Who Feels the Nudge? Knowledge, Self-Awareness and Retirement Savings Decisions*

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Abstract

Using a financial literacy survey of Swedish pension investors matched to actual retirement savings decisions, we argue that respondents can be broken into three groups: those who are financially literate, those who mistakenly believe they are financially literate, and those who know that they are not. We examine how these groups respond differently to informational nudges encouraging them to take charge of their own investments. Investors with mistaken beliefs responded to the nudge, and were more likely to work with mass-market advisors who steer them into high-fee funds. They underperform as a result. By comparison, those who either possess financial literacy or else understand that they do not possess financial literacy were less likely to respond to the nudge. They avoided advisors, stayed with the low-cost default fund, and therefore accumulated retirement savings more quickly.

Keywords: Pensions, financial advisors, financial literacy, overconfidence.

JEL codes: G18, D18

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1 Introduction

Over the last twenty years, public and private retirement plans around the world have moved increasingly away from defined benefit schemes towards defined contribution schemes, placing the onus of retirement planning on individuals and households. As a result, greater and greater amounts of financial sophistication are required simply in order to make routine retirement savings decisions. It is not surprising then that academics, policy makers and industry observers have focused on financial literacy, decision support, and choice architecture as the main mechanisms for exploring how households can make better decisions.[1] Although many studies have explored these channels in isolation, there is little work that examines how these forces interact. In this paper, we use the experience of the Swedish pension system to explore how financial literacy, the market structure of advisory services, and choice architecture—the system of defaults and informaitonal nudges that shape participation—interact to shape retirement savings outcomes.

Sweden provides an ideal laboratory for studying these interactions for a number of reasons. One reason is the structure of the system itself. In the late 1990s, the Swedish government began a transition from a defined benefit pension system to a defined contribution system. In 2000, all members of the Swedish labor force were allowed to allocate a portion of their pension balances among a large number of appropriately registered mutual funds operating in the country. Investors who did not make a choice were allocated to a low-fee, well diversified, global index fund. Pension investors have literally hundreds of equity, bond, target-date and mixed funds available to them through the system; these vary significantly in terms of both fees and historical performance. As described in Cronqvist and Thaler (2004) and Cronqvist, Thaler, and Yu (2018), in order to promote maximum engagement in the new system, the Swedish government initially encouraged citizens to make an active retirement planning choice. A great many pension savers responded to this nudge.

While the government no longer encourages investors to make active retirement planning choices, a class of retirement savings advisers emerged to assist people in directing

[1] See, for example, Thaler and Sunstein (2008), Beshears, Choi, Laibson, Madrian, and Wang (2016), Lusardi and Mitchell (2011) and Hastings, Madrian, and Skimmyhorn (2013).

their pension portfolios. Mass-market retirement planning advisers operate by pooling individual retirement portfolios into a common portfolio and trading that portfolio in a coordinated fashion. Individuals pay retirement advisors a direct management fee for this service on top of the fees already charged by the mutual funds themselves. Many of these firms applied aggressive tele-marketing methods combined with unsound practices, and as complaints increased, the government effectively shut down this method of coordinating retirement trading activity in 2011. Many of the large advisory firms responded by establishing their own fund-of-funds, and directing their clients into these products.

We ask how the financial literacy of pension savers is related to their decision to opt out of the retirement savings default, how it relates to the decision to delegate to these retirements coordinators, and how these decisions in turn relate to the fees they face and the performance they experience. In addition, by exploiting the fact that the initial cohort of pension savers was exposed to what Cronqvist, Thaler, and Yu (2018) call the "Do It Yourself Nudge" while later cohorts were not, we can also ask which types of individuals respond to nudges by comparing the effects of financial literacy and self awareness between the nudged and un-nudged groups.

To study these connections, we commissioned a survey conducted by Statistics Sweden covering a random sample of Swedish workers.[2] The survey measures actual financial literacy using the Big 5 financial literacy questions pioneered by Lusardi and Mitchell (2011) as well as a performance self-assessment that allows us to gauge how calibrated respondents are about their own literacy, as in Anderson, Baker, and Robinson (2017). By matching the survey responses to administrative and tax records, we can connect literacy to the actual mutual fund allocation decisions that investors make. Additionally, data from Dahlquist, Martinez, and Söderlind (2017) allow us to determine whether the retirement portfolio changes in our sample match those believed to have been initiated by advisors. Our representative sample broadly confirms that of other studies: only one-fourth of our sample from the initial cohort remain in the default fund compared to over two-thirds in later cohorts. Among those choosing their own fund, about one-fourth actually only made one choice and stayed with it. Our study aims to shed some light on the

[2]Statistics Sweden is the administrative agency mandated to collect and store official government statistics on households and businesses, analogous to the U.S. Census Bureau.

possible reasons behind this apparent inertia.

We ask respondents how much they agree or disagree with the statement that past returns are more important than fees when selecting mutual funds. A surprisingly large share of respondents, about one-fourth, report that past returns are more important than fees even if they never made a choice or only traded once. Passive investors should strongly disagree with this statement: the Swedish financial services authority, like the U.S. Securities and Exchange Commission and many other financial regulatory bodies across the world, encourage investors to focus on fees rather than past returns when making allocation decisions, in line with a large body of empirical evidence. Indeed, we carefully document that individuals who believe returns are more important are not sophisticated investors acting on, for example, momentum strategies or a sophisticated understanding of Berk and Green (2004) type equilibrium relationship between fees and past returns. Instead, they are poorly informed. In addition, we allow respondents to indicate that they do not know whether fees or past returns are more important. This allows us to measure self-awareness, or what Kruger and Dunning (1999) call *metacognition*—knowing what one does and does not know. By measuring self-awareness, we can contrast the behavior of those who are aware that they do not know to those who are unaware that they do not know that fees are more important than past returns. This distinction turns out to be a critical element of our findings.

Our domain-specific measure of financial literacy parsimoniously captures miscalibration about broader financial literacy. Individuals who think that returns are more important than fees believe that they score well on the financial literacy test, but in fact they score no better than others on average. Individuals who understand that fees are more important also believe that they are high scorers; the difference is that they are more often correct on average. Confidence in one's own financial literacy is associated with strong, but not necessarily correct, opinions about mutual fund investing, whereas actual literacy is associated with correct views. In contrast, the self-aware have lower financial literacy scores on average, but they anticipate that their scores will be lower. This self-awareness is an important middle ground between holding correct and incorrect beliefs.

We find strong links between domain-specific literacy, retirement planning decisions, and actual outcomes. Individuals who delegate retirement planning to advisers pay

higher fees and experience lower Sharpe-ratios. This is not just a default-fund effect: the fees associated with advisers are higher, on average, than those faced by individuals who opt out of the default pension choice without going through advisers. Individuals who use advisors pay average mutual fund fees that are roughly twice those of the default fund; the difference between the median advisor-led fund and the median non-default fund is roughly the same order of magnitude as the fees on the default fund itself, indicating that these effects are both economically and statistically large. The fees associated with advisor recommendations are roughly 20 percent greater than those faced by individuals who opt out of the default without the assistance of an advisor.

In general, individuals who answer the mutual fund literacy question incorrectly are more likely to opt out of the default fund. They are more likely to choose high-fee funds when they do. One reason for this is that they are much more likely to sign up with advisors. Individuals with mutual fund literacy are not more likely to leave the default fund; they are also less likely to work with advisors. As a result, they pay lower fees and have higher (overall and risk-adjusted) returns.

Sitting in the middle are the self-aware, people who know that they do not know. They are less likely to opt out of the default, which in turn means they pay lower fees and earn higher returns. This illustrates how the choice architecture of the pension system interacts not only with financial literacy, but also with metacognition.[3] Although well-structured choice defaults protect against costly inaction, they do not protect against an action rooted in mistaken beliefs. The fact that default choices do little to protect the ill-informed highlights the need to buttress choice architectures with timely, accessible information.

These effects are much stronger in the initial cohort, the group that received the informational nudge. The difference in opt-out rates between those who know and who don't is much higher in this cohort than in later cohorts. Also, the respondents who are willing to admit that they do not know are both fewer in number in the nudged cohort and much less likely to have remained in the default fund. One interpretation of this set of results is that the inattentive were those who felt the nudge, and as they formed opinions about the relative importance of fees and past performance, they acted accordingly. Another inter-

[3] Müller and Weber (2010) also find support for the connection between measures of self-confidence and the propensity to choose actively managed funds.

pretation is that the nudge works along both an extensive margin, pulling the indecisive into the decision environment, and the intensive margin, strengthening an individual's views of the market.

The remainder of the paper is structured as follows. We begin in Section 2 with a brief description of the institutional setting in which our study occurs. In Section 3, we describe the data. Section 4 presents results connecting financial literacy to opting out choices, the resulting fees, and the reliance on advisors. Section 5 studies the performance implications of these decisions. Section 6 concludes.

2 The Institutional Setting

2.1 Historical Background

In June of 1994, the Swedish Parliament passed legislation that transformed the public pension system from one based on defined benefit to one based on defined contribution.[4] The exact details of the transition are complicated and are discussed at length in Palme, Sunden, and Söderlind (2007) and Palmer (1995). Our purpose here is to highlight the key features as they pertain to our analysis. Prior to 1994, the system was a flat-rate universal benefit system augmented by an earnings-related supplement. The period between 1994 and 1999 allowed for the accumulation of two types of accounts. One is a defined contribution plan funded on a pay-as-you-go basis based on a contribution rate of 16% of labor income, analogous to Social Security in the United States. An additional 2.5% of labor income was credited to an individual account managed by the pension authority, similar to a 401(k) plan in the United States, but part of the state pension, rather than an occupational pension. Starting from 2000, individuals were allowed to control how this account was invested by allocating this portion of their account across as many as five different funds. In 2000, there were 456 funds available, a number that has grown to 855 at the end of 2015.

[4]The 1990s were a period of tremendous economic change and upheaval in Sweden more generally. In 1990 and 1991, the Swedish tax system was completely overhauled, reducing tax rates and broadening the base of taxpayers (Agell, Englund and Södersten (1995), "The Swedish Tax Reform: An Introduction" Swedish Economic Policy Review 2, 219-228). In the fall of 1992, the country experienced a banking crisis following a collapse in real estate prices. Indeed, the government's reaction to the crisis offered important lessons during the global financial crisis of 2008.

The PPA maintains the fund platform and administrates the deposits and redemptions on behalf of the investors. Individual account information is available through their webpage, but also sent out by letter once a year (known in Sweden as the "the orange envelope"), which provides a summary of performance as well as a long term projection of the pension outcome. Funds available on the platform are required to follow the European UCITS Directive which puts some restrictions on minimum diversification and transparency, but there are no other specific prerequisites for allowing or preventing fund companies to enter. Funds are however required to follow a discount schedule, which is based on the size of the total PPA investment on the fund family level. Discounts are paid back at the individual account level, and therefore vary across funds. The PPA also charges a small fee from each account to cover its costs. We provide a detailed description of the fees in Section 3.

2.2 The Role of Mass-Market Advisors

The introduction of the system was accompanied by an extensive information campaign encouraging workers to make an active choice. A booklet containing assessments of risk, fees and past performance for 456 funds managed by 72 fund companies was sent out to around 4 million people affected by the change, encouraging them to allocate their savings between one to five funds. As argued in Cronqvist and Thaler (2004), policymakers in Sweden clearly nudged their citizens to make an active choice over falling into the default fund. In 2000, the initial year, almost two-thirds made an active choice, but enthusiasm for active choice did not last long. Of those entering the system in 2001, only 18% made an active choice at the point they entered, and 29% of this cohort had made a choice six years later in 2007. Of those entering 2007, less than 2% made an active choice initially, and by 2013, only 20% had done so.[5]

The fact that a low fraction of individuals made an initial choice, but a much larger share later opted out of the default fund, is widely attributed to the emergence of retirement advisors working aggressively with telemarketing towards very broad layers of the population. The advisor would typically offer to rebalance the individual's pension port-

[5]Data obtained from the Swedish government committee report SOU 2016:61.

folio in exchange for a fee, usually between SEK 500 to 1,000 per year (around USD 100).[6] To facilitate this, the individual would share the PIN-code to her account at the SPA with the advisory firm, allowing the advisor to make automated changes across a large number of accounts. The SPA reports that the number of fund changes grew from around a half a million in 2004 to four and a half million in 2009. As this segment of the market grew, the government received increasing numbers of complaints against advisors and their sales methods, as well as raising a discussion about the added value they provide.

In 2011, the government instructed the SPA to redesign its web interface in order to prohibit robots from making mass changes on behalf of individual accounts. The trading impact was immediate, as from December 2011, the number of transactions fell by 75%. Many of the larger advisor firms responded by forming their own fund-of-funds to which they steered customers in order to retain the mandate to manage their pension savings. Though most advisors stopped charging the direct, fixed yearly advisory fee after the change, the fund-of-fund structure they offered as an alternative had higher than average fees.

3 Data

Our data are assembled from the Swedish Pensions Agency, which provides mutual fund returns data; data from Dahlquist, Martinez, and Söderlind (2017), which allowed us to determine the role that advisors play in the retirement planning decision; and data from Statistics Sweden, which conducted a financial literacy survey on our behalf and merged the data with Swedish tax records and pension contribution data. We next describe each of these in detail.

3.1 Swedish Pensions Agency

Our data include all fund returns and fees from the SPA since the program's inception in 2000. Panel A of Table I reports pension fund investments and fees across eight fund types, as classified by the SPA. There are 789 and 155 holdings in the default equity and

[6] Even if this fee is relatively low in nominal terms, it commonly represents 1% to 2% of individuals' accounts according to the PPA. The relatively small accounts are explained by the implied build-up through contributions over peoples' working life.

bond fund, respectively, where individuals in the bond fund also have holdings in the equity fund. The default funds are managed by the government-controlled AP 7 fund and takes the form of a target date fund.[7] Young individuals who do not actively choose a fund are automatically enrolled in the equity fund. After the age of 56, allocations to the bond fund are made progressively in five steps up to the age 75, when the default portfolio consists of two-third bonds.

—Table I here—

Around a quarter of the value of all pension assets are invested in the default fund, and around half in equity funds, which is also by far the biggest category measured by the number of different funds. Mixed and Target date funds together constitute around a quarter of fund investments, and Bond funds have a negligible share of the overall value of investments.

The fees we report are net of discounts negotiated on behalf of investors by the authority, but excludes the service fee charged to all accounts by the SPA.[8] The discounts are paid back annually to investors and are substantial. According to the SPA, as much as two-thirds of total management fees are distributed back to investors every year. There is a cap on the net fees since 2015. The maximum fee after discounts for equity funds is 0.89 percent, and for mixed and target date funds it is 0.62. The maximum fee for bond funds was set to 0.42 percent.

Fees are reported in the last three columns of Table I and points out the low management fees for the default funds. The AP 7 equity and bond fund charges 12 and 5 basis points (bps) annually. The highest fees are found in the equity fund category, where the median fund in our sample charges 51 bps, and the upper quartile 70 bps. The median fee for a Mixed fund is 38 bps, and for a Bond fund it is 19 bps - all of them well above the default alternatives.

[7]Since May 2010, the equity default fund has a mandate to gear its equity exposure up to 1.5. Although the gearing changes over time, it has been relatively stable around 1.2 to 1.3 during the sample period. Because the stock market has performed well during most of this time, the default fund has outperformed most other funds.

[8]The service fee is determined annually to cover the administrative costs of the system. In 2015, it was 13 basis points with a cap of SEK 120 for each pension account.

3.2 *Advisor-led trades*

Panel C of Table I reports frequencies of advisor-led trades. We flag trades in our data as advisor-led by cross-checking trades against data from Dahlquist, Martinez, and Söderlind (2017). Their dataset includes a large random sample of 480,000 people of all 6 million members of the Swedish pension system making over 10 million choices, from which they identify coordinated trades as trades, defined by the number of identical portfolio choices made the same day. We use a similar methodology to determine coordinated trades. Because we can only observe choices, and not the client-customer relation itself, it is an empirical matter to determine a reasonable cut-off for the number of coordinated trades in order to attribute them to advisors. We use three break-points in this paper to classify investor-initiated trades: the same 1,000 identical trades benchmark used by Dahlquist, Martinez, and Söderlind (2017), the 25th percentile of coordination size (3,076 identical trades occuring at the same point in time) and the 50th percentile of coordination size (12,535 trades). For each classification in the larger data set, we then match the coordinated portfolio and date onto our smaller set of investors and flag them as coordinated. The first two classifications are relatively insensitive to the number investors classified as having advisors. There are 353 investors in our data who made a trade that was coordinated with at least 1,000 other individuals, and 330 investors using the 25th percentile breakpoint. Using the upper half of the distribution, we classify 220 individuals, or almost 9% of the sample, as having enrolled with an advisor. The classification of advisor-led activity is therefore quite insensitive to different assumptions about the activity at the lower end of the distribution, but may act too restrictive in the upper half in order to capture all of them.

Because our varying thresholds for defining investor-led trades are based on the number of simultaneous, identical trades, this threshold classification also naturally sorts individuals according to the size of the advisory firm with which they are affiliated: a greater degree of coordination implies a larger market share for the advisor firm. This is an important source of variation for us, since many of the larger, mass-market advisory firms changed business model after 2011 to steer customers towards their own fund-of-funds as it became impossible to coordinate large numbers of trades simultaneously through a single electronic trade. Panel C of Table I reveal that our classification captures 59% of

all trades in our sample defined as 1,000 simultaneously changes at one time; this falls to 34% if we set the threshold at the median.

3.3 Measuring Financial Literacy

Our second source of data is a web-based survey designed to measure actual and perceived financial literacy, both at a broad level as well as it pertains to the specifics of mutual fund investing.

3.3.1 Survey implementation

We construct a short web survey with 21 questions including a version of the standard Big 5 financial literacy questions, which appears in the National Financial Capability Studies (NFCS).[9] Invitations to take the survey were sent by regular mail by Statistics Sweden in January 2016 to 12,000 people in the ages 18 to 65. Sampling from this age range is designed to match normal working ages in Sweden. There are approximately 5.9 million Swedes in this age group, and we are able to benchmark the demographics of participants in our study against that of the overall population. We received 1,564 responses after the first invite, and a total of 2,854 responses after two reminders sent out in February and early March, which translates into a total response rate of almost 24%. After deleting incomplete responses and matching with socio-demographics and pension fund choices we are left with 2,502 complete survey observations.

We match the survey responses to fundholdings obtained by the pension authority. Panel B of Table I shows that the number of investors in the default fund in the year of 2000 was 24%, or 415 out of 1,768 individuals. The majority, 2/3 of those who entered after 2000 did not make an active choice, and 109 people opted out of the default fund by 2015. At the end of 2015, there are 824 individuals in the default fund in our sample, which constitutes 33% of the 2,502 survey respondents. We find that 23% of investors in sample only traded once, meaning that they chose to leave the default fund, but never made any further changes to the portfolio.

[9] See Lusardi and Mitchell (2014) for an overview.

3.3.2 Survey design

Our version of the Big 5 financial literacy questions and responses are displayed in the Appendix in Table A.1. Because standard residential mortgages in Sweden typically do not exist in the same form as in the U.S., we opt instead to include a question related to savings and compounding, known as the "72" rule of thumb. Questions of this sort have previously appeared in the work of Ambuehl, Bernheim, and Lusardi (2014), and have proven to be an efficient way to convey the concept of compounding for people broadly unfamiliar with finance and investments.[10] A question of this sort is particularly relevant for those saving for retirement.

As in many previous studies, we find that the fraction of correct responses is very high for the first three questions, usually referred to as the Big 3. Finding the correct compounded interest rate, on the other hand, is found to be much more difficult for most people. Less than half of the respondents realized that the required rate of return to double the value of an investment over 10 years is lower than 10%, but only 5% reported that they did not know this.

Following Moore and Healy (2008) and Anderson, Baker, and Robinson (2017), we augment the five standard literacy questions with a question that asks the survey participant to assess the probability for having five, four, three, etc. questions correct. We label the mean of this probability distribution *perceived score*, and the difference of the financial literacy score and percieved score, *overestimation*.

To hone in on financial literacy as it pertains to mutual fund choice, our survey includes a question about the importance of fees as opposed to past returns when selecting mutual funds.[11] The survey also includes questions about attitudes to saving and financial advice. Table II tabulates the responses to two of the main questions besides the financial literacy test. For our questions about mutual fund selection, we ask respondents to agree or disagree to the following statement:

> *"When selecting a mutual fund, past returns are more important than fees"*

Possible responses are Strongly agree, Agree somewhat, Disagree somewhat, Strongly disagree and Don't Know. The responses to the questions are tabulated in Panel A and

[10] The idea is that the factor 72 gives a first approximation of the effect of compunding and interest, i.e. savings will double in 10 years at an interest rate of 7.2%.

[11] The questions and responses are included in the Internet Appendix.

B of Table II. We find that 45% agree with the statement, and 11% strongly so. This is a larger share compared to those who think fees are more important (28%). We also find that 25% respond that they do not know. This is surprising given the effort Swedish policymakers and the SPA have put into informing the public of the importance of fees for future performance when selecting mutual funds, but it is line with other studies.[12]

—Table II here—

The literature on mutual fund performance is somewhat inconclusive with respect to past returns and fees. On one hand, there is strong support for indexing and minimizing instead of chasing past performance, as suggested by the work of Malkiel (2003) and others. But there is also evidence of momentum in stock returns that carry over to mutual funds, as suggested by Carhart (1997). Dahlquist and Martinez (2015) suggest that neglecting past returns is suboptimal for Swedish pension savers, as inattentive investors tend to be stuck in underperforming funds. It is therefore possible that sophisticated investors find a mix of both past returns and fees to be the best predictor of future performance, but they should never overlook the importance of fees in the long run.

In our analysis, we categorize investors with respect to their views on these two salient, and often discussed, characteristics of mutual funds. We then test empirically how individuals differ depending on their beliefs with respect to overall financial knowledge, self-perceptions, and actual pension fund choice. We choose responses that fall into either side of agreeing or disagreeing somewhat to the returns versus fees statement as our benchmark. The benchmark group is then used for comparing the responses of our three main groups of interest: those who strongly agree (hereafter labeled MF Return), strongly disagree (labeled MF Fee), and contrast those categories to those who do not know (MF Don't know).

Column (4) of Table II shows that those finding fees to be most important to have the highest average literacy score of 3.72 out of 5, and those who report that they do not know of only 2.34. Having an opinion about past returns or fees is therefore strongly related to the level of financial knowledge, as measured by the literacy test. We find that

[12]Choi, Laibson, and Madrian (2010) show that most people fail to pick the lowest cost index fund in an experimental setting; Anderson, Baker, and Robinson (2017) report that most people think past returns more important than fees for determining future performance in a sample of U.S. LinkedIn members. Hastings, Mitchell, and Chyn (2011) find that lower literacy individuals rely less on cost data and more on friends and coworkers when making pension fund decisions.

23% of those who find past returns to be most important for future performance are in the default fund at the end of 2015, whereas 48% of those who report not knowing never made an active choice.

One of the most important implications of possessing financial knowledge is how it relates to financial engagement. Most studies find strong correlations between scores on the financial literacy test and the propensity for individuals to save and plan for retirement.[13] But being financially engaged could also drive literacy. Anderson, Baker, and Robinson (2017) find that Overestimation to be an important driver for savings and retirement planning decisions, which could be an indication that engagement spurs self-confidence. Direct questions of desirable investment behavior are also likely to be correlated with other biases, such as cognitive dissonance. For instance, Goetzmann and Peles (1997) show that individuals tend to report overly optimistic assessments of the performance of their mutual fund holdings.

3.3.3 Survey responses

As we draw randomly from a population with known demographic characteristics, we are able to compare the fractions of individuals taking the survey to the underlying population in Sweden in the working age 18 to 65. Statistics Sweden, who administrated the survey for us, attached population weights to each response based on the characteristics of Table III. The second column Table III presents the sample proportions, and the corresponding composition of the population. Comparing the two, we find much lower response rates for those with lower income, education and age.

—Table III here—

Table III shows that the average score of the test is 3.14 out of possible 5, and as discussed by Lusardi and Mitchell (2008), men generally score higher than women on the test. On average, survey participants thought they scored half a point better than they actually did, with overestimation slightly higher for men than women. Similar to the results of Anderson, Baker, and Robinson (2017), we find that Overestimation increases with age, but decreases with the level of education.[14]

[13] See Lusardi and Mitchell (2014).

[14] The distribution of beliefs vary systematically across scores, where those who score very well or very poorly are quite confident about the outcome, but where there is considerable uncertainty in the interme-

Next we turn to the demographics of the mutual fund question. Men are more likely to have stronger opinions of both fees and past returns being important for fund choice, while women are twice as likely to report that they do not know. The general pattern of responses to the mutual fund question broadly follows the score of financial literacy across demographic groups. Within the highest income bracket, 15% think that fees are more important, and 12% past returns. Only 10% report that they do not know. This contrasts with the lowest income bracket, where 46% report that they do not know, but a majority believes past returns are more important than fees for predicting future performance.

The last column in Table III reports the fraction of individuals who were in the default fund at the end of 2015. Overall, a third of our sample was in the default fund, whereas the total share for all Swedes is 48% according to the SPA. This is likely due to the lower representation of young, low income and less educated in our sample as suggested by the first and second column in Table III. For example, our sample only captures 5% of those in the ages 18-25, though they represent 14% of the population. The fraction who holds the default fund is 96% for this group. The fraction holding the default fund drops quickly with age. The strong effects can be explained by the fact that new (and young) entrants in the system did not make an active choice, as evidenced by the results in Table I.

Since young people with low income are also under represented in taking the survey, we re-calculate the sample averages in the first row of Table III using population weights. Scaling up the proportion of this omitted group, we find that the average financial literacy score falls from 3.14 to 2.98. We also find that the group not knowing if fees or past returns are important for mutual fund selection rises from 0.27 to 0.32, and the fraction staying in the default fund from 0.33 to 0.38. Adjusting for the omitted group, which is presumably less engaged in financial decisions, can therefore have important implications for interpreting the subsequent results. We therefore opt to include population weights in the preceding analysis when we match the survey results to choice data.

diate score categories. We include a plot of this relation in the Internet Appendix.

3.3.4 *Household Planning and Financial Literacy*

The survey also contains a number of questions related to household planning, attitudes and decision-making.[15] We ask if respondents agree or disagree with the statement: "I find personal financial matters boring." A slight majority (51%) of survey respondents either agreed or strongly agreed with this statement, and only 2% responded that they did not know or refused to answer.

Column (1) of Table IV display the result of a Probit regressions where we code a dummy to one if the respondent disagree (22% of respondents) or strongly disagree (25% of respondents) with the statement, which we label "Interesting." Interest in finance is strongly related to financial literacy. In Column (2), while controlling for overall financial knowledge, we find that those not knowing the mutual fund question display the greatest lack of interest in financial matters. Among those who think that fees or past returns are important, only the fee group displays interest in finance. We take this as evidence pointing to this group being more sophisticated, even if we cannot formallly reject that they are equal when testing the difference in the parameter estimates.

The dependent variable in Columns (3) and (4) of Table IV takes the value one if the respondent reports having thought about how much to save for retirement. Almost 48% responds yes to this question, which illustrates that Sweden is a country where there is generally a very high awareness of pension planning. Nevertheless, we still find some cross-sectional differences. Planning is more common among high financial literacy, married, older, higher income, and university-educated people. Introducing mutual fund beliefs in Column (4), we find that those who do not know if fees or past returns are more important for fund performance are about 17% less likely to report that they have tried to figure out how much they need in retirement, which is in support with the notion that these individuals should be the main priority for policy interventions.

—Table IV here—

We ask if people would be willing to accept free financial advice if it was offered to them, and code a dummy equal one and zero otherwise if the response was yes to this question. Column (5) of Table IV shows that willingness to accept financial advice is higher for

[15] A complete description of the questions and respnses can be found in the Internet Appendix, Table A.2.

females and high income earners, but lower for the married and insignificantly related to general financial literacy. When we introduce mutual fund beliefs in Column (5), we find evidence that those not knowing are in fact reluctant to receive advice. At the other end, we find that those who think past returns are more important than fees are almost 10% more likely to report that they are willing to accept free financial advice.

In Columns (7) and (8) of Table IV, we model the probability that a respondent reports that they are the sole decision-maker in their household, contolling for marital status. In Column (7), we find that those with higher education and those with higher literacy scores are more likely to be sole decision-makers, but the latter effect is crowded out when introducing beliefs about mutual fund choice. Those thinking past returns rather than fees are more important for mutual fund choice are also more likely to be the sole decision-maker in the household.

The analysis suggests that there are important differences between the groups defined over whether fees or past returns are important. Those who think fees are important display high interest in personal financial matters. Those who think past returns are more important than fees generally lack interest in personal finances, but they are more open to receive financial advice. Furthermore, they are more likely to be decision makers, which raises the concern that they may be particularly exposed to bad or fraudulent financial advice. Finally, those who do not know lack interest in finance, do not plan for retirement, and are reluctant to receive financial advice. This group therefore seems particularly important to target when designing default options, but our results also reveal that they may be difficult to reach due to their lack of engagement.

4 From General to Specific Financial Literacy

As discussed in Hastings, Madrian, and Skimmyhorn (2013) and Fernandes, Lynch, and Netemeyer (2014), there is little research about the relationship between general and specific financial knowledge, and its relevance for actual consumer choices in financial markets. The concern is that an increase in general financial knowledge may not be enough to prepare consumers for many relatively sophisticated and infrequent choices, such as mortgages or deciding to participate in the stock market (see Van Rooij, Lusardi, and

Alessie (2011)).

In this section, we explore correlations between general financial literacy, knowledge about mutual fund choice and interest in personal finance. The latter piece is especially important as policymakers struggle to communicate to younger generations where these decisions are important, but where lack of interest makes it difficult to reach broad layers of this group.

4.1 Mutual fund responses across score

Figure 1 traces out "Perceived score" – the average self-assessed scores plotted against the actual financial literacy score. We find a systematic overestimation of the outcome among those who score poorly on the test. This is a robust feature of the data, which has been shown in many previous studies of overconfidence.[16]

—Figure 1 here—

The bars in Figure 1 indicate the fraction of responses about fees and past returns, and they show a clear pattern where those who believe fees to be most important for future performance have higher literacy scores, whereas those who believe past returns to be important are self-confident if not necessarily knowledgeable.

We formally test these correlations in Table V, using a Probit regression on mutual fund responses and financial literacy variables, with controls for socio-demographics. Since the responses originate from the same question, the regressions are not independent. Nevertheless, they shed light on the correlation structure between literacy, beliefs and socio-demographics. We explore the relation between mutual fund beliefs, actual financial knowledge (as measured by financial literacy score), and perceived score in order to determine the relative importance of self-perceptions and knowledge. In our study, we are not only interested in what people know, but whether they know that they do not know.

A lower test score can originate from two sources: either because the respondent reported the wrong answer, or that they did not know. Thus, we decompose the complement of financial literacy score (ranging from 0 to 5) into two parts: Don't know responses

[16]See for example Kruger and Dunning (1999), Moore and Healy (2008), and references therein.

(labelled "DK") and the number of mistakes (labelled "Financial Mistakes"), counting the number of mistakes. Since the three variables naturally sums up to five, test scores with high meta-cognition should be associated with fewer mistakes, even if the counts of DK responses increase in lower scores.

—Table V here—

Column (1) shows that a past return response is indeed negatively related to level of education, but positively related to age and financial literacy score. When the perceived score is included in Column (2), it completely crowds out the effect of the financial literacy score. In other words, thinking that past returns is the main determinant of future fund performance is common among those who think they are more literate than they actually are.[17] This conjecture is supported by the results in Column (3), that shows that respondents thinking that past returns are more important than fees are less likely to be among those responding Don't Know in the financial literacy test, but they are not less likely to report the wrong answer to the question, as given by the insignificant loading on Financial Mistakes. We take this as another indication that these investors display more confidence than competence.

Columns (4) through (6) explore the responses for those thinking fees are more important. In Column (4), higher literacy scores are associated with thinking fees are more important, but in a horse race between actual and perceived literacy, both are significant. The difference in the point estimates on actual and perceived literacy is insignificant, which indicates that while those who think returns are more important think they are more literate than they actually are, those who think fees are more important have a more accurate picture of their financial literacy. Comparing the two groups, those who find minimizing fees to be most important appear to be more sophisticated investors than those focusing on past returns. We find further evidence for this conjecture in Column (6), where this group has a significant lower propensity to give wrong answers to the test. Therefore, we conjecture that they display both confidence and competence. This is in sharp contrast to the results of the past returns group in Column (3).

[17]Strictly speaking, the difference between the loadings on the perceived and actual literacy measures mistaken beliefs about literacy; it is significantly positive here.

Columns (7) through (9) of Table V present similar regressions for the group who responded that they do not know whether fees or returns are more important. This group has lower scores and income, and they are also younger compared to the other groups. Women are roughly 13% more likely to report that they do not know, an effect size that is roughly equivalent to one additional incorrect answer on the financial literacy test. As in the other regressions, self-perceptions crowds out some of this effect when introduced in Column (8).

The last column of Table V shows that the correlation between responding don't know on the financial literacy test increases the likelihood by 19% to give the same response to the fee versus past return question. Not knowing the mutual fund question is also associated with a higher number of mistakest, but the marginal effect of DK is three times as large compared to making a mistake. This further supports the notion that those with low mutual fund literacy are less knowledgeable, but also better aware of their lack of competence.

Finally, we find that the intial cohort, that is those who entered the market in 2000, are much less likely to report that they do not know, whereas the dummy is insignificant for both return and fee responses. One way to interpret this result is that it is evidence that the informational nudge worked: it caused this cohort to be much more likely to form an opinion about the subject of mutual fund choice. (In untabulated results, we find no evidence that financial literacy is higher or lower for the initial cohort when controlling for the same characteristics as in Table V .)

5 Who Reacts to the Information Nudge?

Next we explore the relation between financial knowledge and self-awareness interact with the key features of the choice architecture. This allows us to explore which types of individuals are affected by information nudges.

5.1 Staying in the Default Fund

We start by modeling the probability that a respondent accepts the default fund option. We estimate the probability of staying in the default retirement fund by running a Probit

regression on an indicator variable taking the value of one for the 824 respondents that held the default fund at the end of our sample period in 2015, and zero otherwise.

Column (1) of Table VI shows that younger, married and lower income respondents were less likely to stay in the default fund. The coefficient for Financial literacy, the result for the Big 5 questions, is essentially zero, which illustrates that general financial knowledge is less relevant for the specific knowledge required to make domain-specific choices about mutual funds. When introducing the responses to the statement about whether fees or past returns are more important for future performance in Column (2), we find that people who do not know are 13% more likely to stay in the default fund. This is an important finding, because it suggests that the default fund picks up investors who are generally unaware of how to select an appropriate portfolio of mutual funds. Conversely, those who think past returns are more important than fees are more likely to opt out of the default fund, which suggests that they believe that the menu of privately managed funds offered by the SPA provides better alternatives. The effect is large: the measured 6% decreased marginal probability for this group is almost half the effect of those who do not know — the category for which the default fund is designed to serve. The coefficient for those thinking fees are important is positive, but insignificant. Since the default fund is the lowest cost fund offered, it is not clear that this group should prefer any other choice if it was true to its beliefs.

—Table VI here—

Column (3) repeats the analysis of Column (2), but applies the survey weights, allowing us to account for the under-representation of lower-income, younger, less financially literate respondents. The results are similar, but stronger. Respondents who think fees are more important are much more likely to stay in the default fund, and the loading on the dummy variable for not knowing whether fees or returns is important becomes stronger. Overall, these results indicate that the default fund is inhabited by those who understand the importance of low fees, and also those who understand that they are unaware.

In Columns (4) and (5) of Table VI, we break the sample in order to look at those 1,768 respondents making the initial choice in year 2000, contrasted to those 734 coming in after the reform. Comparing the results, we see that the overall effect from the previous analysis is all coming from the initial cohort. The initial retirement savers were encouraged

to choose and form opinions about mutual fund choice, which we believe is reflected in this differences. Not knowing the mutual fund question is associated with an 18% higher likelihood to fall into the default fund in the late sample, but only 5% for the initial cohort. Since the very design of the default fund is to pick up this category, we conclude from this that people were effectively "nudged out" from default.

This conjecture is also supported by the analysis in Columns (6) and (7) of Table VI, where the dependent variable takes the value of one for the one-fourth of our respondents who traded exactly once—i.e., these individuals traded out of the default fund, and then never again. We find them to be older than average respondents, but do not find any evidence that they are better associated with any mutual fund response category. On the other hand, these investors are much more likely to belong to the initial cohort. When we introduce a dummy variable for belonging to the initial cohort in Column (7), we find them to be almost 43% more likely to belong to this group.

Columns (8) and (9) replace the dependent variable with an estimate of turnover measured by the number of times the portfolio has been rebalanced using OLS regressions. This allows us to account for the possibility that returns-oriented respondents are actually sophisticated, momentum-chasing investors. There is some evidence that returns-oriented respondents rebalance their portfolios more often, but it is difficult to reconcile with momentum strategies which would trigger substantial trading activity. The difference in parameter estimates suggests that the typical investor in this group rebalances their portfolio roughly two times more often compared to one believing fees to be very important, but the difference is insignificant. We do find a substantial effect for the 2000 cohort, who trade on average almost five times more often than those coming in 2001 and onwards. This difference is considerably larger than what would occur if the probability of trade were proportional to the passage of time, and remains after controlling separately for the individual retirement cohorts.

5.2 Mass-Market Advisors

As we discussed in Section 2, coordinated trades by financial advisors play an important role in driving the turnover studied in the previous section. In this section, we study how the uptake of such financial services is related to financial literacy. Because we are

interested in providing quantitative magnitudes that reflect the broader population, we apply sampling weights to some regression specifications.

—Table VII here—

Table VII reports Probit regressions in which the dependent variable equals one if the respondent in question is classified as having used a mass-market advisor (MMA) and zero otherwise. Because advisors operate at different levels of market scope, the table includes separate analyses depending on how widely the trades in question occurred. Column (1) counts a respondent as being affiliated with an advisor if at least 1,000 coordinated trades occurred, which resulted in 353 investors being classified as having subscribed to an advisor. This definition probably covers many different types of advisors, including MMA's. Column (2) only counts respondents associated with trades coordinated at the 25th percentile (or 3,076 at a given day), resulting in 330 investors being classified as having MMA's. Columns (3) through (5) flag respondents only if they are associated with trades in the upper half of the distribution of coordination size (or at least 12,535 identical portfolio rebalances in a sample of 480,000 retirement accounts), valid for 220 investors in sample. The independent variables MF Return, MF Fee and MF Don't Know are dummy variables for the three categories of mutual fund financial literacy (answers to the statement "When selecting a mutual fund, past returns are more important than fees" as discussed above).

Overall, Table VII shows that respondents with higher actual literacy scores are somewhat less likely to use mass-market advisors, and even stronger when narrowing the definition of MMA's. In addtition, mistaken beliefs about mutual fund selection criteria are associated with increased uptake of such services, while correct beliefs about mutual fund selection criteria are associated with decreased uptake. Column (5) excludes those still in default as of 2015. The links between mutual fund literacy and uptake are generally stronger here. Note too that these effects are not present in Columns (1) and (2), which suggests that advisory firms with mass appeal appear to attract less sophisticated investors.

It is important to stress that we cannot attach a causal interpretation to the point estimates on financial advisor in Table VII. The tabulated results are consistent with alternative explanations, each interesting in their own right. One is that retirement advisors

convince investors to entrust them with their retirement accounts by persuading them that returns are important and promising that they can deliver superior performance. They then incorporate these statements into their beliefs about how mutual fund markets function, and we then measure their understanding of the importance of past returns as a consequence of this. The second is that by holding the belief that returns are more important than fees, people are more likely to succumb to the marketing pressure of the tele-marketing organizations. Both explanations square with existing evidence in the literature on the incentives of advisors, as in Linnainmaa, Melzer, and Previtero (2015). In this sense, the weak results for less widespread coordination of trades may suggest that larger and more successful advisors are among the more aggressive in marketing investment advice.

As discussed earlier, many MMA's opened high-fee fund-of-funds in the wake of changing regulations that made it more difficult to operate through coordinated trades across a large number of investors. The SPA names 15 fund families and 61 funds that originate from advisory firms having a majority fund-of-fund construction, of which 41 appear in our data. According to the SPA, these companies had almost 600,000 clients as of 2014 which is about 10% of the total number of people in the pension system.[18] These funds are on, average, much more expensive for investors. The average equity fund fee for advisor funds is 65 bps, compared to 51 bps in the full sample.

—Table VIII here—

As a further test of assessing the propensity to sign up for MMA services, we estimate the probability of holding one of these funds in 2015 as a function of investor characteristics and financial literacy. Again, these regressions are estimated with sampling weights. Column (1) of Table VIII shows that those with lower financial literacy and strongly believing past returns are important for performance are 6.7% more likely to hold these funds compared to the benchmark group. We then include an indicator variables for having participated in a coordinated change measured on the three different levels of coordinated chages. The point estimates in Columns (2) through (4) reveal that the median

[18] *Effekter av massfondbytesstoppet*, PM Pensionsmyndigheten, PID119386. The five largest firms listed are Monetar, Solitar, Allra, Indecap and Advisor, which together have close to half a million customers according to the estimates.

coordinated change (labelled "MMA 50", with over 12,000 coordinated changes) gives the highest prediction (with a marginal probability of 44.5%) of holding one of the MMA managed funds. At the same time, the point estimate for MF Return becomes attenuated as we expand the scope of the advisory firm, indicating that the main channel by which returns-oriented investors take up advisory-led fund of funds is through their prior affiliation with the more mass-market advisory firms.

6 The Consequences of Fund Choices

Up to this point, the analysis shows that less financially literate respondents are more likely to opt out of the default fund and that a good deal of this comes from reliance on mass-market retirement investment planners, which coordinate trades across large numbers of individuals. The final step of the analysis explores the welfare implications of these decisions for the investors who make them. We do this by first examining the fees (not including any fees paid directly to retirement investment coordinators) and then by examining net-of-fee performance.

6.1 Fees

Table IX reports OLS regressions of the fees associated with mutual fund choices. The independent variables include literacy, demographics, fund characteristics and whether the respondent used an advisor.

—Table IX here—

Columns (1) and (2) omit mutual fund literacy and focus on the role that MMA's play in mutual fund fees. Individuals who use retirement advisors pay substantially higher fees. Column (1) does not control for the type of mutual fund in question (there is substantial variation in average fees by fund type) and shows that advisor-related respondents pay 6.4 basis points more per year, on a population-weighted basis, compared to other individuals who opt out without using an advisor. Given that the conditional mean fee is around 25.6 basis points and the cost for the default fund is 12 basis points, this effect is substantial both economically and statistically. Respondent demographics play little role in explaining fees in the sub-sample of those who have opted out of the default fund.

Column (2) adds the weights in each respondent's portfolio on each of the four fund types of funds in our data. Because the weights naturally sum to one, the constant term is omitted. When we control for the composition of fund types, we see that advisor-affiliated respondents still face higher fees; in fact, the coefficient for the MMA dummy is virtually unchanged. Thus, the higher fees associated with advisor-managed accounts do not stem from the fact that they tilt investors more into one asset class than another: within asset classes they are choosing the higher fee funds available.

Column (3) removes the advisor variable but adds the three variables that capture mutual fund literacy. This column shows that investors who think past returns are more important pay higher fees on average. Again, this is estimated on the subsample of those who opted-out, so the increased tendency for these types to leave the default fund is not responsible for the magnitude of this point estimate. It is based on a comparison with other investors who opted out of the default fund but held different beliefs about the factors that are important for mutual fund selection. Although the effects are not precisely estimated, the loadings on mutual fund fees and on self-awareness indicate that both types pay lower fees, with those who know the importance of fees paying less than those who are unsure.

Advisor selection and mutual fund literacy are jointly considered in Column (4). Here both sets of variables are important. Advisor-affiliated respondents pay about 5.8 basis points more in fees per year, even holding constant their financial literacy. Finally, Column (5) repeats Column (4) but includes the full sample. This changes the interpretation of the point estimate for the advisor dummy variable, because the comparison group is now all individuals who did not choose an advisor, including those who stayed with the default fund. The results are even stronger when benchmarked against those individuals who kept the default choice with an estimated difference of 8.2 basis points.

6.2 Performance

In the final part of our analysis, we investigate how mutual fund literacy and reliance on outside advisors impacts performance. We take several approaches to performance measurement where we have computed monthly returns from daily holdings and prices.

First, we derive an average raw excess returns over the default fund return as follows:

$$AP7_i = \frac{1}{T}\sum_{t=1}^{T}(R_{i,t} - R_{AP7,t}). \tag{1}$$

This provides a measure of performance relative to the return one would have earned had one not opted out of the default fund. Second, use a standard factor model that includes a Swedish and Global value weighted index and three other factor exposures. Formally, we estimate

$$R_{i,t} = \alpha_i + \beta_{i,S}R_{S,t} + \beta_{i,G}R_{G,t} + \beta_{SMB,i}R_{SMB,t} + \beta_{HML,i}R_{HML,t} + \beta_{MOM,i}R_{MOM,t} + e_{i,t}, \tag{2}$$

where $R_{S,t}$ and $R_{G,t}$ denote the monthly Swedish and Global equity excess returns and $R_{SMB,t}$, $R_{HML,t}$, and $R_{MOM,t}$ denote the size, value and momentum zero cost portfolios obtained from the Swedish House of Finance website.[19] We present results for both the full model and those excluding the zero-cost factor portfolios.

—Figure 2 here—

Figure 2 plots the distribution of annualized market-model alphas for those who have opted out of the default. The dark-shaded region of the graph corresponds to those who underperform the benchmark. The annualized mean performance is around negative 1.3% per year, and the median is slightly lower. The upper (lower) decile of the alphas is 1.5% (-4.0%). Only 24% of the active investors have non-negative alphas.

Table X examines how performance is related to participant characteristics for the full sample in OLS-regressions. The median annualized Sharpe ratio in our sample is approximately 0.28, but there is significant variation according to the literacy of the respondent and their reliance on advisors. Column (1) shows that those who do not know if fees or past returns are important have significantly higher - and those finding past returns important - to have lower Sharpe-ratios. The parameter estimates (0.026 and -0.021) imply an average difference in Sharpe-ratios of around 10% between these groups. This result derives from the fact that those who do not know are more likely to be in the default fund, and the default fund has had very strong performance in later years. Older investors ex-

[19] All benchmarks are value weighted. The data was retrieved from the Swedish House of Finance website at https://data.houseoffinance.se/.

perience lower Sharpe-ratios, which is likely also related to the target-date design of the default fund.

—Table X here—

In Column (2) of Table X, we include a dummy for those classified as using mass-market advisors (MMA's). A parameter estimate of -0.065 represents one decile in lower performance compared to the rest of the sample. Column (3) shows that these findings gets even stronger when we estimate using sampling weights. To put this point estimate in perspective, the loading on advisor in Column (3) corresponds to around 1% lower annual return holding constant the annual standard deviation.

The remaining columns of the table replace the Sharpe ratio with abnormal returns obtained from the AP7 benchmark, a market model, or the extended Fama-French-Carhart model. The results are broadly consistent with those of the first three columns. Those finding past returns to be important for mutual fund selection underperform by 25 to 36 basis points per year on average, when we do not control for MMA's. When controlling for MMA's, this effect becomes less pronounced. The negative loadings on the mass-market advisor variable range from an underperformance of 0.5% to 1.5% per year. This underscores the fact that the Sharpe ratio differences come not just from choosing funds with lower average returns, but also with excessive volatility for the returns achieved.

In terms of the importance of mutual fund fees versus returns, those who know that they do not know the answer do far better on a risk-adjusted basis than either those who think either fees or returns are more important. This is driven largely by their greater propensity to remain in the default fund, and gets stronger when we use sampling weights that correct for the under-representation of lower-literacy respondents in our sample relative to the Swedish working-age population. Taken together, the results in this table indicate that returns-oriented investors and investors who rely on mass-market advisory firms have significantly worse retirement savings outcomes than either those who know the importance of low fees, or else know of their own ignorance in the matter.

One potential concern with these findings is that we classify investors using advisors in a time period prior to 2012, when this acitivity virtually stopped. Some investors may have experienced low performance, and therefore chose an advisor. Going forward,

investors could be better off. To safeguard against this possibility, we repeat the analysis of Table X but restrict the performance estimates to the 2012-2015 time period. The results are reported in the Appendix, Table A.3. The loading on the MMA variable is even stronger in this later sample period, even though we find less of a difference in the parameter estimates between the fee and return group. Since the default fund as of mid-2010 was mandated to use leverage in the portfolio, performance measures comparing to standard retail funds are problematic. The main conclusion however remains when we exclude the default fund and analyze the performance of the 1,678 investors that had opted out by 2015 in Table A.4. The effect of being classified with using a mass-market advisor becomes much smaller since we are comparing investors outside of the default fund only. Interestingly, the positive performance for those who do not know is smaller, but not completely wiped out. Overall, we conclude that our results are not due to poor performance driving the choice of a mass-market advisor, and it is those with higher meta-cognition that do better on average.

7 Conclusion

Some of the most important long-run financial decisions facing households throughout the world play out in market settings where household decision-makers must confront persuasion and strategic obfuscation as they search to collect the relevant information required to make appropriate choices. Behavioral biases and the choice architecture itself not only affect how households make decisions, they also affect the very incentives for strategically generating information by other market participants. Understanding how these factors interact is critical not only for designing effective economic policy, but also for understanding more generally how cognitive factors and market structures affect the manner in which information is incorporated into household financial decisions.

Sweden's pension reform experience offers a natural laboratory for studying these interactions. The Swedish system offers a low-cost, well-diversified default fund along with the opportunity to choose among an enormous number of alternative mutual funds; moreover, the initial cohort received a strong informational nudge encouraging them to actively manage their retirement portfolio while later cohorts did not. Thus, through

the Swedish experience we can study how behavioral biases and knowledge affect who responds to informational nudges, acknowledging that the informational nudge itself shapes the market structure facing pension savers.

We find that individuals with mistaken beliefs about their own general financial literacy are also prone to hold mistaken beliefs about the factors important for making mutual fund allocation decisions. These mistaken beliefs have negative consequences: individuals who hold them are steered away from a well-diversified, low-cost default mutual fund into low-performing, higher-cost alternatives. This is especially true among the cohort of individuals who were nudged to make an active choice—the respondents who felt the nudge the most were those who misunderstood the factors important for making mutual fund choices.

In contrast, individuals in our study who find finance uninteresting and are generally disengaged from financial decision-making are well protected by the structure of the plan's default structure. These are exactly the investors best served by a choice architecture designed to guard against costly indecision. Nevertheless, the informational nudge undermined this feature of the system, pulling the otherwise disengaged into the mutual fund choice process.

These results underscore the need for a better understanding of the connection between knowledge, self-awareness and choice architecture. A system that allows individuals to opt out of a default not only provides choice, it creates markets for information and advice. Taking this into account is critical for our understanding of how to balance the costs of sub-optimal decision-making from certain groups against the benefits associated with greater freedom of choice in a market setting where consumer financial knowledge is both heterogeneously distributed and essential for participation.

References

Ambuehl, Sandro, B. Douglas Bernheim, and Annamaria Lusardi, 2014, The effect of financial decision education on the quality of decision making, National Bureau of Economic Research Working Paper 20618.

Anagol, Santosh, and Hugh Hoikwang Kim, 2012, The impact of shrouded fees: Evidence from a natural experiment in the indian mutual funds market, *American Economic Review* 102, 576–593.

Anderson, Anders, Forest Baker, and David T. Robinson, 2017, Precautionary savings, retirement planning and misperceptions of financial literacy, *Journal of Financial Economics* 126, 383–398.

Berk, Jonathan B., and Richard C. Green, 2004, Mutual fund flows and performance in rational markets, *Journal of Political Economy* 112, 1269–1295.

Beshears, John, James J. Choi, David Laibson, Brigitte C. Madrian, and Sean (Yixiang) Wang, 2016, Who is easier to nudge?, Working paper, Harvard University.

Carhart, Mark M., 1997, On persistance in mutual fund performance, *Journal of Finance* 52, 57–82.

Choi, James J., David Laibson, and Brigitte C. Madrian, 2010, Why does the law of one price fail? an experiment on index mutual funds, *Review of Financial Studies* 23, 1405–1432.

Cronqvist, Henrik, and Richard H. Thaler, 2004, Design choices in privatized social-security systems: Learning from the Swedish experience, *American Economic Review, Papers and Proceedings* 94, 424–428.

——— , and Frank Yu, 2018, When nudges are forever: Inertia in the swedish premium pension plan, Working paper, University of Chicago.

Dahlquist, Magnus, and José Martinez, 2015, Investor inattention: A hidden cost of choice in pension plans?, *European Financial Management* 21, 1–19.

——— , and Paul Söderlind, 2017, Individual investor activity and performance, *Review of Financial Studies* 30, 866–899.

Fernandes, Daniel, John G. Lynch, and Richard G. Netemeyer, 2014, Financial literacy, financial education, and downstream financial behaviors, *Management Science* 60, 1861–1883.

Goetzmann, William N., and Naday Peles, 1997, Cognitive dissonance and mutual fund investors, *Journal of Financial Research* 20, 145–158.

Hastings, Justine, Olivia S. Mitchell, and Eric Chyn, 2011, Fees, framing, and financial literacy in the choice of pension managers, in Olivia S. Mitchell, and Annamaria Lusardi, ed.: *Financial Literacy: Implications for Retirement Security and the Financial Marketplace* (Oxford University Press).

Hastings, Justine S., Brigitte C. Madrian, and William L. Skimmyhorn, 2013, Financial literacy, financial education, and economic outcomes, *Annual Review of Economics* 5, 347–373.

Kim, Hugh Hoikwang, Raimond Maurer, and Olivia S. Mitchell, 2016, Time is money: Rational life cycle inertia and the delegation of investment management, *Journal of Financial Economics* 121, 231–248.

Kruger, Justin, and David Dunning, 1999, Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments, *Journal of Personality and Social Psychology* 77, 1121–1134.

Linnainmaa, Juhani, Brian T. Melzer, and Alessandro Previtero, 2015, Costly financial advice: Conflicts of interest or misguided beliefs?, Working Paper w20712, NBER.

Lusardi, Annamaria, Pierre-Carl Michaud, and Olivia S. Mitchell, 2017, Optimal Financial Knowledge and Wealth Inequality, *Journal of Political Economy* 125, 431–477.

Lusardi, Annamaria, and Olivia S. Mitchell, 2008, Planning and financial literacy: How do women fare?, *American Economic Review* 98, 413–417.

——— , 2011, Financial literacy and planning: Implications for retirement well-being, in Annamaria Lusardi, and Olivia S. Mitchell, ed.: *Financial Literacy: Implications for Retirement Security and the Financial Marketplace* . pp. 17–39 (Oxford University Press) Michigan Retirement Research Center, WP 2015-108.

——— , 2014, The economic importance of financial literacy: Theory and evidence, *Journal of Economic Literature* 52, 5–44.

Malkiel, Burton G., 2003, The efficient market hypothesis and its critics, *Journal of Economic Perspectives* 17, 59–82.

Moore, Don, and Paul J. Healy, 2008, The trouble with overconfidence, *Psychological Review* 115, 502–517.

Müller, Sebastian, and Martin Weber, 2010, Financial literacy and mutual fund investments: Who buys actively managed funds?, *Schmalenbach Business Review* 62, 126–153.

Palme, Marten, Annika Sunden, and Paul Söderlind, 2007, How do individual accounts work in the swedish pension system?, *Journal of the European Economic Association* 5, 636–646.

Thaler, Richard H., and Cass R. Sunstein, 2008, *Nudge* (Yale University Press).

Van Rooij, Maarten, Annamaria Lusardi, and Rob Alessie, 2011, Financial literacy and stock market participation, *Journal of Financial Economics* 191, 449–472.

Table I: Pension funds and holdings

This table reports characterics of the funds in the sample. Panel A reports the invesments and fees across six broad fund categories. Default fund savers automatically obtain an increasing allocation to the default bond fund after the age of 56. Fees are reported net of discounts, but excludes the service fee charged to all accounts by the Swedish Pensions Agency (SPA). Panel B reports the number of individuals who were in the default fund at the end of 2000 - the year which the pension system was introduced. The following columns report the number of new savers who entered after 2000; those who opted out of default up until 2015; and the number of individuals in the default fund at the end of 2015. The last column of Panel B reports the number of people trading only once, out of the default fund. The data is obtained from the SPA and matched to our sample of 2,502 survey respondents. Panel C reports frequencies for respondents and trades that are associated with mass-market advisors, where advisor-led trades are defined according to three different criteria from a sample of 480,000 retirement accounts: a trade coincides with at least 1,000 other identical trades on the same day, a trade coincides with a number exceeding the 25th percentile of coordinated trades, or a trade coincides with trades that involve more than the median number of coordinated trades.

Panel A: Pension fund types, investments and fees

					Fees, BPs		
Fund type	No. of funds	No. of invest.	Value 2015	Share of value	Q 1	Med.	Q 3
Default equity fund	1	789	86.67	23%	12	12	12
Default bond fund	1	155	4.80	1%	5	5	5
Equity funds	336	3,152	183.21	48%	33	51	70
Mixed funds	57	375	31.28	8%	35	38	5
Target date funds	30	587	63.31	17%	18	20	20
Bond funds	68	277	13.20	3%	12	19	36
Total	493	5,335	382.47	100%	25	40	62

Panel B: Active and passive choice

Fund choice	2000 default	New entrants	Opted out	2015 default	One trade
Default fund	424	509	-109	824	567
Other	1,344	225	109	1,678	1,935
Total	1,768	734	0	2,502	2,502
Fraction (Default/Trade)	24%	69%		33%	23%

Panel C: Trades Coordinated through Mass-Market Advisors

Coordination Threshold	Respondents N=2,502	Trading Tot. trades = 18,566
At least 1,000 trades	353 (14.1%)	10,884 (58.6%)
25th percentile	330 (13.2%)	10,393 (56.0%)
Median	220 (8.8%)	6,345 (34.2%)

Table II: Measuring Metacognition with Knowledge of Mutual funds

This table reports key statistics tabulated on responses to the mutual fund question: "When selecting a mutual fund, past returns are more important than fees". Responses are categorized into Strongly agree (MF Return), Strongly Disagree (MF Fee) and Don't know (MF DK). Sample proportions are reported separately for the initial and later cohorts, as well as the full sample. The baseline (omitted group) are those who agree or disagree somewhat. Literacy Score denotes the average score on the five-question financial literacy test reported in the Appendix. Default (2015) denotes the proportion of respondents in that category who were in the default fund in 2015. Average fees are expressed in basis points. The last column reports the fraction of respondents who are classified as using mass-market advisors (MMA's) according to the median definition as described in Panel C of I. The data contains a total of 2,502 survey responses.

"When selecting a mutual fund, past returns are more important than fees"								
Survey	Variable	Sample Proportion			Literacy	Default	Avg.	Prop.
Responses	Definition	Initial	Later	All	Score	(2015)	Fees	MMA
Strongly agree	MF Return	8.4%	11.9%	10.8%	3.39	23%	29	15%
Agree somewhat	Baseline	26.6%	36.0%	33.2%	3.34	28%	26	9%
Disagree somewhat	Baseline	15.6%	20.6%	19.1%	3.58	26%	27	8%
Strongly disagree	MF Fee	8.0%	9.5%	9.1%	3.72	31%	26	5%
Don't know	MF Don't know	38.6%	19.4%	25.1%	2.34	48%	22	8%
Prefer not to say	MF Don't know	2.9%	2.7%	2.8%	1.52	44%	24	8%

Table III: Respondent Characteristics

This table tabulates the responses from the survey based on individual characteristics. The first two colums report the fraction of responses compared to the sample population. The third and fourth colums report the average score on the financial literacy test, along with Overestimation, which is the difference between the respondent's subjective estimate of their score and their actual score. Columns (5)-(7) reports fraction of responses to the mutual fund question described in Table II, and the last column the fraction of people in the default fund at the end of 2015. The survey was conducted by Statistics Sweden and matched to data from the Swedish Pensions Agency and consists of 2,502 observations.

	Sample Prop.	Pop. Prop.	Score	Overest.	Mutual Fund: Return	Fee	D/K	Default Fund
Overall	100.00	100.00	3.14	0.50	0.11	0.09	0.27	0.33
Pop. Wtd.	.	.	2.98	0.52	0.11	0.08	0.32	0.38
Gender								
Men	50.04	50.90	3.48	0.53	0.13	0.11	0.17	0.31
Women	49.96	49.10	2.81	0.48	0.09	0.07	0.37	0.34
Age								
18-24	5.36	14.40	2.81	0.25	0.07	0.05	0.50	0.96
25-34	16.39	21.70	3.09	0.29	0.09	0.08	0.40	0.65
35-44	20.18	21.00	3.15	0.44	0.12	0.11	0.26	0.30
45-54	28.22	21.80	3.21	0.56	0.11	0.11	0.22	0.16
55-65	29.86	21.10	3.17	0.65	0.12	0.08	0.21	0.22
Income								
0-124	9.11	23.90	2.91	0.42	0.08	0.06	0.46	0.63
125-274	37.85	41.50	2.78	0.57	0.10	0.07	0.36	0.39
275-374	29.98	21.20	3.21	0.53	0.11	0.08	0.21	0.26
375+	22.42	13.40	3.78	0.41	0.12	0.15	0.10	0.19
Education								
Some school	6.08	16.00	2.60	0.68	0.08	0.09	0.38	0.26
High school	38.85	45.80	2.82	0.65	0.12	0.07	0.30	0.28
College	54.84	38.20	3.43	0.38	0.11	0.11	0.23	0.37

Table IV: Household planning and financial literacy

This table explores the connection between household planning decisions by running Probit regressions including beliefs whether mutual fund fees or past returns are more important for a mutual fund's future long run performance. Interesting takes the value of one if the respondent disagreed or strongly disagreed to the statement "I find personal financial matters boring" and zero otherwise. Retire, Advice, Sole and Equity takes the value of one if the respondent report that they have tried to figure out the amount to save for retirement, if they are willing to accept free financial advice and if they are the sole decision maker in the household, and if the respondent held any financial assets outside the pension account; zero otherwise. The independent variables MF Return, MF Fee and MF Don't Know takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees" and zero otherwise. Initial Cohort is a dummy variable taking the value of one if the respondent was in the initial 2000 cohort, zero otherwise. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. The survey was conducted by Statistics Sweden and matched to data from the Swedish Pensions Agency and consists of 2,502 observations. Point estimates are reported as marginal probabilities. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

VARIABLES	(1) Interesting	(2) Interesting	(3) Retire	(4) Retire	(5) Advice	(6) Advice	(7) Sole	(8) Sole
MF Return		0.036		-0.002		0.099***		0.071**
		(0.034)		(0.033)		(0.033)		(0.035)
MF Fee		0.093**		0.035		-0.045		0.058
		(0.036)		(0.036)		(0.034)		(0.037)
MF Don't know		-0.167***		-0.166***		-0.042*		-0.028
		(0.026)		(0.026)		(0.025)		(0.027)
Financial Literacy	0.100***	0.076***	0.057***	0.034***	0.002	-0.004	0.024***	0.018*
	(0.009)	(0.010)	(0.009)	(0.010)	(0.008)	(0.009)	(0.009)	(0.010)
Initial Cohort	-0.072**	-0.097***	0.052	0.031	0.029	0.022	-0.005	-0.011
	(0.035)	(0.035)	(0.035)	(0.035)	(0.032)	(0.032)	(0.036)	(0.036)
Married	-0.002	-0.013	0.048**	0.039*	-0.055***	-0.061***	-0.314***	-0.318***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)
Female	-0.041*	-0.020	0.001	0.020	0.055***	0.061***	-0.102***	-0.097***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.021)	(0.021)	(0.022)	(0.022)
Age	0.001	0.001	0.003***	0.003**	-0.005***	-0.005***	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log Income	0.013	0.007	0.050***	0.045**	0.021**	0.020*	0.018*	0.016*
	(0.010)	(0.010)	(0.019)	(0.018)	(0.011)	(0.010)	(0.010)	(0.010)
University	-0.036	-0.034	0.053**	0.055**	0.033	0.038*	0.060***	0.062***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.022)	(0.022)	(0.023)	(0.023)
Observations	2,502	2,502	2,502	2,502	2,502	2,502	2,502	2,502
MF Ret-MF Fee=0	-	0.21	-	0.67	-	0.01	-	0.08
Pseudo R^2	0.0474	0.0636	0.0486	0.0612	0.0184	0.0236	0.0785	0.0810

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table V: Mutual fund beliefs and financial literacy

This table explores the connection between financial literacy as measured by a modified version of the NFCS Big 5 Financial Literacy test and beliefs about whether mutual fund fees or past returns are more important for a mutual fund's future long run performance. The dependent variable in the first three columns is a dummy equaling one if the respondent strongly agreed to the statement "When selecting a mutual fund, past returns are more important than fees" and zero otherwise. In columns (4) through (6) the dummy is one for respondents who strongly disagreed with that statement, while in Columns (7) through (9) the dummy is one for those who report that they don't know the answer to the statement. The independent variables Financial Literacy is the score from the test ranging from 0 to 5; Perceived Fin. Literacy is the average self-assessed score. Financial Mistakes and DK is the complement to Financial Literacy score, i.e. the number of mistakes and number of Don't Know responses from the same test. Initial Cohort is a dummy variable taking the value of one if the respondent was in the initial 2000 cohort, zero otherwise. The survey was conducted by Statistics Sweden and matched to data from the Swedish Pensions Agency and consists of 2,502 observations. Point estimates are reported as marginal probabilities. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

	Past Returns More Important			Fees More Important			Don't Know		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial Literacy	0.018***	0.008		0.032***	0.020***		-0.140***	-0.108***	
	(0.005)	(0.006)		(0.005)	(0.006)		(0.008)	(0.009)	
Perceived Fin. Literacy		0.019***			0.025***			-0.058***	
		(0.007)			(0.007)			(0.009)	
Financial Mistakes			0.001			-0.022***			0.065***
			(0.007)			(0.006)			(0.011)
DK			-0.039***			-0.046***			0.192***
			(0.008)			(0.009)			(0.013)
Initial Cohort	0.022	0.023	0.018	0.010	0.012	0.008	-0.141***	-0.144***	-0.124***
	(0.020)	(0.020)	(0.020)	(0.018)	(0.017)	(0.018)	(0.034)	(0.033)	(0.035)
Married	0.029**	0.028**	0.028**	-0.010	-0.012	-0.011	-0.073***	-0.068***	-0.070***
	(0.013)	(0.013)	(0.013)	(0.012)	(0.011)	(0.011)	(0.019)	(0.019)	(0.020)
Female	-0.018	-0.013	-0.021*	-0.016	-0.010	-0.017	0.132***	0.112***	0.150***
	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)	(0.011)	(0.019)	(0.019)	(0.019)
Age	0.000	-0.000	-0.000	-0.000	-0.001	-0.000	-0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log Income	0.002	0.002	0.002	0.023**	0.020**	0.021**	-0.031***	-0.030***	-0.030***
	(0.007)	(0.006)	(0.006)	(0.010)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
University	-0.029**	-0.029**	-0.026**	0.011	0.011	0.012	0.015	0.014	0.005
	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.021)	(0.021)	(0.021)
Observations	2,502	2,502	2,502	2,502	2,502	2,502	2,502	2,502	2,502
Pseudo R^2	0.0189	0.0234	0.0288	0.0502	0.0612	0.0545	0.219	0.233	0.255

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VI: Default fund and turnover

This table reports the probability to stay in the default fund and portfolio turnover for those opting out. Columns (1) through (3) reports Probit regressions of a dummy variable that equals one if the respondent has remained with the default fund in the Swedish pension system as of 2015 and zero if they opted out. The independent variables MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees" and zero otherwise. Columns (4) through (6) display the results of an OLS regression where the dependent variable is a count of the number of portfolio rebalances from 2000 to 2015. Initial Cohort is a dummy variable taking the value of one if the respondent was in the initial 2000 cohort, zero otherwise. The full sample consists of 2,502 observations, the initial sample referes to the 1,768 investors coming in during the year 2000, and the later sample consists of the remaining 734 later entrants. Columns (3) through (9) report the results from a corresponding weighted regression based on the full Swedish population in the ages 18 to 65. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Point estimates for the Probit regressions are reported as marginal probabilities. Intercepts are computed but surpressed for brevity. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

	Remained in Default					Traded Exactly Once		Portfolio Turnover	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MF Return		-0.055*	-0.050	-0.072***	0.032	-0.012	-0.011	0.617	0.610
		(0.032)	(0.038)	(0.027)	(0.059)	(0.104)	(0.104)	(0.937)	(0.928)
MF Fee		0.039	0.078*	0.087**	0.028	-0.047	-0.040	-1.173	-1.115
		(0.037)	(0.044)	(0.043)	(0.061)	(0.118)	(0.120)	(0.887)	(0.872)
MF D/K		0.131***	0.153***	0.053*	0.179***	-0.044	-0.016	-2.070***	-1.781***
		(0.027)	(0.031)	(0.030)	(0.041)	(0.084)	(0.084)	(0.658)	(0.650)
Fin. Lit.	-0.009	0.008	0.010	0.008	0.007	0.010	0.012	0.113	0.124
	(0.009)	(0.009)	(0.011)	(0.010)	(0.016)	(0.031)	(0.031)	(0.284)	(0.281)
Married	-0.060***	-0.050**	-0.041	-0.046**	-0.017	0.059	0.064	0.900	1.000
	(0.021)	(0.021)	(0.025)	(0.021)	(0.044)	(0.068)	(0.068)	(0.630)	(0.627)
Female	0.021	0.008	-0.005	0.010	-0.026	0.048	0.044	-0.475	-0.521
	(0.021)	(0.021)	(0.025)	(0.022)	(0.038)	(0.069)	(0.069)	(0.584)	(0.579)
Age	-0.014***	-0.014***	-0.017***	0.001	-0.010***	0.021***	0.009**	0.200***	0.056*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.004)	(0.020)	(0.032)
log(Inc)	-0.069***	-0.065***	-0.068***	-0.029**	-0.059*	0.041	0.026	0.537***	0.389**
	(0.019)	(0.018)	(0.019)	(0.011)	(0.032)	(0.034)	(0.032)	(0.162)	(0.154)
University	0.011	0.006	0.001	0.009	-0.032	0.014	0.029	-0.841	-0.696
	(0.023)	(0.023)	(0.027)	(0.023)	(0.043)	(0.073)	(0.074)	(0.543)	(0.536)
Initial Cohort							0.429***		4.868***
							(0.110)		(0.771)
Sample	Full	Full	Full	Initial	Later	Full	Full	Full	Full
Pop. weights	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Ret=Fee	-	0.04	0.02	0.01	0.96	0.81	0.84	0.12	0.13

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VII: Working with mass-market advisors

This table reports Probit regressions where the dependent variable that takes the value of one if classified as having used a mass-market advisor (MMA), zero otherwise. The independent variables MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees"' and zero otherwise. Column (2) and (3) redefines the classification as being part of a collective rebalancing scheme that belong to the 25th and 50th percentile ("MMA 25" and "MMA 50") of correlated changes, corresponding to 3,076 and 12,535 identical portfolio rebalances at a given day. Columns (1) through (4) display the results for all respondents, while Column (5) includes only those who opted out of the default fund. Sampling weights based on the Swedish working-age population are applied to specifications in Columns (4) and (5). Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Point estimates are reported as marginal probabilities. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

	Any	25th (3,000)	50th (12,000 trades)			
	(1)	(2)	(3)	(4)	(5)	(6)
MF Return	0.027	0.034	0.055***	0.042**	0.057*	0.018
	(0.023)	(0.023)	(0.021)	(0.021)	(0.030)	(0.019)
MF Fee	-0.029	-0.016	-0.031*	-0.017	-0.047*	0.012
	(0.022)	(0.022)	(0.016)	(0.019)	(0.028)	(0.016)
MF Don't know	-0.028	-0.016	-0.008	-0.004	0.014	-0.008
	(0.018)	(0.017)	(0.014)	(0.015)	(0.025)	(0.009)
Financial Literacy	-0.012*	-0.014**	-0.014***	-0.010**	-0.016**	-0.000
	(0.006)	(0.006)	(0.005)	(0.005)	(0.008)	(0.002)
Married	0.010	0.007	-0.009	-0.006	-0.021	0.011
	(0.015)	(0.014)	(0.012)	(0.012)	(0.018)	(0.011)
Female	-0.013	-0.009	0.001	-0.002	-0.009	0.007
	(0.015)	(0.014)	(0.011)	(0.011)	(0.018)	(0.007)
Age	0.004***	0.003***	0.003***	0.003***	0.001	0.001*
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Log Income	0.017	0.036***	0.010**	0.011**	0.000	0.012**
	(0.012)	(0.011)	(0.005)	(0.005)	(0.006)	(0.006)
University	-0.023	-0.026*	-0.014	-0.021**	-0.031*	-0.007
	(0.015)	(0.014)	(0.011)	(0.011)	(0.018)	(0.006)
Sample	Full	Full	Full	Full	Initial	Later
Pop. weights	No	No	No	Yes	Yes	Yes
Wald Ret=Fee	0.07	0.10	0.01	0.04	0.02	0.77

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VIII: Choosing advisor-affiliated funds

This table reports weighted Probit regressions of a dummy variable that takes the value of one if the respondent invests in an advisor-affiliated fund of funds (as identified by the SPA). The independent variables labelled MMA takes the value one if the investor is classified as having used mass-market advice and zero otherwise. MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees", and zero otherwise. Initial Cohort is a dummy variable taking the value of one if the respondent was in the initial 2000 cohort, zero otherwise. Column (2) and (3) redefines the classification as being part of a collective rebalancing scheme that belong to the 25th and 50th percentile of correlated changes, corresponding to 3,076 and 12,535 identical portfolio rebalances at a given day in a separate sample of 480,000 retirement accounts. Column (1) to (4) display the results for all respondents and Column (5) includes only investors who opted out of the default fund. Sampling weights based on the Swedish working-age population are applied to all specifications. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Point estimates are reported as marginal probabilities. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

VARIABLES	(1) A-fund	(2) A-fund	(3) A-fund	(4) A-fund	(5) A-fund
MMA			0.384***		
			(0.031)		
MMA 25				0.386***	
				(0.032)	
MMA 50					0.431***
					(0.039)
Initial Cohort		0.097***	0.054***	0.057***	0.068***
		(0.021)	(0.021)	(0.021)	(0.021)
MF Return	0.061**	0.061**	0.055**	0.054**	0.041
	(0.027)	(0.027)	(0.026)	(0.026)	(0.026)
MF Fee	-0.030	-0.029	-0.018	-0.023	-0.020
	(0.022)	(0.022)	(0.021)	(0.021)	(0.022)
MF Don't know	0.012	0.018	0.023	0.018	0.015
	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)
Financial Literacy	-0.012*	-0.012*	-0.011*	-0.010	-0.009
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Married	-0.005	-0.003	-0.007	-0.006	0.001
	(0.015)	(0.015)	(0.014)	(0.014)	(0.015)
Female	-0.003	-0.004	0.001	0.003	-0.001
	(0.015)	(0.015)	(0.015)	(0.015)	(.)
Age	0.003***	0.000	-0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log Income	0.018**	0.012*	0.009	0.008	0.012
	(0.008)	(0.007)	(0.006)	(0.006)	(0.008)
University	-0.001	0.000	0.015	0.015	0.011
	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)
Observations	2,502	2,502	2,502	2,502	2,502
Pop. weights	Yes	Yes	Yes	Yes	Yes
MF Ret-MF Fee=0	0.01	0.01	0.02	0.02	0.06

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table IX: Fees

This table reports weighted OLS regressions on mutual fund fees. The dependent variable is the weighted average fee percentage they face in their fundholdings, computed by weighting each fund's fee percentage by that fund's weight in their portfolio at the end of 2015. The independent variable MMA 50 takes the value one if the investor has participated in coordinated trades defined at the median, and zero otherwise. MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement 'When selecting a mutual fund, past returns are more important than fees", and zero otherwise. Initial Cohort is a dummy variable taking the value of one if the respondent was in the initial 2000 cohort, zero otherwise. Columns (2) through (5) include variables that measure the fraction of each respondent's fund invested in each of the four fund types: equity funds, bond funds, target-date funds, and money market funds. Columns (1) through (4) include only those respondents who opted out of the default fund, while Column (5) includes the full sample. Sampling weights based on the Swedish working-age population are applied to all specifications. Investor characteristics controls correspond to those in Table VIII. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Fee	Fee	Fee	Fee	Fee
MMA 50	0.064***	0.061***		0.059***	0.076***
	(0.013)	(0.009)		(0.009)	(0.011)
MF Return			0.028**	0.025**	0.023**
			(0.011)	(0.011)	(0.011)
MF Fee			-0.015	-0.013	-0.013
			(0.014)	(0.014)	(0.011)
MF Don't know			-0.004	-0.005	-0.028***
			(0.009)	(0.009)	(0.007)
Financial Literacy	0.005	0.002	0.000	0.001	0.002
	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)
Initial Cohort	0.001	-0.014	-0.011	-0.014	0.074***
	(0.017)	(0.014)	(0.014)	(0.014)	(0.010)
Constant	0.283***				
	(0.081)				
Observations	1,678	1,678	1,678	1,678	2,502
R-squared	0.024	0.866	0.864	0.866	0.785
Demographics	Yes	Yes	Yes	Yes	Yes
Population weights	Yes	Yes	Yes	Yes	Yes
Strategy weights	No	Yes	Yes	Yes	Yes
Wald Ret=Fee	-	-	0.01	0.03	0.02

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table X: Performance

This table reports the results of OLS regressions in which the dependent variable is various measures of performance: the monthly Sharpe-ratio in Columns (1) through (3); the default fund-adjusted raw return denoted AP7 in Columns (4) to (6); the abnormal return obtained by a two factor market model using a global and Swedish equity index, denoted Market Model in Columns (7) through (9); and a Fama-French-Carhart specification adding European value, size and momentum factors in Columns (9) through (12). Benchmark factor returns are obtained from Swedish House of Finance website. The independent variables MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees", and zero otherwise. A dummy variable for investors classified as having used mass-market advisors (at the median) is labelled "MMA 50". Columns (3), (6), (9) and (12) report the results from the previous column, but with population weights. Characterisics include a constant and independent variables included in Table IV through VIII. There are 2,483 repondents in sample for which we have complete fund return data, winsorized at the 1% level. Population weights are based on all Swedes in the ages 18 to 65. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level.

VARIABLES	(1) Sharpe	(2) Sharpe	(3) Sharpe	(4) AP7	(5) AP7	(6) AP7	(7) MKT	(8) MKT	(9) MKT	(10) FFC	(11) FFC	(12) FFC
MMA 50		-0.065***	-0.077***		-1.196***	-1.433***		-0.676***	-0.876***		-0.379**	-0.592***
		(0.012)	(0.013)		(0.157)	(0.197)		(0.157)	(0.172)		(0.148)	(0.165)
MF Return	-0.021*	-0.017	-0.021	-0.254	-0.183	-0.209	-0.355**	-0.315*	-0.342*	-0.326**	-0.304*	-0.282
	(0.013)	(0.012)	(0.014)	(0.169)	(0.167)	(0.189)	(0.170)	(0.170)	(0.192)	(0.163)	(0.163)	(0.187)
MF Fee	0.013	0.011	0.022	0.019	-0.018	0.192	0.029	0.008	0.196	-0.032	-0.043	0.151
	(0.015)	(0.015)	(0.016)	(0.199)	(0.199)	(0.219)	(0.199)	(0.199)	(0.217)	(0.187)	(0.188)	(0.206)
MF Don't know	0.026**	0.026**	0.031***	0.309**	0.313**	0.321**	0.357***	0.359***	0.374***	0.316***	0.317***	0.313**
	(0.010)	(0.010)	(0.011)	(0.135)	(0.134)	(0.147)	(0.126)	(0.126)	(0.135)	(0.122)	(0.122)	(0.133)
Observations	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483
R-squared	0.818	0.819	0.852	0.186	0.199	0.221	0.603	0.605	0.659	0.634	0.635	0.686
Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population weights	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
MF Ret=MF Fee	0.06	0.12	0.03	0.26	0.49	0.13	0.11	0.19	0.05	0.20	0.26	0.09

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Beliefs about fees vs. past returns across financial literacy scores

This figure shows the number of respondents sorted on financial literacy score ("Actual Score; bars, right scale), together with mean self-estimated correct score, labelled Perceived Score, traced by the solid line (left scale). The dotted 45-degree line indicates a perfect match between Actual and Perceived. The bars show the proportion respondents strongly agreeing or disagreeing to the statement "When selecting a mutual fund, past returns are more important than fees'.

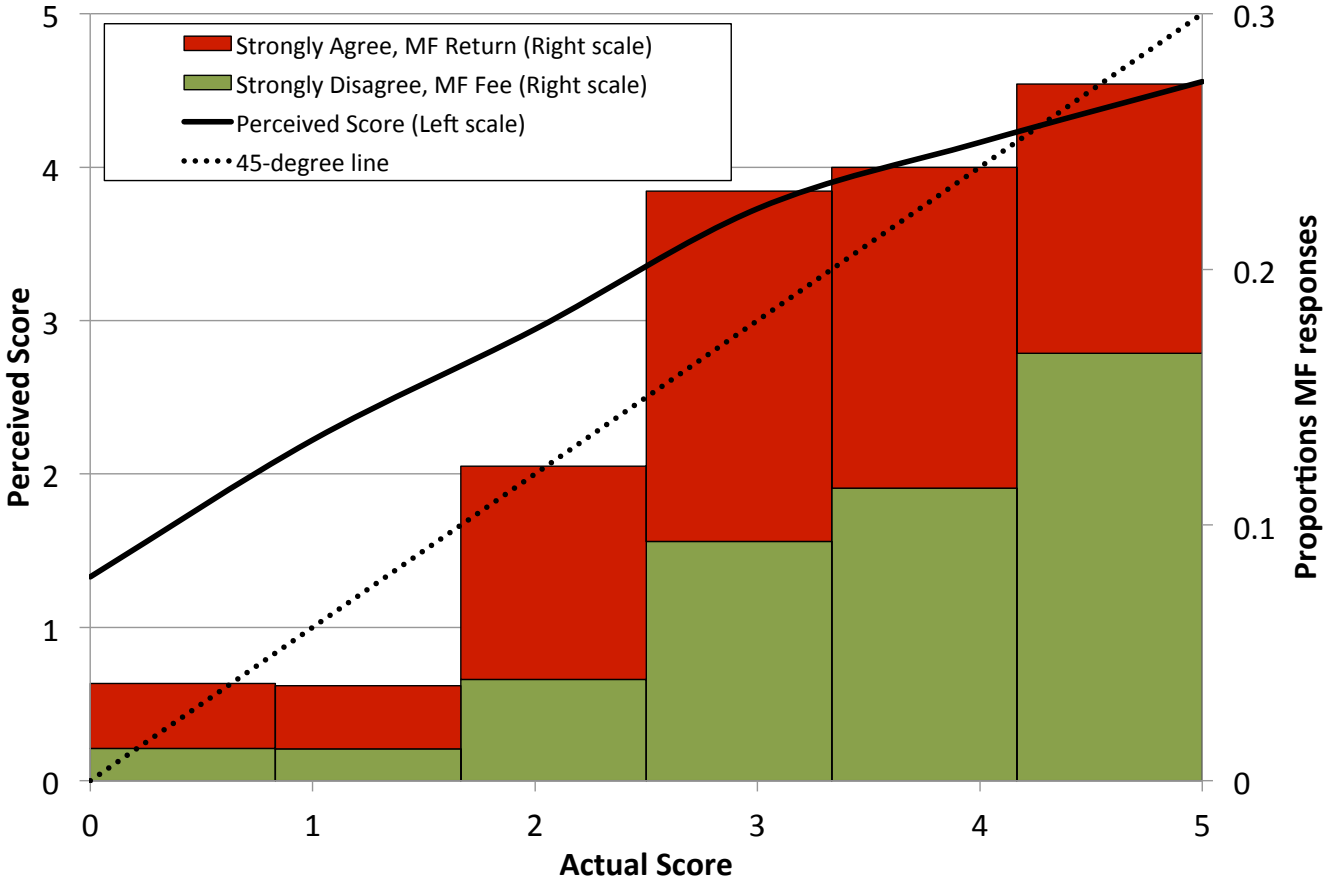
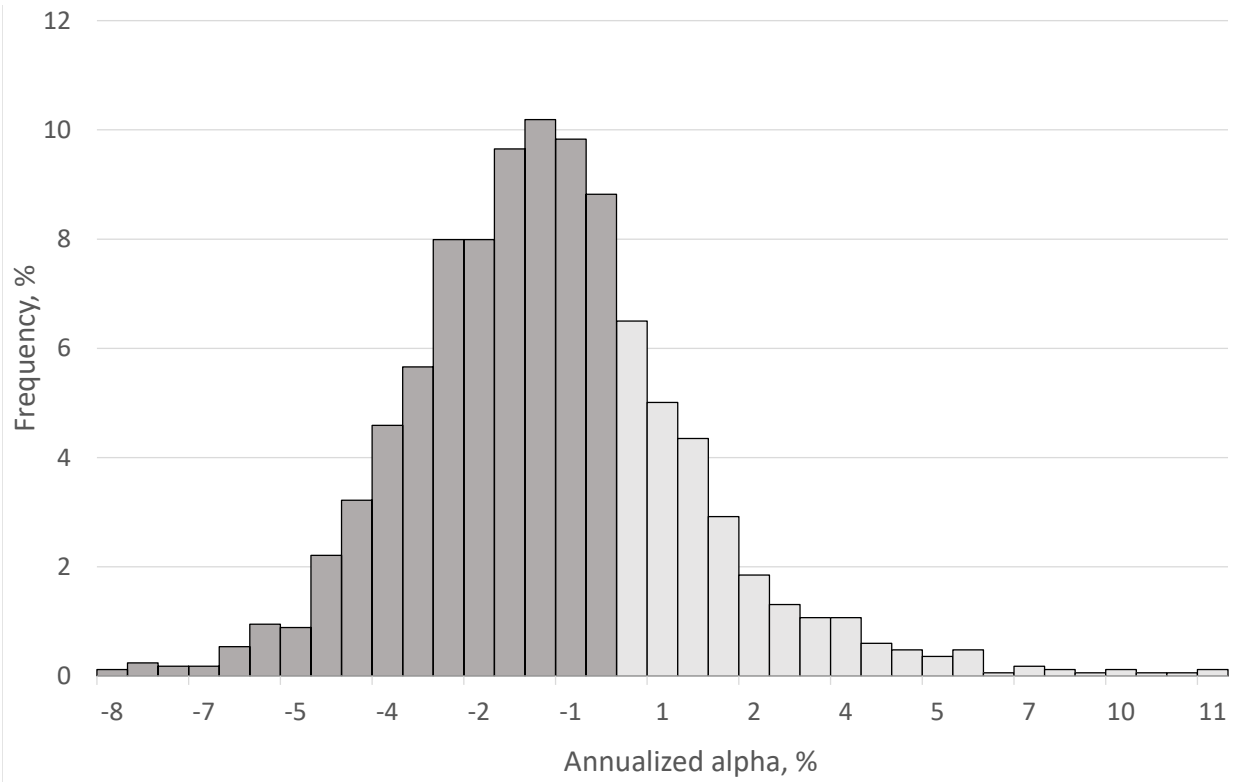


Figure 2: Distribution of market model alphas

This graph displays the distribution of the α_i from the regression of each respondent's portfolio excess return on two market excess returns, $R_{it} - r_{ft} = \alpha_i + \beta_{S,i} R_{S,t} + \beta_{G,i} R_{G,t} + \epsilon_{it}$, where S and G denote the Swedish excess market return and the Global excess market return, respectively. The dark-shaded portion of the graph correspond to $\alpha_i < 0$. The OLS-regression is estimated using monthly data from 2000 to 2015 on a sample of 1,678 respondents that were not in the default fund at the end of 2015.



A Online Appendix

This Appendix contains the distribution of answers to the questions in our financial literacy survey, alternative specifications for performance measurement for the more recent time period 2012-2015 as well as excluding individual in the default fund as of 2015, and a plot of the belif distribution across scores of the financial literacy test.

Table A.1: Five Modified Financial Literacy Questions

Below are the five ("Big 5") financial literacy questions used in the study and corresponding frequency responses on each item. Correct answers are highlighted in boldface. The questions have been translated from Swedish into English.

1. *Compounding*. Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? Please select one.
   - **More than $102 (92%)**
   - Exactly $102 (2%)
   - Less than $102 (3%)
   - Don't know (2%)
   - Prefer not to say (1%)
2. *Inflation*. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? Please select one.
   - More than today (6%)
   - **Less than today (81%)**
   - Exactly the same as today 3%)
   - Don't know (8%)
   - Prefer not to say (2%)
3. *Diversification*. Buying a single company's stock usually provides a safer return than a stock mutual fund. Please select one.
   - True (4%)
   - **False (76%)**
   - Don't know (19%)
   - Prefer not to say (1%)
4. *Saving*. Suppose you were given 10,000 as a gift and wanted to double the amount by saving the money ten years without having to touch it. What interest rate would you require to achieve this goal? Please select one.
   - About 15% annual interest rate (6%)
   - About 10% annual interest rate (45%)
   - **About 7% annual interest rate (43%)**
   - Don't know (5%)
   - Prefer not to say (1%)
5. *Bond Pricing*. If interest rates fall, what should happen to bond prices? Please select one.
   - **They will rise (23%)**
   - They will fall (17%)
   - They will stay the same (45%)
   - Don't know (14%)
   - Prefer not to say (1%)

Table A.2: Question about beliefs and household planning

Below are the questions and responses for the mutual fund belief and household planning questions reported in Tabel IV. Dummy variables taking the value of one for each response highlited in boldface. The questions have been translated from Swedish into English.

1. *Past returns and fees*. Do you agree or disagree with the following statement about selecting a mutual fund? "An equity mutual fund's past returns are more important than it's fees". Please select one.
   - **Strongly agree (11%)**, labelled "MF Return"
   - Agree (34%)
   - Disagree (19%)
   - **Strongly disagree (9%)**, labelled "MF Feee"
   - **Don't know (25%)**, labelled "MF DK"
   - Prefer not to say (2%)
2. *Retire*. Have you ever tried to figure out how much to save for retirement? Please select one.
   - **Yes (48%)**
   - No (49%)
   - Don't know (1%)
   - Prefer not to say (2%)
3. *Advice*. Would you be willing to accept free financial advice it was offered to you? Please select one.
   - **Yes (36%)**
   - No (24%)
   - Maybe, it depends (37%)
   - Don't know (2%)
   - Prefer not to say (2%)
4. *Finance interesting*. Do you agree or disagree with the following statement? "I think personal financial matters are boring" . Please select one.
   - Agree (12%)
   - Agree somewhat (39%)
   - **Disagree (22%)**
   - **Strongly disagree (25%)**
   - Don't know (1%)
   - Prefer not to say (1%)
5. *Decision maker*. Who is primarily repsonsible for planning the savings decisions in your household? Please select one.
   - **Myself (50%)**
   - Someone else (6%)
   - I share repsonsiblitiy (40%)
   - Financial advisor (1%)
   - Someone else in the family or friend (0%)
   - I don't save (1%)
   - I don't plan (1%)
   - Prefer not to say (1%)

Table A.3: Performance, robustness 2012-2015

This table reports the results of OLS regressions in which the dependent variable is various measures of performance, but on the sample of returns from 2012 an onwards only. The monthly Sharpe-ratio in Columns (1) through (3); the default fund-adjusted raw return denoted AP7 in Columns (4) to (6); the abnormal return obtained by a two factor market model using a global and Swedish equity index, denoted Market Model in Columns (7) through (9); and a Fama-French-Carhart specification adding European value, size and momentum factors in Columns (9) through (12). Benchmark factor returns are obtained from Swedish House of Finance website. The independent variables MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees"' and zero otherwise. A dummy variable for investors classified as having used mass-market advisors (at the median) is labelled "MMA 50". Columns (3), (6), (9) and (12) report the results from the previous column, but with population weights. Characterisics include a constant and independent variables included in Table IV through VIII. There are 2,483 repondents in sample for which we have complete fund return data, winsorized at the 1% level. Population weights are based on all Swedes in the ages 18 to 65. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level..

VARIABLES	(1) Sharpe	(2) Sharpe	(3) Sharpe	(4) AP7	(5) AP7	(6) AP7	(7) MKT	(8) MKT	(9) MKT	(10) FFC	(11) FFC	(12) FFC
MMA 50		-0.127***	-0.136***		-0.190***	-0.206***		-1.402***	-1.512***		-1.605***	-1.744***
		(0.021)	(0.024)		(0.021)	(0.024)		(0.170)	(0.202)		(0.179)	(0.212)
MF Return	-0.008	-0.001	-0.002	-0.010	0.001	-0.002	-0.186	-0.103	-0.084	-0.184	-0.089	-0.052
	(0.027)	(0.027)	(0.029)	(0.023)	(0.022)	(0.024)	(0.212)	(0.211)	(0.234)	(0.223)	(0.222)	(0.244)
MF Fee	-0.025	-0.028	0.018	-0.009	-0.015	0.019	-0.149	-0.193	0.214	-0.142	-0.192	0.245
	(0.034)	(0.034)	(0.034)	(0.029)	(0.029)	(0.030)	(0.282)	(0.281)	(0.295)	(0.293)	(0.292)	(0.307)
MF Don't know	0.084***	0.085***	0.081***	0.056***	0.057***	0.059***	0.743***	0.748***	0.726***	0.730***	0.736***	0.727***
	(0.021)	(0.021)	(0.021)	(0.020)	(0.020)	(0.021)	(0.178)	(0.176)	(0.189)	(0.186)	(0.183)	(0.197)
Observations	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483
R-squared	0.094	0.100	0.136	0.257	0.271	0.314	0.182	0.192	0.226	0.199	0.211	0.249
Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop. weights	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
MF Ret=MF Fee	0.69	0.49	0.62	0.96	0.64	0.53	0.91	0.78	0.38	0.90	0.76	0.40

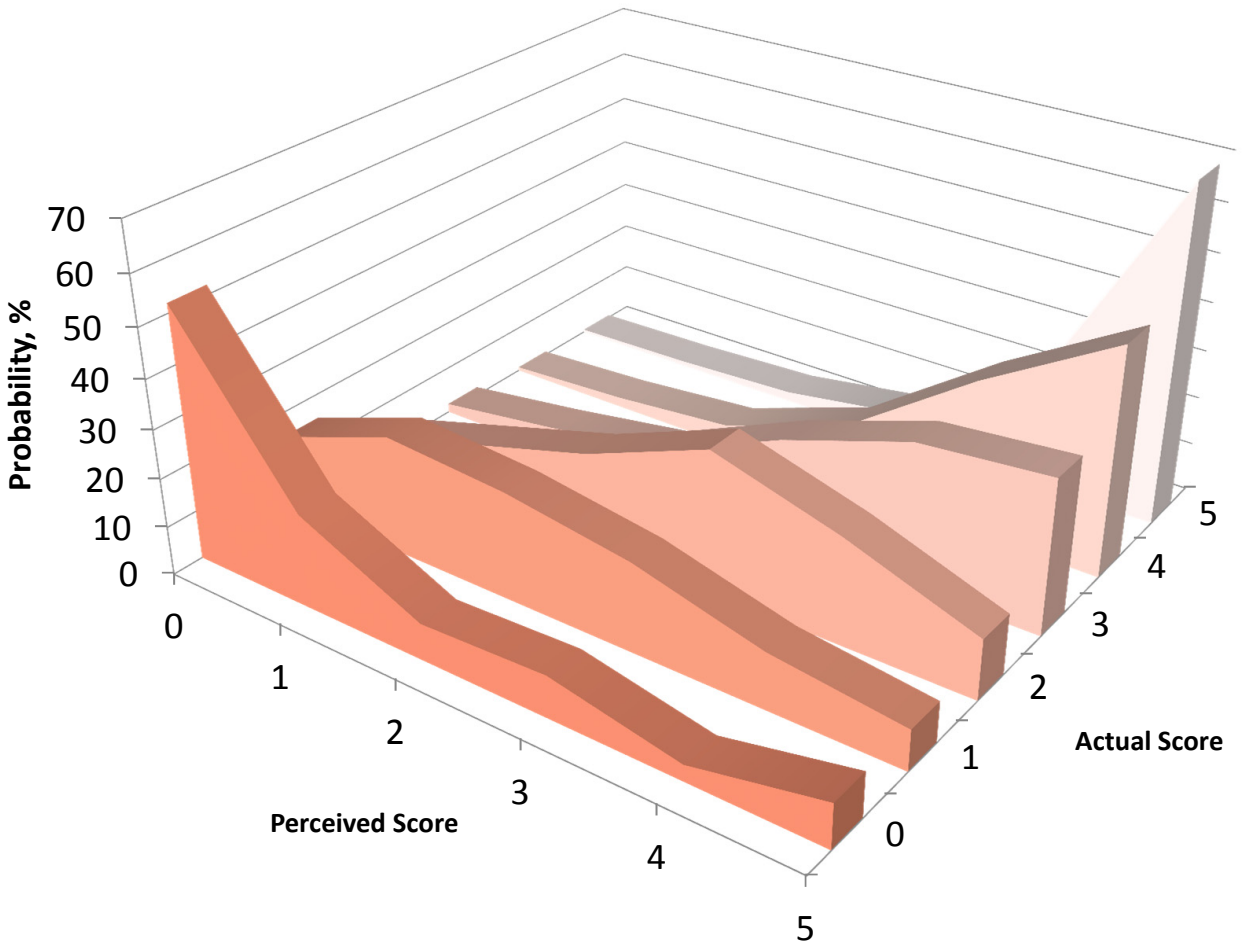
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.4: Performance, robustness 2012-2015 excluding default fund investors

This table reports the results of OLS regressions in which the dependent variable is various measures of performance, but on the sample of returns from 2012 an onwards only while excluding those in the default fund as of 2015. The monthly Sharpe-ratio in Columns (1) through (3); the default fund-adjusted raw return denoted AP7 in Columns (4) to (6); the abnormal return obtained by a two factor market model using a global and Swedish equity index, denoted Market Model in Columns (7) through (9); and a Fama-French-Carhart specification adding European value, size and momentum factors in Columns (9) through (12). Benchmark factor returns are obtained from Swedish House of Finance website. The independent variables MF Return, MF Fee and MF DK takes the value of one if the respondent strongly agreed, strongly disagreed or reported don't know to the statement "When selecting a mutual fund, past returns are more important than fees"' and zero otherwise. A dummy variable for investors classified as having used mass-market advisors (at the median) is labelled "MMA 50". Columns (3), (6), (9) and (12) report the results from the previous column, but with population weights. Characterisics include a constant and independent variables included in Table IV through VIII. There are 2,483 repondents in sample for which we have complete fund return data, winsorized at the 1% level. Population weights are based on all Swedes in the ages 18 to 65. Rejection probabilities from a Wald test for difference in coefficients between MF Return and MF Fee are included at the bottom of the table. Robust standard errors are reported in parentheses; one, two and three asterisks denote statistical significance at the 10, 5, and 1% level..

VARIABLES	(1) Sharpe	(2) Sharpe	(3) Sharpe	(4) AP7	(5) AP7	(6) AP7	(7) MKT	(8) MKT	(9) MKT	(10) FFC	(11) FFC	(12) FFC
MMA 50		-0.031	-0.034		-0.062***	-0.067***		-0.252	-0.264		-0.435**	-0.476***
		(0.022)	(0.023)		(0.020)	(0.022)		(0.160)	(0.174)		(0.169)	(0.183)
MF Return	0.027	0.029	0.030	0.029	0.033	0.029	0.167	0.184	0.214	0.176	0.206	0.263
	(0.032)	(0.032)	(0.035)	(0.022)	(0.022)	(0.024)	(0.210)	(0.210)	(0.241)	(0.226)	(0.227)	(0.256)
MF Fee	-0.041	-0.043	0.006	-0.025	-0.029	-0.003	-0.318	-0.334	0.033	-0.277	-0.303	0.110
	(0.043)	(0.043)	(0.046)	(0.028)	(0.028)	(0.028)	(0.300)	(0.300)	(0.327)	(0.317)	(0.318)	(0.347)
MF Don't know	0.077***	0.078***	0.063**	0.002	0.003	-0.011	0.434**	0.440**	0.255	0.378*	0.387*	0.214
	(0.030)	(0.030)	(0.030)	(0.021)	(0.021)	(0.023)	(0.200)	(0.200)	(0.212)	(0.209)	(0.209)	(0.223)
Observations	1,678	1,678	1,678	1,678	1,678	1,678	1,678	1,678	1,678	1,678	1,678	1,678
R-squared	0.023	0.024	0.031	0.026	0.030	0.038	0.021	0.022	0.029	0.021	0.023	0.032
Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop. weights	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
MF Ret=MF Fee	0.18	0.15	0.66	0.10	0.06	0.34	0.15	0.13	0.64	0.21	0.16	0.70

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure A.3: Beliefs about financial literacy scores

This figure shows the average beliefs distribution of sefl-assessed scores ("Perceived score") across actual financial literacy score ("Actual Score). There are 2,502 repondents in sample. The average of the belief distribution is used to compute "Perceived Score" in the main text.