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ORIGINAL PAPER

How Retired Households and Households Approaching Retirement Handle Their Equity Investments in the United States

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Abstract This study examines how U.S. retired households and households approaching retirement change their equity holdings over time. Applying a decomposition analysis on the repeated cross-sectional U.S. Survey of Consumer Finances from 1989 to 2004, this study presents the effects of change in population size including mortality, change in financial wealth, and change in preference on the change in aggregate financial asset share invested in equity. A formal regression-based decomposition is also provided. It was found that there is a convex relationship between age and equity holdings as a share to financial assets for the older population. In addition, the risk-taking attitude-equity holdings profile shifted upward during the period of 1989 to 2004 for the older population. It is further documented that 70% of those senior equity investors chose financing retirement and financing future liquidity as the primary saving goals. Therefore, longevity pattern plays an important role for older population to hold equity.

Keywords Equity holdings · Elderly · Retirement

The equity holdings of the older population have been a focus of attention among economists for several reasons. First, according to the U.S. Census Bureau (2008), the percentage of population over 55 years old is expected to increase from 23.9% in 2008 to 30.4% by 2030 in the U.S. In particular, the percentage of population in the age group of more-than-65 is expected to increase from 12.8% in 2008 to 19.6% by 2030, with a growth rate of more than 50%. This ongoing compositional change in population is complicated by the fact that the older population as a group controls a substantial fraction of the U.S. household wealth. For example, according to the 2004 Survey of Consumer Finances (SCF), 55–64 and 65–74 age groups had the highest and the second highest mean net worth, respectively, in overall population, reflecting life-cycle saving behavior and growth in real wage over time (Bucks et al. 2006). Furthermore, both 55–64 and 65–74 age groups

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had the highest percentage of total stock holdings as a share to financial assets among all ages in the 2004 SCF, where the magnitude was as high as 51% for both age groups (Bucks et al. 2006). Thus, the older population plays a more influential role than other age groups in the equity markets since they are the main players in the markets. As a result, any change in the portfolio composition of the older population will have an impact on financial markets, especially in the equity markets.

Another complication is related to the change in equity preference for the older population. Xiao and Anderson (1997) documented that equity holdings represented the highest-level growth needs in family hierarchical financial need. In addition, the behavior of age-financial risk-taking profile may change for the older population. According to the report of Capgemini in 2007, the older population might try to shift to income over capital growth in financial investment, implying draw-down equity holdings to support a less risky retirement consumption.

On a more practical level, the change in equity holdings for the older population is relevant to the debate concerning when baby boom cohort reaches retirement; many households will try to sell equities to support retirement consumption, thereby driving down asset values. Such selling pressure can reduce the long-term rate of return earned by baby boom investors on their retirement savings. The consequences could be disastrous not only for the boomers' retirement but also for the economic health of the entire population.

The purpose of this study was to examine how U.S. retired households and households approaching retirement (referred to as the older population in this study) change their equity holdings over time, where the measure is the share of equity in household financial wealth. The change in equity holdings of the older population can be an indication of how baby boomers are likely to start behaving in the next 10 years or so. In particular, a decomposition analysis is applied to repeated cross-sectional U.S. Survey of Consumer Finances (SCF) from 1989 to 2004 (a) to access the impact of change in equity holdings of the older population on aggregate markets, and (b) to analyze the confounding compositional and behavioral effects of older population on the aggregate dynamics of equity holdings over time. In addition, the debate that entry of baby boom investors into their traditional high-saving years contributes to the increasing demands in equity during the 1990s can be examined and is a by-product of the decomposition analysis described in this study. Finally, a formal regression analysis is provided to investigate the age-equity holdings profile and risk-taking attitude-equity holdings profile for retired households and households approaching retirement over the period of 1989 to 2004.

The first part of the Literature Review summarizes previous theoretical and empirical results on demographic structure and equity demands as well as returns. The second part of the Literature Review summarizes the rationales for decomposing the change in aggregate fraction of equity holdings to financial assets into three effects, which are the population size effect, the wealth effect and the preference effect. Methodology presents the methods and data used in this study. Results present the empirical findings. Discussions and Conclusions are then provided.

Literature Review

Demographic Effects on Asset Returns

Most of the recent interest in the demographic effects on asset pricing begins with the provocative work of Bakshi and Chen (1994). In the model of Bakshi and Chen, the

coefficient of Arrow–Pratt relative risk aversion was linear in average age of a population in the representative's utility of consumption function, i.e., $\gamma + \lambda A_t$, where A_t was the average age at t and λ was used to test whether age factor would affect the equilibrium determination of asset return (with null hypothesis of $\lambda = 0$) and whether risk aversion would decrease or increase with age ($\lambda < 0$ or $\lambda > 0$). The first order condition of this representative's utility function subject to wealth constraint would yield an intertemporal Euler equation that related consumption growth and demographic process to asset returns. Given the time series data of real per capita consumption of nondurables and services, average age of the U.S. adult population, and real rate of return on the S&P 500 stocks, Bakshi and Chen (1994) estimated the model of Euler equation for the 1945–1990 period. They found that the age-dependent risk aversion was positive and significantly different from zero, indicating that the average age of the U.S. population affects the stock return and that risk aversion increases with average age. The implication of these results is that an aging population means an increasing average risk aversion, which implies a decrease in the demand of risky assets (e.g., stocks) and a decrease in stock prices.

Other empirical studies also examined the relationship between asset returns and various demographic structures, although there was no consensus on the asset market effects of the baby boom generation. Yoo (1994) used demographic variables regarding the percentages of the U.S. population in different age groups to examine the relationship between asset returns and demographic structures in the period of 1926 to 1988. Yoo (1994) found that the demographic variables were less definitive in explaining the change in real equity returns. Erb et al. (1997) found a positive correlation between the lagged fraction of the U.S. population in the ages of 25–45 and real stock returns for the sample period of 1970–1995. This finding suggests a positive link between an increase in the proportion of primary savers in the population and asset returns. Brooks (1998) examined the relationship between real equity *prices* and the ratio of the population in the ages of 40–64 to that outside this age range for OECD nations. Brooks (1998) found a positive relationship, indicating that an increase in the fraction of population of primary savers would increase equity prices. Bergantino (1998) extended Mankiw and Weil's (1989) methodology by first estimating age profile of household stock holdings using cross-sectional data of SCF. The demand profile was then used in a time series sense, where the age distribution of the U.S. population was substituted into the model to obtain time series measure of aggregate stock demand over the period, 1946–1997. The real stock price appreciation over the same period was then regressed on the growth in stock demand, and Bergantino (1998), given the size of demographic changes, concluded that demographic changes had and will have a large impact on stock price levels. Furthermore, Abel (2001) argued that the baby boom in the U.S. might cause movements in the real price of capital, even if people had a bequest motive.

In contrast, Poterba (2001) estimated the age profile of stock holdings based on the data of the repeated cross-sectional SCF. He suggested that, while households tended to invest a great amount in equity in their thirties and forties, they tended not to sell off their financial wealth abruptly in retirement. When this age profile of stock holdings was combined with data of the projected U.S. population, there was no sharp decline in the *projected asset demand* between 2020 and 2050. Furthermore, Poterba (2001) found that there was no robust evidence to support the relationship between equity returns and demographic structures in the time series data.

In addition, Constantinides et al. (2002) provided a theoretically overlapping generation model (OLG) to analyze the impact of demographic factors on asset prices. Donaldson and Maddaloni (2002) extended the OLG model of Constantinides et al. (2002) by including an

exogeneous population growth rate in order to allow different age distributions of the population. Donaldson and Maddaloni (2002) calibrated simulations of the model and showed that returns on equity would increase with population growth rate, but the effect of demographic structure changes on stock returns was generally small. Most of the OLG models assumed that the elderly sold their financial assets in order to finance consumption in retirement once they got retired. In this framework, an aging population generally implied a decrease in equity prices and an increase in the required risk premium.

Brooks (2002) analyzed the quantitative impact of the baby boom on the stock returns. Brooks (2002) considered a production-based economy and augmented it with overlapping generations and a portfolio decision over risky capital and safe bonds. Calibrating the model to match the U.S. baby boom, Brooks (2002) suggested that, although baby boomers were likely to suffer lower asset returns in retirement by about 100 basis points, they would nonetheless be better off in terms of lifetime consumption. This was due to the favorite move in equity returns during boomers' working lives and few children they had. In addition, Goyal (2004) empirically showed that new net flows into stock markets were directly related to changes in the demographic structures of the population. Poterba (2001) gave a possible explanation for the inconsistency in findings that it might due to the "limited power of statistical tests based on the few effective degrees of freedom in the historical records of age structures and asset returns." (p. 565)

Ang and Maddaloni (2005) examined the link between equity risk premiums and demographic changes by conducting pooled cross-sectional estimations using a long sample from the United States, Japan, United Kingdom, Germany, and France. They found that demographic variables could predict excess returns internationally and also found that faster growth in the fraction of retired persons significantly decreased equity risk premiums.

Regarding the balance sheets of the older population, Finke et al. (2006) compared the distribution of accumulated wealth of early boomers (born between 1946 and 1957) and pre-boomers (born between 1934 and 1945) at the same ages of 44–45. They found that the inflation-adjusted mean net worth of early boomers was higher than that of pre-boomers. In addition, they found that there was wealth disparity among early boomers; whereas, the disparity was significantly linked to education and race. In addition, Lee et al. (2007) examined the liability of the U.S. older population. They found that those who were more highly educated, married, and Black were more likely than their counterparts to hold consumer debt as well as mortgage debt in later life. They linked owing consumer or mortgage debt to one form of informal financial planning among indebted older persons.

Other related literature directly investigated the age-financial risk-taking profile. For example, some studies used the risky assets as a percentage of household net worth to proxy the measure of financial risk-taking. Morin and Suarez (1983) and Palsson (1996) found that such an objective measure of financial risk-taking decreased with age. In contrast, Bellante and Saba (1986) and Wang and Hanna (1997) found that financial risk-taking increased with age, where Wang and Hanna (1997) concluded that the age-financial risk-taking profile was dependent on whether to include human capital in the analysis. Bellante and Green (2004) documented that relative risk aversion among elderly people decreased but modestly increased as elderly people grew older. Ameriks and Zeldes (2001) focused exclusively on stock ownerships in their analysis of age, cohort, and year effects from the pooled SCF data over the period of 1989 to 1998. Ameriks and Zeldes (2001) found that conditional on stock ownerships, the fraction of financial assets held in equity was fairly constant with age. These results held in both the SCF and TIAA-CREF data sets. Jianakoplos and Bernasek (2006) estimated the effects of chronological age, birth cohort,

and calendar year on the household financial risk-taking, where one proxy to financial risk-taking was based on the observed portfolio allocations of wealth in risky assets and the other one was based on survey respondents' stated willingness to take risk. They found that financial risk-taking decreased with age.

Factors of the Dynamics of Equity Holdings for Older Population

A number of studies have applied various types of decomposition methods in research. In particular, Canudas-Romo (2003) gave a comprehensive review regarding the decomposition methods. Jianakoplos and Bernasek (2006) investigated the age-financial risk-taking profile of investors and their paper was relevant to the current study. They decomposed the effects of chronological age and birth cohort on household financial risk-taking by using the technique of regression-based decomposition, where the observed ratio of risky assets to investment wealth was used to proxy for household financial risk-taking. In particular, they argued that individuals in a birth cohort living through the Great Depression might have a reduction in their willingness to take risk over their entire life cycle than other birth cohorts who did not. Therefore, they included cohort dummies in the regression analysis, where the estimated coefficients on the cohort dummies could indicate how the age-financial risk-taking profile shifted across cohorts, holding other factors constant. They also controlled time dummies to allow for the impact of changes in the economy over the investigated period. Since there existed a linear dependence of age, birth-year cohort and survey year, following Deaton (1997)'s methodology, they normalized the effect of survey years.

The purpose of this study was to examine how U.S. people who are retired or who approach retirement change their equity portfolios over time, where the share of equity in household financial assets was the measure. In order to access the significance of equity change of the older population on the aggregate markets and to further analyze the confounding effects on the change in the aggregate markets, a decomposition method of identifying and measuring the compositional factors that affect aggregate equity holdings was required. In addition, a regression analysis that investigates the age-equity holdings profile and the shift in financial risk-taking attitude for older population over time was also provided for a formal test.

The factors that determine the change in equity holdings, especially for the older population, are described as follows. In particular, the portfolio choices of households in transition to retirement or are retired will be different from the portfolio choices of work-age households. First, one of the most obvious reasons is that under the life cycle model, income and wealth will decline after retirement. Such declining may influence the portfolio choices for those who are approaching retirement or who are retired. In addition, Bodie et al. (1992) incorporated the fact that individuals might have considerable flexibility in varying their labor supply ex post. Given this flexibility, it could induce individuals to assume greater risks in their investment portfolios ex ante. However, for the older population who are approaching retirement or who are retired, the ability to return to work force may be limited. The limitation may eliminate the flexibility to adjust labor supply to financial losses in investment portfolios, thus reducing the willingness for elderly people to invest in equity. On the other hand, Dosman et al. (2006) indicated that people remained engaged in productive activities even as they moved out of the labor force, substituting unpaid for paid work. Only respondents who exceeded their normal life expectancy would greatly reduce their productive activities.

The second reason is that people who are approaching retirement or who are retired face increasing mortality risk, resulting in a different investment horizon from that of work-age population. On the other hand, the bequest motive can extend the time horizons, reducing part of the effect of mortality risk.

The third reason is that the availability of financial instruments has increased and the cost of acquiring some of the instruments has decreased due to economy of scale and intense competition. For example, according to Investment Company Institute (2007), the number of funds across all types in the U.S. fund industry increased from 564 to 7,977 over the period of 1980–2005. Over the same period, equity mutual fund fees and expenses trended downward from 2.32% of fund assets in 1980, to 1.98% in 1990, to 1.28% in 2000, and to 1.11% in 2005. The growth and cost reduction in financial instruments can change the equity preference for all household investors.

As a result, for the older population, income effect, mortality risk, and preference shift can interactively contribute to change in equity holdings as a share of financial assets. The impact of these factors on aggregate equity markets can be investigated via the decomposition analysis described in the Methodology section below. Similar factors and the decomposition method have also been used to explain the change in aggregate saving rates. For example, Fry and Mason (1982) showed that an increase in life-cycle wealth caused by high economic growth interacted with an increase in the number of population who have a higher propensity to save, resulting in a large increase in the aggregate saving rates in Korea. In addition, Park and Rhee (2005) classified the increase in aggregate saving rates into three parts: (a) change due to an increase in the population size of the age groups that had higher propensities to save, (b) change due to an increase in the income share of the age groups that had higher propensities to save, and (c) change due to an upward shift of the age-saving rate profile. The decomposition method used in this study was the same as the one used by Park and Rhee (2005).

Methodology

In this section, a decomposition method of identifying and measuring the population size effect, income effect and preference shift that affect aggregate equity holdings as a share to financial assets is presented first. This method is helpful for us to access the significance of equity change of older population and the contributing factors on the change in the aggregate markets. Following the description of decomposition method, a section regarding the data used in this study are explained. Finally, a regression-based decomposition that investigates the age-equity holdings profile and the shift in financial risk-taking attitude for older population over time is also provided.

Decomposition of Change in Equity Holdings as a Share to Financial Assets

The aggregate financial asset share invested in equity at time t, A_t, can be expressed as in Eq. 1:

$$A_t = E_t/Y_t = \sum_i \alpha_t^i Y_t^i w_t^i \Big/ \sum_i Y_t^i = \sum_i \alpha_t^i y_t^i w_t^i \tag{1}$$

where $y_t^i = Y_t^i / \sum_i Y_t^i$, and A_t: aggregate financial asset share invested in equity at time t, E_t: amount of aggregate equity holdings at time t, Y_t: amount of aggregate financial

assets at time t, Y_t^i: weighted average financial assets of the ith cohort households at time t, α_t^i: weighted average financial asset share invested in equity of the ith cohort households at time t, w_t^i: relative population size of the ith cohort households at time t, y_t^i: relative share of the weighted average financial assets of the ith cohort households at time t.

Note that SCF dataset provides sampling weights that specify the number of households in the U.S. population that is similar to each survey household. The sampling weights were used in the calculation of w_t^i in this study. (See footnote for a numerical example).[1] Then the change in the aggregate financial asset share invested in equity from time t to time $t + 1$, i.e., $A_{t+1} - A_t$, would be written as:

$$\begin{aligned} A_{t+1} - A_t &= \sum_i \alpha_{t+1}^i y_{t+1}^i w_{t+1}^i - \sum_i \alpha_t^i y_t^i w_t^i \\ &\approx \sum_i \Delta w_{t,t+1}^i y_t^i \alpha_t^i + \sum_i w_t^i \Delta y_{t,t+1}^i \alpha_t^i + \sum_i w_t^i y_t^i \Delta \alpha_{t,t+1}^i \end{aligned} \quad (2)$$

where all the terms of cross products of $\Delta w_{t,t+1}^i$, $\Delta y_{t,t+1}^i$, and $\Delta \alpha_{t,t+1}^i$ were ignored in this study because their magnitudes were of second order. In Eq. 2, the first term represented the change in aggregate financial asset share invested in equity from time t to time $t + 1$ due to the change in the population size of cohort i households from time t to time $t + 1$, or population size effect in this study. The second term of Eq. 2 represented the change in aggregate financial asset share invested in equity due to the change in the relative financial assets of the cohort i households, or wealth effect. The third term of Eq. 2 represented the change in aggregate financial asset share invested in equity due to the change in the preference for equity holdings of cohort i households, referred to preference effect.

In this study, the population size effect, wealth effect and preference effect on aggregate financial asset share invested in equity for both birth cohorts and age groups were analyzed, respectively. For the birth cohorts, the total households at time t were partitioned into five groups: (1) those who were born before 1935, (2) those who were born between 1935 and 1944, (3) those who were born between 1945 and 1954, (4) those who were born between 1955 and 1964, and (5) those who were born after 1964. For the age groups, the total households at time t were partitioned into five groups: (1) less-than-35 age group, (2)

[1] To simplify the calculation, suppose there are four households and two cohorts in the economy at time t. Household 1 and 2 belong to cohort 1 and household 3 and 4 belong to cohort 2. The weight attached to each household specifies the number of households in the U.S. population that are similar to each survey household. We have:

$$\begin{aligned} A_t = E_t/Y_t &= \frac{(E_1 w_1 + E_2 w_2) + (E_3 w_3 + E_4 w_4)}{(Y_1 w_1 + Y_2 w_2) + (Y_3 w_3 + Y_4 w_4)} \\ &= \frac{(\alpha_1 Y_1 w_1 + \alpha_2 Y_2 w_2) + (\alpha_3 Y_3 w_3 + \alpha_4 Y_4 w_4)}{(Y_1 w_1 + Y_2 w_2) + (Y_3 w_3 + Y_4 w_4)} \\ &= \frac{\overline{\alpha}_{cohort1} \overline{Y}_{cohort1}(w_1 + w_2) + \overline{\alpha}_{cohort2} \overline{Y}_{cohort2}(w_3 + w_4)}{\overline{Y}_{cohort1}(w_1 + w_2) + \overline{Y}_{cohort2}(w_3 + w_4)} \\ &= \overline{\alpha}_{cohort1} \overline{y}_{cohort1} w_{cohort1} + \overline{\alpha}_{cohort2} \overline{y}_{cohort2} w_{cohort2} \end{aligned}$$

where

$$\begin{aligned} &\overline{y}_{cohort1} = \overline{Y}_{cohort1}/[\overline{Y}_{cohort1} * (w_1 + w_2)/w + \overline{Y}_{cohort2} * (w_3 + w_4)/w], \\ &\overline{y}_{cohort2} = \overline{Y}_{cohort2}/[\overline{Y}_{cohort1} * (w_1 + w_2)/w + \overline{Y}_{cohort2} * (w_3 + w_4)/w], \\ &w_{cohort\,1} = (w_1 + w_2)/w, w_{cohort2} = (w_3 + w_4)/w, \\ &w = w_1 + w_2 + w_3 + w_4. \end{aligned}$$

35–44 age group, (3) 45–54 age group, (4) 55–64 age group, and (5) more-than 64 years old.

Data

The repeated cross sections of the SCF from 1989, 1992, 1995, 1998, 2001, and 2004 were used in this study. Assets in different years of the SCF were inflated or deflated to constant 2004 dollars using the Consumer Price Index. SCF provides sampling weights that specify the number of households in the U.S. population that is similar to each survey household. In this study, the aggregate information regarding financial assets for the U.S. population was obtained by weighting the observations in the sample with the corresponding sampling weights provided in the SCF to represent the U.S. population. The value of aggregate equity holdings was calculated in a similar way. The population within each cohort was also obtained from the summation of sampling weights over all sample cases in that cohort. There were 3,143 sample households in 1989, 3,906 sample households in 1992, 4,299 sample households in 1995, 4,305 sample households in 1998, 4,442 sample households in 2001, and 4,519 sample households in 2004.[2]

The total sample households in the combined SCF data files used in this study were 24,614. Furthermore, the value of equity holdings was of the main concern in this study. Equity holdings included direct stock holdings, indirect holdings through stock mutual funds, defined-contribution retirement accounts and IRA/Keoghs accounts, trusts, and managed accounts. Specifically, stock mutual funds included full value of stock mutual funds and one-half value of combination mutual funds. Stocks invested in IRAs/Keoghs accounts included full value of the accounts if mostly invested in stocks, one-half value if split between stocks/bonds or stocks/money markets, one-third value if split between stocks/bonds/money markets. Other managed assets with equity interests, including annuities and trusts, were consist of full value of the accounts if mostly invested in stocks, one-half value if split between stocks/mutual funds and bonds/CDs, or mixed/diversified, one-third value if other. Thrift-type retirement accounts invested in stocks included full value of the accounts if mostly invested in stocks, one-half value if split between stocks and interest earning assets.

In addition, Lindamood et al. (2007) addressed concerns regarding clear definitions of variables in the SCF. For example, racial/ethnic status was of respondent, who was not necessarily the person identified as the household head. Same was true for attitudes used in this study, such as risk-taking attitude and self-perceived health status. Therefore, in this study the term *respondent* was used except for the answers that SCF coded for household head separately from spouse/partner.

Age-equity Holdings Profile and Shift in Financial Risk-taking Attitude

A formal regression analysis was provided in this study. There are two purposes in the regression analysis. First, the age-equity holdings profile for the retired households and households approaching retirement was formally estimated using regression. Second, whether a respondent's financial risk-taking attitude shifted over time to reflect possible shift in preference was tested. In the regression analysis, two samples were used,

[2] The population defined by the weights in SCF was 93 million households in 1989, 95.9 million households in 1992, 99 million households in 1995, 102.6 million households in 1998, 106.5 million households in 2001, and 112.1 million households in 2004.

respectively. The first sample included household heads born before year, 1935. This population was 55 years old in year 1989 and 70 years old in 2004. The second sample included household heads whose ages were larger than 54 years old in each survey year. The regression model was specified as follows.

$$\begin{aligned}&\frac{\text{Equity Holdings}}{\text{Financial Assets}}\\&= f((\text{Age}-55),(\text{Age}-55)^2,\ \text{Financial Risk}-\text{Taking Attitude (dummy)},\\&\quad \text{Year Dummy}_t \times \text{Financial Risk}-\text{Taking Attitude (dummy)},\ \text{other Demographic},\\&\quad \text{Behavioral, and Financial Characteristics, Year dummies}).\end{aligned}$$

Dependent Variable

The dependent variable in the regression model was the share of equity in household financial wealth for each household.

Risk-taking Attitude and Shifting in Risk-taking Attitudes

Lai (2006) documented that a respondent who had the tendency to select a high level of portfolio risk in self-directed pension accounts was more vulnerable to efficiency losses. Therefore, financial risk-taking attitude is important for equity holdings. In this study, one dummy variable was created to reflect the willingness of a respondent to take financial risk. If a respondent was willing to take substantial financial risk expecting to earn substantial expected return, or was willing to take above average financial risk expecting to earn above average return, or was willing to take average financial risk expecting to earn average return, the Risk-Taking Attitude was a dummy variable set equal to 1, and set equal to 0 if the respondent was not willing to take any financial risk at all. Year Dummy$_t$ was a dummy variable which was unity if the year was the tth period and zero otherwise, where $t = 1992$, 1995, 1998, 2001 and 2004.

To further test whether the effect of a respondent's risk-taking attitude on equity share shifted over the period of 1989–2004 to reflect possible shifting in the preference for equity in the corresponding periods, the products of Year Dummy$_t$ ($t = 1992$, 1995, 1998, 2001 and 2004) and Risk-Taking Attitude dummy were used in the regression analysis. The coefficients of these dummies measured the differential effects of market conditions in the tth period on the risk-taking attitude. The regression model in this study permitted a test of the hypothesis that a respondent's risk-taking attitude shifted in the tth period compared to the year of 1989 by testing whether the corresponding differential coefficient was statistically different from zero.

Demographic Variables

Age − 55 was a continuous variable. This variable was represented as the age of a household head minus 55. $(\text{Age} - 55)^2$ was also included to allow for nonlinearities in the impact of age. This variable was represented as the square of the difference between the age of a household head and 55. Kivett and Schwenk (1994) showed that race and marital status had persistent effects on the economic well-being of older women regardless of age and household size. Therefore, race and marital status were included. *Nonwhite* was a dummy variable set equal to 0 if the respondent chose White when presented with a list of

racial/ethnic categories, and set equal to 1 if the respondent chose Black, Hispanic, or some other category. *Married* was a dummy variable set to one when a respondent was married, and zero otherwise. *Education* was a dummy set to one when a respondent had some college or higher educational background and zero otherwise. *Household size* represented the number of people in a household.

Behavioral Characteristics

To capture labor supply flexibility for the older population, four variables were included in the regression analysis. A dummy variable, *Poor health-Head,* was set to one if a household head perceived himself/herself to be in poor health when asked in the survey. A similar dummy variable, *Poor health-Spouse/Partner,* was also obtained for the spouse or partner, if any. In addition, SCF provided information about expected working years for a household head and spouse/partner (if any) in the following question: "In what year do you expect to stop working for pay altogether?" (variables *X7700-X7704* for head and *X7729-X7733* for spouse/partner). The expected number of years for a household head or spouse/partner was recorded as *Expected working years-head* and *Expected working years-spouse/partner,* respectively. However, if a household head/spouse/partner reported *never stop* when asked in the survey, the following procedure was applied to estimate the expected number of working years. If the age of a household head/spouse/partner was smaller than 70, the difference between 70 and current age was used to proxy the expected number of working years. If age of a household head/spouse/partner was smaller than 75 but larger than 70, expected number of working years was arbitrarily set at 3 years. If age of a household head/spouse/partner was smaller than 80 but larger than 74, then expected number of working years was set at 2 years. Finally, if age of a household head/spouse/partner was higher than 79, expected number of working years was set at one year. Note that by using expected working years for both household head and spouse/partner, the model in effect was also controlling for whether the household was a couple household or not, since that variable would always be 0 for a non-couple household.

Financial Characteristics

With respect to net worth, five net worth dummies were created: *Net worth-1st quintile r*epresented that the net worth of a household was below the 20th percentile of all SCF respondents in one survey year. *Net worth-top quintile* represented that the net worth of a household was above the 80th percentile of all SCF respondents in the corresponding survey year and so on. *Home ownership* was set to one if one owned primary residence, and zero otherwise.

Since imputation techniques were implemented to deal with the missing SCF survey data, the reported coefficient estimates in the regression analysis were obtained by running the Repeated-Imputation Inference (RII) procedure suggested by Montalto and Sung (1996).

In addition, Lindamood et al. (2007) documented that using weighted or unweighted data in multivariate analysis "is not one of the complete superiority of one approach over the other. In a majority of the estimates, the significance level estimated is more conservative for unweighted data than for weighted data, so presenting the unweighted results in publications seems reasonable." (p. 212) In this study, the multivariate analysis was applied to unweighted data.

Results

Decomposition Results

Table 1 presents the percentage of equity in household financial assets by birth cohorts and age groups from 1980 to 2004. In Panel A of Table 1, it was found that there was a growth in the fraction of household financial assets in equity for every birth cohort from 1989 to 2001, but a small breakdown in 2004. In 1998 and 2001, the percentages of equity in household financial assets were more than 50% for almost all birth cohorts, including the older people who were born before 1935. Panel B of Table 1 shows the percentages of equity in household financial assets by age groups. The results in Panel B were broadly consistent with the findings in Panel A of Table 1.

How retired households and household approaching retirement handle their equity investment was of special interests in this study. In particular, older-than-64 age group held 50%, 54%, and 46% of financial assets in equity in the year of 1998, 2001, and 2004. Compared to the percentages of other age groups, the percentage of older-than-64 age group was not the lowest. In addition, for less-than-1935 birth cohort, the percentage of equity in household financial assets increased from 27% to 54% over the period of 1989 to 2001 and decreased to 44% in year 2004. One of the possible reasons for this fluctuation was the change in equity prices over the period of 1989 to 2004. In order to take the price effect into consideration, for example, suppose in 1989 the equity value of a household investor was worth USD 1,000, and the bond value was worth USD 2,679, so that the percentage of household equity holdings to financial assets was 27% (i.e., the number for a

Table 1 Equity as a percentage of financial assets by birth cohorts and age groups, 1989–2004

Panel A: Birth cohorts						
Birth year	1989 (%)	1992 (%)	1995 (%)	1998 (%)	2001 (%)	2004 (%)
≤1934	27.18	31.12	39.21	50.12	54.24	44.15
1935–1944	33.52	43.28	43.44	58.21	54.01	49.40
1945–1954	28.79	31.10	43.18	56.52	58.88	50.45
1955–1964	21.86	28.38	32.11	53.28	57.11	47.92
≥1965	17.65	14.62	25.05	41.94	53.77	35.77
Total[a]	28.26	33.65	40.03	53.73	55.78	47.30
Panel B: Age groups						
Ages	1989 (%)	1992 (%)	1995 (%)	1998 (%)	2001 (%)	2004 (%)
<35	20.93	24.87	27.22	43.19	52.51	29.91
35–44	29.14	30.77	39.66	54.92	57.33	47.56
45–54	34.08	40.94	43.29	55.35	58.37	46.65
55–64	27.51	37.04	44.26	58.23	55.79	51.01
>64	26.66	29.04	37.38	50.30	53.63	45.84
Total	28.26	33.65	40.03	53.73	55.78	47.30

[a] The aggregate financial asset share invested in equity was obtained by dividing the weighted average equity holdings by the weighted average financial assets by years, where the weights are provided in the SCF

typical household investor who was born before year 1935). Also suppose the return for fix-income securities was 3% annually. When the actual level of Dow Jones Wilshire 5000 was used to proxy for the broad-market equity price level, the price-adjusted financial asset shares invested in equity over the period of 1989–2004 could be obtained and were shown in the last row of footnote 3.[3] These ratios were not significantly different from the percentages over the corresponding period of 1989 to 2001 shown in the 1st row of Panel A in Table 1, suggesting that less-than-1935 birth cohort as a group did not drive down equity holdings over 1989 to 2001 when the price levels of equity markets were considered.

Table 2 reports the decomposition results based on five birth cohorts, including household heads who were born before 1935, 1935–1944, 1945-1954, 1955–1964, and after 1964. The contributions of population size effects, wealth effects and preference effects to the change in the aggregate financial asset share invested in equity between year t and $t + 1$ (i.e., Δt) are presented in Table 2. In addition, Table 3 reports the decomposition results based on five age groups. There are several findings shown in Tables 2 and 3.

First, for the entire population, the population size effects were almost offset by the wealth effects in the corresponding periods in explaining the changes in aggregate financial asset share invested in equity over the periods of 1989–1992, 1989–1995, 1989–1998, 1989–2001 and 1989–2004. As a result, most of the net changes in the aggregate equity holdings over these periods could be attributed to the upward shift in the preference for equity.

Several factors could explain the upward shift in the preference for equity holdings over the periods. First, in 1990s mutual funds expanded dramatically in terms of numbers and types available to consumers, accompanied by the growth of no-load funds and the emergence of new means of stock trading, such as Internet-based brokerage services. Second, tax-deferred individual retirement accounts (IRAs), responding to a variety of changes in legislation governing pensions, increased a lot in 1990s. Third, in 1990s employers increasingly offered tax-deferred saving plans as a way for workers to accumulate savings for retirement. Often such employer-provided plans offered options of mutual funds or even self company stocks. The rise in retirement saving accounts increased the direct stock holdings or indirect holdings through equity mutual funds.

Second, it was argued that the entry of the baby boom cohort (much larger than a usual cohort) into their traditional high-saving years contributed to the rise in stock demand and the large increase in stock prices during the 1990s. The quantitative impact of the baby boom cohort was examined in this study and is shown in Table 2. In particular, it was found that the birth cohorts of 1945–1954 and 1955–1964 together contributed

[3] Price-adjusted financial asset share invested in equity, 1989 to 2004

	1989	1992	1995	1998	2001	2004
Avg. Wilshire 5000	2,279	3,169	4,534	9,018	10,078	10,682
Equity	1,000	1,391	1,990	3,957	4,423	4,688
Bonds	2,679	2,928	3,199	3,496	3,820	4,174
Equity/(Equity + Bonds)	27%	32%	38%	53%	54%	53%

Table 2 Decomposition results by birth cohorts

Birth year	Equity/financial assets			
	Population size effect (%)	Wealth effect (%)	Preference effect (%)	Sum (%)
Δr: 1989–1992				
≤1934	−34.04	−2.71	45.01	8.26
1935–1944	−1.83	32.67	36.38	67.22
1945–1954	−2.30	8.53	6.80	13.04
1955–1964	0.74	0.98	8.07	9.80
≥1965	0.97	0.93	−0.22	1.67
Sum	−36.46	40.41	96.05	100.00
Δr: 1989–1995				
≤1934	−31.31	−2.85	59.44	25.29
1935–1944	−6.83	20.01	16.03	29.22
1945–1954	−0.73	16.18	18.37	33.82
1955–1964	0.29	3.73	5.50	9.53
≥1965	1.02	0.89	0.24	2.15
Sum	−37.55	37.97	99.58	100.00
Δr: 1989–1998				
≤1934	−24.78	−6.91	56.91	25.22
1935–1944	−2.75	11.58	20.03	28.86
1945–1954	−1.25	12.78	17.76	29.29
1955–1964	0.26	6.15	8.47	14.89
≥1965	0.77	0.59	0.39	1.75
Sum	−27.75	24.19	103.56	100.00
Δr: 1989–2001				
≤1934	−28.12	−4.49	61.46	28.86
1935–1944	−4.70	12.39	15.23	22.91
1945–1954	−1.38	14.71	17.65	30.98
1955–1964	0.25	6.12	8.70	15.08
≥1965	0.93	0.72	0.53	2.18
Sum	−33.02	29.46	103.57	100.00
Δr: 1989–2004				
≤1934	−51.49	−7.98	57.98	−1.49
1935–1944	−6.25	18.32	17.74	29.81
1945–1954	−3.38	28.79	19.10	44.51
1955–1964	−0.09	14.62	9.67	24.20
≥1965	1.78	0.79	0.40	2.97
Sum	−59.43	54.54	104.89	100.00

approximately 69% (44.51% plus 24.20%) to the upward shift in the aggregate percentage of equity holdings to financial assets over the period of 1989–2004, where 63% of this total contribution (i.e., 28.8% plus 14.6% and then divided by 63%) could be attributed to the increase in financial assets, or wealth effect, of baby boomers over the same period. Over the period of 1989–2004, the baby boom cohort switched from the age group of 25–45 to the age group of 40–60, entering into their primary saving years. Therefore, an increase in

Table 3 Decomposition results by age groups

Age	Equity/financial assets			
	Population size effect (%)	Wealth effect (%)	Preference effect (%)	Sum (%)
Δt: 1989–1992				
<35	−2.39	−3.42	5.41	−0.40
35–44	5.18	−9.87	4.76	0.06
45–54	9.54	4.22	26.15	39.90
55–64	−5.45	27.00	39.89	61.43
>64	5.15	−23.28	17.13	−1.01
Sum	12.03	−5.36	93.33	100.00
Δt: 1989−1995				
<35	−1.49	−1.18	3.75	1.08
35–44	2.68	−6.24	13.33	9.77
45–54	10.14	4.16	15.26	29.56
55–64	−4.85	4.40	30.46	30.00
>64	1.68	−5.58	33.49	29.59
Sum	8.16	−4.45	96.29	100.00
Δt: 1989–1998				
<35	−1.00	−0.20	6.15	4.95
35–44	1.44	−0.41	15.12	16.14
45–54	7.01	−2.35	16.31	20.98
55–64	−1.69	5.46	25.84	29.61
>64	0.00	−5.85	34.16	28.31
Sum	5.76	−3.35	97.59	100.00
Δt: 1989−2001				
<35	−1.01	−0.41	7.98	6.55
35–44	0.62	−3.13	15.13	12.62
45–54	8.64	−1.23	17.05	24.46
55–64	−0.93	4.89	21.77	25.74
>64	−0.52	−4.51	35.66	30.63
Sum	6.80	−4.38	97.59	100.00
Δt: 1989–2004				
<35	−1.69	−3.70	3.43	−1.96
35–44	−0.92	−4.45	14.95	9.58
45–54	13.45	−4.51	13.33	22.27
55–64	3.21	8.50	27.35	39.06
>64	−0.60	−6.71	38.35	31.04
Sum	13.45	−10.87	97.41	100.00

the financial wealth of the baby boom cohort over the period of 1989–2004 certainly contributed to the high demand for equity in the aggregate markets.

The third finding in Table 2 was that the older cohort born before 1935 did not make any significant downward impact on the change in aggregate financial asset share invested

in equity over the period of 1989–2004. While most of the increase in equity holdings for the baby boom cohort was the result of an increase in financial wealth, a different sort of reason was found for the older cohort. Table 2 shows that the decrease in population size in the less-than-1935 birth cohort over the period of 1989–2004 resulted in a downward shift in the aggregate percentage of equity holdings to financial assets by 51%. However, this older cohort also presented a great amount of upward shift in preference for equity over the same period. The preference effect was as high as 58% for the less-than-1935 birth cohort over the period of 1989–2004, alleviating the offset effects from the decrease in cohort population and in cohort wealth, and resulting in a net effect of −1.49% on the change in aggregate financial asset share invested in equity. Similar results were obtained based on different Δts.

Table 3 reports the decomposition results based on five age cohorts, including household heads in the less-than-35 age group, 35–44 age group, 45–54 age group, 55–64 age group and older-than-64 age group. Table 3 shows similar findings to those in Table 2. For the more-than-64 age group, most of the population size effects and the wealth effects were negative but were relatively small in explaining the changes in aggregate financial asset share invested in equity over the periods of 1989–1992, 1989–1995, 1989–1998, 1989–2001, and 1989–2004. On the other hand, the preference effects were positive and largely alleviated the offset effects from population and wealth effects for more-than-64 age group in the corresponding periods. The results of the upward shift in the older cohort's preference for equity was broadly consistent with the findings of Hurd (2001). He documented that the large increase in stockholdings for elderly cohorts (defined as over 70 years old) between 1992 and 1995 was the result of a high rate of new ownership by the large fraction who did not invest in stocks.

There are possible reasons especially explaining the upward shift in the preference for equity holdings for the elderly. In particular, elderly people face substantial mortality risk, especially at advanced ages, reducing their planning horizons. However, Hurd (2001) documented that the bequest motive could extend the time horizons, resulting in eliminating any negative effects of mortality risk. Moreover, the retired people face more limited income risk and more uncertainty about medical expenditures. Christelis et al. (2005) found that the propensity to invest in stocks for elderly households was positively related to social interactions, financial literacy and intention to leave a bequest, and was negatively associated with health status.

To further examine the equity types which the older population preferred, four equity categories were examined: (a) directly-held stock ownerships, (b) stock mutual fund ownerships, (c) managed assets with equity interests, including annuities and trusts, and (d) retirement accounts invested in stocks, including thrift-type retirement accounts and IRAs/Keoghs invested in stocks. The change in the aggregate financial asset share invested in each equity category was decomposed into population size effects, wealth effects, and preference effects for five birth cohorts. Table 4 reports the results for less-than-1935 birth cohort only. In the last column of Table 4, less-than-1935 birth cohort as a group contributed more than 60% to the changes in the aggregate financial asset share invested in the managed assets with equity interests, including annuities and trusts, over the periods of 1989–1995, 1989–1998, 1989–2001 and 1989–2004. Preference shift was the main reason for the less-than-1935 birth cohort to prefer the managed assets with equity interests. The results suggested that bequest motive and the motive to hedge longevity risk increased preference of the older population to hold equity through annuities and trusts.

Table 4 Decomposition results by asset types, birth cohort ≤1934

Δt	Birth year	Asset types	Population size effect (%)	Wealth effect (%)	Preference effect (%)	Sum (%)
1989–1992	<1935	Directly-held stock	−40.42	−3.22	42.87	−0.77
		Stock mutual funds	−8.05	−0.64	81.07	72.38
		Managed assets[a]	9.36	0.74	15.66	25.76
		Retirement accounts[b]	−5.31	−0.42	33.64	27.91
1989–1995	<1935	Directly-held stock	−63.33	−5.76	87.55	18.46
		Stock mutual funds	−4.44	−0.40	63.57	58.72
		Managed assets[a]	−34.86	−3.17	193.39	155.36
		Retirement accounts[b]	−8.08	−0.73	25.61	16.80
1989–1998	<1935	Directly-held stock	−30.64	−8.54	64.00	24.83
		Stock mutual funds	−5.97	−1.66	55.84	48.20
		Managed assets[a]	−12.62	−3.52	86.21	70.06
		Retirement accounts[b]	−7.64	−2.13	41.37	31.60
1989–2001	<1935	Directly-held stock	−34.98	−5.58	72.06	31.50
		Stock mutual funds	−6.26	−1.00	61.71	54.44
		Managed assets[a]	−6.89	−1.10	76.35	68.35
		Retirement accounts[b]	−8.31	−1.33	38.26	28.62
1989–2004	<1935	Directly-held stock	−59.99	−9.29	69.74	0.46
		Stock mutual funds	−6.58	−1.02	45.24	37.64
		Managed assets[a]	−14.31	−2.22	76.69	60.16
		Retirement accounts[b]	−11.65	−1.80	49.83	36.38

[a] Managed assets with equity interests, including annuities and trusts

[b] Retirement accounts invested in stocks, including thrift-type retirement accounts and IRAs/Keoghs invested in stocks

Regression-based Analysis

A formal regression analysis is provided in Table 5. Model (1) includes a sample where the household heads are in the less-than-1935 birth cohort. Model (2) includes a sample where the ages of household heads are older than 55 years old. There are several findings. First, in Model (1) and Model (2), the coefficients of both (Age − 55) and $(\text{Age} - 55)^2$ were significantly different from zero, but the coefficient of (Age − 55) was negative and the coefficient of $(\text{Age} - 55)^2$ was positive. These coefficients indicated a convex relationship between age and equity holdings as a share of financial assets for the older population, with a predicted minimum at the age of 78 (based on Model (2)) or 80 (based on Model (1)).

In addition, the coefficient of Risk-Taking Attitude was significantly positive, indicating older respondents who were willing to take (a) average financial risk, (b) above average financial risk, or (c) substantial financial risk would take more equity holdings in their financial assets than those who did not want to take any financial risk at all. In addition, the coefficients of the variables of Year1995 * Risk-Taking Attitude, Year1998 * Risk-Taking Attitude, Year2001 * Risk-Taking Attitude, and Year2004 * Risk-Taking Attitude were statistically significant and positive, while the reference year was 1989. The results suggested that risk-taking attitude-equity holdings profile shifted upward in 1995, 1998, 2001, and 2004 compared with 1989. In addition, the magnitude of the coefficients

Table 5 Age effect on financial asset share invested in equity (dependent variable in percentage)

Independent variables	(1) Birth year < 1935		(2) Age > 55	
	Coefficient	*t*-stat.	Coefficient	*t*-stat.
Intercept	6.254*	1.970	6.047*	2.244
Demographic characteristics				
(Age − 55)	−0.622***	−3.794	−0.745***	−6.324
(Age − 55) squared	0.013**	3.203	0.016***	4.710
Non-White	−3.910**	−3.283	−4.011***	−3.906
Married	−0.877	−0.910	−0.864	−0.999
Education	6.392***	7.640	6.388***	8.914
Household size	−0.496	−0.948	−0.773†	−1.921
Behavioral and financial characteristics				
Risk-taking attitude(*reference group = No risk*)	6.848***	4.218	6.490***	3.833
Year1992 * Risk-taking attitude	1.832	0.827	2.900	1.292
Year1995 * Risk-taking attitude	4.378*	2.028	5.240*	2.470
Year1998 * Risk-taking attitude	10.721***	4.475	11.504***	5.244
Year2001 * Risk-taking attitude	15.050***	5.956	13.965***	6.190
Year2004 * Risk-taking attitude	8.809***	3.315	9.300***	4.381
Expected working years-head	−0.259*	−2.091	−0.261**	−3.046
Expected working years-spouse/partner	−0.063	−0.670	−0.051	−0.720
Poor health-head	−2.104†	−1.640	−3.049*	−2.557
Poor health-spouse/partner	−3.634*	−2.016	−3.359*	−2.087
Net worth (1st quintile as the reference group)				
Net worth (top quintile)	26.943***	13.208	26.532***	15.170
Net worth (4th quintile)	19.907***	10.277	20.373***	12.354
Net worth (3rd quintile)	8.420***	4.650	9.616***	6.005
Net worth (2nd quintile)	4.243*	2.325	4.230**	2.726
Homeowner	−2.350†	−1.732	−0.576	−0.498
Year = 1992	1.147	0.712	0.695	0.428
Year = 1995	1.968	1.196	1.559	0.962
Year = 1998	5.026**	2.771	5.837***	3.497
Year = 2001	4.940**	2.609	5.605***	3.384
Year = 2004	5.787**	2.900	5.246**	3.269
Adj. *R*-squared (the average adj. *R*-squared of five implicates)	0.305		0.309	
N	6,021		9,054	

Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

increased through 1992–2001 but slightly decreased in 2004 while year dummies were controlled in the model. The results were consistent with the decomposition results in Tables 2 and 3 that the older population as a whole presented a greater amount of upward shift in the preference for equity during the 1990s.

Among the variables used to control for demographic, behavioral, and financial characteristics in equity holdings for the older population, it was found that the older non-White respondents took fewer equity holdings in their financial assets than did the older

White respondents. Being in poor health was estimated to significantly reduce equity holdings in financial assets for both household heads and their spouses/partners. One interesting result was that the older household heads who expected to work longer after age 55 held less equity in financial assets. Similarly, the spouses/partners of older household heads held less equity in financial assets when they expected to work longer (in Model (1) of Table 5). One possible explanation was that the household heads who expected to work longer after age 55 had financial insecurity, resulting in less risk-taking behavior in equity holdings.

In contrast, older household heads with at least some college educational backgrounds took more equity holdings in their financial assets than did those who do not have any college or higher educational backgrounds. In addition, older respondents in a higher net worth level significantly increased their financial asset shares invested in equity.

Discussions, Limitations, and Implications

It is possible that the large changes in asset prices interact with age effect and preference shift for equity holdings, resulting in a likelihood that the changes in financial asset share invested in equity are related to changes in asset prices rather than changes in preferences or age structure. Thus the decomposition analysis described in the previous section has its limits. The regression analysis in Table 5 provides a further regression-based decomposition on the age-equity holdings profile and risk-taking attitude-equity holdings profile for the older population while the asset prices are controlled in the year dummies. It was found that there was a convex relationship between age and equity holdings as a share of financial assets for retired households and households approaching retirement. In addition, the risk-taking attitude-equity holdings profile shifted upward in 1995, 1998, 2001, and 2004 compared with 1989 while year dummies were controlled in the model, indicating possible shifts in the preference for equity holdings during the periods. In addition, the magnitude of shifting preference increased through 1992 to 2001 but slightly decreased in 2004. The results were consistent with the decomposition results in Tables 2 and 3.

For a robustness check, household equity ownership over the period of 1989 to 2004 was also estimated, where the measure of equity ownership was a dummy variable set equal to one if one owned equity through directly-held stock, stock mutual funds, as well as through managed asset accounts or retirement accounts, and set equal to zero otherwise. (See footnote for results.)[4] It was found that equity ownership for less-than-1935 birth cohort increased over the period of 1989–2004. In addition, equity ownership increased for

[4] Equity ownership for those who were born before 1935 and for household heads older than 64 years old are shown below. Equity ownership was a dummy variable set to one if one owned equity and zero otherwise.

Year	1989 (%)	1992 (%)	1995 (%)	1998 (%)	2001 (%)	2004 (%)
Birth year < 1935	30.54	33.11	32.19	36.69	36.19	36.89
Age > 64 years old	26.53	28.31	31.59	36.32	36.80	40.18

Table 6 Equity investors' financial goals by year

Year	*N*	Can't save (%)	Education (%)	Family (%)	Home (%)	Purchase (%)	Retirement (%)	Liquidity/ the future (%)	Investment (%)	No reasons (%)
Panel A: For household heads born before year 1935										
1989	630	2.69	1.64	3.48	0.00	10.05	39.82	30.34	10.54	1.45
1992	708	4.26	1.26	2.36	0.26	10.56	38.56	32.80	8.02	1.91
1995	683	3.15	1.10	3.11	0.47	8.71	40.83	35.61	5.87	1.15
1998	544	5.48	1.31	3.84	0.09	12.63	38.89	32.19	1.44	4.12
2001	461	2.48	1.93	5.85	0.00	11.98	33.79	39.58	0.74	3.64
2004	350	4.84	1.84	6.33	0.00	10.69	31.20	42.95	0.33	1.82
Panel B: For household heads whose ages are larger than 54 Years old										
1989	620	2.74	1.67	3.55	0.00	10.26	39.36	30.08	10.76	1.57
1992	813	4.07	1.64	2.04	0.22	9.90	40.87	32.50	7.02	1.74
1995	931	2.41	2.56	2.83	0.35	7.92	44.11	33.57	5.21	1.05
1998	982	3.85	1.41	3.16	0.05	9.42	48.87	29.03	1.79	2.43
2001	1,039	2.98	1.77	4.15	0.47	7.90	47.47	31.81	0.75	2.70
2004	1,209	2.39	3.09	4.04	0.46	5.91	50.80	30.69	0.37	2.26

the older-than-64 age group over the period of 1989–2004. About 40% of households whose heads older than 64 years old owned stocks in 2004, compared to 27% in 1989.

The findings in this study imply that equity holdings decrease first then increase with age for retired households and households approaching retirement. In addition, the preference for equity holdings has shifted upward for retired households and households approaching retirement since 1989. One possible reason is that for the older population, they are facing longevity risk, i.e., people still need to prepare for the possibility of living many more years in retirement than do people in earlier generations. In order to examine this possible underlying reason, saving goals for the older population who still hold equity are examined (sub-samples of Model (1) and Model (2) in Table 5). SCF provides the following information regarding saving goals: "People have different reasons for saving, even though they may not be saving all the time. What are your most important reasons for saving?" (variable *X3006*) Although multiple saving reasons may be reported, only the first (most important) reason was chosen for this study. Panel A of Table 6 reports the results for equity investors born before year 1935, and Panel B reports the results for equity investors age 55 or older. Consequently, about 70% of these senior equity investors listed financing retirement and financing future liquidity as saving goals. Therefore, longevity patterns may encourage the older population to hold equity in order to maintain a decent standard of living during a possible long retirement period.

Conclusions

This study examined how U.S. retired households and households approaching retirement change their equity holdings over time, where the measure is the share of equity in household financial wealth. Applying a decomposition analysis on the repeated cross-sectional U.S. Survey of Consumer Finances from 1989 to 2004, this study presents the effects of change in population size including mortality, change in financial wealth, and change in preference on the change in aggregate financial asset share invested in equity over the investigated period. There are several findings as below.

Overall, for the entire population, the population size effect is almost offset by the wealth effect in explaining the change in aggregate financial asset share invested in equity. Most of the net change in aggregate equity holdings over the investigated period can be attributed to an upward shift in the preference for equity.

Second, the baby boom cohort contributes approximately 69% to the upward shift in the aggregate percentage of equity holdings to financial assets over the period of 1989 to 2004, where 63% of this total contribution can be attributed to the wealth effect. Therefore, this study provides support to some extent that baby boomers entering their primary saving years contribute to the high demand and then the possible high returns observed throughout the period.

Third, over the period of 1989–2004 the decrease in population size in the less-than-1935 birth cohort results in a downward shift in the aggregate percentage of equity holdings to financial assets by 51%. However, this older cohort also presents an upward shift in the preference for equity by 58% over the same period, resulting in a net effect of −1.49% in change in the aggregate financial asset share invested in equity. Furthermore, it is documented that managed assets with equity interests, including annuities and trusts, is the asset class through which the older people increase their equity holdings the most. The results suggest that bequest motive and the motive to hedge longevity risk increase the preference of the older population to hold equity through annuities and trusts. For a

robustness check, household equity ownership over the period of 1989–2004 was also estimated to avoid price effects. It was found that equity ownership for those who were born before the year 1935 increased over the period of 1989–2004. In addition, equity ownership grew for household heads older than 64 years old over the period of 1989–2004.

Finally, in a formal regression-based decomposition analysis, it was found that there is a convex relationship between age and equity holdings as a share to financial assets for the older population, with a predicted minimum at the age of 78–80. In addition, the preference for equity holdings shifts upward during the period of 1989–2004 for retired households and households approaching retirement. It was further found that 70% of these senior equity investors choose financing retirement and financing future liquidity as the primary saving goals. Therefore, longevity risk plays an important role for the older population to hold equity in order to maintain a decent standard of living during a possible long retirement period.

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