations of future stock market returns (but not volatility) are affected by their disaster experiences. These results show that both expectations about future returns as well as risk aversion are affected by disasters which then affect portfolio choice. Our final contribution is a numerical assessment using these results to show that 45% of the changes in portfolio can be attributed to revised expectations and 55% of the changes can be attributed to changes in risk aversion following disaster experiences.

The standard model of time-varying risk aversion (and hence time varying discount rates) is the habit specification of Campbell and Cochrane (1999). In their model, when a person's consumption approaches her habit, her risk aversion rises. Using aggregate consumption data, Campbell and Cochrane (1999) find that their implied risk aversion measure can explain a large proportion of the movements in the price-dividend ratio on the stock market. Thus changes in preferences are central in this model.

On the other hand, the Long Run Risks model (LRR) of Bansal and Yaron (2004), a small but persistent component of consumption growth captures its long run risk along with the long run fluctuations in consumption volatility. Using these two features, LRR can match the risk-free rate, equity premium, predictability and other important asset market data features. Thus LRR emphasizes the long run cash flow risk channel, which depends on expectations of the agent about the future.

In this paper, by attempting to decompose quantitatively the relative importance of expectations about future returns (which emphasizes cash flow risk of LRR) as well as risk aversion (which emphasizes the discount rate risk of habit model) in a portfolio choice setting, we can offer an assessment of the the relative importance of the two canonical models in asset pricing.

We use detailed micro panel data contained in the National Longitudinal Survey of Youth 1979 cohort (NLSY79) for our estimation, and construct measures for their participation in the risky asset markets and the intensity of their participation. Natural disasters are obtained from the Federal Emergency Management Agency (FEMA) Disaster Declarations database. Our identification strategy exploits cross sectional differences of individuals exposed to natural disasters and relate it to the cross sectional differences in financial decisions. We also exploit time variation in cross sectional differences of individuals' exposure to disasters to examine if portfolio choice decisions are long lived. Cross sectional heterogeneity enables the estimation with time fixed effects to remove time trends, time varying aggregate risk aversion or other time specific determinants such as delayed portfolio rebalancing. This enables a clear separation of lifetime disaster experience effect and rules out omitted macro factors. Age effect controls rule out life cycle effect explanations such as increased risk aversion or retirement considerations. Wealth and income controls address the possibility of disaster shocks affecting portfolio choice through these channels.

Our estimation results show that past disaster experiences have an economically significant effect on an individuals risky asset market participation, and the share of risky assets in the portfolio. Moving from the 5th to the 95th percentile of disaster experiences produces a decline in the participation rate of 2.5% (compared with the average participation rate of 38.7%), correspondingly the usage rate of safe assets increases by 0.4% (average usage rate of 74.0%). The risky asset share falls by 3.0% (against an average share of 32.2%). Following Malmendier and Nagel (2011), we also estimate a weighting function parameter λ to be 2.478 (remarkably similar to their λ of 1.924 estimated from a completely different data set on stock market return experience) suggesting more recent disaster experiences are weighted more heavily in portfolio choice decisions.

Finally, we show a decline in asset market participation and risky asset share only after a disaster is experienced by an individual. Remarkably, this decline persists even after the individual moves to a now/low disaster geographic area. Individual movers with no disaster experience (while they were residing in a high disaster area) show none of these effects during their lifetimes.

Our paper complements Cameron and Shah (2013) who use experiments in rural Indonesia to show increased risk aversion after a flood or an earthquake which is consistent with our real life, survey data results. While Cameron and Shah (2013) attribute the results to changes in beliefs of background risk, we provide evidence consistent with a change in preferences channel. Bernile, Bhagwat, and Rau (2014) find early childhood experiences of CEOs affect corporate financial policies, which follows earlier studies on heterogeneity in CEO experiences affecting corporate policies by Malmendier and Tate (2005) and Malmendier, Tate, and Yan (2011). Our results are also consistent with Knpfer, Rantapuska, and Sarvimki (2014), who show that adverse labor market experiences during the Finnish depression leads workers to invest less in risky assets by about 3% even after a decade has passed by.

1 Data and Main Variable

The key variables for our analysis are risky asset market participation and risky asset share of the total portfolio as dependent variables. These household micro data are sourced from the NLSY79, a nationally representative sample of 12,686 young men and women between 14 to 22 years of age when first interviewed in 1979. The respondents were interviewed annually through 1994 and every 2 years after 1994, with retention rates higher than 90% after 19 rounds of interviews.

We use the data from 1988 to 2008 since the NLSY 79 began to collect information on financial assets from 1988. In defining risky and safe assets, we follow Angerer and Lam (2009): risky assets consist of common stocks, preferred stocks, stock options, government and corporate bonds and mutual funds where as safe assets include checking and saving accounts, money market funds, certificates of deposit, US saving bonds and personal loans. Individual retirement accounts and tax deferred accounts are included in risky assets from 1994 (prior to 1994, the survey reported these with other safe assets and as a sum; hence, we include them in safe assets[4]). The sum of risky and safe assets is defined as total liquid wealth. Risky asset share is defined as the ratio of risky assets to total liquid wealth.

Table 1 presents summary statistics of variables used in our analysis. Most of the variables in this table exhibit large variations, notably non liquid financial assets and financial assets. The average risky asset market participation rate is 39% while the average safe asset market participation rate is almost three quarters. The average fraction of risky assets is 32%. Panel B separately shows summary statistics by each asset market participants. Mean of all variables, except for Female indicator, are greater (or equal) for risky asset market participants. Most risky asset market participants participates in safe asset market as well.

We obtain the confidential zip code data for the NLSY79 respondents from the Bureau of Labor Statistics which will enable us to match households with the natural disaster data from the FEMA, collected at the county level and described below.

[4]We obtain similar results using a sub-sample only after 1994.

The set of disaster events in U.S. that we use comes from the Federal Emergency Management Agency (FEMA) Disaster Declarations database dating back to 1953. It documents a variety of details for each declaration including declaration date, incident begin / end dates, disaster type, incident type, and location (state-county). From 1953 through the end of 2013, a total of 3,220 separate disasters were declared across the 50 states. The early portion of the database (1953-1963) contains location information only at the state level.

Our identification strategy is to examine cross sectional variations in risk taking behavior across households with different disaster experiences as in the literature. We also exploit within household time variations in disaster exposure by both examining the effect of relocation decisions on asset allocation decisions (Section 3.2.1) and including household fixed effects.

According to the FEMA disaster declaration process, a governor of each state asks the FEMA to declare disasters so that the state can get the federal assistance. Once it is approved by the President, that disaster shows up in our data. Hence, there might be political considerations of declaration process (Garrett and Sobel, 2003). However, we classify households who were actually hit by disasters as ones with no disaster experiences, therefore, we systematically underestimate the effect of disaster experiences on the portfolio choice decisions.

There are three major categories of disaster aid programs: Individual Assistance, Public Assistance, and Hazard Mitigation. The Individual Assistance includes disaster housing, disaster grants, low-interest disaster loans, and etc. The Public Assistance (PA) Grant Program provides affected areas with federal assistance so that communities can quickly recover from disasters while the Hazard Mitigation (HM) Grant Program provides grants to states and local governments to implement long-term hazard mitigation measures after a disaster declaration. Among them, the PA and the HM programs provide data on the amount granted by each program since August 1998 and January 1989, respectively. We use this data as a proxy for disaster severity when we separate our main variable, *Disaster Experiences* (defined below), into *Severe* and *Non-severe Disaster Experiences*.

Panel A in Figure 1 shows a heatmap of total number of disaster declarations took place from May 1953 to December 2013 at state-county level. Darker color indicates more disasters declared in that county. Table 1 presents a set of tables for disaster characteristics. Panel B in this table shows 10 most disaster prone states (and state-county) in terms of three different measures: total number of disaster declarations, sum of Hazard Mitigation amount, and sum of Public Assistance amount. By number, Texas is the most disaster prone state, followed by California and Oklahoma. By severity (sum of PA amount), Louisiana is the most disaster prone state, followed by New York and Florida.

Our main variable is *Disaster Experiences* and we use three different measures: (i) lifetime experience is a household's cumulative number of disaster experience from household's birth[5] up to current time, (ii) the most recent 5 year experience is a household's cumulative number of disaster experience during the most recent 5 years, and (iii) weighted number of experience is a weighted average number of lifetime disaster experience from household's birth up to current time where weights are determined by how old the experiences are (details are in the below). The upper part of Panel B in Figure 1 depict a histogram of cumulative number of

[5]Excluding disasters before age of 5 at which most people have their memories yield similar results.

disasters experiences by households in the NLSY79 database. Mean is about 6.4 and median is 5 disasters.

2 Methodology

2.1 Risk Taking Behavior and Disaster Experiences

Our first set of analysis is the decision to participate in the risky asset market using the following logit model, with the participation decision as the dependent variable and the independent variables including a vector of demographic variables, age fixed effects, and year fixed effects. We cluster standard errors by household[6]:

$$\begin{aligned} & Pr(\mathbb{1}_{\{y_{i,t}>0\}} | x_{i,t}, \textit{Disaster Experiences}_{i,t}) \\ & = F(\alpha + \beta \textit{Disaster Experiences}_{i,t} + \gamma' x_{i,t}) \end{aligned} \tag{1}$$

where $y_{i,t}$ is a fraction of liquid assets invested in risky assets, $x_{i,t}$ is a vector of control variables (log income, log income squared, number of children, number of children squared, liquid assets, liquid assets squared, housing variables and dummies for completed high school education, completed college education, marital status, race, gender, health status)[7], and F is the logistic distribution. The coefficient of interest is β and we expect it to be negative.

[6]Clustering on two dimensions by household and county does not alter the significance of our estimated coefficients.

[7]Additional control variable that is potentially important is private insurance, especially one related to housing. Unfortunately, we do not observe homeowners insurance data in the NLSY79. One might expect that the negative effect of disaster experiences on risk taking behavior becomes weak for those who have private insurance. However, this conjecture is true only if housing or income channel drives our results. In the following analysis, we rule out housing, income, and health status channels, thereby confirming that insurance plays little role.

The second set of analysis regresses the fraction of liquid assets that are invested in risky assets on the same set of covariates [8]:

$$y_{i,t} = \alpha + \beta \mathit{Disaster\ Experiences}_{i,t} + \gamma' x_{i,t} + \epsilon_{i,t} \tag{2}$$

It is possible that unobserved (but time invariant) heterogeneity across households may affect decisions on both asset allocation and the location of residence which, in turn, determines their disaster experiences. Hence, as a robustness test, we include household fixed effects in Equation (2) to address this problem (See Table A2).

We also use the following nonlinear regression model to formally estimate weighting scheme of households in portfolio choice decision as in Malmendier and Nagel (2011):

$$\begin{aligned} y_{i,t} &= \alpha + \beta N_{i,t}(\lambda) + \gamma' x_{i,t} + \epsilon_{i,t} \qquad (3) \\ N_{i,t}(\lambda) &= \sum_{k=1}^{age_{it}-1} w_{it}(k,\lambda) \cdot NUM\_EXP_{i,t-k} \\ w_{it}(k,\lambda) &= \frac{(age_{it}-k)^{\lambda}}{\sum_{k=1}^{age_{it}-1}(age_{it}-k)^{\lambda}} \end{aligned}$$

where $y_{i,t}$ refers to the fraction of liquid assets invested in risky assets, $x_{i,t}$ is a vector of control variables, $NUM\_EXP_{i,t-k}$ is a total number of disaster experiences of household i at year $t-k$, and $N_{i,t}(\lambda)$ is a weighted average number of disaster experiences where weights are given by $w_{it}(k,\lambda)$. We estimate β and λ simultaneously using nonlinear least squares.

[8] To control for possible fixed costs of risky asset market participation, we also run these regressions conditioning on participation, that is, only for risky asset market participants. We obtain similar results.

2.2 Expectations / Risk Preferences and Disaster Experiences

To examine whether disaster experiences change households' risk preferences, we run the following first difference logit regressions:

$$\begin{aligned} &Pr(\mathbb{1}_{\{\Delta(Risk\ Aversion\ Measure)>0\}}|\Delta x_{i,t}, \Delta Disaster\ Experiences_{i,t}) \\ &= F(\alpha + \beta \Delta Disaster\ Experiences_{i,t} + \gamma' \Delta x_{i,t}) \end{aligned} \tag{4}$$

where $\Delta(Risk\ Aversion\ Measure)$ indicates the first difference of disaster experiences, either cumulative number of disasters or cumulative severity of disasters, and $x_{i,t}$ includes $\Delta ln(Income)$ and $\Delta ln(Income)$ *Squared*. The indicator variable is set to one if household's job related risk aversion measure increases and zero otherwise. Appendix A.1 describes how we construct risk aversion measure in detail (based on Barsky et al. (1997)).

Taking first differences is crucial for our risk aversion tests because unobservable and time-invariant risk appetite might have impact on both our risk aversion measure and the choice of residence that determine disaster experiences. By taking the first differences, we cancel out the potential effect of this unobservable, time-invariant risk appetite. Effectively, we examine the effect of *changes* in disaster experiences on *changes* in risk aversion measures.

Since the original risk aversion measure has four distinct categories ranging from 1 (least risk averse) to 4 (most risk averse), changes in risk aversion measure has seven distinct categories from -3 (most decrease) to 3 (most increase). Hence, we alternatively run a ordered logit regression of changes in risk aversion measure on the same set of covariates in Equation 4.

Next we examine the effect of disaster experiences on expectations about stock market over the next 12 months using the UBS/Gallup survey data. Details on the survey questions are discussed in Appendix A.2. We run the following OLS regression of expected stock market return over the next 12 months on households' disaster experiences and a set of control variables:

$$\mathbb{E}_{i,t}[R] = \alpha + \beta \textit{Disaster Experiences}_{i,t} + \gamma' x_{i,t} \tag{5}$$

where $\mathbb{E}_{i,t}[R]$ indicates household i's expectations on stock market return at time t and $x_{i,t}$ includes income categories[9], dummies for completed high school education, completed college education, marital status, race, and gender, age fixed effects, and year-month fixed effects. $\textit{Disaster Experiences}_{i,t}$ is either dummy variable or continuous variable where dummy is set to one if households have at least one disaster experiences during the last one month before the interview dates and zero otherwise. We predict β to be negative.

The UBS/Gallup survey also asks respondents about the expected stock market volatility over the next 12 months. Since the response to the question has three distinct categories (see Appendix A.2 for detail), we run the following logit regression to examine whether disaster experiences affect households' expectations on stock market volatility:

$$\begin{aligned} &Pr(\mathbb{1}_{\{\mathbb{E}_{i,t}[\sigma]=Increase\}} | x_{i,t}, \textit{Disaster Experiences}_{i,t}) \\ &= F(\alpha + \beta \textit{Disaster Experiences}_{i,t} + \gamma' x_{i,t}) \end{aligned} \tag{6}$$

where $\mathbb{1}_{\{\mathbb{E}_{i,t}[\sigma]=Increase\}}$ is a dummy variable set to one if respondent i expects increase in

[9]Since only available income variable in the UBS/Gallup survey is categorical, we use the middle point of the range as our income variable.

volatility over the next 12 months at time t and zero otherwise, and $x_{i,t}$ is the same set of control variables as in Equation 5.

3 Description of Results

3.1 Risk Taking Behavior and Disaster Experiences

Table 3 specification (1-3) describes the results of the logit regressions on risky asset market participation. The coefficient on total number of lifetime disaster experiences is strongly negative and significant in specification (1) suggesting lifetime disaster experiences are associated with significantly lower likelihood of participation in the risky asset market. The effect is statistically significant at the 1% level. Figure 2 suggests the economic significance is also large. As we move from the lowest disaster experience to the highest in the data, participation rates fall from about 39.1% to 29.9% - a sizeable effect. A formal test of the difference of the fitted probability of risky asset market participation between the 5th and 95th percentile of the disaster experiences distribution is significant at the 1% level. (Table 3 specification (1)).

Specifications (2) and (3) are robustness checks. In specification (2), we use the most recent 5 year disaster experiences variable with a higher coefficient suggesting recent experiences have a bigger effect. In specification (3), using dummy variables based on quartiles of total number of lifetime disaster experiences reveals the effect to be present across the distribution of disaster experience. The next three specifications repeat the first three using Fama-MacBeth regression finding similar significant results, suggesting the effect is present across time.

In table 4, we regress the participation in safe asset markets on disaster experiences. Results show that recent 5 year history of disasters is associated with higher safe asset market participation. We obtain similar results by stratifying total number of lifetime disaster experience by quartiles. Table 5 shows that it really the severe disasters (measured by the amount of assistance offered by the government) that produce the reduced risky asset market participation. A formal test of the differences in coefficients between severe and non-severe disaster experience is statistically significant (specification (2)). The coefficient on severe disasters by itself is statistically significant while the coefficient on non-severe disasters is not. No such differences are observed on the decision to participate in the safe asset market.

Table 6 shows the estimated effect of weighted number of disaster experiences on the fraction of liquid assets invested in risky assets. The weighted average number of disasters has a statistically significant negative effect on the percentage invested in risky assets. The coefficient on weighted experiences is not directly comparable to that on cumulative number of disaster experiences in specification (1) of Table 7a because weighted experiences are not a total number of disaster experiences, but an (weighted) average of total number of disaster experiences. Marginal effect of one additional disaster at time $t-1$ for hypothetical 50-year-old household is -0.4%, which lies between -0.2% and -0.5%, marginal effects in specification (1) and (2) of Table 7a. This confirms that our estimate for λ is reasonable and consistent with our results from equally weighted disaster experiences. The point estimate for λ, 2.478, suggests that weighting function is decreasing as the time lag k approaches age_{it} in (3) and convex (Figure A2), remarkably similar to that in Malmendier and Nagel (2011) that use a completely different data set on stock market return experiences.

Table 7a, 7b, and 7c repeat our analysis in Table 3, 4, and 5 with fraction of liquid assets invested in risky assets. We find strong negative effects of disaster experiences on risky asset shares and these effects are driven by the severe disasters. In specification (1) of Table 7a, significant negative coefficient on disaster experiences implies that if households are hit by one additional disaster, a fraction decreases by 0.2%. The difference between two fitted fractions at 95th and 5th percentile of the disaster experiences distribution is 3%, almost 10% decrease relative to the average fraction. We also confirm that recent experiences have stronger effects (Table 7a specification (2)).

Table 8a repeats the regressions of column (1) in Table 3 and column (1) in Table 7a using housing variables as additional control variables since the literature on portfolio decisions argues that investment in housing plays an important role in the process of households' financial decision (e.g., Cocco, 2005; Yao and Zhang, 2005). The inclusion of housing variables addresses the concern that the main effect we find could be due to changes in housing variables which might result from disaster shocks. As shown in column (1) and (4) of the table, adding market value of residential property (MVRP) and mortgage and debt of residential property (MDRP) does not alter the effect of disaster experiences on both risky asset market participation and the percentage invested in risky assets. The remaining columns in Table 8a use relative values of these variables to Net Wealth, a sum of risky assets, safe assets, and net value of residential property in both linear and quadratic forms. None of them change the effect. In addition, we repeat the regressions of column (1) in Table 3 and column (1) in Table 7a only for households who do not own their houses. Those households are less subject to changes in housing values which might be affected by disaster shocks. We find significant negative effect of disaster experiences on households' risk taking behavior even for this subset of households (Table 8b). Hence our findings are not driven by potential changes in housing values due to disaster hits.

Strategic asset allocation models with non-tradable human wealth (stochastic labor income) yield the optimal portfolio rule that also depends on the mean wealth-income ratio and covariance between risky asset returns and labor income. Hence, changes in future income stream due to disaster shocks might affect asset allocation decision, potentially driving out a direct effect of disaster experiences on portfolio choice. Unfortunately, we do not observe future income stream in the NLSY79 data. If disaster shocks damage households' health, and as a result future income stream changes, the inclusion of health status variables mitigates this future income channel. In Table , we include Health Limit Amount (Kind) dummy variables indicating if households think that they are limited in the amount (kind) of work they could do because of their health. These additional variables do not alter our findings.

In addition to the aforementioned robustness tests, we do a placebo test, asking whether the false variables affect households' risky asset market participation. Figure A1 plots a density of $\hat{\beta}^{Psuedo}$, estimated coefficient on pseudo disaster experience variable, from Equation (8). We randomly assign the whole history of disaster experiences during 11 survey years to each household to construct pseudo disaster experience variable. We run Equation (8) 1,000 times and save $\hat{\beta}^{Psuedo}$. The vertical red line indicates the actual $\hat{\beta}$ from column (1) in Table 3, and p-value of the actual $\hat{\beta}$ is 0.000. Therefore, the negative effect of disaster experiences on portfolio choice we find cannot be obtained from random chance.

3.2 Which Channels? Expectations vs. Risk Preferences

3.2.1 Relocation Tests

In Table 9, we analyze the effect of disaster experiences on portfolio choices within the same household. We divide the households into four groups: (1) Households that stay in disaster prone counties during the sample (2) Households that stay in low disaster prone counties during the sample (3) Households that move from disaster prone counties to low disaster prone counties during the sample and (4) Households that move from low disaster prone counties to disaster prone counties during the sample. Disaster prone (low disaster prone) counties are defined as the areas that experience the number of natural disasters above (below) the median value of the disaster distribution. For the mover households from disaster prone areas to low disaster prone areas, we examine their portfolio choice behavior (i) before the move and before experiencing a natural disaster (ii) before the move and after experiencing a natural disaster and (iii) after the move. Similarly, for the mover households from low disaster prone areas to disaster prone areas, we examine their portfolio choice behavior (i) before the move (ii) after the move and before experiencing a natural disaster and (iii) after the move and after experiencing a natural disaster.

Specification (1) examines participation rates and specification (2) examines the weight of the risky asset in the portfolio. Households in low disaster prone areas are more likely to participate and invest more in the risky asset, relative to the households in the disaster prone areas (the omitted group). Interestingly, the movers to low disaster prone areas behave very differently during their stay in disaster prone areas. Before being hit with a natural disaster shock, these households participate and invest much more in the risky asset which declines sharply after experiencing their first disaster. This can be seen by comparing the significant coefficients 0.465 and 0.226 in the specification. Further, this participation coefficient declines to -0.102 after the households have moved to a low disaster prone area and this decline is significantly different from their behavior (the coefficient of 0.226 in the specification) after personally experiencing a disaster in the disaster prone area. As an example, these households could have moved from Florida (high disaster prone area reflecting the threat of hurricanes) to Arizona (low disaster prone area in our sample). This result suggests that natural disaster affect individual's preferences and tastes for assets. This follows as these households update their beliefs after their move and think that they are less likely to be hit by natural shocks anymore. Further evidence of the experience effect on preferences can be seen by the households in disaster prone areas having never experienced an actual disaster participating at much higher rates than the rest of the sample who have already experienced disasters.

The reverse effect can be seen by comparing the movers from low disaster prone areas to disaster prone areas, who invest and participate at much higher rates before the move, but fall to the general average of the households who live in disaster prone areas after experiencing a natural disaster themselves.

To examine whether the effects we find from relocation tests are really long lived ones, we further divide group $D_{bD} \mapsto D_{aD} \mapsto LD^*$ in Table 9 into two subgroups: $D_{bD} \mapsto D_{aD} \mapsto LD^*$ $[ST]$ and $D_{bD} \mapsto D_{aD} \mapsto LD^*$ $[LT]$ based on the duration of stay at LD, low disaster prone area. $D_{bD} \mapsto D_{aD} \mapsto LD^*$ $[ST]$ ($[LT]$) refers to households who moved to LD *and* the time passed since the move is less (greater) than the median value of duration of stay. ST indicates short term effects whereas LT refers to long term effects. In Table A3, the coefficient remain strong even after long time period, supporting risk preference channel.

This is consistent with Knpfer, Rantapuska, and Sarvimki (2014) where adverse labor market experiences during the Finnish Depression have a long lived impact on households' risk taking behavior.

3.2.2 Risk Preferences and Disaster Experiences

In Table 10, we examine the impact of *changes* in disaster experiences on *changes* in risk aversion. This approach cleanly controls for a host of variables and circumstances that are specific to the individual that might affect their risk aversion. We obtain survey data on an individual's risk aversion at different points in time using the sources described in the Appendix A.1. In Panel A, we estimate logistic regressions (with the dependent variable being an increase in risk aversion coded as a 1 and 0 otherwise) with the independent variable measured as changes in number of disasters or changes in cumulative severity of diasters. The results show that changes in disaster experiences are strongly significantly related to changes in risk aversion. Moving from the 5th to the 95th percentile of changes in disaster experiences increase the likelihood of being more risk averse by 6.5% points. These results hold even after controlling for changes in income (both linear and non linear terms). Panel B repeats the same analysis using an ordered logit framework, taking into account the magnitude of the change in risk aversion. The results are qualitatively unchanged. The results in this table strongly suggests that an individual's risk aversion increases after having faced a disaster, which can be a channel to affect portfolio choice decisions.

3.2.3 Expectations and Disaster Experiences

Table 11, presents the results of estimations that regress future expectations of stock market return and volatility on the disaster experiences of individuals. We obtain survey data on individual's expectations of returns and volatility using the sources described in the Appendix

A.2. In Panel A (Panel B), we estimate OLS (logit) regressions with the dependent variable being the estimate of the expected return over the next 12 months (or the expected increase in stock market volatility over the next 12 months coded as a 1 and 0 otherwise). In all estimations, disaster experiences are strongly negatively related to expected returns (and unrelated to volatility), even after controlling for time effects and demographic variables. The presence of a disaster experience lowers the estimate of next year's expected return of that individual by about 50 basis points. Thus disaster seem to affect expected returns, which can be another channel to affect future portfolio choice decisions.

3.3 Decomposition

In Table 12, we attempt to decompose the relative impact of risk aversion and expectations on portfolio choice decisions in our sample when an individual is faced with natural disasters. We adopt the classic portfolio choice model where an investor with constant relative risk aversion (CRRA) preferences maximizes her expected utility by optimally allocating her wealth to risky and risk-free assets over one period. The model implies that the optimal fraction (α) of wealth invested in risky assets is proportional to the risk premium and inversely proportional to the product of volatility (σ^2) and relative risk aversion coefficient (γ): $\alpha =$ (risk premium)/($\sigma^2 \ * \ \gamma$). Keeping σ^2 constant (justified by results in Panel B in Table 11), we decompose changes in α into two parts as follows:

$$\Delta\alpha \approx \frac{1}{\sigma^2}\left[\frac{\Delta(risk\ premium)}{\gamma} + (risk\ premium)\Delta\left(\frac{1}{\gamma}\right)\right] \tag{7}$$

We consider two different households with different disaster experiences: one is at the 95th percentile and the other is at the 5th percentile of disaster experiences distribution. Scenario I uses all available return series till 2008 whereas Scenario II uses return data from

1988 to 2008, the same sample period as for the NLSY79, when calculating parameter values of risk premium and volatility.

$\Delta(rp)$ comes from our expectations test (specification (4) of Panel A in Table 11, and α_{5th} and α_{95th} are the fitted fractions at 5th and 95th percentile of disaster experiences distribution, respectively (specification (1) of Table 7a). Using the classic portfolio choice model, we calculate model implied relative risk aversion coefficient for two different households, γ_{5th} and γ_{95th}. Consistent with our risk preferences test (Table 10), disaster experiences make household more risk averse.

Final calculations reveal that contributions due to the expectations channel in explaining portfolio choices is 45% and the balance 55% is explained by changes in risk aversion under Scenario I.

4 Conclusion

We investigate whether individual experiences of natural disasters affect portfolio choice. Using data from the National Longitudinal Survey of Youth 1979 Cohort, we show that past disaster experiences which are fleeting and last less than five days on average, have an economically significant effect lowering an individual's risky asset market participation, and the share of risky assets in the portfolio. Results control for age, year effects and household demographics and most recent disasters trigger stronger effects. These effects are observed mainly for exposure to severe natural disasters and persist even after the individual relocates to a new geographic area, not vulnerable to disasters. Individuals who live in a disaster prone area do not display this behavior unless they experience a disaster first hand. We find that individuals become risk averse and have lower expectation of future returns (but not volatility of returns) after disaster experiences. A quantitative decomposition of the disaster effect on portfolio choice shows that 45% of the effect is due to change in expectations and 55% of the effect is due to changes in risk aversion. Our results are consistent with a view that even transient but salient life experiences can affect an individual's preferences and tastes in dynamically meaningful ways.

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A Appendix

A.1 Risk Aversion Measure

The risk aversion measure we use in Table 10 has four distinct categories ranging from 1 (least risk averse) to 4 (most risk averse). It is constructed from the following sequence of three survey questions on the NLSY79 of 1993, 2002, 2004, and 2006: "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 that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?". If respondents accept the first offer (i), they are given the second offer (ii) whereas if they reject the first offer (i), they face the third offer (iii). Therefore, respondents who accept the second offer get risk aversion measure of 1; respondents who only accept the first offer have risk aversion measure of 2; respondents who accept the third offer receive risk aversion measure of 3; and finally, respondents who do not accept any offer get risk aversion measure of 4.

A.2 Expected Stock Market Return and Volatility Over the Next 12 Months

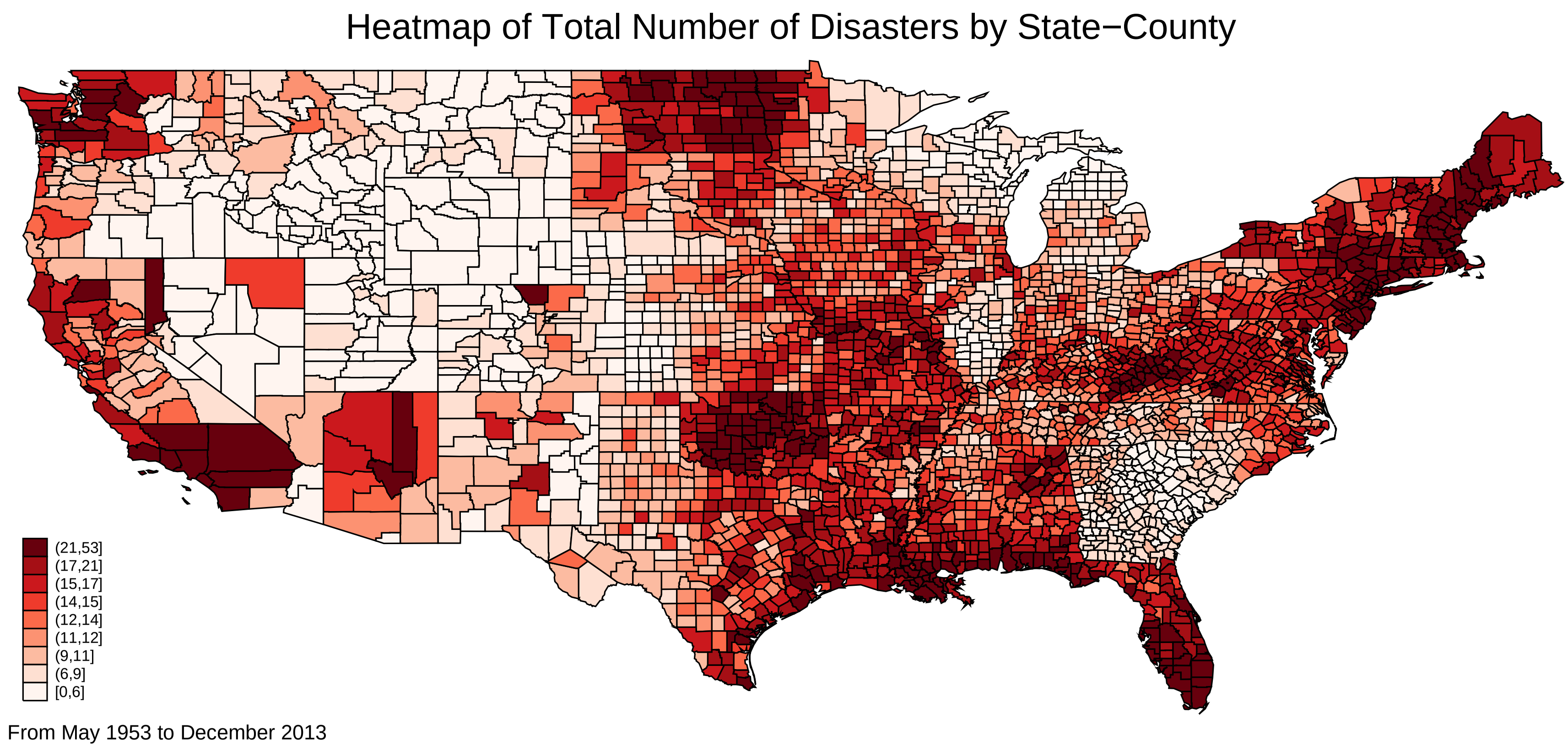
Households' expectations about the stock market over the next 12 months (Table 11) are obtained from the UBS/Gallup survey through the Roper Center at the University of Connecticut. We work with the responses to the following two questions on stock return expectations: (i) "Thinking about the stock market more generally, what overall rate of return do you think the stock market will provide investors during the coming 12 months?" and

(ii) "(INTERVIEWER: Do NOT ask; code only whether a 'positive' or 'negative' number. If you are unsure whether the number is positive or negative, then ask the respondent. As a general rule, you should ASSUME it to be POSITIVE, unless the respondent explicitly says 'Minus'; or in some other way indicates the number is NEGATIVE)". The first question is open ended question and coded as actual percent while the second question only indicates the signs of answers to the first question (1 - Positive; 2 - Negative). Both questions are available every month from January 2000 to April 2003. However, we drop 4 month data sets from January 2003 to April 2003 since data set after January 2003 does not have state-level residence information. We eliminate observations with expected stock returns higher than 75% or lower than -75%.

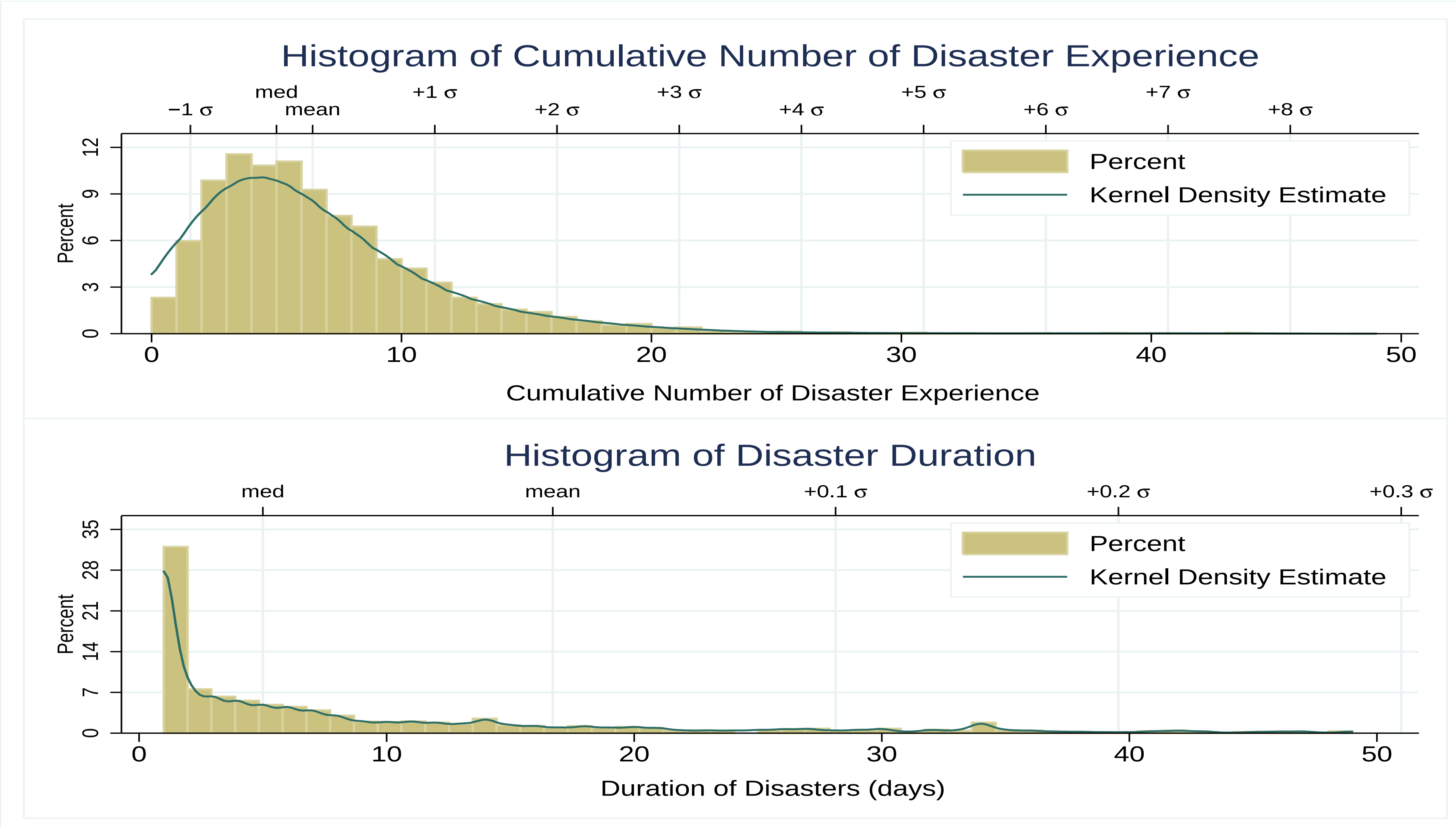
The survey also asks respondents about the expected stock market volatility over the next 12 months using the following question: "Do you think the amount of volatility in the marketplace during the next twelve months will increase, stay at the same level, or decrease from what it has been during the last several months?". The response to the question has three distinct categories: 1 (Increase), 2 (Stay at the same level), and 3 (Decrease). Expected stock market volatility dummy variable used in Panel B of Table 11 is set to one if respondents expect increase in volatility and zero otherwise. The question is available every month from May 1998 to December 2000, with the exception of 1998 where data are available only in May, September, and November.

Figure 1. Heatmap of Number of Disasters / Distributions of Disaster Experience and Duration

Panel A: Heatmap of Total Number of Disasters by State-County

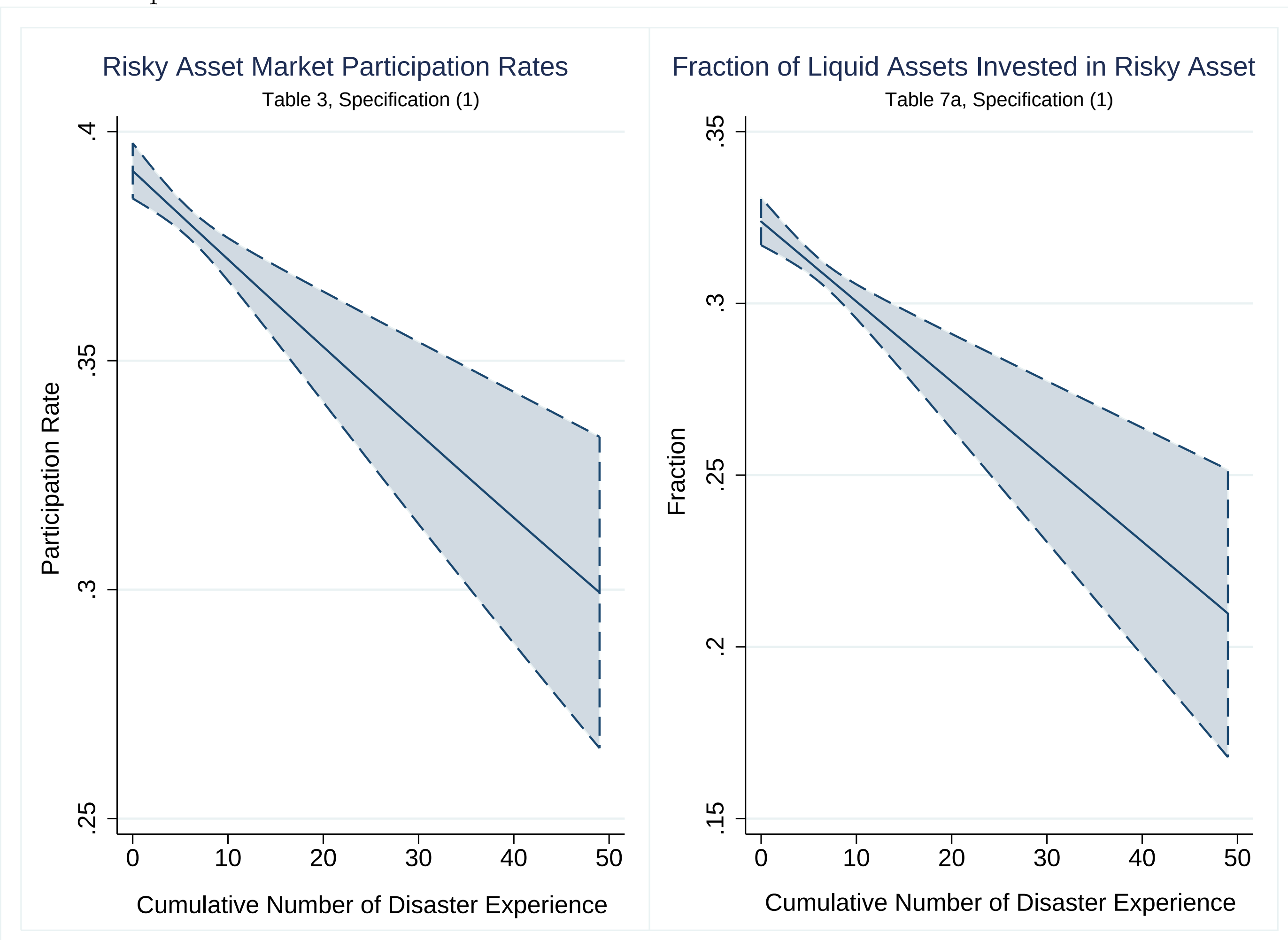


Panel B: Histogram of Cumulative Number of Disaster Experience / Duration of Disasters



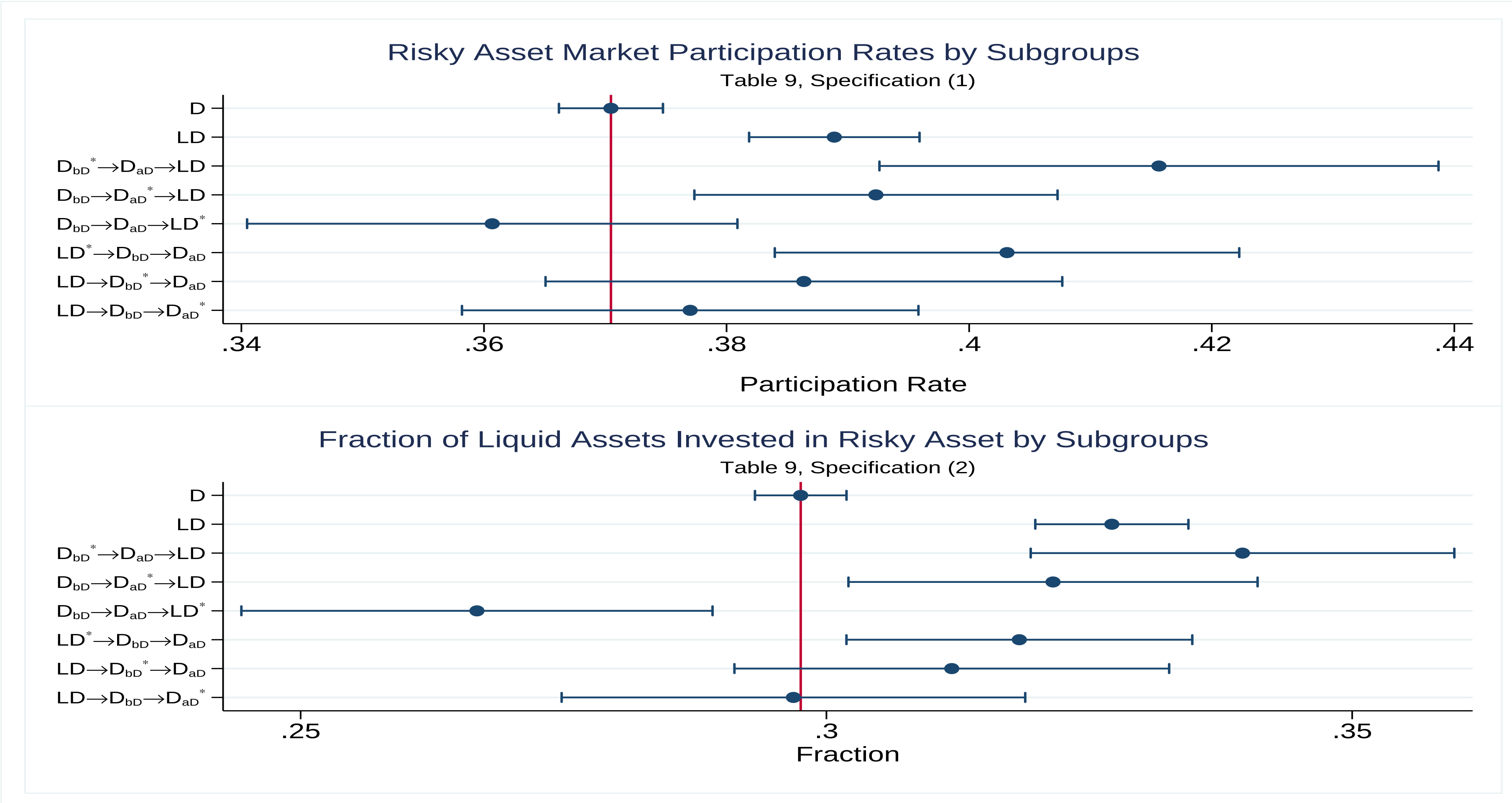
Panel A shows a heatmap of total number of disaster declarations took place from May 1953 to December 2013 at state-county level. We use the Federal Emergency Management Agency (FEMA) Disaster Declarations database. Upper part of panel B provides a histogram of cumulative number of disaster experiences of households that are included in the National Longitudinal Survey of Youth 1979 (NLSY79) database. Lower part of panel B shows a histogram of disaster duration. 174 extreme observations with over 50 days of duration are excluded in this histogram for clarity. Disaster with the longest duration was 'Lava Flow' in Kilauea Volcano in Hawaii from January 24th 1983 to January 27th 1997.

Figure 2. Relation Between Participation Rate / Risky Asset Fraction and Number of Disaster Experience



Left figure shows the relation between fitted risky asset market participation rates and cumulative number of disaster experience from regression specification (1) in Table 3. Right figure presents the relation between fitted fractions of liquid assets invested in risky asset and cumulative number of disaster experience from regression specification (1) in Table 7a. Shaded areas are 90% confidence interval. Observations are weighted by the NLSY79 sample weights. Range of x-axis, cumulative number of disaster experience, is chosen by the minimum and maximum values of data.

Figure 3. Fitted Participation Rates / Risky Asset Proportions by Subgroups



Upper figure shows fitted risky asset market participation rates by subgroups from regression specification (1) in Table 9. Lower figure presents fitted fractions of liquid assets invested in risky asset from regression specification (2) in Table 9. Dots are point estimates; Dashed lines indicate 90% confidence intervals. Observations are weighted by the NLSY79 sample weights. Each state-county is categorized into either disaster prone state-county or low disaster prone state-county; state-county is disaster prone if total number of disasters took place in that state-county exceeds the median value of the distribution. Then, subgroups are defined as follows: D if household remains at disaster prone state-county (omitted group); LD if household remains at low disaster prone state-county; $D \mapsto LD$ if household relocated from disaster prone to low disaster prone state county only once for entire sample period; $LD \mapsto D$ if household relocated from low disaster prone to disaster prone state-county only once for entire sample period; subscript $bD(aD)$ refers to time period before(after) household was firstly hit by disaster while she resides in disaster prone area; subscript $\emptyset D$ indicates that household had no disaster experience at all before she moved to low disaster prone area; finally, the location of superscript denotes where household currently resides.

Table 1. Summary Statistics

Panel A provides summary statistics for all households. All dollar-valued variables are deflated by the Consumer Price Index for All Urban Consumers (CPI-U) inflation rates into December 1999 dollars. Observations are weighted by the NLSY79 sample weights. Income is calculated as the sum of military income, wages, salaries, tips, farm and business income, unemployment compensation, Aid to Families with Dependent Children payments, food stamps, Supplemental Security Income, and other welfare payments. Safe Assets consist of checking and saving accounts, money market funds, certificates of deposit, U.S. saving bonds, personal loans, and individual retirement accounts and tax-deferred accounts (401(k), 403(b), and others) before 1994. Individual retirement accounts and tax-deferred accounts are included in Risky Assets starting from 1994. Risky Assets contain common stocks, preferred stocks, stock options, government and corporate bonds, and mutual funds before 1994. Liquid Assets are the sum of Risky Assets and Safe Assets. Non Liquid Financial Assets are residential properties, farms and proprietary businesses, investment trusts, vehicles, and other assets. Sum of Liquid Assets and Non Liquid Financial Assets is Financial Assets. Risky (Safe) Asset Market Participation is a dummy variable that equals one if household participates in the risky (safe) asset markets. Completed High School (College) Education is a dummy variable that equals one if household head has completed high school (college) education. Hispanic (Black) indicates if household head is Hispanic (Black). Married equals one if household head is married and Female is set to one if household head is female. Panel B provides summary statistics for the subsamples of risky (safe) asset market participants. The sample period is 1988-2008.

Panel A: All Households

Variables	10th pct	Median	90th pct	Mean	Std.Dev.	Num.Obs.
Income	10,859	42,314	99,305	55,514	163,726	94,864
Safe Assets	0	1,669	29,117	14,471	67,066	97,876
Risky Assets	0	0	67,154	34,050	294,773	98,030
Liquid Assets	0	3,375	96,121	47,825	315,436	97,184
Non Liquid Financial Assets	-2,015	18,297	168,738	37,354	3,532,689	96,572
Financial Assets	-578	28,572	271,269	87,277	3,293,097	95,068
Risky Asset Market Participation	0	0	1	0.39	0.49	98,030
Safe Asset Market Participation	0	1	1	0.74	0.44	97,876
Fraction of Risky Assets	0	0	1	0.32	0.39	66,490
Number of Children	0	1	3	1.20	1.24	95,128
Completed High School Education	0	1	1	0.90	0.30	98,789
Completed College Education	0	0	1	0.24	0.43	98,789
Hispanic	0	0	0	0.07	0.25	122,848
Black	0	0	1	0.14	0.35	122,848
Married	0	1	1	0.60	0.49	98,899
Female	0	0	1	0.49	0.50	122,848

Panel B: Risky / Safe Asset Market Participants

	Risky Asset Market Participants				Safe Asset Market Participants			
Variables	Median	Mean	Std.Dev.	Num.Obs.	Median	Mean	Std.Dev.	Num.Obs.
Income	60,205	77,575	176,096	29,759	49,341	64,216	185,094	62,904
Safe Assets	6,682	28,663	97,605	29,516	4,112	19,345	74,917	63,850
Risky Assets	17,784	88,518	545,642	30,013	0	43,978	356,325	63,326
Liquid Assets	31,863	116,445	572,823	29,516	8,497	63,118	377,480	63,326
Non Liquid Financial Assets	53,105	82,635	2,953,978	29,541	30,033	69,290	570,954	62,661
Financial Assets	98,245	209,911	928,138	29,063	47,440	131,918	710,085	62,190
Safe/Risky Asset Market Participation	1	0.93	0.26	29,516	0	0.48	0.50	63,326
Number of Children	1	1.33	1.22	28,196	1	1.20	1.20	61,362
Completed High School Education	1	0.97	0.18	30,004	1	0.95	0.23	63,808
Completed College Education	0	0.38	0.48	30,004	0	0.30	0.46	63,808
Hispanic	0	0.06	0.23	30,013	0	0.06	0.23	63,850
Black	0	0.11	0.32	30,013	0	0.11	0.32	63,850
Married	1	0.73	0.45	30,010	1	0.67	0.47	63,844
Female	0	0.46	0.50	30,013	0	0.50	0.50	63,850

Table 2. Disaster Characteristics
Panel A shows some disaster characteristics. We use the FEMA Disaster Declarations Database for the period May 1953 to December 2013. Durations of disasters are calculated as difference between start date and end date of disasters. Due to missing start and/or end dates of disasters, a total number of observations shown in the last column is less than 3,220, a total number of disasters in the FEMA data. Note that the Hazard Mitigation (HM) Program Project Amount data is available only after January 1989 and the Public Assistance (PA) Grant Funding Amount data is available only after August 1998. Panel B shows top 10 most disaster prone areas (state or state-county) based on three different measures: total number of disaster declarations, sum of HM amount, and sum of PA amount. Panel C represents disaster frequency by incident types. Sample period for total number of disaster declarations runs from May 1953 to December 2013. Due to limited data availability, sample period for sum of HM amount is from January 1989 to September 2013 while that for sum of PA amount runs from August 1998 to November 2013. Note that Puerto Rico would have been ranked 8th with sum of HM amount of 450.53 million dollars if it were included. All dollar-valued variables are deflated by the Consumer Price Index for All Urban Consumers (CPI-U) inflation rates into December 1999 dollars.

Panel A: Summary Statistics

Variables	10th pct	Median	Mean	90th pct	Std.Dev.	Num.Obs.
Duration (days)	1.00	5.00	16.71	34.00	114.24	3,020
Hazard Mitigation Program Project Amount (millions)	0.00	0.46	272.58	158.95	2,899.19	2,191
Public Assistance Grant Funding Amount (millions)	1.45	60.50	2,309.26	1,537.16	23,682.13	986

Panel B: Top 10 Most Disaster Prone State / State-County

	Total Number of Disasters				Sum of HM amount		Sum of PA amount	
Rank	State	Number	County, State	Number	State	$ millions	State	$ millions
1	Texas	245	Los Angeles, California	53	Louisiana	2,610	Louisiana	13,430
2	California	205	San Bernardino, California	45	Texas	1,751	New York	8,859
3	Oklahoma	154	Riverside, California	44	California	1,687	Florida	5,149
4	Florida	118	St. Louis, Missouri	44	New York	1,169	Texas	4,071
5	New York	91	St. Louis, Missouri	44	Florida	1,111	Mississippi	3,442
6	Washington	88	Oklahoma, Oklahoma	39	Iowa	611	Iowa	1,619
7	Alabama	77	San Diego, California	36	Mississippi	476	New Jersey	1,579
8	New Mexico	76	Baltimore, Maryland	35	Missouri	336	California	1,299
9	Louisiana	71	Baltimore, Maryland	35	Illinois	334	Kansas	956
10	Colorado	70	McClain, Oklahoma	35	Alabama	293	Oklahoma	842

Panel C: Frequency by Incident Types

Incident Type	Frequency
Severe Storm(s)	831
Fire	813
Flood	732
Hurricane	303
Snow	175
Tornado	156
Drought	42
Severe Ice Storm	41
Earthquake	28
Others†	99

†Others include coastal storm, typhoon, fishing losses, and etc.

Table 3. Risky Asset Market Participation

First three columns of this table present logit regressions of risky asset market participation on three different measures of households' disaster experience (#DE_LIFE, #DE_5YR, and Dummy_Q1-4). We use the FEMA Disaster Declarations Database. #DE_LIFE is a household's total number of disaster experience up to current time. #DE_5YR is a household's total number of disaster experience during the recent 5 years. Dummy_Q1-4 are defined by quartiles of #DE_LIFE for every survey year: Dummy_Q1 equals one if #DE_LIFE of household is less than the 25th percentile of #DE_LIFE distribution and similarly for Dummy_Q2-4. Dummy_Q1 is omitted. Observations are weighted by the NLSY79 sample weights. Average fitted probabilities are calculated from actual sample realizations of all the other predictor variables. Average fitted probability at Dummy_Q4 = 1 is calculated by setting Dummy_Q2 = 0, Dummy_Q3 = 0, and Dummy_Q4 = 1 while probability at Dummy_Q4 = 0 is calculated by just setting Dummy_Q4 = 0. The last three columns provide Fama-MacBeth regressions of risky asset market participation on the same three measures of households' disaster experience used in the logit regressions. The sample period runs from 1988 to 2008. Standard errors are clustered by household in logit regressions. Numbers in parentheses are z (t) statistics for logit (Fama-MacBeth) regressions. # Obs. for Fama-MacBeth regressions indicate average number of observations. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Logit Regression						Fama-MacBeth Regression					
	Lifetime Exp. (1) Continuous		5yr Exp. (2) Continuous		Lifetime Exp. (3) Categories		Lifetime Exp. (1) Continuous		5yr Exp. (2) Continuous		Lifetime Exp. (3) Categories	
#DE_LIFE	-0.020***	(-3.707)					-0.022***	(-3.678)				
#DE_5YR			-0.031***	(-2.700)					-0.035**	(-2.401)		
Dummy_Q2					-0.082	(-1.442)					-0.093***	(-3.985)
Dummy_Q3					-0.049	(-0.809)					-0.042	(-1.010)
Dummy_Q4					-0.198***	(-3.267)					-0.198***	(-4.929)
ln(Income)	0.161**	(2.488)	0.167**	(2.572)	0.162**	(2.511)	0.269	(1.790)	0.277*	(1.860)	0.268*	(1.824)
ln(Income) Squared	-0.008*	(-1.944)	-0.008**	(-2.043)	-0.008*	(-1.954)	-0.016	(-1.586)	-0.016	(-1.655)	-0.016	(-1.621)
# Children	0.119***	(3.080)	0.121***	(3.089)	0.119***	(3.079)	0.104***	(3.693)	0.106***	(3.742)	0.102***	(3.635)
# Children Squared	-0.015	(-1.524)	-0.015	(-1.517)	-0.014	(-1.525)	-0.009	(-1.047)	-0.01	(-1.086)	-0.009	(-1.029)
High School	0.233***	(2.945)	0.224***	(2.845)	0.232***	(2.937)	0.294***	(3.604)	0.284***	(3.490)	0.291***	(3.639)
College	0.286***	(5.824)	0.288***	(5.849)	0.284***	(5.790)	0.198**	(2.483)	0.201**	(2.494)	0.201**	(2.552)
ln(Liquid Assets)	0.725***	(14.325)	0.724***	(14.361)	0.723***	(14.310)	0.65***	(25.590)	0.648***	(25.700)	0.648***	(25.373)
ln(Liquid Assets) Squared	0.008**	(2.541)	0.008**	(2.552)	0.008***	(2.576)	0.014**	(3.108)	0.014**	(3.130)	0.014**	(3.131)
Hispanic	-0.162***	(-2.930)	-0.167***	(-3.014)	-0.171***	(-3.089)	-0.17***	(-3.260)	-0.169***	(-3.346)	-0.173***	(-3.241)
Black	0.124***	(2.661)	0.125***	(2.687)	0.121***	(2.593)	0.136*	(1.976)	0.14*	(2.060)	0.137*	(1.949)
Married	-0.061	(-1.316)	-0.059	(-1.266)	-0.061	(-1.325)	-0.056**	(-2.274)	-0.052*	(-2.096)	-0.055*	(-2.215)
Female	-0.056	(-1.330)	-0.056	(-1.343)	-0.057	(-1.356)	0.144	(0.819)	0.136	(0.802)	0.139	(0.804)
Age Dummies	YES		YES		YES		YES		YES		YES	
Year Dummies	YES		YES		YES		YES		YES		YES	
Avg. fitted prob. at Dummy_Q4 = 1					0.370							
Avg. fitted prob. at Dummy_Q4 = 0					0.386							
Avg. fitted prob. at 95th pct. of #DE	0.364		0.372									
Avg. fitted prob. at 5th pct. of #DE	0.390		0.384									
Diff. between two fitted prob.	-0.025***	(-3.76)	-0.012***	(-2.72)	-0.016***	(-3.69)						
# Obs.	89,265		89,265		89,265		8,115		8,115		8,115	
Sample Period	1988-2008		1988-2008		1988-2008		1988-2008		1988-2008		1988-2008	
Average / Pseudo R^2	0.541		0.541		0.541		0.469		0.469		0.469	

Table 4. Safe Asset Market Participation

This table presents logit regressions of safe asset market participation on three different measures of households' disaster experience (#DE_LIFE, #DE_5YR, and Dummy_Q1-4). We use the FEMA Disaster Declarations Database. #DE_LIFE is a household's total number of lifetime disaster experience up to current time. #DE_5YR is a household's total number of disaster experience during the recent 5 years. Dummy_Q1-4 are defined by quartiles of #DE_LIFE for every survey year: Dummy_Q1 equals one if #DE_LIFE of household is less than the 25th percentile of #DE_LIFE distribution and similarly for Dummy_Q2-4. Dummy_Q1 is omitted. Observations are weighted by the NLSY79 sample weights. Average fitted probabilities are calculated from actual sample realizations of all the other predictor variables. Average fitted probability at Dummy_Q4 = 1 is calculated by setting Dummy_Q2 = 0, Dummy_Q3 = 0, and Dummy_Q4 = 1 while probability at Dummy_Q4 = 0 is calculated by just setting Dummy_Q4 = 0. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are z statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Lifetime Exp.		5yr Exp.		Lifetime Exp.	
	(1)		(2)		(3)	
	Continuous		Continuous		Categories	
#DE_LIFE	0.001	(0.187)				
#DE_5YR			0.036**	(2.060)		
Dummy_Q2					0.066	(0.803)
Dummy_Q3					0.126	(1.546)
Dummy_Q4					0.025	(0.309)
ln(Income)	-0.061	(-0.792)	-0.058	(-0.756)	-0.061	(-0.800)
ln(Income) Squared	0.008*	(1.699)	0.008*	(1.646)	0.008*	(1.709)
# Children	-0.015	(-0.320)	-0.013	(-0.279)	-0.016	(-0.341)
# Children Squared	0.002	(0.231)	0.002	(0.216)	0.003	(0.237)
High School	0.265***	(3.118)	0.265***	(3.108)	0.267***	(3.141)
College	0.468***	(5.962)	0.465***	(5.924)	0.469***	(5.988)
ln(Liquid Assets)	1.702***	(103.242)	1.703***	(103.115)	1.703***	(103.228)
ln(Liquid Assets) Squared	-0.091***	(-62.647)	-0.091***	(-62.548)	-0.091***	(-62.643)
Hispanic	-0.395***	(-5.650)	-0.411***	(-5.863)	-0.383***	(-5.445)
Black	-0.625***	(-10.701)	-0.629***	(-10.751)	-0.619***	(-10.525)
Married	0.051	(0.789)	0.052	(0.816)	0.050	(0.785)
Female	0.224***	(4.010)	0.222***	(3.958)	0.224***	(4.007)
Age Dummies	YES		YES		YES	
Year Dummies	YES		YES		YES	
Avg. fitted prob. at Dummy_Q3 = 1					0.755	
Avg. fitted prob. at Dummy_Q3 = 0					0.752	
Avg. fitted prob. at 95th pct. of #DE	0.753		0.755			
Avg. fitted prob. at 5th pct. of #DE	0.752		0.751			
Diff. between two fitted prob.	0.001	(0.19)	0.004**	(2.07)	0.003*	(1.77)
# Obs.	89,265		89,265		89,265	
Sample Period	1988-2008		1988-2008		1988-2008	
Pseudo R^2	0.772		0.772		0.772	

Table 5. Risky and Safe Asset Market Participation (Severe / Non-severe Disasters)

This table provides logit regressions of asset market participation on two measures of total number of lifetime disaster experiences. #DE_NOSV refers to a total number of "non-severe" disaster experiences while #DE_SV indicates a total number of "severe" disaster experiences. We use the FEMA Disaster Declarations Database. "Severity" is defined by either project amount supported by the Hazard Mitigation Program (HM) or grant funding by the Public Assistance (PA). In defining severe disasters, we put zeros into missing PA and HM amounts, then obtain 75th percentile cut-off values of PA and HM amounts. [75th HM amount] defines disasters as severe ones if their project amounts supported by the HM exceeds 75th percentile of HM amount distribution for *each year*. [75th PA amount] defines disasters as severe ones if their grant funding by the PA exceeds 75th percentile of PA amount distribution for *each year*. Note that HM amount data is available only after January 1989, giving us a sample period of 1993-2008 (further reduction of sample period is due to inability to generate dummy variables for certain early years because of a few observations given a year) ; PA amount data is available only after August 1998, giving us a sample period of 1999-2008. Reduction of sample period is due to missing PA and HM amount for certain early years. Observations are weighted by the NLSY79 sample weights for corresponding sample period. Average predicted probabilities are calculated from actual sample realizations of all the other predictor variables. Standard errors are clustered by household. Numbers in parentheses are z statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Risky Asset				Safe Asset			
	(1) 75th HM amount		(2) 75th PA amount		(3) 75th HM amount		(4) 75th PA amount	
#DE_NOSV	-0.019	(-1.544)	-0.010	(-0.551)	0.014	(0.895)	0.041**	(2.018)
#DE_SV	-0.046***	(-2.774)	-0.105***	(-2.608)	0.008	(0.376)	0.039	(0.972)
ln(Income)	0.323***	(4.248)	0.470***	(4.689)	-0.038	(-0.619)	-0.014	(-0.188)
ln(Income) Squared	-0.021***	(-4.354)	-0.038***	(-5.148)	0.008*	(1.932)	0.007	(1.262)
# Children	0.092**	(2.160)	0.008	(0.127)	-0.076	(-1.492)	-0.113*	(-1.817)
# Children Squared	-0.010	(-0.967)	0.007	(0.541)	0.008	(0.790)	0.013	(1.101)
High School	0.090	(1.018)	0.124	(1.028)	0.323***	(3.079)	0.080	(0.580)
College	0.174***	(2.981)	-0.056	(-0.543)	0.561***	(6.581)	0.449***	(3.968)
ln(Liquid Assets)	0.715***	(11.602)	0.581***	(9.663)	1.413***	(79.791)	1.097***	(43.952)
ln(Liquid Assets) Squared	0.016***	(4.036)	0.029***	(6.757)	-0.074***	(-48.918)	-0.051***	(-25.599)
Hispanic	-0.090	(-1.486)	-0.054	(-0.608)	-0.436***	(-5.619)	-0.455***	(-4.676)
Black	0.194***	(3.604)	0.370***	(4.657)	-0.679***	(-10.701)	-0.745***	(-8.870)
Married	-0.069	(-1.258)	-0.025	(-0.267)	0.187***	(2.578)	0.070	(0.717)
Female	0.067	(1.411)	0.241***	(3.050)	0.216***	(3.501)	0.049	(0.564)
Age Dummies	YES		YES		YES		YES	
Year Dummies	YES		YES		YES		YES	
Avg. fitted prob. at 95th pct. of #DE_SV	0.504		0.656		0.770		0.798	
Avg. fitted prob. at 5th pct. of #DE_SV	0.525		0.678		0.768		0.791	
Diff. between two fitted prob.	-0.021***	(-2.76)	-0.023**	(-2.54)	0.002	(0.38)	0.006	(0.99)
H0: #DE_SV - #DE_NOSV = 0	-0.027	(-1.20)	-0.095*	(-1.91)	-0.006	(-0.21)	-0.002	(-0.05)
# Obs.	50,566		17,922		50,566		17,922	
Sample Period	1993-2008		1999-2008		1993-2008		1999-2008	
Pseudo R^2	0.583		0.635		0.686		0.585	

Table 6. Fraction of Liquid Assets Invested in Risky Assets - Weighted Experiences

Model (3) is estimated with nonlinear least squares. λ refers to weighting parameter and β indicates a coefficient on weighted average number of lifetime disaster experiences. We use the FEMA Disaster Declarations Database. The sample period runs from 1988 to 2008. Observations are weighted by the NLSY79 sample weights for corresponding sample period. Numbers in parentheses are t statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Weighted Experiences	
Experienced # of Disaster coefficient (β)	-0.059***	(-6.074)
Weighting parameter (λ)	2.478***	(2.589)
ln(Income)	0.050***	(11.182)
ln(Income) Squared	-0.003***	(-12.996)
# Children	0.022***	(9.071)
# Children Squared	-0.004***	(-5.748)
High School	0.007	(1.307)
College	0.007**	(2.494)
ln(Liquid Assets)	-0.004	(-1.575)
ln(Liquid Assets) Squared	0.005***	(27.777)
Hispanic	0.001	(0.299)
Black	0.018***	(4.741)
Married	-0.010***	(-3.505)
Female	-0.011***	(-4.839)
Age Dummies	YES	
Year Dummies	YES	
Marginal effect of one additional disaster at time $t-1$ for hypothetical 50-year-old household	-0.004	
# Obs.	62,553	
Sample Period	1988-2008	
Adjusted R^2	0.481	

Table 7a. Fraction of Liquid Assets Invested in Risky Assets

This table shows OLS regressions of fraction of liquid assets invested in risky assets on three different measures of households' disaster experiences. #DE_LIFE is a household's total number of lifetime disaster experiences up to current time. #DE_5YR is a household's total number of disaster experience during the recent 5 years. Dummy_Q1-4 are defined by quartiles of #DE_LIFE for every survey year: Dummy_Q1 equals one if #DE_LIFE of household is less than the 25th percentile of #DE_LIFE distribution and similarly for Dummy_Q2-4. Dummy_Q1 is omitted. We use the FEMA Disaster Declarations Database. Observations are weighted by the NLSY79 sample weights. Average fitted fractions are calculated from actual sample realizations of all the other predictor variables. Average fitted fractions at Dummy_Q4 = 1 is calculated by setting Dummy_Q2 = 0, Dummy_Q3 = 0, and Dummy_Q4 = 1 while fractions at Dummy_Q4 = 0 is calculated by just setting Dummy_Q4 = 0. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are t statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Lifetime Experience		5yr Experience		Lifetime Experience	
	(1)		(2)		(3)	
	Continuous		Continuous		Categories	
#DE_LIFE	-0.002***	(-3.930)				
#DE_5YR			-0.005***	(-3.834)		
Dummy_Q2					-0.008	(-1.473)
Dummy_Q3					-0.014**	(-2.311)
Dummy_Q4					-0.023***	(-3.867)
ln(Income)	0.050***	(7.474)	0.050***	(7.548)	0.050***	(7.482)
ln(Income) Squared	-0.003***	(-8.521)	-0.003***	(-8.600)	-0.003***	(-8.519)
# Children	0.022***	(5.682)	0.022***	(5.693)	0.022***	(5.699)
# Children Squared	-0.003***	(-3.585)	-0.003***	(-3.596)	-0.003***	(-3.592)
High School	0.007	(0.880)	0.006	(0.801)	0.007	(0.906)
College	0.006	(1.304)	0.007	(1.341)	0.006	(1.278)
ln(Liquid Assets)	-0.004	(-1.045)	-0.004	(-1.068)	-0.004	(-1.023)
ln(Liquid Assets) Squared	0.005***	(16.964)	0.005***	(16.958)	0.005***	(16.939)
Hispanic	-0.001	(-0.200)	-0.001	(-0.202)	-0.003	(-0.464)
Black	0.017***	(3.763)	0.018***	(3.815)	0.017***	(3.623)
Married	-0.010**	(-2.216)	-0.010**	(-2.186)	-0.010**	(-2.226)
Female	-0.011***	(-2.706)	-0.011***	(-2.694)	-0.011***	(-2.712)
Age Dummies	YES		YES		YES	
Year Dummies	YES		YES		YES	
Avg. fitted frac. at Dummy_Q4 = 1					0.299	
Avg. fitted frac. at Dummy_Q4 = 0					0.316	
Avg. fitted frac. at 95th pct. of #DE	0.291		0.297			
Avg. fitted frac. at 5th pct. of #DE	0.322		0.316			
Diff. between two fitted frac.	-0.030***	(-3.93)	-0.019***	(-3.83)	-0.017***	(-3.97)
# Obs.	62,553		62,553		62,553	
Sample Period	1988-2008		1988-2008		1988-2008	
Adjusted R^2	0.480		0.480		0.480	

Table 7b. Fraction of Liquid Assets Invested in Safe Assets

This table shows OLS regressions of fraction of liquid assets invested in safe assets on three different measures of households' disaster experiences. #DE_LIFE is a household's total number of lifetime disaster experiences up to current time. #DE_5YR is a household's total number of disaster experience during the recent 5 years. Dummy_Q1-4 are defined by quartiles of #DE_LIFE for every survey year: Dummy_Q1 equals one if #DE_LIFE of household is less than the 25th percentile of #DE_LIFE distribution and similarly for Dummy_Q2-4. Dummy_Q1 is omitted. We use the FEMA Disaster Declarations Database. Observations are weighted by the NLSY79 sample weights. Average fitted fractions are calculated from actual sample realizations of all the other predictor variables. Average fitted fractions at Dummy_Q4 = 1 is calculated by setting Dummy_Q2 = 0, Dummy_Q3 = 0, and Dummy_Q4 = 1 while fractions at Dummy_Q4 = 0 is calculated by just setting Dummy_Q4 = 0. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are t statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Lifetime Experience (1) Continuous		5yr Experience (2) Continuous		Lifetime Experience (3) Categories	
#DE_LIFE	0.002***	(3.930)				
#DE_5YR			0.005***	(3.834)		
Dummy_Q2					0.008	(1.473)
Dummy_Q3					0.014**	(2.311)
Dummy_Q4					0.023***	(3.867)
ln(Income)	-0.050***	(-7.474)	-0.050***	(-7.548)	-0.050***	(-7.482)
ln(Income) Squared	0.003***	(8.521)	0.003***	(8.600)	0.003***	(8.519)
# Children	-0.022***	(-5.682)	-0.022***	(-5.693)	-0.022***	(-5.699)
# Children Squared	0.003***	(3.585)	0.003***	(3.596)	0.003***	(3.592)
High School	-0.007	(-0.880)	-0.006	(-0.801)	-0.007	(-0.906)
College	-0.006	(-1.304)	-0.007	(-1.341)	-0.006	(-1.278)
ln(Liquid Assets)	0.004	(1.045)	0.004	(1.068)	0.004	(1.023)
ln(Liquid Assets) Squared	-0.005***	(-16.964)	-0.005***	(-16.958)	-0.005***	(-16.939)
Hispanic	0.001	(0.200)	0.001	(0.202)	0.003	(0.464)
Black	-0.017***	(-3.763)	-0.018***	(-3.815)	-0.017***	(-3.623)
Married	0.010**	(2.216)	0.010**	(2.186)	0.010**	(2.226)
Female	0.011***	(2.706)	0.011***	(2.694)	0.011***	(2.712)
Age Dummies	YES		YES		YES	
Year Dummies	YES		YES		YES	
Avg. fitted frac. at Dummy_Q4 = 1					0.701	
Avg. fitted frac. at Dummy_Q4 = 0					0.684	
Avg. fitted frac. at 95th pct. of #DE	0.709		0.703			
Avg. fitted frac. at 5th pct. of #DE	0.678		0.684			
Diff. between two fitted frac.	0.03***	(3.93)	0.019***	(3.83)	0.017***	(3.97)
# Obs.	62,553		62,553		62,553	
Sample Period	1988-2008		1988-2008		1988-2008	
Adjusted R^2	0.480		0.480		0.480	

Table 7c. Fraction of Liquid Assets Invested in Risky / Safe Asset (Severe / Non-severe Disasters)

This table provides OLS regressions of fraction of liquid assets invested in risky / safe asset on two measures of total number of lifetime disaster experience. #DE_NOSV refers to a total number of "non-severe" disaster experiences while #DE_SV indicates a total number of "severe" disaster experiences. We use the FEMA Disaster Declarations Database. "Severity" is defined by either project amount supported by the Hazard Mitigation Program (HM) or grant funding by the Public Assistance (PA). In defining severe disasters, we put zeros into missing PA and HM amount, then obtain 75th percentile cut-off values of PA and HM amount. [75th HM amount] defines disasters as severe ones if their project amounts supported by the HM exceeds 75th percentile of HM amount distribution for each year. [75th PA amount] defines disasters as severe ones if their grant funding by the PA exceeds 75th percentile of PA amount distribution for each year. Note that HM amount data is available only after January 1989, giving us a sample period of 1993-2008 ; PA amount data is available only after August 1998, giving us a sample period of 1999-2008. Reduction of sample period is due to missing PA and HM amount for certain early years. Observations are weighted by the NLSY79 sample weights for corresponding sample period. Average predicted fractions are calculated from actual sample realizations of all the other predictor variables. Standard errors are clustered by household. Numbers in parentheses are t statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Risky Asset				Safe Asset			
	(1) 75th HM amount		(2) 75th PA amount		(3) 75th HM amount		(4) 75th PA amount	
#DE_NOSV	-0.002*	(-1.764)	-0.002	(-1.068)	0.002*	(1.764)	0.002	(1.068)
#DE_SV	-0.007***	(-3.906)	-0.011***	(-3.062)	0.007***	(3.906)	0.011***	(3.062)
ln(Income)	0.062***	(8.552)	0.053***	(5.434)	-0.062***	(-8.552)	-0.053***	(-5.434)
ln(Income) Squared	-0.005***	(-9.907)	-0.004***	(-6.252)	0.005***	(9.907)	0.004***	(6.252)
# Children	0.023***	(4.541)	0.019***	(3.122)	-0.023***	(-4.541)	-0.019***	(-3.122)
# Children Squared	-0.003***	(-3.011)	-0.003**	(-2.538)	0.003***	(3.011)	0.003**	(2.538)
High School	0.000	(0.037)	0.011	(0.624)	-0.000	(-0.037)	-0.011	(-0.624)
College	0.005	(0.785)	0.008	(0.926)	-0.005	(-0.785)	-0.008	(-0.926)
ln(Liquid Assets)	0.067***	(13.198)	0.148***	(19.235)	-0.067***	(-13.198)	-0.148***	(-19.235)
ln(Liquid Assets) Squared	0.002***	(4.841)	-0.003***	(-6.805)	-0.002***	(-4.841)	0.003***	(6.805)
Hispanic	0.009	(1.256)	0.001	(0.141)	-0.009	(-1.256)	-0.001	(-0.141)
Black	0.027***	(4.229)	0.039***	(4.480)	-0.027***	(-4.229)	-0.039***	(-4.480)
Married	-0.009	(-1.455)	-0.002	(-0.222)	0.009	(1.455)	0.002	(0.222)
Female	-0.007	(-1.236)	0.006	(0.753)	0.007	(1.236)	-0.006	(-0.753)
Age Dummies	YES		YES		YES		YES	
Year Dummies	YES		YES		YES		YES	
Avg. fitted frac. at 95th pct. of #DE_SV	0.421		0.570		0.579		0.430	
Avg. fitted frac. at 5th pct. of #DE_SV	0.457		0.602		0.543		0.398	
Diff. between two fitted frac.	-0.036***	(-3.91)	-0.032***	(-3.06)	0.036***	(3.91)	0.032***	(3.06)
H0: #DE_SV - #DE_NOSV = 0	-0.005**	(-1.98)	-0.009**	(-2.05)	0.005**	(1.98)	0.009**	(2.05)
# Obs.	37,216		14,052		37,216		14,052	
Sample Period	1993-2008		1999-2008		1993-2008		1999-2008	
Adjusted R^2	0.416		0.321		0.416		0.321	

Table 8a. Risky Asset Market Participation / Fraction of Liquid Assets Invested in Risky Asset - Housing Variables

First three columns of this table present logit regressions of risky asset market participation on households' disaster experiences, #DE_LIFE, with several housing variables as additional controls. We use the FEMA Disaster Declarations Database. #DE_LIFE is a household's total number of lifetime disaster experiences up to current time. MVRP stands for market value of residential property, MDRP stands for mortgage and debt of residential property, and Net Wealth is sum of risky assets, safe assets, and net value of residential property (MVRP-MDRP). Observations are weighted by the NLSY79 sample weights. The last three columns provide OLS regressions of fraction of liquid assets invested in risky asset on households' disaster experiences, #DE_LIFE, with the same housing variables used in the logit regressions as additional controls. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are z statistics for logit regressions and t statistics for linear regressions. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Logit						OLS					
	(1) Level		(2) Ratio		(3) Squared Ratio		(4) Level		(5) Ratio		(6) Squared Ratio	
#DE_LIFE	-0.015**	(-2.345)	-0.019***	(-2.818)	-0.019***	(-2.819)	-0.002***	(-2.804)	-0.002***	(-3.463)	-0.002***	(-3.463)
MVRP	-1.720***	(-8.693)					-0.217***	(-10.388)				
MDRP	1.877***	(3.699)					0.253***	(6.147)				
MVRP / Net Wealth			0.000	(0.002)	-0.000	(-0.067)			-0.001	(-1.633)	-0.001*	(-1.789)
MDRP / Net Wealth			-0.000	(-0.002)	0.000	(0.064)			0.001	(1.633)	0.001*	(1.786)
MVRP / Net Wealth squared					-0.000	(-1.341)					-0.000	(-1.032)
MDRP / Net Wealth squared					0.000	(1.344)					0.000	(1.033)
ln(Income)	0.179**	(2.304)	0.218***	(2.728)	0.218***	(2.726)	0.053***	(6.392)	0.064***	(7.452)	0.064***	(7.451)
ln(Income) Squared	-0.011**	(-2.148)	-0.014***	(-2.675)	-0.014***	(-2.673)	-0.004***	(-7.515)	-0.004***	(-8.712)	-0.004***	(-8.711)
# Children	0.108**	(2.239)	0.099**	(2.050)	0.099**	(2.052)	0.020***	(4.316)	0.019***	(3.939)	0.019***	(3.940)
# Children Squared	-0.012	(-1.042)	-0.012	(-1.019)	-0.012	(-1.019)	-0.003**	(-2.476)	-0.003**	(-2.322)	-0.003**	(-2.322)
High School	0.327***	(3.365)	0.319***	(3.281)	0.319***	(3.279)	0.023**	(2.069)	0.022**	(2.035)	0.022**	(2.036)
College	0.300***	(4.974)	0.304***	(5.112)	0.304***	(5.109)	0.011*	(1.850)	0.011*	(1.874)	0.011*	(1.872)
ln(Liquid Assets)	0.633***	(7.750)	0.679***	(7.709)	0.679***	(7.707)	0.022***	(3.547)	0.032***	(5.268)	0.032***	(5.238)
ln(Liquid Assets) Squared	0.017***	(3.558)	0.014***	(2.606)	0.014***	(2.609)	0.003***	(9.447)	0.003***	(7.515)	0.003***	(7.520)
Hispanic	-0.172**	(-2.429)	-0.165**	(-2.342)	-0.166**	(-2.348)	-0.000	(-0.006)	0.001	(0.137)	0.001	(0.133)
Black	0.029	(0.462)	0.060	(0.947)	0.059	(0.941)	0.004	(0.637)	0.009	(1.339)	0.009	(1.335)
Married	-0.034	(-0.531)	-0.021	(-0.329)	-0.021	(-0.331)	-0.008	(-1.154)	-0.006	(-0.843)	-0.006	(-0.844)
Female	-0.074	(-1.457)	-0.079	(-1.555)	-0.079	(-1.552)	-0.017***	(-3.318)	-0.017***	(-3.382)	-0.017***	(-3.378)
Age Dummies	YES		YES		YES		YES		YES		YES	
Year Dummies	YES		YES		YES		YES		YES		YES	
# Obs.	40,699		40,486		40,486		35,129		35,129		35,129	
Sample Period	1988-2008		1988-2008		1988-2008		1988-2008		1988-2008		1988-2008	
Pseudo / Adjusted R^2	0.516		0.512		0.512		0.495		0.491		0.491	

Table 8b. Risky Asset Market Participation / Fraction of Liquid Assets Invested in Risky Asset - Households with No Home Ownership

This table repeats the regressions of column (1) in Table 3 and column (1) in Table 7a only for households who do not own their own houses. First column of this table present logit regressions of risky asset market participation on households' disaster experiences, #DE_LIFE. #DE_LIFE is a household's total number of lifetime disaster experiences up to current time. We use the FEMA Disaster Declarations Database. The second column provide OLS regressions of fraction of liquid assets invested in risky asset on households' disaster experiences, #DE_LIFE. Observations are weighted by the NLSY79 sample weights. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are z statistics for logit regressions and t statistics for linear regressions. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Logit (1)		OLS (2)	
#DE_LIFE	-0.025***	(-3.074)	-0.002**	(-2.442)
ln(Income)	0.133	(1.243)	0.033***	(2.981)
ln(Income) Squared	-0.005	(-0.720)	-0.002***	(-3.352)
# Children	0.066	(1.129)	0.021***	(3.257)
# Children Squared	-0.004	(-0.264)	-0.004**	(-2.258)
High School	0.046	(0.394)	-0.019*	(-1.849)
College	0.316***	(4.292)	0.003	(0.412)
ln(Liquid Assets)	0.884***	(13.102)	-0.029***	(-4.840)
ln(Liquid Assets) Squared	-0.006	(-1.418)	0.006***	(13.329)
Hispanic	-0.113	(-1.420)	-0.001	(-0.099)
Black	0.203***	(3.241)	0.027***	(4.523)
Married	-0.128*	(-1.922)	-0.018***	(-2.835)
Female	-0.030	(-0.477)	-0.001	(-0.244)
Age Dummies	YES		YES	
Year Dummies	YES		YES	
# Obs.	48,258		27,244	
Sample Period	1988-2008		1988-2008	
Pseudo / Adjusted R^2	0.483		0.361	

Table 9. Risky Asset Market Participation / Fraction of Liquid Assets Invested in Risky Asset - Relocation

Table provides different behavior on risky asset market participation and fraction of liquid assets invested in risky asset across 10 subgroups. We use the FEMA Disaster Declarations Database. Each state-county is categorized into either disaster prone state-county or low disaster prone state-county; state-county is disaster prone if total number of disasters took place in that state-county exceeds the median value of the distribution. Then, subgroups are defined as follows: D if household remains at disaster prone state-county (omitted group); LD if household remains at low disaster prone state-county; $D \mapsto LD$ if household relocated from disaster prone to low disaster prone state county only once for entire sample period; $LD \mapsto D$ if household relocated from low disaster prone to disaster prone state-county only once for entire sample period; subscript $bD(aD)$ refers to time period before(after) household was firstly hit by disaster while she resides in disaster prone area; subscript $\emptyset D$ indicates that household had no disaster experience at all before she moved to low disaster prone area; finally, the location of superscript denotes where household currently (at time t) resides. #DE_LIFE is a household's total number of lifetime disaster experiences up to current time. Observations are weighted by the NLSY79 sample weights. Average predicted probabilities/fractions are calculated from actual sample realizations of all the other predictor variables. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are z (t) statistics for logit (OLS) regressions. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Logit (1)		OLS (2)		Logit (3)		OLS (4)	
#DE_LIFE					-0.013**	(-2.178)	-0.001**	(-2.290)
LD	0.191***	(3.676)	0.030***	(5.712)	0.149***	(2.659)	0.025***	(4.532)
$D^*_{bD} \mapsto D_{aD} \mapsto LD$	0.465***	(3.177)	0.042***	(3.390)	0.448***	(3.045)	0.040***	(3.228)
$D_{bD} \mapsto D^*_{aD} \mapsto LD$	0.226**	(2.317)	0.024**	(1.979)	0.224**	(2.286)	0.024*	(1.949)
$D_{bD} \mapsto D_{aD} \mapsto LD^*$	-0.102	(-0.780)	-0.031**	(-2.206)	-0.116	(-0.887)	-0.033**	(-2.333)
$D^*_{\emptyset D} \mapsto LD$	1.710***	(2.968)	0.102	(1.186)	1.643***	(2.839)	0.095	(1.095)
$D_{\emptyset D} \mapsto LD^*$	0.179	(0.592)	0.076	(1.359)	0.105	(0.346)	0.067	(1.199)
$LD^* \mapsto D_{bD} \mapsto D_{aD}$	0.337***	(2.744)	0.021**	(2.027)	0.309**	(2.494)	0.018*	(1.704)
$LD \mapsto D^*_{bD} \mapsto D_{aD}$	0.165	(1.207)	0.014	(1.120)	0.134	(0.970)	0.011	(0.835)
$LD \mapsto D_{bD} \mapsto D^*_{aD}$	0.068	(0.561)	-0.001	(-0.050)	0.056	(0.463)	-0.002	(-0.165)
Age Dummies	YES		YES		YES		YES	
Year Dummies	YES		YES		YES		YES	
Controls	YES		YES		YES		YES	
(i) Avg. fitted prob./fraction for $[D^*_{bD} \mapsto D_{aD} \mapsto LD]$	0.416		0.340		0.415		0.339	
(ii) Avg. fitted prob./fraction for $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$	0.392		0.322		0.393		0.323	
(iii) Avg. fitted prob./fraction for $[D_{bD} \mapsto D_{aD} \mapsto LD^*]$	0.361		0.267		0.360		0.266	
Diff. between two fitted prob./fraction: (ii) - (i)	-0.023	(-1.58)	-0.018	(-1.25)	-0.022	(-1.48)	-0.017	(-1.15)
Diff. between two fitted prob./fraction: (iii) - (ii)	-0.032**	(-2.24)	-0.055***	(-3.40)	-0.033**	(-2.31)	-0.056***	(-3.49)
H0: $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$ - $[D^*_{bD} \mapsto D_{aD} \mapsto LD] = 0$	-0.239	(-1.58)	-0.018	(-1.25)	-0.224	(-1.48)	-0.017	(-1.15)
H0: $[D_{bD} \mapsto D_{aD} \mapsto LD^*]$ - $[D_{bD} \mapsto D^*_{aD} \mapsto LD] = 0$	-0.328**	(-2.22)	-0.055***	(-3.40)	-0.34**	(-2.30)	-0.057***	(-3.49)
H0: $[LD \mapsto D^*_{bD} \mapsto D_{aD}]$ - $[LD^* \mapsto D_{bD} \mapsto D_{aD}] = 0$	-0.172	(-1.06)	-0.007	(-0.44)	-0.175	(-1.07)	-0.007	(-0.47)
H0: $[LD \mapsto D_{bD} \mapsto D^*_{aD}]$ - $[LD \mapsto D^*_{bD} \mapsto D_{aD}] = 0$	-0.097	(-0.58)	-0.015	(-0.92)	-0.078	(-0.46)	-0.013	(-0.79)
# Obs.	82,954		57,970		82,954		57,970	
Sample Period	1988-2008		1988-2008		1988-2008		1988-2008	
Pseudo / Adjusted R^2	0.540		0.484		0.541		0.484	

Table 10. Risk Aversion Measures

Tables present the effect of *changes* in disaster experiences on *changes* in risk aversion measures. Risk aversion measures range from 1 (least risk averse) to 4 (most risk averse), which are obtained from the following three sequence of survey questions on the NLSY79 (1993, 2002, 2004, 2006): "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 that it will double your (family) income and a 50-50 chance that it will cut your (family) income (i) by a third, (ii) in half, and (iii) by 20 percent. Would you take the new job?". Panel A shows first difference logit regressions of risk aversion dummy on disaster experiences. Risk aversion dummy is set to one if household's job related risk aversion measure increases and zero otherwise. Panel B provides first difference ordered logit regressions of risk aversion measure on disaster experiences. Both panels use income and income squared as controls. Two types of disaster experiences are used: cumulative number of disasters and cumulative severity of disasters. Cumulative severity of disasters are calculated by adding the Hazard Mitigation (HM) amount of disasters household has experienced so far. We use the FEMA Disaster Declarations Database. Observations are weighted by the NLSY79 sample weights. Standard errors are clustered by household. Numbers in parentheses are z statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Difference Dummies (Logit)

	Cumulative Number of Disasters				Cumulative Severity of Disasters			
	(1)		(2)		(3)		(4)	
ΔDE	0.052***	(6.140)	0.050***	(5.629)	0.276***	(3.089)	0.265***	(2.773)
Δln(Income)			-0.501***	(-3.519)			-0.537***	(-3.716)
Δln(Income) Squared			0.030***	(4.069)			0.033***	(4.331)
Avg. fitted prob. At 95th pct. Of ΔDE	0.332		0.331		0.308		0.303	
Avg. fitted prob. At 5th pct. Of ΔDE	0.267		0.268		0.290		0.291	
Diff. between two fitted prob.	0.065***	(6.09)	0.063***	(5.58)	0.018***	(3.06)	0.012***	(2.76)
# Obs.	20,392		18,505		20,383		18,503	
Pseudo R^2	0.002		0.004		0.000		0.003	

Panel B: Differences (Ordered Logit)

	Cumulative Number of Disasters				Cumulative Severity of Disasters			
	(1)		(2)		(3)		(4)	
ΔDE	0.039***	(5.032)	0.037***	(4.532)	0.203**	(2.453)	0.195**	(2.273)
Δln(Income)			-0.381***	(-3.429)			-0.401***	(-3.594)
Δln(Income) Squared			0.024***	(4.155)			0.025***	(4.389)
Change of Risk Aversion = -3 (most decrease)								
Avg. of fitted prob. At 95th pct. Of ΔDE	0.048		0.046		0.052		0.051	
Avg. of fitted prob. At 5th pct. Of ΔDE	0.060		0.057		0.055		0.053	
Diff. between two fitted prob.	-0.012***	(-5.12)	-0.011***	(-4.61)	-0.003**	(-2.50)	-0.002**	(-2.30)
Change of Risk Aversion = 3 (most increase)								
Avg. of fitted prob. At 95th pct. Of ΔDE	0.082		0.079		0.076		0.072	
Avg. of fitted prob. At 5th pct. Of ΔDE	0.066		0.064		0.072		0.070	
Diff. between two fitted prob.	0.016***	(4.87)	0.015***	(4.39)	0.004**	(2.41)	0.003***	(2.25)
# Obs.	20,392		18,505		20,383		18,503	
Pseudo R^2	0.001		0.001		0.000		0.001	

Table 11. Expected Stock Market Return and Volatility Over the Next 12 Months
Tables present the effect of disaster experiences on expectations about stock market over the next 12 months. Panel A shows OLS regression of expected stock market return over the next 12 months on households' disaster experiences. Expected stock market data are reported by individual respondents in the UBS/Gallup survey. Disaster experience dummy is set to one if households have at least one disaster experience during the last one month before the interview dates and zero otherwise. Panel B provides logit regressions of expected stock market volatility on households' disaster experiences. Expected stock market volatility dummy is set to one if respondents expect increase in volatility over the next 12 months and zero otherwise. Both panels use demographic and income controls. Since only available income variable in the UBS/Gallup survey is categorical, we use the middle point of the range as income. Observations are weighted by the USB/Gallup survey sample weights. We use the FEMA Disaster Declarations Database. Standard errors are robust to heteroskedasticity. Numbers in parentheses are z statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Expected Stock Market Return Over the Next 12 Months

	Dummy				Continuous			
	(1)		(2)		(3)		(4)	
Dummy_DE	-0.006**	(-2.537)	-0.005**	(-2.243)				
#DE					-0.004**	(-2.549)	-0.003**	(-2.161)
High School			-0.007	(-1.234)			-0.007	(-1.221)
College			-0.017***	(-8.097)			-0.017***	(-8.087)
Hispanic			0.019**	(2.530)			0.019**	(2.555)
Black			0.048***	(6.718)			0.048***	(6.723)
Female			0.019***	(9.506)			0.019***	(9.508)
Income			-0.021	(-0.959)			-0.021	(-0.952)
Age Dummies	YES		YES		YES		YES	
Year-Month Dummies	YES		YES		YES		YES	
# Obs.	27,896		26,365		27,896		26,365	
Sample Period	2000-2002		2000-2002		2000-2002		2000-2002	
Pseudo R^2	0.072		0.095		0.072		0.095	

Panel B: Expected Stock Market Volatility Over the Next 12 Months (Logit)

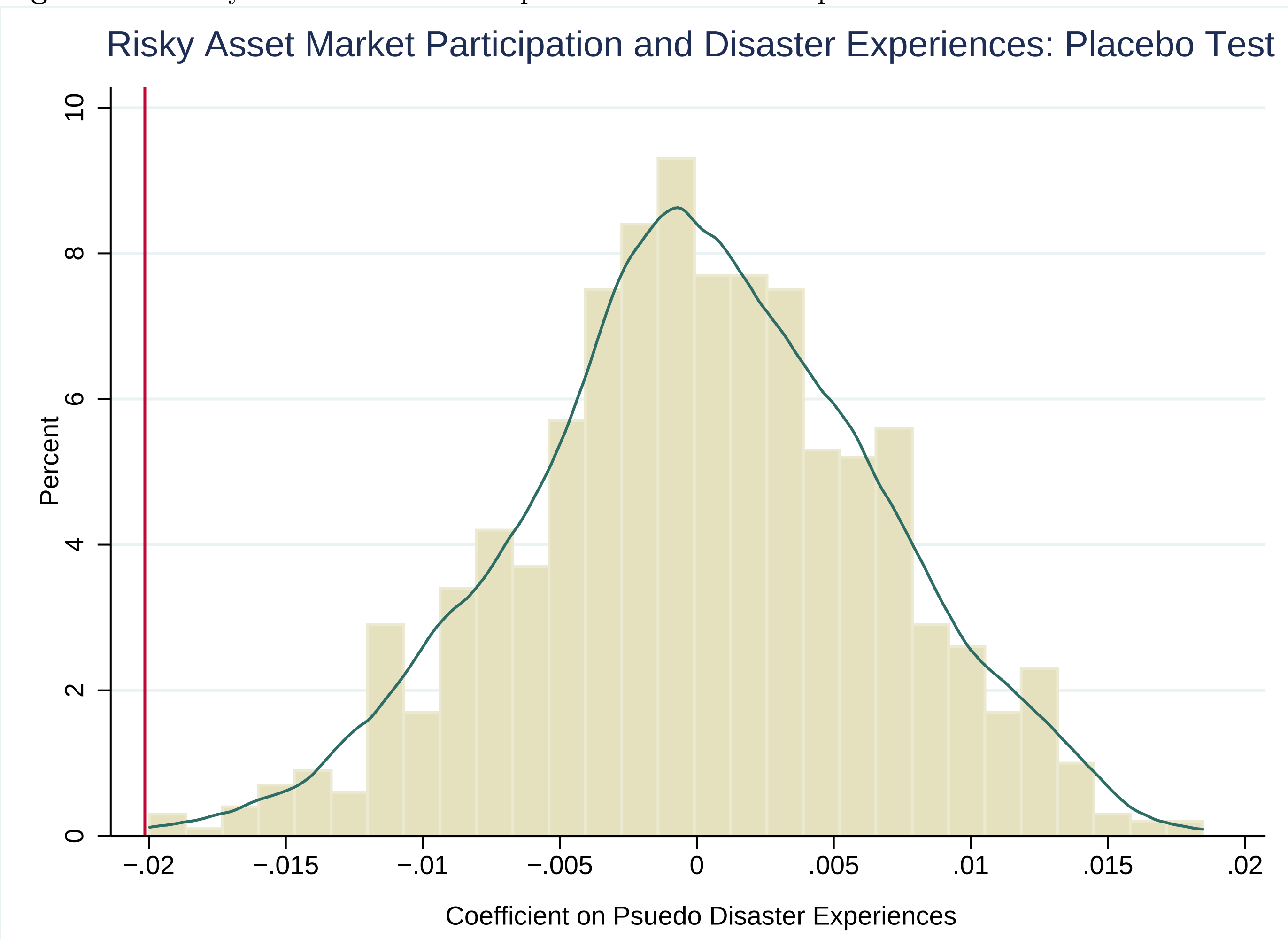
	Dummy				Continuous			
	(1)		(2)		(3)		(4)	
Dummy_DE	-0.049	(-0.954)	-0.058	(-1.099)				
#DE					-0.008	(-0.221)	-0.015	(-0.390)
High School			0.018	(0.178)			0.018	(0.173)
College			0.112**	(2.478)			0.111**	(2.470)
Hispanic			-0.079	(-0.491)			-0.082	(-0.505)
Black			0.036	(0.348)			0.035	(0.340)
Female			-0.118***	(-2.836)			-0.118***	(-2.839)
Income			-0.117	(-0.232)			-0.121	(-0.240)
Age Dummies	YES		YES		YES		YES	
Year-Month Dummies	YES		YES		YES		YES	
# Obs.	20,310		19,040		20,310		19,040	
Sample Period	1998-2000		1998-2000		1998-2000		1998-2000	
Pseudo R^2	0.018		0.021		0.018		0.021	

Table 12. Expectations vs. Risk Preferences - Decomposition of Contributions

This table shows the percentage contributions of expectations and risk preferences to change in the fraction of liquid assets invested in risky assets by using back of the envelope calculations. We adopt the classic portfolio choice model where investor with constant relative risk aversion (CRRA) preferences maximizes her expected utility by optimally allocating her wealth to risky and risk-free assets over one period. The model implies that the optimal fraction (α) of wealth invested in risky assets is proportional to the risk premium and inversely proportional to the product of volatility (σ^2) and relative risk aversion coefficient (γ): $\alpha = \textit{risk premium}/(\gamma\sigma^2)$. We use the excess returns on market (NYSE, AMEX, and NASDAQ) from Kenneth French's website to calculate risk premium and volatility. Scenario I uses all available return series till 2008 whereas Scenario II uses return data from 1988 to 2008, the same sample period as for the NLSY79. We assume that the expected volatility is not affected by disaster experiences, therefore is fixed (see Panel B of Table 11). Adjusted percentage contributions are normalized contributions.

Parameter / Contribution	Scenario I [1926-2008]	Scenario II [1988-2008]	Note
rp	7.36%	5.45%	average excess return on market (NYSE, AMEX, and NASDAQ)
σ	18.89%	14.62%	standard deviation of market return
Δ(rp)	-0.32%	-0.32%	estimated from Table 11 Panel A (4)
α_{5th}	32.15%	32.15%	estimated from Table 7a (1) (at 5th pct. Of #DE)
α_{95th}	29.13%	29.13%	estimated from Table 7a (1) (at 95th pct. Of #DE)
γ_{5th}	6.42	7.92	model implied relative risk aversion coefficient (at 5th pct. Of #DE)
γ_{95th}	6.78	8.24	model implied relative risk aversion coefficient (at 95th pct. Of #DE)
$\Delta\gamma$	0.36	0.31	γ_{95th} - γ_{5th}
$\Delta\alpha$ due to			
Δ(rp)	-1.39%	-1.88%	$\frac{\Delta(rp)}{\gamma\sigma^2}$
$\Delta\gamma$	-1.71%	-1.22%	$\frac{(rp)}{\sigma^2}\Delta\left(\frac{1}{\gamma}\right)$
Δ(rp) and $\Delta\gamma$	0.07%	0.07%	$\frac{\Delta(rp)}{\sigma^2}\Delta\left(\frac{1}{\gamma}\right)$
Contribution(%) to $\Delta\alpha$			
Δ(rp)	46%	62%	
$\Delta\gamma$	57%	40%	
Δ(rp) and $\Delta\gamma$	-2%	-2%	
Adjusted Contribution(%) to $\Delta\alpha$			
Δ(rp)	45%	61%	
$\Delta\gamma$	55%	39%	

Figure A1. Risky Asset Market Participation and Disaster Experiences : Placebo Test

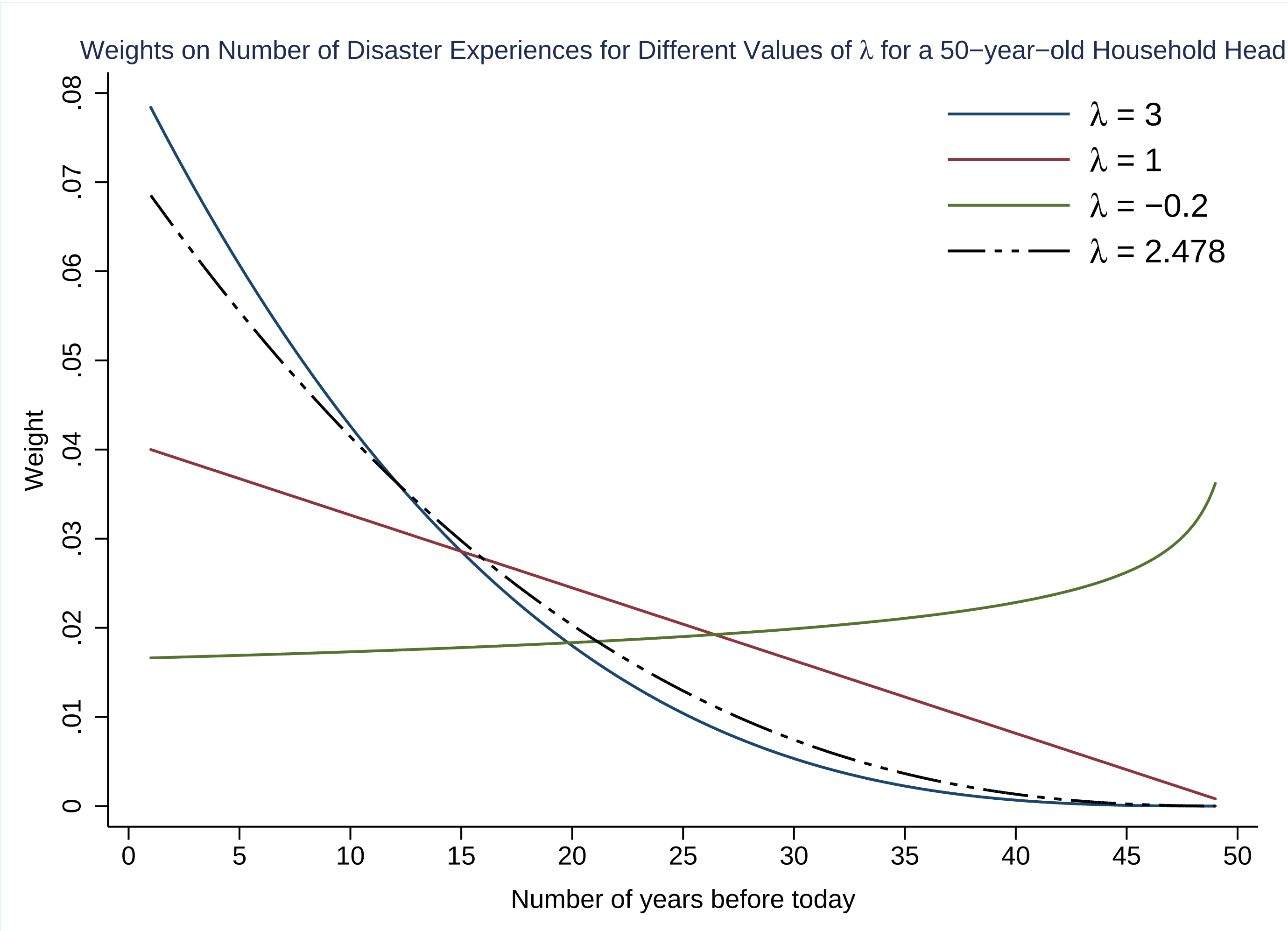


The figure is based on the following logit model:

$$Pr(\mathbb{1}_{\{y_{i,t}>0\}} = 1 | x_{i,t}, \textit{Disaster Experiences}_{i,t}) = F(\alpha + \beta^{Pseudo} \textit{Disaster Experiences}_{i,t}^{Pseudo} + \gamma' x_{i,t}) \quad (8)$$

where $y_{i,t}$ is a fraction of liquid assets invested in risky assets by household i at year t, $x_{i,t}$ is a vector of control variables for household i at year t, and F is the logistic distribution. $\textit{Disaster Experiences}_{i,t}^{Pseudo}$ is a household i's cumulative number of *hypothetical* disaster experience up to time t. We randomly assign the whole history of disaster experiences during 11 survey years to each household. We run the above logit regression 1,000 times and save the $\hat{\beta}^{Pseudo}$. Following figure is a density plot of $\hat{\beta}^{Pseudo}$. The vertical red line indicates the actual $\hat{\beta}$ obtained from the regression based on the actual $\textit{Disaster Experiences}_{i,t}$. The green line shows kernel density. Observations are weighted by the NLSY79 sample weights. The sample period runs from 1988 to 2008. Standard errors are clustered by household.

Figure A2. Weights on Number of Disaster Experiences for Different Values of λ for a 50-year-old Household



The figure is based on the following weighting method as in Malmendier and Nagel (2011):

$$w_{it}(k, \lambda) = \frac{(age_{it} - k)^{\lambda}}{\sum_{k=1}^{age_{it}-1}(age_{it} - k)^{\lambda}}$$

Y axis shows weights and X axis is the number of years before today. By changing the value of lambda, we can change the shape of weights as a function of how old experiences are. λ of 2.478 depicted in this figure (black dashed line) is an actual estimate from nonlinear least squares (Equation 3).

Table A1. Risk Taking Behavior - Controlling for Health Status

This table repeats the regressions of column (1) in Table 3 and column (1) in Table 7a using two different measures of health status as additional control variables. First two columns of this table present logit regressions of risky asset market participation on households' total number of disaster experiences (#DE_LIFE). We use the FEMA Disaster Declarations Database. We also include Health Limit Amount (Kind) dummy variables indicating if households think that they are limited in the amount (kind) of work they could do because of their health. Observations are weighted by the NLSY79 sample weights. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are z (t) statistics for logit (OLS) regressions. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Logit				OLS			
	Health Limit Amount (1)		Health Limit Kind (2)		Health Limit Amount (3)		Health Limit Kind (4)	
#DE_LIFE	-0.020***	(-3.702)	-0.020***	(-3.679)	-0.002***	(-3.916)	-0.002***	(-3.893)
Health Limit Amount	-0.000	(-0.003)			-0.015	(-1.533)		
Health Limit Kind			0.001	(0.017)			-0.011	(-1.293)
ln(Income)	0.140**	(2.139)	0.140**	(2.146)	0.050***	(7.237)	0.050***	(7.238)
ln(Income) Squared	-0.007*	(-1.659)	-0.007*	(-1.665)	-0.003***	(-8.358)	-0.003***	(-8.351)
# Children	0.124***	(3.139)	0.124***	(3.155)	0.022***	(5.604)	0.022***	(5.585)
# Children Squared	-0.016*	(-1.669)	-0.016*	(-1.681)	-0.004***	(-3.643)	-0.004***	(-3.622)
High School	0.210***	(2.618)	0.210***	(2.616)	0.004	(0.481)	0.004	(0.496)
College	0.280***	(5.663)	0.278***	(5.640)	0.006	(1.133)	0.006	(1.144)
ln(Liquid Assets)	0.702***	(14.033)	0.703***	(14.006)	-0.005	(-1.125)	-0.005	(-1.126)
ln(Liquid Assets) Squared	0.010***	(3.033)	0.010***	(3.022)	0.005***	(16.824)	0.005***	(16.817)
Hispanic	-0.169***	(-3.082)	-0.169***	(-3.075)	-0.002	(-0.278)	-0.002	(-0.285)
Black	0.120**	(2.565)	0.120**	(2.553)	0.017***	(3.692)	0.017***	(3.661)
Married	-0.069	(-1.473)	-0.068	(-1.454)	-0.011**	(-2.296)	-0.011**	(-2.281)
Female	-0.057	(-1.340)	-0.057	(-1.357)	-0.011***	(-2.611)	-0.011***	(-2.620)
Age Dummies	YES		YES		YES		YES	
Year Dummies	YES		YES		YES		YES	
# Obs.	86,370		86,410		61,476		61,498	
Sample Period	1988-2008		1988-2008		1988-2008		1988-2008	
Average / Pseudo R^2	0.538		0.538		0.482		0.482	

Table A2. Fraction of Liquid Assets Invested in Risky Assets - Household Fixed Effects
This table repeats the regressions of column (1) in Table 7a by including household fixed effects. #DE_LIFE is a household's total number of lifetime disaster experiences up to current time. We use the FEMA Disaster Declarations Database. Observations are weighted by the NLSY79 sample weights. Average fitted fractions are calculated from actual sample realizations of all the other predictor variables. Since we exploit within household time variations in disaster experiences given that the maximum number of survey years within household is only 11, we restrict our sample to households with at least 6 years of observations. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are t statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Lifetime Experience	
#DE_LIFE	-0.002*	(-1.644)
ln(Income)	0.019**	(2.345)
ln(Income) Squared	-0.002***	(-3.650)
# Children	0.018***	(3.324)
# Children Squared	-0.002*	(-1.740)
High School	-0.037	(-1.623)
College	-0.019	(-1.311)
ln(Liquid Assets)	0.010*	(1.689)
ln(Liquid Assets) Squared	0.004***	(11.861)
Marry	-0.012**	(-1.998)
Age Dummies	YES	
Year Dummies	YES	
Household Dummies	YES	
Avg. fitted prob. at 95th pct. of #DE	0.312	
Avg. fitted prob. at 5th pct. of #DE	0.336	
Diff. between two fitted prob.	-0.023*	(-1.64)
# Obs.	51,141	
Sample Period	1988-2008	
Adjusted R^2	0.526	

Table A3. Risk Taking Behavior by Subgroups - Really Long Lived Impact?
This table repeats the OLS regressions in Table 9 by further dividing subgroup $D_{bD} \mapsto D_{aD} \mapsto LD^*$ into two subgroups: $D_{bD} \mapsto D_{aD} \mapsto LD^*$ $[ST]$ and $D_{bD} \mapsto D_{aD} \mapsto LD^*$ $[LT]$. $D_{bD} \mapsto D_{aD} \mapsto LD^*$ $[ST]$ ($[LT]$) refers to households who moved to LD and the time passed since the move is less (greater) than the median value of duration of stay distribution. We use the FEMA Disaster Declarations Database. Observations are weighted by the NLSY79 sample weights. The sample period runs from 1988 to 2008. Standard errors are clustered by household. Numbers in parentheses are t statistics. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	OLS			
	(1)		(2)	
#DE_LIFE			-0.002**	(-2.304)
LD	0.030***	(5.712)	0.025***	(4.525)
$D^*_{bD} \mapsto D_{aD} \mapsto LD$	0.042***	(3.390)	0.040***	(3.228)
$D_{bD} \mapsto D^*_{aD} \mapsto LD$	0.024**	(1.980)	0.024*	(1.951)
$D_{bD} \mapsto D_{aD} \mapsto LD^*[ST]$	-0.026*	(-1.661)	-0.027*	(-1.701)
$D_{bD} \mapsto D_{aD} \mapsto LD^*[LT]$	-0.037*	(-1.923)	-0.040**	(-2.089)
$D^*_{\emptyset D} \mapsto LD$	0.102	(1.186)	0.094	(1.095)
$D_{\emptyset D} \mapsto LD^*$	0.076	(1.359)	0.066	(1.198)
$LD^* \mapsto D_{bD} \mapsto D_{aD}$	0.021**	(2.029)	0.018*	(1.704)
$LD \mapsto D^*_{bD} \mapsto D_{aD}$	0.014	(1.121)	0.011	(0.835)
$LD \mapsto D^*_{bD} \mapsto D_{aD}$	-0.001	(-0.052)	-0.002	(-0.167)
Age Dummies	YES		YES	
Year Dummies	YES		YES	
Controls	YES		YES	
H0: $[D_{bD} \mapsto D^*_{aD} \mapsto LD]$ - $[D^*_{bD} \mapsto D_{aD} \mapsto LD] = 0$	-0.018	(-1.25)	-0.016	(-1.14)
H0: $[D_{bD} \mapsto D_{aD} \mapsto LD^*[ST]]$ - $[D_{bD} \mapsto D^*_{aD} \mapsto LD] = 0$	-0.050***	(-2.99)	-0.051***	(-3.01)
H0: $[D_{bD} \mapsto D_{aD} \mapsto LD^*[LT]]$ - $[D_{bD} \mapsto D^*_{aD} \mapsto LD] = 0$	-0.061***	(-2.82)	-0.064***	(-2.95)
# Obs.	57,970		57,970	
Sample Period	1988-2008		1988-2008	
Adjusted R^2	0.484		0.484	