# Recent demographic trends, fund flows and the geographic segmentation of the US mutual funds industry

**Abstract**

Population aging across the globe has become a big concern for policy makers and governments worldwide, but particularly for the US. This paper examines the impact of aging (as measured by the proportion of seniors to the total population) on mutual fund flows (measured as the net growth in assets beyond re-invested dividends) by analysing US mutual fund data from January 2000 to March 2019. We also examine how the aging of the population affects the investor choice between equity and fixed income funds. Our main finding shows that locations with more seniors have lesser fund flows, and similarly, more flows into fixed income than equity securities confirming that as investors move into retirement, they tend to draw down rather than build up their financial assets. Our findings are stable over time and robust to a number of sensitivity checks. We however document that funds which charge low expenses fees attract more fund flows compared to those medium and high fees.

**Keywords:** *Mutual fund flows, seniors, geographic segmentation.*

## 1.0 Introduction

Recent changes in population demographics have re-ignited interest of researchers in the capital markets industry. Poterba (2014) in his paper "Retirement security in an aging population" notes that longer life expectancy has profound economic consequences for individuals as they engage in lifecycle planning and for economies as the average age of their population rises. In the United States of America (US), the aging of the baby boomers ignited this debate and a lot of research in the mid 1990's and early 2000's was motivated by this trend. Brooks (2000) finds that changes in age distribution have significant effects on asset returns, even when investors are rational and forward-looking while Abel (2001)finds that a baby boom increases stock prices. Poterba (2001), on the other hand, using time series data, finds no robust evidence linking demographic structure and asset returns. We rely on recent demographic changes that provide evidence of a growing aged population across the world[1](See also Holzmann (2017)) and in the US in particular to examine its impact on mutual fund flows. Specifically, we ask the following research questions; 1) How does an aging population (as measured by seniors[2])[3] affect mutual fund flows? 2) How does it affect the structure of mutual fund assets (investment in equity funds or fixed income funds)?

Whilst there is a lot of literature that has attempted to address these questions, see for example (Abel, 2001; Arnott & Chaves, 2012; Brooks, 2000; Brunetti & Torricelli, 2010; Goyal, 2004) all find a positive relationship between demographic structure and asset returns), to the best of our knowledge, and from the surveyed literature, there is no study that has used demographic data to specifically answer the above questions. Ellis and Underwood (2018) use location data to document the extent of competition within the

[1] According to the UN world population estimates (2017), globally, population aged sixty or over is growing faster than all younger age groups. This number is expected to be more than double by 2050 and more than triple by 2100, rising from 962 million (13%) in 2017 to 2.1 billion (22%) in 2050 and 3.1 billion (28%) in 2100. In the United States of America (US), the trend is similar, with the population aged 65 and above expected to rise from 15.2% in 2016 to about 21% in 2030 and 23.5% in 2060.

[2] Seniors is used to mean the population aged 65 years and above.

[3] Bakshi and Chen (1994) define an aging population as one in which there is "a rising average age" and not necessarily "the fraction of those aged 65 and above". In our paper however, we prefer to use the "fraction of those aged 65 and above ("seniors")" to represent aging for measurement reasons (as explained in hypothesis development).

US mutual funds industry while Becker (2007) uses the demographic variations in savings behaviours to provide evidence on the geographic segmentation of the US capital markets industry. In this paper, we aim to fill this gap by examining the impact of population aging on mutual fund flows. We also examine how this affects the investor choice between equity and fixed income funds.

Mutual fund flows are, to a considerable extent, the outcome of individual savings decisions of households. In 2018, 44.8 percent of US households owned shares of mutual funds representing an estimated 57.2 million households and 101.6 million investors Holden et al. (2018). This can be partly explained by the aging baby boomer generation[4] (see fig 1 below) that effectively started retiring in 2011[5]. Bakshi and Chen (1994) using the life-cycle investment hypothesis concluded that an investor's asset mix changes with the lifecycle and hence as the population ages[6], there will be more people who draw down rather than build up their assets. Similarly, Goyal (2004) finds that outflows from the stock market are positively correlated with the fraction of old people (seniors). These studies further underpin the importance of this study.

Using the approach of Becker (2007), we demonstrate that geographical areas with more seniors are likely to have lesser mutual fund flows. We use data on seniors (from the US census bureau) and mutual funds (from the Center for Research in Security Prices (CRSP)). We measure the flows using the formula in Sirri and Tufano (1998) and use the geographical unit of measurement as the Metropolitan Statistical Area

[4] Baby boomers are a generation of Americans born after World War II (1945 to 1964). Read more about the US generations here: https://www.census.gov/newsroom/blogs/research-matters/2015/05/talkin-bout-our-generations-will-millennials-have-a-similar-impact-on-americas-institutions-as-the-baby-boomers.html

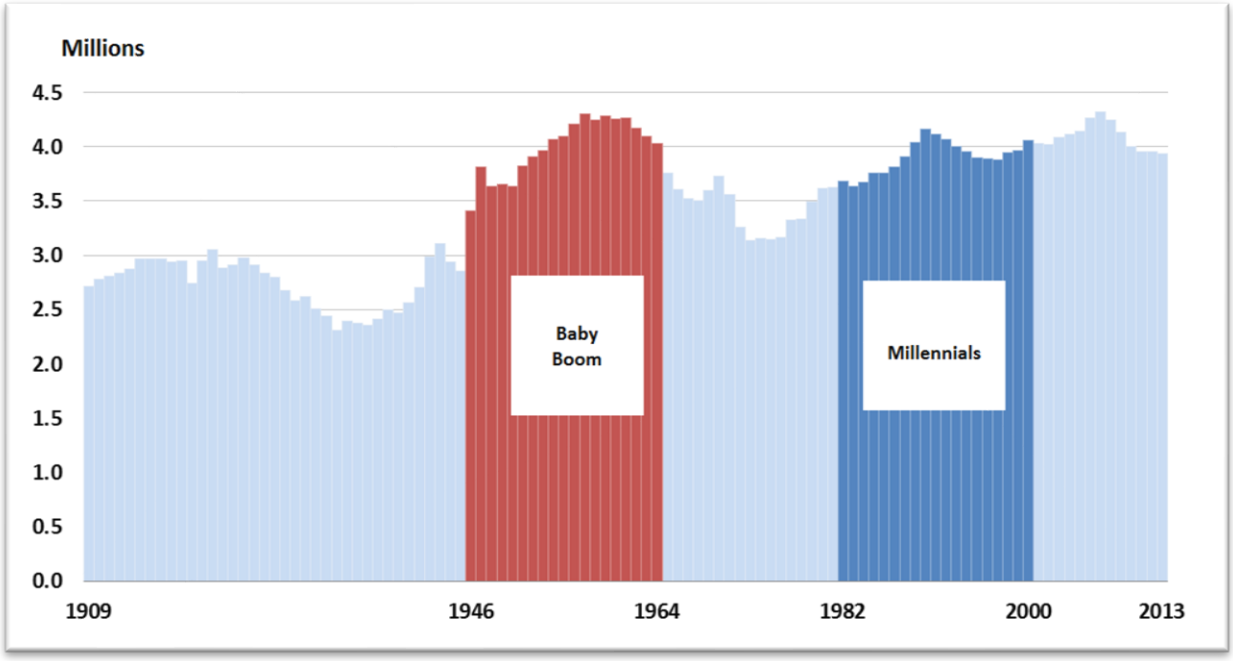
[5] The 2018 Investment Company Institute (ICI) Mutual fund shareholder tracking survey (Characteristics of Mutual Fund Investors) showed that mutual fund ownership is most prevalent among Generation Xers and Baby Boomers. In 2018, 52 percent of the 35.0 million households headed by a member of Generation X owned mutual funds, 46 percent of the 42.5 million households headed by a Baby Boomer owned mutual funds, and 38 percent of the 33.2 million households headed by a Millennial owned mutual funds. Households headed by Baby Boomers accounted for 34 percent of mutual fund–owning households, while households headed by a member of Generation X or a Millennial accounted for 32 and 23 percent of mutual fund–owning households, respectively. More details can be found here https://www.ici.org/pdf/per24-09.pdf

[6] Bakshi and Chen (1994) define an aging population as one in which there is "a rising average age" and not necessarily "the fraction of those aged 65 and above". In our paper however, we prefer to use the "fraction of those aged 65 and above ("seniors")" to represent aging for measurement reasons (as explained in hypothesis development).

(MSA)[7] to be able to present as closely as possible the association between location and fund flows[8]. Where appropriate, we use the ZIP codes, and map them to the respective census tracts[9], which we then map on to the MSA.

**Figure 1: Births in the United States from 1909 to 2013**

Figure 1 shows the number of births in the US from 1909 to 2013 clearly showing the baby boom between 1946 and 1964 (baby boomers) and the millennials between 1982 and 2000.




Source: https://www.census.gov/newsroom/blogs/research-matters/2015/05/talkin-bout-our-generations-will-millennials-have-a-similar-impact-on-americas-institutions-as-the-baby-boomers.html

[7] Metropolitan Statistical Areas (MSAs) are defined by the Office of Management and Budget (OMB) according to published standards applicable to the Census Bureau data, the current being the 2010 standards. Each MSA must have at least one urbanized area of 50,000 or more inhabitants, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties. There are currently 384 delineated MSAs, and these were announced by OMB effective September 2018. For more information, please see https://www.census.gov/programs-surveys/metro-micro/about.html

[8] see also Becker (2007) and Ellis and Underwood (2018) for more justification.

[9] A census tract was developed around 1910. Tract boundaries do not change from census to census and hence are more stable. When a population swells, census tracts are subdivided into smaller tracts, but retain an identifier to the original tract. See more on https://www.census.gov/data/acadeour/data-gems/2018/tract.html

To further understand the relationship between demography and fund flows, we then turn to the factors that affect portfolio choice of investors. Korniotis and Kumar (2011) find that older and experienced investors are more likely to follow rules of thumb that reflect greater investment knowledge but are less effective in applying their investment knowledge and exhibit worse investment skill. They note that overall, the adverse effects of aging dominate the positive effects of experience. Their findings concur with Bakshi and Chen (1994) who examine the life-cycle risk aversion hypothesis and find that population aging on average increases risk aversion. Brooks (2000) also finds that the return differential between stocks and bonds changes over the demographic shift because agents shift from stocks to bonds as they age. Therefore, the deeper relationship between demographic structure and fund flows is studied by examining the specific behaviour of senior investors with respect to whether they invest more in equity or fixed income securities. In addition to contributing to existing research on demography and financial markets, this study aims to make the following specific contributions:

We empirically investigate the investment decision-making behaviour of the seniors age group. Investment behaviour can vary significantly among individuals of different ages due to differences in risk tolerance, financial goals, life stages, and economic circumstances. Younger individuals, for example, often have a higher risk appetite as they have more time to recover from potential losses and may be more focused on capital growth and long-term wealth accumulation. In contrast, seniors, especially those nearing or in retirement, tend to prioritize capital preservation and income generation to support their post-retirement lifestyles (Brooks et al., 2018; Yao et al., 2011) . Furthermore, understanding the investment choices of seniors in a given geographical location can help financial professionals to tailor their product offerings based on the unique need and preferences of the seniors. For instance, they could design investment plans that emphasize growth for younger investors while focusing on income and preservation for seniors.

Considering that demographic shifts impact investment preferences, this study will provide research insights to mutual fund companies that will enable them to adjust their diversification strategies. For

instance, if certain age groups in specific areas show a preference for specific types of funds, such as fixed income funds, fund managers may need to ensure they have a well-balanced and diversified portfolio across different asset classes to cater to various investor preferences.

The study's examination of mutual fund flows in areas with a significant senior population indirectly sheds light on the financial preparedness of seniors for retirement. By analysing investment behaviour in such areas, this research will provide valuable insights into whether seniors are making informed and prudent financial decisions to secure their retirement years. If areas with higher proportions of seniors experience lesser mutual fund flows, it might indicate potential inadequacies in retirement planning and savings. This highlights the critical importance of financial literacy programs and targeted retirement planning initiatives that address the specific needs and challenges faced by seniors and different age groups. Strengthening financial literacy among seniors can also empower them to make better investment choices and build a more secure financial future, ensuring a dignified and comfortable retirement for the aging population. Additionally, this knowledge can guide policymakers in designing effective retirement planning policies and programs to support and protect the financial well-being of seniors.

The research's valuable insights into the investment behaviour of seniors, particularly their preferences for fixed income or Equity funds have significant policy implications for policymakers overseeing social security and pension systems. By comprehending the risk aversion and income-focused investment tendencies of seniors, policymakers can make informed decisions to ensure the long-term viability of retirement benefits. Understanding seniors' inclination towards stable and predictable returns can prompt policymakers to assess the asset allocation strategies within pension funds to better align with retirees' risk profiles. Additionally, this knowledge can drive the development of targeted financial literacy programs, empowering seniors to make informed and responsible financial choices, ultimately fostering a more sustainable and secure retirement landscape.

Finally, Demographic shifts and investment patterns can significantly impact fiscal and monetary policies, creating a link between the preferences of seniors for equity or fixed income securities and broader economic decisions. For instance, in the US mutual fund industry, if a considerable proportion of seniors shifts their investments towards fixed income securities, it could increase the demand for government and corporate bonds, leading to higher bond prices and lower yields. This scenario might influence the Federal Reserve's decisions on interest rates, as lower bond yields could signal reduced borrowing costs and impact monetary policy. Additionally, if seniors' risk aversion drives them to withdraw from equity-focused mutual funds, it may lead to a potential decrease in the overall equity market demand. Such a shift could affect investor sentiment and broader market performance, influencing fiscal policies and economic planning. This study will serve as a valuable addition to existing empirical literature and findings that influence the Federal Reserve's decision-making concerning seniors' investments in the mutual fund industry.

Finally, in contrast to previous empirical studies that have primarily approached the mutual fund industry from a competition or rational investor perspective, our paper offers a fresh and complementary dimension by examining fund flows through the lens of age structure. Building on the work of (Ellis & Underwood, 2018) and (Brown & Wu, 2016) who focussed on competition and rational investor behaviour, respectively, this research delves into the influence of age groups (specifically seniors) on investment decisions and fund flows. This unique perspective adds valuable empirical evidence to the literature, facilitating a more comprehensive understanding of the complexities and nuances that shape the dynamics of mutual fund flows.

The rest of the paper proceeds as follows; Section 2.0 discusses literature review and hypothesis development; Section 3.0 discusses data set up and methodology; Section 4.0 discusses the results; and Section 5.0 concludes.

## 2.0 Literature review and hypotheses development

In this section, our primary objective is to formulate and develop the key hypotheses that will be rigorously tested throughout the course of this study. These hypotheses are directly derived from the research questions articulated in the introduction, aligning our investigation with the study's overarching goals. By constructing well-defined hypotheses, we aim to establish clear and specific predictions about the expected relationships between the mutual fund flows and proportion of seniors.

### 2.1 Seniors and mutual fund flows

Mutual funds play a pivotal role as intermediaries, facilitating the participation of households in financial markets. These investment vehicles offer accessible and cost-effective access to professionally managed diversified portfolios of financial assets. As a result, an ever-growing number of households have been able to engage in financial markets, benefitting from the ease of trading and the expertise of fund managers.

The retirements industry in the US has grown significantly over the last almost half a century with retirement assets increasing from $469 billion in 1975 to $32.3 trillion in 2019 (ICI annual report to members, 2020). According to the ICI fact book (2020), an estimated 101.8 million individual Americans in 58.5 million households owned mutual funds, relying on them to meet long-term personal financial objectives, such as preparing for retirement, saving for education, purchasing a house, or preparing for emergencies. Majority of these holdings are in equity (53%), with the balance in bonds (23%), money markets (17%) and hybrid (7%). Further, changing demographics and investors' reactions to US and worldwide economic and financial conditions play important roles in determining how demand for specific types of mutual funds evolves.

Using comprehensive coverage of twenty-one countries with both developed and emerging markets , Kim et al. (2019) reveal that older investors (seniors), that is investors who have recently been classified

as members of the old generation have a stronger demand for equity funds. Holden and Schrass (2017) in their study of American households that invest in Individual Retirement Accounts (IRAs) find that people of all ages own IRAs, but ownership is greatest (about 62%) among the older groups of working-age individuals (35-64 years) while only about 37% are aged 65 years and above. This indicates that seniors (aged sixty-five and older) have limited savings accessible for investment, as a significant portion of their income is directed towards consuming goods and services. In a related study, Ben-David et al. (2022) highlight the importance of understanding how investors allocate capital in financial markets. Using data spanning from January 1991 to December 2011 of diversified actively managed US equity funds from the CRSP database, they reveal that households appear to behave no differently when it comes to investing in mutual funds than they do in other domains of financial decision-making. Investors possess limited financial sophistication, are inattentive, extrapolate past performance, and rely on simple signals to invest in mutual funds.

Goyal (2004) notes that old households invest less because they have less time to enjoy the fruits of their investments, noting further that an increase in proportion of the old-age population is accompanied by a decline in aggregate savings and that outflows from the stock market are positively correlated with changes in the fraction of Seniors (65 and over). According to Fagereng et al. (2017), whereas participation in the stock market increases rapidly with age when young (reaching a value of 60% at age 45), and staying roughly constant or slightly increasing until retirement, as soon as investors leave the labour market (retire), they start exiting the market. Specifically, they suggest that households rebalance their portfolio away from stocks before they reach retirement (in order to compensate for the decline in their stock of human wealth as households age) and exit the stock market after retirement[10].

[10] Fagereng et al. (2017) define risky assets as a sum of mutual funds with a stock component and directly held assets while risk free assets are a sum of bank deposits, money market funds and bonds.

Quayes and Jamal (2016) find that stock prices are positively affected by the proportion of population in their prime earning age and negatively affected by the proportion of retirees. Bakshi and Chen (1994) note that as the population ages, the aggregate demand (as a proportion of aggregate wealth) for housing decreases, which, ceteris paribus, depresses housing prices, while that for financial investments increases, which drives up financial Prices. In addition, the aging population means higher pressure on Social Security, Medicare, and other social programs. The overall effect is that there will be more people who draw down rather than build up their assets, which reduces the aggregate supply of capital and raises the cost of capital for productive investments.

We therefore hypothesize that because seniors have a higher pressure to draw down rather than build up their assets, there will likely be more outflows from the mutual funds than inflows. Hence, in locations that are dominated by seniors, there will likely be lesser mutual fund flows. We therefore state the first hypothesis as.

*$H_1$: Areas with a higher proportion of seniors will likely receive lesser mutual fund flows than areas with a lower proportion of seniors because of the pressure by seniors to draw down rather than build up their assets.*

At the same time, as investors age, they tend to shift away from higher riskier products. The wide-ranging literature on the financial decision making of seniors points to poor financial literacy or low risk appetite from the seniors because of limited time and opportunity to recoup any potential losses[11]. Bakshi and Chen (1994) using the life-cycle hypothesis of risk aversion conclude that an aging population means an increasing average risk aversion. Holden and Schrass (2017) find that the willingness to take on

[11] See Lusardi (2012); Zhou and Xiao (2018); and Bailey et al. (2013) for literature on financial decision making of seniors.

investment risk falls with age while Brooks (2000) finds that the return differential between stocks and bonds changes over the demographic shift and this is because agents shift away from stocks as they age.

Sabelhaus et al. (2008) note that as investors age, their focus shifts away from building a retirement nest egg to managing the variability of investment returns and generating an income stream. They further find that older investors are much less likely to say they are willing to take above average or substantial risks in order to get higher returns. Antolin (2009) states that Population ageing may have major implications for financial markets, in particular for the relative attractiveness of different asset classes and the role of different financial institutions. The retirement of the baby boom generation is likely to increase the demand for fixed income instruments at the expense of equities and may raise the role of insurance companies at the expense of pension funds, especially in countries where DC plans dominate.

Other strands of literature support the fact that certain investors based on their social demographic characteristics prefer dividend paying stocks. According to Becker et al. (2011), older investors prefer dividend -paying stocks. They also note that firms headquartered in areas in which seniors constitute a large fraction of the population are more likely to pay dividends, initiate dividends, and have higher dividend yields. This is also supported by Graham and Kumar (2006) who find that older investors with low income exhibit the strongest preference for dividend paying stocks and that these older investors or any investor with a greater need for regular income stream may prefer high-yield stocks if they use dividend income to finance their consumption. Miller and Modigliani (1961) in their earlier quest to address the optimal dividend policy question document the "Clientele effect" that young "accumulators" prefer low pay-out shares and retired people lean towards "income stocks"

Similarly, other literature also demonstrates that as people age, they prefer to invest their savings in instruments that provide them with regular incomes "Annuities" and less of Equities.Yogo (2016) notes

that the portfolio share in stocks is low overall and is positively related to health, especially for younger retirees. Similarly, the portfolio share in bonds is positively related to health for younger retirees and rises significantly in age.

Korniotis and Kumar (2011) conclude that the older investors' portfolio decisions reflect greater knowledge about investing but the investment skills deteriorate with age due to the adverse effects of cognitive aging while Brunetti and Torricelli (2010) conclude that there is an inverse relationship between age and the shares held in risky assets. Further still, findings by Arnott and Chaves (2012) indicate that as adults slide into retirement, they begin to sell assets in order to buy goods and services that they no longer produce—either directly, through their own investments, or indirectly, through their pension benefits. They tend to liquidate their riskiest assets (stocks) before their less risky assets. Yuan et al. (2022) use the Probit model, the Tobit model, and the ZIP model to empirically test that aging has a significant negative impact on the participation, depth, and diversity of household risky financial assets. Their findings reveal that aging significantly negatively affects household risky financial asset participation, depth of participation, and diversity. The findings remain robust after robustness tests using a two-way fixed effects model. All these studies above further demonstrate that, as the population ages, there is likely to be lesser investment in the risky equity securities and more investment in fixed income securities. We therefore state the second hypothesis as.

*$H_2$: As Investors age, they tend to invest less in the risky equity securities and more in fixed income securities. Hence, areas with a higher proportion of seniors will likely experience less mutual fund flows into equity securities than fixed income securities.*

## 3.0 Data set up and methodology.

This section aims to provide a comprehensive overview of the procedures utilized for data setup and analysis in the investigation of the relationship between mutual fund flows and the proportion of seniors. In doing so, it offers insightful justifications for the selection of specific data sets, sample periods, and the chosen method of analysis**.**

### 3.1 Mutual Fund data

We construct our sample using data from the Centre for Research in Security Prices (CRSP) survivor free US Mutual fund data base for the period January 2000 to March 2019. We chose January 2000 as the cut-off start date because reliable fund location information is available in the CRSP mutual fund database beginning at the end of 1999 (Ellis & Underwood, 2018). We only include funds with a US ZIP code in our sample and eliminate all the funds with either a missing US ZIP code or a code outside the US. The purpose is to ensure that we only include those funds that can be traced to a definite geographical location within the US.

We focus our study on understanding how the mutual fund flows are affected by the demographic structure in a particular location. We calculate fund flows for each month using the formula in Sirri and Tufano (1998) who define Net flows (Flow) as the net growth in fund assets beyond reinvested dividends, calculated as;

$$Flow_{i,t} = \frac{\left[TNA_{i,t}\right] - TNA_{i,t-1}\left] * (1 + R_{i,t})\right.}{TNA_{i,t-1}}$$

Where $TNA_{i,t}$ is the total net assets of fund *i* in month *t* and $R_{i,t}$ is the fund's return over the period from *t*-1 to t. $TNA_{i,t-1}$ is the total net assets of fund *i* in month *t*-1. Flow measures the percentage growth of a fund in excess of the growth that would have occurred had no new funds flowed in and had all dividends been reinvested (*See also* Ellis and Underwood (2018). Considering that net flows are plagued by outliers, we winsorize observations that are 5% in the top or bottom of the fund flows.

To further understand the behaviour of flows, we segregate outflows from inflows, and present them separately, following the approach in (Goyal, 2004).

We define net outflows as below. For each unit of mutual fund, *i*, the net outflow during the month *t* is calculated as

$$Net\ Outflow_{i,t} = -tna_{i,t} + tna_{i,t-1} * (1 + R_{i,t})$$

where $tna_t$ is the total net asset value at month end *t* and $R_{i,t}$ is the return during the month *t*. For new issues in the month t, only the first term in the equation is included (since the term $tna_{i,t-1}$ is zero) and for any delisting, only the second term is included but with $R_{i,t}$ equal to zero. We then compute the total outflows for the month *t* as the sum of all the units of securities within that particular month *t*, as below.

$$Net\ Outflow_t = \sum_{i=1}^{Nt} Net\ Outflows_{i,t}$$

Where $N_t$ is the number units of securities in month *t* on CRSP.

We also calculate the total dividends ($Dividends_t$) paid during the period, and this gives us the net repurchases during the period (i.e., total outflows minus dividends).

$$Dividends_t = \sum_{i=1}^{Nt} Dividends_{i,t}$$

We carefully crosscheck the data to confirm that the Lipper asset codes exist on all sampled funds. The Lipper asset codes are EQ for equity, MB for tax free fixed income funds and TX for taxable fixed income funds. This is important to address $H_1$ and $H_2$ above.

Funds location decisions are influenced by among others home bias, proximity to other investment management firms, banking establishments, and other large institutional money managers (Parwada,

2008). Fund sponsors will tend to open a new fund when the expected benefits of opening and operating a fund are greater than the associated costs (Khorana & Servaes, 1999). According to the ICI fact book (2019), Mutual fund sponsors create new funds to meet investor demand, and they merge or liquidate those that do not attract sufficient investor interest[12]. Moreover, the demographic variation in savings behaviour as ably demonstrated in Becker (2007) can also be used to understand the effect that seniors have on Fund flows. Our aim is to show how the proportion of seniors in a particular area affect funds flows in that particular area.

### 3.2 Demographic Data

We collect demographic data from the US census bureau[13] for the period 2000 to 2019. This period covers two decennial censuses of 2000 and 2010 and estimates for the periods 2011 to 2019. We collect state level data on the proportion of seniors in each state and the results show that over the last about three decades, the proportion of seniors to the total population has grown from 12.5% to about 15.2% and is further projected to grow to about 24% by the year 2060.

To study a closer relationship that exists between seniors and fund flows in a particular location, we use data at Metropolitan Statistical Areas (MSA) level[14] because of the closeness with which they identify with the local unique settings. Becker (2007) reports that in 2000, about 82% of the US population resided in MSAs. This number increased to 84% in 2010[15]. To align fund data and demographic data, we use the ZIP code given for the fund in the CRSP database and map each fund location to MSAs[16]. We then use the WFCIN key from the MFLINKS database to aggregate individual share classes to fund level and

[12] For example, a total of 345 mutual funds opened, 336 mutual funds liquidated, while 171 funds merged in the US in 2018 (ICI fact book, 2019)
[13] https://census.gov/ and https://factfinder.census.gov/faces/nav/jsf/pages/download_center.xhtml
[14] *See* Becker (2007) and Ellis and Underwood (2018) for more justification on using MSA level data.
[15] See also comparison table for more details https://www.census.gov/data/tables/time-series/dec/cph-series/cph-t/cph-t-2.html
[16] The data is downloaded from https://simplemaps.com/data/us-zips

eliminate funds for which we cannot match to the WFCIN. The final sample dataset contains 1,235 unique mutual funds with 125,757 observations from January 2000 to December 2019.

The data shows that for the four periods, Florida is the State with the most seniors (18.3% in 1990, 17.6% in 2000, 17.3% in 2010 and 19.4% in 2017) while Alaska is on the other end of the spectrum with the least number of seniors (4.1% in 1990, 5.7% in 2000, 7.7% in 2010 and 10.1% in 2017). This gives us a perspective in terms of state wise demographic distribution.

**Table 1: Panel A: Variable definitions**

This table presents a comprehensive list of the variables utilized in the study, along with their respective definitions.

| *Variable* | Unit | Definition |
|---|---|---|
| *Monthly Return (%)* | Percent | Monthly return of each fund in the sample |
| *Market Adjusted Returns- MAR (%)* | Percent | Return adjusted by Market Indices for example equity funds adjusted by S&P 500 Index return |
| *Fund Flow (%)* | Percent | Fund Flow as defined in Sirri & Tuffano (1998) as the net growth in fund assets beyond the re-invested dividends |
| *Monthly tna ($'m)* | $million | Monthly total net assets |
| *Proportion Of Seniors (%)* | Percent | The fraction of the population representing those aged 65 years and above as a proportion of the total population |
| *Median income ($'000)* | $'000 | The median household incomes |
| *Education Level (%)* | Percent | the education levels for those with at least a university degree and above |
| *Unemployment Rates (%)* | Percent | Unemployment rates |
| *Fund Fees (%)* | Percent | refer to the charges or expenses incurred by investors when investing in a mutual fund. |
| *Logtna* | Dummy | The log value of the monthly total net assets |
| *Logpci* | Dummy | The log value of the income per capita |
| *logmed_income* | Dummy | The log value of the household median income |

Panel B: Summary Statistics

This table presents summary statistics for the dataset used in this study for each month from January 2000 to March 2019. The final sample includes 1235 funds.

| Variable | mean | sd | min | max | p25 | p50 | p75 |
|---|---|---|---|---|---|---|---|
| Monthly Return (%) | 0.0042 | 0.0457 | -0.5000 | 0.5930 | -0.0130 | 0.0055 | 0.0254 |
| Market Adjusted Returns (%) | -0.0006 | 0.0342 | -0.5265 | 0.5606 | -0.0159 | -0.0015 | 0.0135 |
| Fund Flow (%) | 0.3931 | 0.3942 | -0.0619 | 1.0025 | 0.0173 | 0.2575 | 0.8140 |
| Monthly tna ('$m) | 1,071.22 | 4,982.11 | 0.10 | 116,542.70 | 45.90 | 173.30 | 647.40 |
| Proportion of Seniors (%) | 12.73 | 1.54 | 8.52 | 17.57 | 11.73 | 13.10 | 13.55 |
| Median income ($ '000) | 61,769.23 | 7,333.00 | 38,405.00 | 112,396.00 | 53,407.43 | 65,567.64 | 68,222.40 |
| Education Level (%) | 20.42 | 9.42 | 8.20 | 33.30 | 15.00 | 15.10 | 32.20 |
| Unemployment Rates (%) | 3.88 | 0.62 | 2.00 | 8.80 | 3.40 | 4.03 | 4.04 |
| Fund Fess (%) | 0.01 | 0.02 | 0.00 | 0.48 | 0.01 | 0.01 | 0.01 |
| logtna | 5.10 | 2.00 | -2.30 | 11.67 | 3.83 | 5.16 | 6.47 |
| logpci | 11.14 | 0.19 | 10.61 | 11.70 | 10.95 | 11.25 | 11.27 |
| logmed income | 11.02 | 0.12 | 10.56 | 11.63 | 10.89 | 11.09 | 11.13 |

In Table 1, Panel B, we present the descriptive statistics for our final sample which consists of 1235 unique mutual funds. We observe that on average, the funds in the sample achieved a modest monthly return of 0.0042%. The maximum return observed among the funds in the sample reached 0.59%, indicating the presence of higher-performing funds in terms of monthly returns. The average fund flow of 0.3931% in the sample indicates that, on average, the funds experienced positive growth in assets beyond dividends, equivalent to a fraction of their total net assets. The statistics also indicate that for monthly fund flow rates, approximately 25% of the funds had lower growth rates of 0.0173%. This suggests that these funds experienced slower asset growth compared to the rest. However, the majority (75%) of the fund flows demonstrated moderate growth rates at 0.8140%. This indicates that most funds experienced a reasonable level of asset growth during the given period, suggesting a healthier overall performance for the majority of the funds. It is worth noting that there were a few outliers in the sample that experienced higher growth rates, potentially reflecting exceptional performance or significant inflows into those particular funds.

On average, the funds in this study possess total net assets of approximately $1.07 billion, with the largest mutual fund reaching a substantial figure of around $11.6 billion in monthly total net assets. The analysed areas in this study have an average proportion of seniors of around 12.73% out of the total population. The minimum observed proportion of seniors is 8.52%, indicating an area with the lowest concentration of elderly individuals, while the maximum proportion is 17.57%, representing an area with the highest concentration of seniors. Additionally, the 75th percentile reveals that 75% of the areas have a proportion of seniors below 13.55%. This suggests that in the majority of the areas studied, the proportion of seniors is lower compared to the younger generation, indicating a larger population of younger individuals. The proportion of seniors in a particular area may influence investment decisions, as seniors tend to have different financial goals, risk tolerance, and investment preferences compared to younger individuals.

We calculate the mean median income to be $61,769.23, representing the average income level in those regions. Additionally, the minimum reported median income is documented as $38,405.00, signifying the lowest income recorded among the areas. Conversely, the maximum median income is reported at $112,396.00. Seventy-five percent (75%) of the areas in the study have a median income below $68,222.40.

**Proportion of seniors regressions.**

In this study, we aim to explore the relationship between the proportion of seniors and mutual fund flows in the context of USA data. To achieve this, we conduct a multivariate regression analysis where the main variable of focus are mutual fund flows and proportion of seniors. We also incorporate various selected control variables to account for potential confounding factors. These control variables include Median income, Education level, Unemployment rates, Fund fees, market-adjusted returns (MAR), monthly total net assets, per capita income (PCI), and lagged MAR variables. The multivariate regression model is structured to examine how the proportion of seniors influences mutual fund flows while controlling for the impact of the aforementioned control variables. By including these additional factors in the model, we can better understand and isolate the specific effect of the proportion of seniors on mutual fund flows. All the variables used in our investigation are described in detail in Table 1, providing a comprehensive overview of the data and their relevance to the research. The regression enables us to systematically analyse the interplay between demographic factors, economic indicators, and fund characteristics, thereby providing valuable insights into the dynamics of the mutual funds industry and its interaction with changing demographic trends in the USA. The model is thus nested as follows:

$$\text{Mutual Fund Flows}_{i,t} = \beta 0 + \beta 1 * \text{Proportion of Seniors} + \beta 2 * \log \text{Median Income}_{i,t} + \beta 3 * \text{Education Level}_{i,t} + \beta 4 * \text{Unemployment Rates}_{i,t} + \beta 5 * \text{Fund Fees}_{i,t} + \beta 6 * \text{MAR}_{i,t} + \beta 7 *$$

Monthly TNA $_{i,t}$ + β8 * log PCI $_{i,t}$ + β9 * MAR $_{i,t-1}$ + β10 * MAR $_{i,t-2}$ + β11 * MAR $_{i,t-3}$ + ε

## 4.0 Discussion of results

This section discusses results from the study. All the variable names are defined in panel B of Table 1, unless defined in this section.

## 4.1 Seniors and mutual fund flows

Table 2 presents the correlation coefficients among key variables related to recent demographic trends, fund flows, and the geographic segmentation of the mutual funds industry. The correlation analysis provides insights into the relationships between variables such as fund flows, proportion of seniors, median income, education level, unemployment rates, expense ratio, and market-adjusted returns, shedding light on potential influences and dynamics within the industry.

**Table 2: Correlation matrix**

| | Fund Flow | Proportion of Seniors | Median income | Education Level | Unemployment Rates | Fund Fess | MAR |
|---|---|---|---|---|---|---|---|
| Fund Flow | 1.0000 | | | | | | |
| Proportion of Seniors | -0.0194 | 1.0000 | | | | | |
| Median income | 0.0812 | 0.4225 | 1.0000 | | | | |
| Education Level | 0.0158 | 0.2514 | 0.6302 | 1.0000 | | | |
| Unemployment Rates | 0.0697 | -0.3102 | -0.2332 | -0.3534 | 1.0000 | | |
| Fund Fees | -0.0072 | -0.0055 | 0.0104 | 0.0791 | -0.0159 | 1.0000 | |
| MAR | 0.0367 | -0.0198 | -0.0011 | -0.0027 | 0.0002 | -0.0157 | 1.0000 |

The correlation matrix in Table 2 presents the relationships between key variables in the US mutual funds industry for data used in this study, shedding light on their associations and potential influences. The analysis primarily focuses mutual fund flows, proportion of seniors and other variables that could affect the relationship between the mutual fund flows and proportion of seniors. The correlation between fund flows and the proportion of seniors is found to be weakly negative (-0.0194), indicating that areas with a higher proportion of seniors tend to receive slightly lesser mutual fund flows.

The correlation coefficient of 0.4225 between Median Income and Proportion of Seniors reveals a moderate positive correlation. This indicates that there is a tendency for areas with higher median incomes to have a larger proportion of seniors in their population. Several factors may contribute to this

relationship. For example, areas with greater wealth often offer enhanced living standards, improved healthcare services, and desirable amenities that appeal to seniors seeking retirement options. Additionally, individuals with higher incomes typically possess greater financial means to support a comfortable retirement, resulting in a higher concentration of seniors in affluent areas.

As expected, there is a high correlation (0.6302) between the educational level and Median income. This positive correlation between higher median incomes and higher education levels in the population, suggesting that areas with greater median incomes tend to have a more educated population. We attribute this relationship to several factors. Firstly, higher levels of education often lead to increased job opportunities and higher-paying professions, which in turn contribute to higher median incomes. Additionally, areas with well-developed educational institutions and a strong emphasis on education tend to attract individuals with higher levels of education. Conversely, it is also possible that higher median incomes enable individuals to invest more in education, pursuing advanced degrees and professional development, thereby further increasing their literacy levels.

To delve deeper into the relationship between fund flows and the proportion of seniors, we conduct a supplementary analysis using regression models and we present the results in Table 3. This approach enables a more meticulous examination of the variables, considering potential confounding factors, and offering statistical evidence to support the relationships. By employing regression analysis, we can gain a clearer understanding of the extent to which one variable influences the other, as well as assess the significance of these connections in a more robust and comprehensive manner.

**Seniors and fund flows- regression results**

Table 3 presents the results of a regression analysis investigating the relationship between mutual fund flows and the proportion of seniors, alongside various other fund characteristics. The primary variable of interest, Proportion of Seniors, represents the ratio of the population aged 65 years and above to the total population. The regression model incorporates additional independent variables, including Median income, Education level, Unemployment rates, Fund fees, market-adjusted returns (MAR), monthly total net assets, per capita income, and lagged MAR variables. The objective of this analysis is to assess the impact of the proportion of seniors on fund flows and gain valuable insights into the demographic and economic factors influencing the mutual funds industry. The t-statistics are presented in parentheses, and the significance levels are indicated as follows: *** for p<0.001, ** for p<0.01, and * for p<0.05.

| | **Fund Flows** |
|---|---|
| Proportion of Seniors | -0.0185*** |
| | (-22.5422) |
| Log Median Income | 0.6442*** |
| | (35.2800) |
| Education Level | -0.0010*** |
| | (-6.7159) |
| Unemployment Rates | 0.0506*** |
| | (25.6277) |
| Fund fees | 0.3453*** |
| | (5.2642) |
| Market Adjusted Returns | 0.4314*** |
| | (13.5860) |
| Log TNA | 0.0349*** |
| | (63.3209) |
| Log Per Capita Income | -0.1501*** |
| | (-14.4850) |
| Market Adjusted Returns (t-1) | -0.0094 |
| | (-0.2959) |
| Market Adjusted Returns (t-2) | -0.0098 |
| | (-0.3079) |
| Market Adjusted Returns (t-3) | -0.0408 |
| | (-1.2852) |
| Constant | -5.1579*** |
| | (-38.6140) |
| Adjusted R-squared | 5.03% |
| Observations | 125,754 |

* p<0.05, ** p<0.01, *** p<0.001

The regression analysis results in Table 3 sheds light on the relationship between fund flows and proportion of seniors, and various fund characteristics. The proportion of Seniors variable has a negative coefficient of -0.0185 (t = -22.54), which is statistically significant at the 1% level. The findings suggest that when the proportion of seniors in the population increases, there is a statistically significant decrease in fund flows. This finding aligns with the notion that older individuals, typically in or approaching retirement, may have different investment objectives and risk tolerances compared to younger investors. As a result, mutual funds operating in areas with a higher proportion of seniors may experience lower inflows of new investments, potentially due to a shift towards more conservative investment strategies or a higher preference for capital preservation.

Turning to control variables, the positive coefficient 0.6442(t=35.28) for the log median income variable indicates that higher median income levels positively influence mutual fund flows. This outcome can be attributed to the greater financial capacity of individuals with higher incomes to invest in mutual funds, potentially leading to increased fund inflows. The coefficient estimate of 0.0506 ($t$ =-25.63) suggests that there is a positive association between unemployment rates and fund flows. This implies that higher unemployment rates tend to be associated with increased fund flows. One explanation is that during periods of economic downturn or high unemployment, individuals may be more inclined to invest in mutual funds as an alternative investment vehicle to generate returns or diversify their portfolios. Additionally, higher unemployment rates may lead to increased savings or a shift in investment strategies, prompting individuals to allocate more funds to mutual funds.

We also find a significant positive relationship between the logarithm of total net assets (Log TNA) and fund flows of 0.035 ($t$ = -63.32). This suggests that as mutual funds' total net assets increase, there is a tendency for fund flows to rise as well. This relationship reflects investor confidence and perception of the fund's performance, as larger net assets indicate success and attract more investments. Additionally, larger funds often have greater marketing and distribution resources, contributing to increased fund flows.

Taken a whole, the regression results indicate a geographically segmented mutual fund market. In order to account for the potential differences in investment preferences across populations, we conduct a more detailed analysis to explore the impact of the presence of seniors on the flows into two distinct asset classes: Equity and fixed income. By focusing on these specific asset classes, we can gain insights into how the demographic factor of seniors influences the allocation of investments and the relative attractiveness of equity and fixed income securities. This analysis allows for a more nuanced understanding of the relationship between demographic characteristics and investment flows, providing valuable information for investors, fund managers, and policymakers in navigating the dynamics of these asset classes.

Up to this stage, we have focused on fund flows directed towards a single asset class. However, in Table 4, we shift our analysis to examine how the presence of seniors influences fund flows in two different asset classes. Analysing mutual fund flows and the proportion of seniors in various asset classes, including equity and fixed income, offers insights into how seniors' presence impacts investment patterns. By studying these asset classes separately, we can uncover variations in seniors' preferences, asset allocation decisions, and the interplay between market dynamics and demographics. This analysis improves our understanding of senior investors, aids in designing customized investment strategies, and informs the creation of appropriate investment products.

**Table 4: Equity and fixed income- how flows into the two asset classes are affected by the presence of seniors.**

This table provides evidence on the how fund flows into two asset classes and the proportion of seniors, along with several other fund characteristics. Equity mutual funds primarily invest in stocks or equities of various companies while Fixed Income mutual funds primarily invest in debt securities like bonds issued by governments, municipalities, corporations, or other entities. The t-statistics are enclosed in parentheses, and significance levels are indicated as follows: *** p<0.001, ** p<0.01, * p<0.05.

| | Equity<br>A | Equity<br>B | Taxable Fixed income<br>C | Taxable Fixed income<br>D | Tax free fixed income<br>E | Tax free fixed income<br>F |
|---|---|---|---|---|---|---|
| Proportion of Seniors | -0.0266***<br>(-30.0291) | -0.0266***<br>(-30.0806) | -0.0205***<br>(-8.1725) | -0.0205***<br>(-8.1686) | 0.0173***<br>(3.7683) | 0.0188***<br>(4.0730) |
| Log Median Income | 0.3711***<br>(19.0079) | 0.3715***<br>(19.0284) | 2.0293***<br>(38.3929) | 2.0298***<br>(38.3730) | 4.3467***<br>(35.7862) | 4.3359***<br>(35.6914) |
| Education Level | 0.0013***<br>(7.3888) | 0.0013***<br>(7.3910) | -0.0097***<br>(-22.6167) | -0.0097***<br>(-22.6156) | -0.0362***<br>(-48.7915) | -0.0361***<br>(-48.6267) |
| Unemployment Rates | 0.0665***<br>(31.5580) | 0.0666***<br>(31.5596) | -0.0126*<br>(-2.0812) | -0.0127*<br>(-2.0869) | -0.3056***<br>(-22.7240) | -0.3032***<br>(-22.5006) |
| Fund fees | 0.2310***<br>(3.5229) | 0.2268***<br>(3.4575) | 20.7335***<br>(35.3883) | 20.7369***<br>(35.3837) | 22.6167***<br>(20.9760) | 22.5150***<br>(20.8772) |
| Market Adjusted Returns | 0.6524***<br>(17.0170) | 0.6526***<br>(17.0180) | -0.0596<br>(-0.8406) | -0.0557<br>(-0.7822) | 0.1076<br>(1.4617) | 0.0960<br>(1.2963) |
| Log TNA | 0.0331***<br>(55.7457) | 0.0331***<br>(55.7645) | 0.0459***<br>(29.5843) | 0.0459***<br>(29.5661) | 0.0122***<br>(4.4361) | 0.0125***<br>(4.5402) |
| Log Per Capita Income | -0.0164<br>(-1.4679) | -0.0164<br>(-1.4652) | -0.8893***<br>(-27.8484) | -0.8894***<br>(-27.8471) | -1.3506***<br>(-25.4854) | -1.3454***<br>(-25.3805) |
| Market Adjusted Returns (t-1) | | 0.0047<br>(0.1233) | | -0.0363<br>(-0.5085) | | 0.0808<br>(1.0934) |
| Market Adjusted Returns (t-2) | | -0.0419<br>(-1.0936) | | 0.0195<br>-0.2737 | | 0.1323<br>(1.7888) |
| Market Adjusted Returns (t-3) | | -0.0678<br>(-1.7680) | | -0.0160<br>(-0.2253) | | 0.1581*<br>(2.1314) |
| Constant | -3.6452***<br>(-25.0253) | -3.6495***<br>(-25.0537) | -11.9798***<br>(-32.3668) | -11.9833***<br>(-32.3479) | -31.0263***<br>(-38.0554) | -30.9973***<br>(-38.0283) |
| Adjusted R-squared | 5.56% | 5.56% | 16.73% | 16.72% | 23.59% | 23.64% |
| Observations | 97,447 | 97,444 | 17,848 | 17,848 | 10,462 | 10,462 |

* p<0.05, ** p<0.01, *** p<0.001

We present the results of these regressions in Table 4 above. In Column A and B, it is evident that the percentage of seniors exerts a notable adverse impact on fund flows within the Equity asset class. The coefficients in Column A and B of -0.026 (t = -30.02) and -0.026(t= -30.08) respectively demonstrate that an increase in the proportion of seniors corresponds to a decline in Equity fund flows. Furthermore, this association remains unaffected by the presence of market-adjusted returns. In columns C and D, the effect is slightly lower (-0.0205***) in the fixed income (Taxable) regressions compared to the equity regressions. On the hand, in column E and F, results indicate that there is statistically positive relationship between fund flows and proportion of seniors in a tax-free fixed income asset class of (0.0173***) and (0.0188**) respectively. This could be a suggestion that seniors may find tax- free fixed income assets more attractive and prefer to allocate a larger portion of their investments in these assets. Tax-free fixed income assets, such as municipal bonds, provide tax advantages and can be appealing to investors seeking tax-exempt income. As expected, the number of observations in Equity asset class is more compared to both Tax- and Tax-Free Fixed income asset class. This could be due to the reason that Equity asset classes have higher trading volumes and turnover compared to Fixed income asset classes and encompass a broader range of investment opportunities such as investment in various companies across different sectors and industries. Furthermore, unlike the findings of Kim et al. (2019) in a previous research using data from 293 country-year observations, which indicated that individuals in their early 60s, who recently became part of the older generation, exhibited reduced aversion to market risk and a greater inclination towards equity funds, our study aligns with the life cycle risk-aversion hypothesis. This discrepancy could be attributed to the fact that our investigation delved extensively into mutual funds located in the United States, thereby minimizing the influence of contextual factors stemming from variations in political systems, cultural norms, economic development, and historical events.

Overall, the divergent relationships between fund flows and the proportion of seniors in taxable and tax-free fixed income asset classes indicate that the preferences, risk tolerance, and investment behaviour of senior investors differ based on the tax implications.

The results thus far indicate a strong relationship between mutual fund flows and proportion of seniors. We further carry out various robustness tests on the main results. We assess the relationship between funds flows and proportion of seniors across different time periods. By examining the relationship over different time periods, we can better understand how the relationship between fund flows and the proportion of seniors may evolve and change over time. This analysis can reveal any temporal patterns or trends that may exist and help identify if the relationship is consistent or is subject to fluctuations. It is also possible that over time, policies, and regulatory changes such as changes in tax laws, retirement policies happen, and these could consequently affect funds flows.

### 4.2 Robustness tests

#### 4.2.1 Effects of the 2007-2008 Global Financial Crisis (GFC).

The GFC, which occurred in 2008 and had far-reaching implications for the global economy. The crisis, triggered by the collapse of the subprime mortgage market in the United States, led to a widespread credit crunch, sharp declines in asset prices, and increased market volatility. As a result, investors' confidence was severely shaken, leading to significant changes in their investment behaviour and preferences.

Furthermore, owing to their substantial size and interconnectedness with other financial entities, mutual funds can contribute to the spread of financial shocks. These channels of contagion primarily stem from mutual funds' involvement in financing banks through mechanisms such as repurchase agreements, deposits, or holdings of securities issued by financial institutions. Notably, the interconnections through bank funding are particularly significant in the United States, where money market funds (MMFs) serve as the primary source of short-term funding for financial institutions (Kacperczyk & Schnabl, 2013). We thus expect the crisis to have had a significant impact on mutual fund flows.

Table 5 categorizes the model into three time periods: before, during, and after the GFC (2000-2006, 2007-2011, and 2012-2019, respectively). Throughout these periods, similar to the main findings, we still find a statistically significant negative relationship between the proportion of seniors and mutual fund flows. Notably, during and after the crisis, the variable Proportion of Seniors demonstrates higher coefficients (-0.02) and t-values exceeding -15.503 for models 1 and 2. The consistent negative relationship between the proportion of seniors and mutual fund flows across different time periods confirms that older individuals maintain stable, long-term investment preferences and economic conditions and consequently this may not significantly change the investment patterns of the senior investors. Our findings complement Korniotis and Kumar (2011), who reveal that older investors have less risky portfolios, prefer diversification, trade less frequently, engage in year-end tax-loss selling, and exhibit weaker behavioural biases. Seniors' investment decisions may prioritize wealth and capital preservation, reducing reliance on mutual funds. Overall, the GFC did not significantly impact the relationship between seniors and mutual fund flows, indicating that their investment strategies remain resilient and aligned with long-term objectives and risk tolerance.

**Table 5:** Sub sample test results: Classification based on time periods

This table reports the robustness test result for the regression analysis that explores the relationship between fund flows and the proportion of seniors, along with several other fund characteristics. Model 1, Model 2, and Model 3 represent the period before, during and after the GFC. The t-statistics are enclosed in parentheses, and significance levels are indicated as follows: *** p<0.001, ** p<0.01, * p<0.05.

| | **Model 1 (2000-2006)** | **Model 1 (2000-2006)** | **Model 2 (2007-2011)** | **Model 2 (2007-2011)** | **Model 3 (2012-2019)** | **Model 3 (2012-2019)** |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Proportion of Seniors | -0.0051*** | -0.0050*** | -0.0272*** | 0.0271*** | -0.0246*** | -0.0245*** |
| | (-3.7034) | (-3.6397) | (-15.5031) | (-15.4583) | (-17.2158) | (-17.1721) |
| Log Median Income | 0.3865*** | 0.3865*** | 0.7968*** | 0.7950*** | 0.8622*** | 0.8594*** |
| | (14.1391) | (14.1401) | (21.5741) | (21.5264) | (25.6052) | (25.5270) |
| Education Level | -0.0028*** | -0.0028*** | -0.0001 | -0.0001 | -0.0006* | -0.0007* |
| | (-11.8397) | (-11.8513) | (-0.3285) | (-0.3143) | (-2.3491) | (-2.4212) |
| Unemployment Rates | 0.0317*** | 0.0318*** | 0.0640*** | 0.0641*** | 0.0511*** | 0.0508*** |
| | (9.3792) | (9.4264) | (17.3567) | (17.3891) | (15.7539) | (15.6675) |
| Fund fees | 0.1020 | 0.0959 | 0.1033 | 0.1182 | 9.8706*** | 9.9435*** |
| | (1.2001) | (1.1283) | (0.9425) | (1.0768) | (23.5035) | (23.6739) |
| Market Adjusted Returns | 0.4131*** | 0.4098*** | 0.5082*** | 0.5013*** | 0.2100** | 0.1951** |
| | (9.3674) | (9.2798) | (8.7086) | (8.4539) | (2.7823) | (2.5798) |
| Log TNA | 0.0349*** | 0.0350*** | 0.0299*** | 0.0299*** | 0.0459*** | 0.0460*** |
| | (42.1020) | (42.1761) | (28.0186) | (27.9720) | (42.4291) | (42.5231) |
| Log Per Capita Income | -0.0760*** | -0.0757*** | -0.1654*** | 0.1645*** | -0.2068*** | -0.2056*** |
| | (-4.6511) | (-4.6334) | (-8.2683) | (-8.2273) | (-11.4519) | (-11.3878) |
| Market Adjusted Returns (t-1) | | -0.0199 | | -0.0138 | | -0.1956** |
| | | (-0.4513) | | (-0.2310) | | (-2.5844) |
| Market Adjusted Returns (t-2) | | -0.0710 | | 0.1260* | | -0.2693*** |
| | | (-1.6109) | | (2.0998) | | (-3.5498) |
| Market Adjusted Returns (t-3) | | -0.1290** | | 0.1658** | | -0.2943*** |
| | | (-2.9435) | | (2.7275) | | (-3.9566) |
| Constant | -3.1925*** | -3.1972*** | -6.5984*** | 6.5895*** | -7.0378*** | -7.0246*** |
| | (-16.4730) | (-16.4979) | (-24.2308) | (-24.2010) | (-27.8338) | (-27.7908) |
| Adjusted R-squared | 4.22% | 4.24% | 5.79% | 5.82% | 8.51% | 8.58% |
| Observations | 53,601 | 53,598 | 34,403 | 34,403 | 37,753 | 37,753 |

* p<0.05, ** p<0.01, *** p<0.001

### 4.2.2 Classification based on Total Net Assets (TNA)

We also conduct a robustness test to examine the relationship between the proportion of seniors and mutual fund flows, focusing on classification based on Total Net Assets (TNA). Total Net Assets is a critical metric representing the total value of assets held by a mutual fund. By classifying mutual funds

into different asset size categories, we aim to assess whether the observed relationship between seniors and mutual fund flows remains consistent across varying fund sizes.

Table 6 introduces a breakdown of the model classification based on the Total Net Assets of the mutual funds. The assessment is conducted considering two specific categories: 1). funds with a Total Net Asset Value of Less than $15 Million and 2). funds with a Total Net Asset Value of Above $15 Million. The size of a mutual fund's assets can significantly impact its investment strategies, market position, and operational dynamics. By categorizing funds based on Total Net Assets, we can gain insights into how fund size relates to the relationship between fund flows and the proportion of seniors. Specifically, it is important to assess whether investors in smaller funds may have distinct preferences, risk appetites, and investment goals compared to those in larger funds. Moreso, large funds are expected to be more liquid and provide a wide range of investment options there by attracting more inflows than outflows as compared to the small funds. Larger funds are also perceived as more stable and trustworthy by investors. Investors may feel more comfortable investing in funds with larger assets under management (AUM) due to the perception that these funds have a stronger record and better risk management capabilities. As a result, larger funds may attract more inflows from investors.

**Table 6**: Sub sample testing: Classification based on Total Net Assets

This table reports the robustness test result for the regression analysis that explores the relationship between fund flows and the proportion of seniors, along with several other fund characteristics. Model 1 represent fund size of less than $15m while Model 2 represents fund size of more than $15m. The t-statistics are enclosed in parentheses, and significance levels are indicated as follows: *** p<0.001, ** p<0.01, * p<0.05.

| | **Model 1 (tna <= $15m)** | **Model 1 (tna <= $15m)** | **Model 2 (tna >15m)** | **Model 2 (tna >15m)** |
|---|---|---|---|---|
| | A | B | C | D |
| Proportion of Seniors | -0.0256*** | -0.0256*** | -0.0187*** | -0.0188*** |
| | (-13.1733) | (-13.1812) | (-20.9696) | (-21.0818) |
| Log Median Income | 0.0744* | 0.0734* | 0.8192*** | 0.8198*** |
| | (2.1428) | (2.1135) | (39.2214) | (39.2492) |
| Education Level | 0.0005 | 0.0006 | -0.0028*** | -0.0028*** |
| | (1.3026) | (1.3359) | (-17.1508) | (-17.1632) |
| Unemployment Rates | 0.1201*** | 0.1201*** | 0.0270*** | 0.0269*** |
| | (26.1707) | (26.1815) | (12.4846) | (12.4581) |
| Fund fees | -0.4764*** | -0.4674*** | 8.8642*** | 8.8765*** |
| | (-7.7099) | (-7.5377) | (40.7686) | (40.8163) |
| Market Adjusted Returns | 0.6297*** | 0.6253*** | 0.3789*** | 0.3812*** |
| | (8.3212) | (8.2558) | (11.0755) | (11.1343) |
| Log TNA | 0.0119*** | 0.0117*** | 0.0343*** | 0.0343*** |
| | (4.7388) | (4.6661) | (47.2653) | (47.2290) |
| Log Per Capita Income | 0.1909*** | 0.1918*** | -0.2141*** | -0.2139*** |
| | (8.8395) | (8.8793) | (-18.2562) | (-18.2405) |
| Market Adjusted Returns (t-1) | | 0.1265 | | -0.0487 |
| | | (1.6594) | | (-1.4247) |
| Market Adjusted Returns (t-2) | | 0.0280 | | -0.0355 |
| | | (0.3666) | | (-1.0380) |
| Market Adjusted Returns (t-3) | | 0.0778 | | -0.0784* |
| | | (1.0192) | | (-2.2920) |
| Constant | -2.8642*** | -2.8631*** | -6.3357*** | -6.3428*** |
| | (-9.0327) | (-9.0296) | (-43.0345) | (-43.0786) |
| Adjusted R-squared | 9.33% | 9.33% | 5.28% | 5.28% |
| Observations | 13,398 | 13,398 | 112,356 | 112,356 |

* p<0.05, ** p<0.01, *** p<0.001

The findings from table 6 provide evidence that, irrespective of the size of the mutual fund, there remains a consistent negative relationship between fund flows and the proportion of seniors. Besides, even after accounting for several factors such as median income, educational level, unemployment rates, expense ratios, and market-adjusted returns, the significantly negative coefficients persists. Specifically, the coefficient for the proportion of seniors is -0.0256 (t = -13.1733) for fund sizes less than or equal to $15 million, -0.0256 (t = -13.18) for the same fund size category, -0.0187(t = -20.96) for fund sizes above $15 million, and -0.0188(t = -21.08) for the same fund size category. These results emphasize the robustness of the negative relationship between the proportion of seniors and fund flows, which remains significant even after controlling for various influencing factors.

### 4.2.3 Wealth classifications

As the population continues to age and approaches retirement, there is a noticeable shift in their financial behaviour. Seniors tend to increasingly rely on their pension funds or personal savings, rather than earning income through employment. This transition from active employment to retirement income sources often leads to decreased median income levels in areas with a higher proportion of elderly residents. Consequently, regions with a significant senior population are expected to experience lower median income levels.

The impact of this demographic trend extends beyond individual financial circumstances and affects the investment landscape in these regions. With lower median incomes, there is a reduction in the overall investment capacity and financial resources of the population. As a result, the participation in mutual funds and other investment opportunities is expected to decline in these areas. Investors residing in such regions might exhibit a more risk-averse attitude, preferring conservative investment options that prioritize wealth preservation over aggressive investment strategies. This conservative approach is driven by the desire to secure their financial future and ensure a stable financial footing during their retirement years. In Table 7, we further expound this phenomenon by categorizing funds based on two wealth groups (Low vs High), as measured by median income.

**Table 7: Funds sorted by Wealth.**

This table presents results from regressions of mutual fund flows against proportion of seniors and a number of control variables as described in Table 1: Panel A. Specifically, the funds are sorted in two wealth groups i.e. Low and High. *t*-statistics are in reported in parentheses below each coefficient ***, **, and * denote statistical significance at the 1%, 5% and 10% levels.

| | LOW | | HIGH | |
|---|---|---|---|---|
| | A | B | C | D |
| Proportion of Seniors | -0.0327*** | -0.0329*** | 0.0186*** | 0.0186*** |
| | (-36.0774) | (-36.1266) | (-7.2932) | (-7.2240) |
| Log Median Income | 0.7221*** | 0.7237*** | 0.7100*** | 0.7096*** |
| | (-29.0824) | (-29.1310) | (-9.7556) | (-9.7459) |
| Education Level | 0.0041*** | 0.0041*** | 0.0175*** | 0.0175*** |
| | (-17.0284) | (-17.0177) | (-9.6270) | (-9.6229) |
| Unemployment Rates | 0.0592*** | 0.0593*** | 0.0689*** | 0.0689*** |
| | (-23.4934) | (-23.5180) | (-12.9396) | (-12.8821) |
| Fund Fees | -0.0691 | -0.0733 | 4.3328*** | 4.3314*** |
| | (-1.0270) | (-1.0895) | (-12.7009) | (-12.6951) |
| Market Adjusted Returns | 0.4109*** | 0.4127*** | 0.4323*** | 0.4330*** |
| | (-10.8373) | (-10.8768) | (-7.6626) | (-7.6651) |
| Log TNA | 0.0345*** | 0.0345*** | 0.0299*** | 0.0299*** |
| | (-53.7850) | (-53.7674) | (-26.6136) | (-26.6256) |
| Log Per Capita Income | 0.0184 | 0.0179 | -0.3282*** | -0.3281*** |
| | (-1.2021) | (-1.1710) | (-17.1388) | (-17.1107) |
| Market Adjusted Returns (t-1) | | -0.0362 | | 0.0125 |
| | | (-0.9530) | | (-0.2212) |
| Market Adjusted Returns (t-2) | | -0.0300 | | 0.0023 |
| | | (-0.7900) | | (-0.0407) |
| Market Adjusted Returns (t-3) | | -0.0611 | | -0.0281 |
| | | (-1.6101) | | (-0.4990) |
| constant | -7.7812*** | -7.7922*** | -5.0970*** | -5.0930*** |
| | (-48.2076) | (-48.2462) | (-6.8720) | (-6.8572) |
| Adjusted R-Squared | 7.16% | 7.17% | 5.64% | 5.64% |
| Observations | 88,501 | 88,501 | 37,253 | 37,253 |
| * p<0.05, ** p<0.01, | *** p<0.001 | | | |

The results in Table 7 indicate that there is a significant difference in the relationship between the proportion of seniors and mutual fund flows based on the wealth group i.e., low vs High. Specifically in Panel A and B the relationship is highly significant -0.03 ($t$=-36.0774) and -0.03 ($t$=-36.1266) regardless of whether we control of lagged Market adjusted returns. On the other hand, Panel C and D show that there is statistically positive relationship between proportional of seniors and mutual fund flows at 0.0186 ($t$ = -7.29) and 0.018 ($t$ = -7.22). As expected, seniors in the low wealth group might have limited financial resources and lower disposable income for investments and as such observe a decreased level of participation in mutual funds while seniors in the high-income group have a higher discretionary income that is beyond meeting essential expenses and this allows for greater capacity to invest in various financial investments. Moreover, seniors in the high wealth group have more financial independence considering that they will have accumulated substantial wealth through higher earning, investment from their successful careers. As a result, they are more likely to invest in mutual funds for capital growth and to potentially diversify the investment portfolios. In summary, these findings underscore the importance of considering wealth levels when assessing the impact of the proportion of seniors on mutual fund flows, as distinct relationships emerge within the different economic strata.

### 4.2.4 Expense ratio

Numerous studies have investigated how the fees charged by mutual funds, such as expense ratios and front-end loads, influence the inflow and outflow of funds from these investment vehicles. Barber et al. (2005) examine the influence of front-end loads and expense ratios on individual investors' decisions regarding mutual fund investments. However, their focus is primarily on the relationship between aggregated net fund flows across many individuals and lagged values of expense ratios and front-end loads. They do not specifically analyse the decisions of individual investors to sell mutual fund shares after acquiring them. According to Barber et al. (2005) the results indicate that net fund flows are significantly affected by prominent costs like front-end loads, while they appear to be less responsive to

subtler, ongoing costs such as expense ratios. Ivković and Weisbenner (2009) find that mutual fund investors prefer funds with lower expense ratios, leading to a negative fee-fund flow relationship. On this premise, we supplement previous findings by assessing whether the relationship between funds flows and proportion of seniors can be explained by expense fees charged by the funds.

We sort funds into three categories by expense rations. Table 8 reports the estimated slope coefficients on proportional of seniors. In both panel A and B, we observe that there is a positive relationship between the proportion of seniors and fund flows in the low fees group. we observe a coefficient of 0.0077(t = -6.1733) in the group where we do not control for MAR and when controlling for MAR, the coefficient is slightly lower at 0.0074(t = -5.9035). On the contrary, we find a negative relationship for both the medium and high fees group regardless of whether we control for MAR and other variables in the regression. Moreover, we also find a highly significant relationship between expense ratio and funds flows in the low fees group: 7.4650 (t = -10.5385) in panel A and 7.4658 (t = -10.5413) in panel B. In Panels C and D, the coefficient estimates are -5.1761 (t = -2.8955) and -5.1826 (t = -2.8985), respectively. Likewise, in Panels E and F, the coefficient estimates are -0.0824 (t = -1.2734) and -0.0767 (t = -1.1838), respectively. Across panels C to F, the consistent findings highlight a negative relationship between expense ratios and fund flows.

An explanation for our results is that high expense ratios can diminish the overall returns. As a result, senior investors who often have a lower risk tolerance and longer investment horizons may be particularly averse to such fees in preference for lower cost funds. Consequently, they will be more fund flows into low expense fees group compared the medium and high expense fees group.

**Table 8: Funds are sorted by expense ratio into Terciles**

This table presents results from regressions of mutual fund flows against proportion of seniors and a number of control variables as described in Table 1: Panel A. Funds are categorized in the terciles based on the variable, expense ratio namely, Low, Medium, and high expense fees. *t*-statistics are in reported in parentheses below each coefficient ***, **, and * denote statistical significance at the 1%, 5% and 10% levels.

| | Low fees | | Medium fees | | High fees | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Proportion of Seniors | 0.0077*** | 0.0074*** | -0.0171*** | -0.0173*** | -0.0294*** | -0.0293*** |
| | (-6.1733) | (-5.9035) | (-11.7407) | (-11.8307) | (-22.5917) | (-22.4954) |
| Log Median Income | 0.8554*** | 0.8592*** | 0.1361*** | 0.1374*** | 0.4340*** | 0.4329*** |
| | (-23.5821) | (-23.6817) | (-4.3207) | (-4.3621) | (-15.0098) | (-14.9718) |
| Education Level | -0.0025*** | -0.0025*** | 0.0011*** | 0.0011*** | -0.0019*** | -0.0019*** |
| | (-9.2364) | (-9.2170) | (-4.1713) | (-4.1591) | (-7.4273) | (-7.3929) |
| Unemployment Rates | 0.0011 | 0.0009 | 0.0279*** | 0.0278*** | 0.1306*** | 0.1308*** |
| | (-0.2661) | (-0.2197) | (-10.1818) | (-10.1637) | (-31.0876) | (-31.1204) |
| Expense ratio | 7.4650*** | 7.4658*** | -5.1761** | -5.1826** | -0.0824 | -0.0767 |
| | (-10.5385) | (-10.5413) | (-2.8955) | (-2.8985) | (-1.2734) | (-1.1838) |
| Market Adjusted Returns | 0.1718** | 0.1738** | 0.3160*** | 0.3194*** | 0.7105*** | 0.7100*** |
| | (-3.1606) | (-3.1944) | (-5.3200) | (-5.3656) | (-15.0134) | (-14.9966) |
| Log TNA | 0.0260*** | 0.0259*** | 0.0196*** | 0.0196*** | 0.0608*** | 0.0608*** |
| | (-24.1930) | (-24.0666) | (-21.7995) | (-21.8064) | (-70.2656) | (-70.2337) |
| Log Per Capita Income | -0.0913*** | -0.0926*** | 0.0572*** | 0.0570*** | -0.1371*** | -0.1369*** |
| | (-4.0739) | (-4.1299) | (-3.4233) | (-3.4099) | (-8.4520) | (-8.4400) |
| Market Adjusted (t-1) | | -0.1252* | | -0.0575 | | 0.087 |
| | | (-2.3035) | | (-0.9669) | | (-1.8385) |
| Market Adjusted (t-2) | | -0.1078* | | -0.0251 | | 0.0416 |
| | | (-1.9811) | | (-0.4215) | | (-0.8805) |
| Market Adjusted (t-3) | | -0.1474** | | -0.0473 | | 0.0132 |
| | | (-2.7099) | | (-0.7953) | | (-0.2781) |
| Constant | -8.2687*** | -8.2912*** | -1.7598*** | -1.7697*** | -3.1750*** | -3.1682*** |
| | (-35.7203) | (-35.8126) | (-7.1191) | (-7.1572) | (-14.9794) | (-14.9444) |
| Adjusted R-Squared | | 6.30% | | 2.01% | | 15.24% |
| Observations | | 42,640 | | 41,431 | | 41,683 |

* p<0.05, ** p<0.01, *** p<0.001

### 4.2.5 The impact of SEC Rule 22c- 2

We further conduct robustness test to assess the impact of the SEC Rule 22c-2 on the relationship between mutual fund flows and the proportion of seniors. Rule 22c-2, also known as the "anti-dilution rule," was implemented by the Securities and Exchange Commission (SEC) to address potential market timing and late trading abuses in mutual funds[17]. Rule 22c-2 outlines that if a fund redeems its shares within seven days, its board must evaluate the option of imposing a redemption fee of up to two percent of the value of the shares redeemed shortly after their purchase. This fee is aimed at discouraging frequent trading practices that could negatively impact long-term investors. Additionally, the rule mandates such funds to establish agreements with their intermediaries, granting fund management the capability to identify investors who engage in trading that violates the fund's restrictions on short-term trading. These agreements, known as "shareholder information agreements," enable better monitoring and enforcement of trading policies, contributing to greater transparency and accountability within the mutual fund industry.

In this analysis, we examine the period before and after the implementation of Rule 22c-2 to understand how it may have influenced the investment behaviour of senior investors. In Table 9, Panel A shows the coefficients for the proportion of seniors as 0.0015 (t = -0.9215) and 0.0015 (t = -0.9578), respectively. These results indicate that there is no statistically significant relationship between mutual fund flows and the proportion of seniors before the implementation of SEC Rule 22c-2. However, in contrast, after the enactment of SEC Rule 22c-2, we observe a consistently negative relationship between mutual fund flows and the proportion of seniors. Panel C and Panel D both reveal coefficients of -0.0263 (t = -28.4625) and -0.0263 (t = -28.4378), respectively, implying that the negative relationship remains highly statistically significant after the rule's implementation. These findings suggest that the regulatory intervention of SEC Rule 22c-2 had a notable impact on the relationship between mutual fund flows and

[17] *See* Mutual Fund Redemption Fees, Investment Company Act Release No. 26782 (Mar. 11, 2005) [70 FR 13328 (Mar. 18, 2005)] (“Adopting Release”)

the proportion of seniors, resulting in a significant reduction in mutual fund flows for funds with a higher proportion of senior investors.

The main aim of the SEC Rule 22c-2 was to curb market timing and late trading abuses, which were common practices that could adversely affect long-term investors. By imposing redemption fees on short-term trading and enabling better monitoring through shareholder information agreements, the rule discouraged frequent trading practices and potentially made it less appealing for senior investors to engage in such activities. Our results also suggest that there is a possibility that seniors became more cautious about engaging in short-term trading activities due to the imposition of redemption fees, leading to a reduction in mutual fund flows for funds where a higher proportion of seniors were present.

**Table 9: Examining the impact of the SEC rule 22c-2**

This table reports the regression findings of mutual fund flows against the proportion of seniors and various control variables, as detailed in Table 1: Panel A. The reported results in Panels A and B pertain to the period before the enactment of SEC Rule 22c-2, while Panels C and D focus on the period after the enactment of the rule. The t-statistics are presented in parentheses.

| | Before SEC Rule 22c-2 (2005) | | After SEC Rule 22c-2 (2005) | |
|---|---|---|---|---|
| | A | B | C | D |
| Proportion of Seniors | 0.0015 | 0.0015 | -0.0263*** | -0.0263*** |
| | (-0.9215) | (-0.9578) | (-28.4625) | (-28.4378) |
| Log Median Income | 0.3744*** | 0.3744*** | 0.7922*** | 0.7923*** |
| | (-11.7115) | (-11.7117) | (-35.4501) | (-35.4498) |
| Education Level | -0.0029*** | -0.0029*** | -0.0008*** | -0.0008*** |
| | (-9.9864) | (-9.9829) | (-4.4087) | (-4.4128) |
| Unemployment Rates | 0.0194*** | 0.0195*** | 0.0580*** | 0.0580*** |
| | (-4.5761) | (-4.6155) | (-26.0393) | (-26.0272) |
| Fund Fees | 0.1845 | 0.1792 | 0.4400*** | 0.4390*** |
| | (-1.8354) | (-1.7822) | (-5.0517) | (-5.0376) |
| Market Adjusted Returns | 0.3898*** | 0.3872*** | 0.4551*** | 0.4571*** |
| | (-8.3443) | (-8.2645) | (-10.4214) | (-10.4249) |
| Log TNA | 0.0393*** | 0.0394*** | 0.0331*** | 0.0331*** |
| | (-39.2544) | (-39.291) | (-49.5681) | (-49.5644) |
| Log Per Capita Income | -0.1178*** | -0.1175*** | -0.1597*** | -0.1597*** |
| | (-6.0813) | (-6.0668) | (-13.0305) | (-13.0322) |
| Market Adjusted Returns (t-1) | | -0.0042 | | -0.0372 |
| | | (-0.0894) | | (-0.8454) |
| Market Adjusted Returns (t-2) | | -0.0351 | | -0.0046 |
| | | (-0.7478) | | (-0.1038) |
| Market Adjusted Returns (t-3) | | -0.1156* | | 0.0135 |
| | | (-2.4782) | | -0.3068 |
| constant | -2.6555*** | -2.6597*** | -6.5889*** | -6.5899*** |
| | (-11.7264) | (-11.7444) | (-39.7777) | (-39.7769) |
| Adjusted R-Squared | 4.75% | 4.76% | 5.84% | 5.84% |
| Observations | 37,796 | 37,793 | 87,961 | 87,961 |

* p<0.05, ** p<0.01, *** p<0.001

### 4.2.6 Money Market Fund Reforms (2010)

In the wake of the 2007-2008 GFC, the U.S. Securities and Exchange Commission (SEC) made regulatory changes in a bid to enhance the resilience and stability of the money market industry. For instance, all money market funds were required to hold at least 30% of their total assets in Weekly liquid assets and also taxable money market funds were required to hold 10% of their total assets in daily liquid

assets[18]. The reforms also allowed money market funds to impose liquidity fees of up 2% on redemptions and implement temporary redemption gates, preventing investors from making withdrawals for a limited period during times of market turmoil. These reforms represented a significant step towards strengthening the regulatory framework surrounding money market funds and promoting greater stability and confidence in the broader financial system.

In Table 10, we re-examine the relationship between mutual fund flows and proportion of seniors before and after the money market reforms were implemented. The results across all panels still indicate a statistically significant negative relationship regardless of whether we control for MAR. An explanation is that the reform provision for liquidity fees and redemption gates could have discouraged investors from using money market funds as a liquid cash management tool. Instead, investors might have favoured more flexible options to access their funds when needed, leading to a negative impact on fund flows. Moreover, these reforms could have created uncertainty among investors about the future stability and structure of money market funds. Consequently, this could have led the senior investors to reduce their exposure to money market funds.

[18] https://www.sidley.com/en/insights/newsupdates/2022/01/sec-proposes-new-rule-amendments-for-money-market-funds

**Table 10: Money Market Fund Reforms (2010)**

This table reports the regression findings of mutual fund flows against the proportion of seniors and various control variables, as detailed in Table 1: Panel A. The reported results in Panels A and B pertain to the period before the Money market fund reforms, while Panels C and D focus on the period after the Money market fund reforms of 2010. The t-statistics are presented in parentheses.

| | Before Money Market Fund Reforms (2010) | | After Money Market Fund Reforms (2010) | |
|---|---|---|---|---|
| | A | B | C | D |
| Proportion of Seniors | -0.0077*** | -0.0078*** | -0.0298*** | -0.0299*** |
| | (-6.9648) | (-6.9847) | (-23.8642) | (-23.9656) |
| Log Median Income | 0.4620*** | 0.4620*** | 0.9397*** | 0.9397*** |
| | (-19.721) | (-19.7204) | (-31.6241) | (-31.6298) |
| Education Level | -0.0019*** | -0.0019*** | -0.0003 | -0.0003 |
| | (-9.4957) | (-9.4849) | (-1.4080) | (-1.4467) |
| Unemployment Rates | 0.0440*** | 0.0440*** | 0.0564*** | 0.0561*** |
| | (-16.0378) | (-16.0500) | (-19.7691) | (-19.6800) |
| Fund Fees | 0.1045 | 0.105 | 1.3894*** | 1.3675*** |
| | (-1.4204) | (-1.4259) | (-9.2348) | (-9.0859) |
| Market Adjusted Returns | 0.4635*** | 0.4648*** | 0.2711*** | 0.2670*** |
| | (-12.3791) | (-12.3963) | (-4.4159) | (-4.3428) |
| Log TNA | 0.0330*** | 0.0330*** | 0.0418*** | 0.0418*** |
| | (-47.1867) | (-47.1742) | (-44.7956) | (-44.8206) |
| Log Per Capita Income | -0.0882*** | -0.0881*** | -0.2364*** | -0.2364*** |
| | (-6.4259) | (-6.4129) | (-14.9385) | (-14.9412) |
| Market Adjusted Returns (t-1) | | 0.0073 | | -0.1407* |
| | | (-0.1939) | | (-2.2959) |
| Market Adjusted Returns (t-2) | | 0.0297 | | -0.1915** |
| | | (-0.7891) | | (-3.1333) |
| Market Adjusted Returns (t-3) | | -0.0245 | | -0.1585** |
| | | (-0.6534) | | (-2.5773) |
| constant | -3.9103*** | -3.9121*** | -7.3778*** | -7.3769*** |
| | (-23.2950) | (-23.3044) | (-33.0739) | (-33.0755) |
| Adjusted R-Squared | 4.22% | 4.22% | 7.34% | 7.37% |
| Observations | 75,538 | 75,535 | 50,219 | 50,219 |

* p<0.05, ** p<0.01, *** p<0.001

.

4.2.7 Pension Protection Act 2006.

Finally, we also conduct robustness tests basing on what effects the Pension Protection Act (PPA) of 2006 could have had on the relationship between mutual fund flows and proportion of seniors. Our analysis is premised upon the idea that primarily, the Act had significant implications on retirement savings and investments in the USA and consequently this could have affected mutual fund flows. For instance, the PPA encouraged automatic enrolment of employees in employer-sponsored retirement

plans, such as 401(k) plans. When employees were automatically enrolled, their contributions were directed into default investment options, often target-date funds, or balanced funds, which typically invest in mutual funds. The PPA also gradually increased the annual contribution limits for retirement accounts, allowing individuals to contribute more to their retirement savings (Poterba et al., 2011). We anticipate that this increase in retirement savings could have led to more inflows. Due to an enhanced retirement security and promotion of retirement savings, investor confidence might have also increased and that could have translated into more investment in mutual funds especially those offered within retirement plans.

In Table 11, we present the results from the robustness tests examining the impact of the Pension Protection Act 2006. In Panels A and B, the coefficient estimates for the proportion of seniors (-0.0021, t = -1.5548 and -0.0021, t = -1.5227, respectively) show no statistically significant effect on mutual fund flows before the enactment of the Pension Protection Act (PPA). However, in Panels C and D, the coefficient estimates for the proportion of seniors (-0.0275, t = -27.4942; and -0.0275, t = -27.4391, respectively) are statistically significant and consistent with the main findings of this study. An explanation of these findings is that majority of the seniors are near or in retirement, the PPA could have mostly affected the young generation that forms majority of the workforce by encouraging them to participate in savings and retirement plans.

**Table 11: Pension Protection Act 2006**

This table reports the regression findings of mutual fund flows against the proportion of seniors and various control variables, as detailed in Table 1: Panel A. The reported results in Panels A and B pertain to the period before the enactment of Pension Protection Act 2006, while Panels C and D focus on the period after the enactment of the Act. The t-statistics are presented in parentheses.

| | **Before** | | **After** | |
|---|---|---|---|---|
| | A | B | C | D |
| Proportion of Seniors | -0.0021 | -0.0021 | -0.0275*** | -0.0275*** |
| | (-1.5548) | (-1.5227) | (-27.4942) | (-27.4391) |
| Log Median Income | 0.3678*** | 0.3680*** | 0.8560*** | 0.8557*** |
| | (-13.0900) | (-13.0993) | (-35.3272) | (-35.3107) |
| Education Level | -0.0029*** | -0.0029*** | -0.0004 | -0.0004 |
| | (-11.6858) | (-11.7007) | (-1.9082) | (-1.9023) |
| Unemployment Rates | 0.0316*** | 0.0318*** | 0.0582*** | 0.0582*** |
| | (-9.0040) | (-9.0458) | (-24.3903) | (-24.3965) |
| Fund Fees | 0.1275 | 0.1219 | 0.6272*** | 0.6292*** |
| | (-1.4558) | (-1.3918) | (-6.2614) | (-6.2774) |
| Market Adjusted Returns | 0.4182*** | 0.4140*** | 0.4198*** | 0.4201*** |
| | (-9.3926) | (-9.2788) | (-9.2134) | (-9.1741) |
| Log TNA | 0.0361*** | 0.0362*** | 0.0350*** | 0.0350*** |
| | (-42.0619) | (-42.1412) | (-47.7184) | (-47.7110) |
| Log Per Capita Income | -0.0785*** | -0.0782*** | -0.1906*** | -0.1905*** |
| | (-4.6568) | (-4.6404) | (-14.5007) | (-14.4947) |
| Market Adjusted Returns (t-1) | | -0.0193 | | -0.0328 |
| | | (-0.4310) | | (-0.7149) |
| Market Adjusted Returns (t-2) | | -0.0712 | | 0.0282 |
| | | (-1.5949) | | (-0.6139) |
| Market Adjusted Returns (t-3) | | -0.1424** | | 0.0473 |
| | | (-3.2046) | | (-1.0289) |
| constant | -3.0006*** | -3.0071*** | -6.9543*** | -6.9525*** |
| | (-15.0716) | (-15.1044) | (-38.4961) | (-38.4813) |
| Adjusted R-Squared | 4.37% | 4.39% | 6.34% | 6.34% |
| Observations | 50,261 | 50,258 | 75,496 | 75,496 |

* p<0.05, ** p<0.01, *** p<0.001

.

### 4.3 Conclusion and recommendations

The fundamental premise of this paper revolves around the potential impact of demographics on mutual fund flows. Our study specifically examines the influence of demographic aging, particularly the proportion of seniors relative to the overall population, on mutual fund flows. To explore this relationship, we analysed a dataset spanning from January 2000 to March 2019, focusing on the net growth in assets beyond reinvested dividends as our measure of mutual fund flows.

The main findings support the hypothesis that areas with a higher proportion of seniors will likely receive lesser mutual fund flows than areas with a lower proportion of seniors because of the pressure by seniors to draw down rather than build up their assets. This finding also reinforces the second hypothesis by indicating that seniors' investment preferences lean towards tax-free fixed income mutual funds, which are considered safer and more stable than equity securities. The tax-free aspect could be an added incentive for seniors seeking income while minimizing tax obligations.

In our comprehensive study, we have discovered a notable trend among seniors when it comes to their investment preferences, particularly in mutual funds. Seniors exhibit a strong inclination towards low-cost investment options. This preference seems to be intricately linked to the appeal of lower expense ratios, which serve as a significant motivating factor for them to invest more in mutual funds.

Furthermore, we delved deeper into the data and conducted an analysis based on household wealth. The results indicated that seniors with substantial wealth tend to lean towards investment rather than drawing down on their assets in mutual fund flows. This finding suggests that even affluent seniors see the potential benefits and advantages of mutual funds as a viable investment option to grow their wealth further. A critical aspect of our research is the robustness of our findings. We also methodically performed sensitivity checks to ensure the accuracy and reliability of our results. Through these rigorous checks, we confirmed that our conclusions remained consistent and were not influenced by specific events or market conditions during the sample period. During the course of our study, we considered

significant economic factors and regulatory changes that occurred, such as the 2007-2008 GFC, SEC Rule 22c-2, Money market fund reform (2010), and the Pension Protection Act (2006). Despite the potential impact of the aforementioned events, our main results remain highly robust, underscoring a compelling and significant observation about the investment behaviour of seniors in the USA. Our comprehensive analysis reveals that a considerable proportion of seniors in the country exhibit a stronger inclination towards drawing down on their assets rather than actively investing in mutual funds.

While this paper seems to be the initial exploration of the influence of age (proportion of seniors) on mutual fund flows, there are abundant opportunities for further investigation. For instance, conducting a comparative analysis across three age groups (i.e., Young, middle, and old aged), examining various parameters such as the holding period in mutual funds, would provide valuable insights. Secondly, given the growing significance of Islamic investment funds (Climent et al., 2020) and their appeal to both Muslim and non-Muslim investors, it would be beneficial to expand this research by evaluating how the proportion of seniors impacts mutual fund flows in the context of categorizing funds into Islamic and conventional categories.

Another strand of empirical research could investigate the role of digital technology, such as online platforms, Artificial intelligence, and mobile applications, in shaping the investment choices of senior investors. The increasing adoption of technology in the financial industry could significantly influence how seniors access and manage their investment portfolios. Finally, we also recommend a study that explores how the relationship between demographics and mutual fund flows varies across different regions or states within the USA. Analysing regional differences can shed light on the localized impact of demographic factors on investment behaviour.

## Appendix 1: Funds classification per state

| Sr. No | State | Frequency | Cumulative Frequency | Percent | Cumulative Percent |
|---|---|---|---|---|---|
| 1 | MA | 101,583 | 101,583 | 23.55 | 23.55 |
| 2 | NY | 94,484 | 196,067 | 21.91 | 45.46 |
| 3 | TX | 53,859 | 249,926 | 12.49 | 57.95 |
| 4 | NJ | 40,613 | 290,539 | 9.42 | 67.37 |
| 5 | CA | 38,849 | 329,388 | 9.01 | 76.38 |
| 6 | IL | 24,530 | 353,918 | 5.69 | 82.06 |
| 7 | RI | 13,560 | 367,478 | 3.14 | 85.21 |
| 8 | MD | 7,501 | 374,979 | 1.74 | 86.95 |
| 9 | WI | 6,815 | 381,794 | 1.58 | 88.53 |
| 10 | GA | 6,046 | 387,840 | 1.40 | 89.93 |
| 11 | CO | 5,596 | 393,436 | 1.30 | 91.23 |
| 12 | CT | 4,857 | 398,293 | 1.13 | 92.35 |
| 13 | VA | 4,504 | 402,797 | 1.04 | 93.40 |
| 14 | OH | 3,716 | 406,513 | 0.86 | 94.26 |
| 15 | AL | 3,667 | 410,180 | 0.85 | 95.11 |
| 16 | PA | 3,402 | 413,582 | 0.79 | 95.90 |
| 17 | MN | 3,028 | 416,610 | 0.70 | 96.60 |
| 18 | HI | 2,628 | 419,238 | 0.61 | 97.21 |
| 19 | NC | 2,201 | 421,439 | 0.51 | 97.72 |
| 20 | MI | 2,147 | 423,586 | 0.50 | 98.22 |
| 21 | NH | 2,095 | 425,681 | 0.49 | 98.70 |
| 22 | LA | 1,187 | 426,868 | 0.28 | 98.98 |
| 23 | VT | 843 | 427,711 | 0.20 | 99.18 |
| 24 | NE | 776 | 428,487 | 0.18 | 99.36 |
| 25 | MO | 576 | 429,063 | 0.13 | 99.49 |
| 26 | WA | 395 | 429,458 | 0.09 | 99.58 |
| 27 | FL | 291 | 429,749 | 0.07 | 99.65 |
| 28 | WV | 278 | 430,027 | 0.06 | 99.71 |
| 29 | AZ | 256 | 430,283 | 0.06 | 99.77 |
| 30 | OK | 230 | 430,513 | 0.05 | 99.82 |
| 31 | DC | 224 | 430,737 | 0.05 | 99.88 |
| 32 | UT | 195 | 430,932 | 0.05 | 99.92 |
| 33 | KY | 115 | 431,047 | 0.03 | 99.95 |
| 34 | TN | 77 | 431,124 | 0.02 | 99.97 |
| 35 | ME | 64 | 431,188 | 0.01 | 99.98 |
| 36 | KS | 20 | 431,208 | 0.00 | 99.99 |
| 37 | SC | 17 | 431,225 | 0.00 | 99.99 |
| 38 | IA | 11 | 431,236 | 0.00 | 99.99 |
| 39 | OR | 10 | 431,246 | 0.00 | 99.99 |
| 40 | DE | 9 | 431,255 | 0.00 | 100.0 |
| 41 | NV | 9 | 431,264 | 0.00 | 100.00 |
| 42 | NM | 4 | 431,268 | 0.00 | 100.00 |
| | **Total** | **431,268** | **431,268** | **100.00** | |

## Appendix 2: Funds per Metropolitan Statistical Area (MSA)

| Sr. No | Metropolitan Statistical Areas (MSAs) | Frequency | Cumulative Percent | Percent | Cumulative Percent |
|---|---|---|---|---|---|
| 1 | New York-Newark-Jersey City | 133,684 | 133,684 | 31.00 | 31.00 |
| 2 | Boston-Cambridge-Newton | 103,365 | 237,049 | 23.97 | 54.97 |
| 3 | Houston-The Woodlands-Sugar Land | 48,496 | 285,545 | 11.24 | 66.21 |
| 4 | Chicago-Naperville-Elgin | 24,527 | 310,072 | 5.69 | 71.90 |
| 5 | Los Angeles-Long Beach-Anaheim | 18,312 | 328,384 | 4.25 | 76.14 |
| 6 | San Francisco-Oakland-Berkeley | 14,880 | 343,264 | 3.45 | 79.59 |
| 7 | Providence-Warwick | 13,560 | 356,824 | 3.14 | 82.74 |
| 8 | Washington-Arlington-Alexandria | 10,249 | 367,073 | 2.38 | 85.11 |
| 9 | Milwaukee-Waukesha | 6,658 | 373,731 | 1.54 | 86.66 |
| 10 | Atlanta-Sandy Springs-Alpharetta | 6,465 | 380,196 | 1.50 | 88.16 |
| 11 | Denver-Aurora-Lakewood | 5,446 | 385,642 | 1.26 | 89.42 |
| 12 | San Diego-Chula Vista-Carlsbad | 5,379 | 391,021 | 1.25 | 90.67 |
| 13 | Dallas-Fort Worth-Arlington | 4,737 | 395,758 | 1.10 | 91.77 |
| 14 | Bridgeport-Stamford-Norwalk | 3,995 | 399,753 | 0.93 | 92.69 |
| 15 | Birmingham-Hoover | 3,667 | 403,420 | 0.85 | 93.54 |
| 16 | Minneapolis-St. Paul-Bloomington | 2,641 | 406,061 | 0.61 | 94.16 |
| 17 | Urban Honolulu | 2,628 | 408,689 | 0.61 | 94.76 |
| 18 | Philadelphia-Camden-Wilmington | 2,384 | 411,073 | 0.55 | 95.32 |
| 19 | Columbus | 2,165 | 413,238 | 0.50 | 95.82 |
| 20 | Cleveland-Elyria | 1,873 | 415,111 | 0.43 | 96.25 |
| 21 | Baltimore-Columbia-Towson | 1,319 | 416,430 | 0.31 | 96.56 |
| 22 | Detroit-Warren-Dearborn | 1,305 | 417,735 | 0.30 | 96.86 |
| 23 | Raleigh-Cary | 1,193 | 418,928 | 0.28 | 97.14 |
| 24 | New Orleans-Metairie | 1,135 | 420,063 | 0.26 | 97.40 |
| 25 | Pittsburgh | 1,027 | 421,090 | 0.24 | 97.64 |
| 26 | Hartford-East Hartford-Middletown | 862 | 421,952 | 0.20 | 97.84 |
| 27 | Charlotte-Concord-Gastonia | 857 | 422,809 | 0.20 | 98.04 |
| 28 | Omaha-Council Bluffs | 750 | 423,559 | 0.17 | 98.21 |
| 29 | Grand Rapids-Kentwood | 621 | 424,180 | 0.14 | 98.36 |
| 30 | Austin-Round Rock-Georgetown | 612 | 424,792 | 0.14 | 98.50 |
| 31 | Trenton-Princeton | 535 | 425,327 | 0.12 | 98.62 |
| 32 | Rochester | 532 | 425,859 | 0.12 | 98.75 |
| 33 | Charlottesville | 429 | 426,288 | 0.10 | 98.85 |
| 34 | Seattle-Tacoma-Bellevue | 395 | 426,683 | 0.09 | 98.94 |
| 35 | Cincinnati | 393 | 427,076 | 0.09 | 99.03 |
| 36 | St. Louis | 301 | 427,377 | 0.07 | 99.10 |
| 37 | Charleston | 278 | 427,655 | 0.06 | 99.16 |
| 38 | San Jose-Sunnyvale-Santa Clara | 278 | 427,933 | 0.06 | 99.23 |
| 39 | Kansas City | 264 | 428,197 | 0.06 | 99.29 |
| 40 | Tucson | 231 | 428,428 | 0.05 | 99.34 |
| 41 | Tulsa | 230 | 428,658 | 0.05 | 99.39 |
| 42 | Lynchburg | 226 | 428,884 | 0.05 | 99.45 |
| 43 | Flint | 221 | 429,105 | 0.05 | 99.50 |

| | | | | | |
|---|---|---|---|---|---|
| 44 | North Port-Sarasota-Bradenton | 198 | 429,303 | 0.05 | 99.54 |
| 45 | St. Cloud | 196 | 429,499 | 0.05 | 99.59 |
| 46 | Salt Lake City | 195 | 429,694 | 0.05 | 99.64 |
| 47 | Duluth | 191 | 429,885 | 0.04 | 99.68 |
| 48 | Burlington-South Burlington | 173 | 430,058 | 0.04 | 99.72 |
| 49 | Albany-Schenectady-Troy | 168 | 430,226 | 0.04 | 99.76 |
| 50 | Appleton | 157 | 430,383 | 0.04 | 99.79 |
| 51 | Colorado Springs | 150 | 430,533 | 0.03 | 99.83 |
| 52 | Miami-Fort Lauderdale-Pompano Beach | 93 | 430,626 | 0.02 | 99.85 |
| 53 | Asheville | 89 | 430,715 | 0.02 | 99.87 |
| 54 | Barnstable Town | 82 | 430,797 | 0.02 | 99.89 |
| 55 | Portland-South Portland | 64 | 430,861 | 0.01 | 99.91 |
| 56 | Durham-Chapel Hill | 62 | 430,923 | 0.01 | 99.92 |
| 57 | Lexington-Fayette | 58 | 430,981 | 0.01 | 99.93 |
| 58 | Louisville/Jefferson County | 57 | 431,038 | 0.01 | 99.95 |
| 59 | Nashville-Davidson--Murfreesboro--Fra. | 46 | 431,084 | 0.01 | 99.96 |
| 60 | Memphis | 31 | 431,115 | 0.01 | 99.96 |
| 61 | Topeka | 31 | 431,146 | 0.01 | 99.97 |
| 62 | Lincoln | 26 | 431,172 | 0.01 | 99.98 |
| 63 | Phoenix-Mesa-Chandler | 25 | 431,197 | 0.01 | 99.98 |
| 64 | Greenville-Anderson | 17 | 431,214 | 0.00 | 99.99 |
| 65 | San Antonio-New Braunfels | 14 | 431,228 | 0.00 | 99.99 |
| 66 | Des Moines-West Des Moines | 11 | 431,239 | 0.00 | 99.99 |
| 67 | Portland-Vancouver-Hillsboro | 10 | 431,249 | 0.00 | 100.0 |
| 68 | Reno | 9 | 431,258 | 0.00 | 100.00 |
| 69 | Richmond | 6 | 431,264 | 0.00 | 100.00 |
| 70 | Santa Fe | 4 | 431,268 | 0.00 | 100.00 |
| | **Total** | **431,268** | **431,268** | **100.0** | **100.00** |

## References


Abel, A. B. (2001). Will bequests attenuate the predicted meltdown in stock prices when baby boomers retire? *Review of Economics and Statistics*, *83*(4), 589-595.

Antolin, P. (2009). Ageing and the payout phase of pensions, annuities and financial markets. *OECD Journal: Financial Market Trends*, *2008*(2), 1-19.

Arnott, R. D., & Chaves, D. B. (2012). Demographic changes, financial markets, and the economy. *Financial Analysts Journal*, *68*(1), 23-46.

Bakshi, G. S., & Chen, Z. (1994). Baby boom, population aging, and capital markets. *Journal of business*, 165-202.

Becker, B. (2007). Geographical segmentation of US capital markets. *Journal of Financial economics*, *85*(1), 151-178.

Becker, B., Ivković, Z., & Weisbenner, S. (2011). Local dividend clienteles. *The journal of finance*, *66*(2), 655-683.

Ben-David, I., Li, J., Rossi, A., & Song, Y. (2022). What do mutual fund investors really care about? *The Review of Financial Studies*, *35*(4), 1723-1774.

Brooks, C., Sangiorgi, I., Hillenbrand, C., & Money, K. (2018). Why are older investors less willing to take financial risks? *International Review of Financial Analysis*, *56*, 52-72.

Brooks, R. (2000). What will happen to financial markets when the baby boomers retire?

Brown, D. P., & Wu, Y. (2016). Mutual fund flows and cross-fund learning within families. *The journal of finance*, *71*(1), 383-424.

Brunetti, M., & Torricelli, C. (2010). Population age structure and household portfolio choices in Italy. *The European Journal of Finance*, *16*(6), 481-502.

Climent, F., Mollá, P., & Soriano, P. (2020). The investment performance of US Islamic mutual funds. *Sustainability*, *12*(9), 3530.

Ellis, J. A., & Underwood, S. (2018). The only fund in town? Geographic segmentation in the US mutual fund industry. *Financial Management*, *47*(3), 715-737.

Fagereng, A., Gottlieb, C., & Guiso, L. (2017). Asset market participation and portfolio choice over the life-cycle. *The journal of finance*, *72*(2), 705-750.

Goyal, A. (2004). Demographics, stock market flows, and stock returns. *Journal of Financial and Quantitative Analysis*, *39*(1), 115-142.

Graham, J. R., & Kumar, A. (2006). Do dividend clienteles exist? Evidence on dividend preferences of retail investors. *The journal of finance*, *61*(3), 1305-1336.

[Record #18 is using a reference type undefined in this output style.]

Holden, S., Schrass, D., & Bogdan, M. (2018). Ownership of Mutual Funds, Shareholder Sentiment, and Use of the Internet, 2018. *ICI Research Perspective*, *24*(8).

Holzmann, R. (2017). An optimistic perspective on population ageing and old-age financial protection. *Malaysian Journal of Economic Studies*, *50*(2), 107-137.

Kacperczyk, M., & Schnabl, P. (2013). How safe are money market funds? *The Quarterly Journal of Economics*, *128*(3), 1073-1122.

Khorana, A., & Servaes, H. (1999). The determinants of mutual fund starts. *The Review of Financial Studies*, *12*(5), 1043-1074.

Kim, S.-W., Lee, B.-S., & Kim, Y.-M. (2019). Early 60s is not old enough: Evidence from twenty-one countries' equity fund markets. *Journal of International Money and Finance*, *92*, 62-74.

Korniotis, G. M., & Kumar, A. (2011). Do older investors make better investment decisions? *The Review of Economics and Statistics*, *93*(1), 244-265.

Miller, M. H., & Modigliani, F. (1961). Dividend policy, growth, and the valuation of shares. *the Journal of Business*, *34*(4), 411-433.

Parwada, J. T. (2008). The genesis of home bias? The location and portfolio choices of investment company start-ups. *Journal of Financial and Quantitative Analysis*, *43*(1), 245-266.

Poterba, J. M. (2001). Demographic structure and asset returns. *Review of Economics and Statistics*, *83*(4), 565-584.

Poterba, J. M. (2014). Retirement security in an aging population. *American Economic Review*, *104*(5), 1-30.

Poterba, J. M., Venti, S. F., & Wise, D. A. (2011). *The drawdown of personal retirement assets*.

Quayes, S., & Jamal, A. M. (2016). Impact of demographic change on stock prices. *The Quarterly Review of Economics and Finance*, *60*, 172-179.

Sabelhaus, J., Bogdan, M., & Holden, S. (2008). Defined contribution plan distribution choices at retirement: A survey of employees retiring between 2002 and 2007. *Investment Company Institute Research Series*.

Sirri, E. R., & Tufano, P. (1998). Costly search and mutual fund flows. *The journal of finance*, *53*(5), 1589-1622.

Yao, R., Sharpe, D. L., & Wang, F. (2011). Decomposing the age effect on risk tolerance. *The Journal of Socio-Economics*, *40*(6), 879-887.

Yogo, M. (2016). Portfolio choice in retirement: Health risk and the demand for annuities, housing, and risky assets. *Journal of Monetary Economics*, *80*, 17-34.

Yuan, H., Puah, C.-H., & Yau, J. T.-H. (2022). How Does Population Aging Impact Household Financial Asset Investment? *Sustainability*, *14*(22), 15021.