Investor Inattention: A Hidden
Cost of Choice in Pension Plans?

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Abstract

We investigate inattention on the part of pension plan participants using a novel dataset covering savings in Sweden's Premium Pension System, data that permit direct comparison of the investment behaviors of pension and retail mutual fund investors. Unlike retail mutual fund investors, pension investors do not seem to react to past fund performance. This behavior means that pension investors face a greater risk of being caught in poorly performing funds. Our evidence suggests that inertia and inattention to past returns may translate into poorer investment results for pension investors. We discuss a potential change in the design of the Premium Pension System that may mitigate costs for inattentive investors while maintaining flexibility for attentive investors.

Keywords: Flows, inertia, pension plan design, performance, redemptions.

JEL Classification Numbers: G11, G23, H55.

1 Introduction

Pension and savings schemes where investment decisions are made by pension plan partic-
ipants have grown steadily over the past two decades. Sweden was an early mover in this
trend, implementing pension reforms in 1998 that introduced a second tier of mandatory
individual accounts, the Premium Pension System (PPS), often mentioned as an example in
this regard (Cronqvist and Thaler, 2004). The Swedish scheme, like most defined contribu-
tion schemes of its kind, has many attractive features, such as flexibility and transparency.
However, it undoubtedly requires greater individual responsibility, which, according to recent
evidence on investor inattention, individuals may not be ready or willing to take.

Investor inertia and inattentiveness are well-documented phenomena in pension plans (see
Samuelson and Zeckhauser, 1998; Madrian and Shea, 2001; Agnew, Balduzzi, and Sundén,
2003; Ameriks and Zeldes, 2004; and Mitchell, Mottola, Utkus, and Yamaguchi, 2006).
We assess the inertia and inattention of pension investors and its welfare consequences by
evaluating the flow-performance relationship and investment performance of pension versus
retail mutual fund investors.[1] We use a novel dataset covering investments in Sweden's
PPS and retail mutual funds, which allows direct comparison of the investment behavior of
pension and retail investors.

We first investigate whether pension investors are particularly inattentive, by comparing
their investment behavior with that of retail mutual fund investors. If past performance
contains relevant information about managers' skill or future performance, sensitivity to
past performance should be a good indicator of attention. The existing literature suggests
that flows into and out of mutual funds indeed are strongly related to measures of past
performance, and that mutual fund investors seem to chase performance (see Chevalier and
Ellison, 1997; and Sirri and Tufano, 1998). We find similar evidence among retail mutual

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[1]Here and throughout the paper we use the term "inattention" in a broad sense, to denote lack of
attention, indifference, negligence and even procrastination.

funds investors in our sample, but we also find that pension investors' flows are insensitive to past performance. We view this as further evidence of inattention on the part of pension investors. We also find strong evidence of investor inertia when new money enters the PPS.[2]

We then investigate how investor inertia and inattention affect performance. On the one hand, models of rational behavior suggest that investors with superior information/skills or facing lower transaction costs should be able to perform better than other investors (see, e.g, Gruber, 1996; Zheng, 1999; Berk and Green, 2004; and Berk and Tonks, 2007). Inattention should thus be inefficient and costly.[3] On the other hand, it is well documented that individual investors' frequent trading degrades performance in some settings (see, e.g., Barber and Odean, 2000 and 2002), in which case inattention may be a blessing. We find that differences in responsiveness have consequences for the performance of retail and pension investments. Pension investors hold 20–30% more of their assets in the worst-performing funds than do retail mutual fund investors. Moreover, pension investors continue to invest in the worst-performing funds whereas retail investors withdraw assets from the worst-performing funds. For the worst-performing decile or quintile of funds, the difference in quarterly outflows is as large as 6% of total assets invested. This difference is statistically and economically significant and affects the overall performance of pension fund investors.

Our work relates to an extensive literature on the flow-performance relationship. Ippolito (1992), Chevalier and Ellison (1997), Sirri and Tufano (1998), and Chen, Hong, Huang,

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[2]To the best of our knowledge, no studies systematically examine how defined contribution pension plan investors respond to past performance. Cohen and Schmidt (2009) provide some evidence that suggests that trustee funds in 401(k) plans have higher and more insensitive flows than funds not included in these retirement plans. Other studies have examined fiduciary pension plans and managed portfolios, schemes in which investment choices are made by professional managers and not by individual pension investors (see Del Guercio and Tkac, 2002; and Busse, Goyal, and Wahal, 2010).

[3]In the model of Berk and Green (2004), high performance signals a manager's superior ability. Investors chase performance and make rational use of information about fund history in doing so. Money flows into and out of funds to the point at which no abnormal returns are expected. This implies that, if investors do not respond to past performance, poorly performing funds survive without experiencing significant outflows. Accordingly, investors who fail to monitor their investments face a higher risk of being caught in poorly performing funds.

and Kubik (2004) provide evidence of a positive, convex relationship between mutual fund flows and performance. Chen, Goldstein, and Jiang (2010) document that investments in mutual funds with more illiquid assets respond more to past performance than do investments with liquid assets. Del Guercio and Tkac (2002), James and Karceski (2006), and Busse, Goyal, and Wahal (2010) document differences in the flow-performance relationship for fiduciary pension plans and managed portfolios. Kaplan and Schoar (2005) find that the flow-performance relationship for private equity partnerships is concave, attributing this to the structure of the private equity industry. Ding, Getmansky, Liang, and Wermers (2009) find a convex flow-performance relationship for hedge funds in the absence of share restrictions, but a concave relationship for hedge funds with share restrictions, while Baquero and Verbeek (2009) argue that the structure of hedge funds creates asymmetries and consider investments as well as disinvestments. We complement this literature by providing evidence of different flow-performance relationships between pension plan investors and retail investors. We argue that the flow-performance relationship is flat for low performers due to the inattention of pension investors. It seems that not only do a fund's organizational form and investment choices matter, but also who invests in it.

Our work also relates to the literature on pension plan design. Several scholars, as mentioned previously, provide evidence of investor inertia and inattentiveness among pension plan investors. Cronqvist and Thaler (2004) discuss the design choices of the PPS and point out that participants were encouraged to be active at the launch of the system in 2000. We argue that investors who were once active and opt out of the default fund only to become inattentive may obtain poor investment results. In this sense, investor inattention is a hidden cost of choice in the PPS. A possible solution to this problem is to introduce a 'back to the default' clause for investors who do not confirm their initial fund selections or who have not reallocated recently. This exemplifies the type of choice architecture advocated by Thaler and Sunstein (2008). Such a change in the design of the PPS might mitigate costs for

inattentive investors while maintaining flexibility for attentive investors.

It is worth mentioning that we gauge the cost of choosing poor investments by assessing risk-adjusted returns. We do not consider the cost of selecting a portfolio with a risk-return profile that does not correspond to the risk appetite of the investor (see Brennan and Torous, 1999; and Benartzi and Thaler, 2001). Furthermore, we do not consider the cost of choosing under-diversified portfolios (see Canner, Mankiw, and Weil, 1997; and Calvet, Campbell, and Sodini, 2007). These costs could be substantial, but assessing them requires knowledge of the total holdings of individual investors and cannot be measured using our data.

We proceed as follows. In Section 2 we examine the difference in the flow-performance relationship between pension and retail mutual fund investors in a specific fund. In Section 3 we describe the institutional background and data used in this study. In Section 4 we present estimates of the flow-performance relationship for pension and retail investors and evaluate the performance of pension and retail assets; we also discuss the design of the PPS. We conclude in Section 5.

2 Robur Contura—an illustration

We examine how mutual fund investors and pension investors respond differently to fund performance by considering one specific fund—Robur Contura. Cronqvist and Thaler (2004) discuss the design choices of Sweden's Premium Pension System, in particular, what happened at the launch of the system in 2000 as exemplified by the Contura fund. We use the fund to illustrate what happened after the launch. Figure 1 depicts total net assets, performance, and flows for the fund in the retail market and in the PPS on a quarterly basis from 2000 to 2010. (Data and the PPS are described more extensively in Section 3.)

The Contura fund specializes in technology and health-care stocks. When the PPS was launched in 2000, the fund had been in a five-year run during which its net asset value had

increased by more than 500%. It is perhaps not surprising that Contura, after the default fund, attracted the greatest interest on the part of pension investors when the system was launched. By the end of 2000, Contura was managing SEK 2 billion of PPS assets, a significant amount but still small compared with its more than SEK 17 billion in retail assets (see Figure 1a). That is, approximately 90% of the fund's assets were initially in the retail market and approximately 10% in the PPS. Contura's performance after 2000 was disappointing, and in the three years after the launch of the system it achieved a –70% return (see Figure 1b). In the same period, the default fund, a well-diversified, low-cost fund, was down significantly less, about –30%. Since the dramatic first three years, Contura's average return has been about zero. The ranking of the fund relative to other funds has been in the lowest decile except in two periods, i.e., the last two quarters of 2003 and the first two quarters of 2008. In these periods, the fund ranked above the median fund in the PPS.

Flows into and out of the Contura fund in the retail market and in the PPS highlight the inattentiveness of pension investors relative to retail investors. There are large inflows of new pension money into the PPS once per year (see Figure 1c), stemming from the annual contributions into the system. Unless deliberate reallocation action is taken, this new pension money flows proportionally into the investor's initially selected funds. We see these massive automatic injections as evidence of inertia. Ignoring the quarters when new pension money is injected, negative flows seem to follow poor performance (see Figure 1d). There are two additional observations. First, in the retail market, there are periods of positive inflows into particular funds, occurring immediately after they receive high rankings. Second, retail investors respond more than do pension investors to poor fund performance. Taken together, the flow-performance data indicate that retail investors respond more than do pension investors to performance and that there is inertia in pension assets.

We confirm the above results via simple regressions of Contura's absolute or relative flows on past performance using two control variables: the total net assets of the fund and a dummy

variable capturing new money injected into the PPS. We find that the response of retail investors is several times greater to that of pension investors and statistically significant. The effects are even stronger when we allow contemporaneous performance to affect flows. While these regression results apply to only one fund, identified in the time series, we think they highlight the potential reasons for the dramatic change in Contura's assets: differences in responsiveness between pension and retail investors, and inertia. To better identify these differences, we will use the entire panel of funds and identify responsiveness in the cross-section of funds. We also provide evidence suggesting that pension investors, due to their lower responsiveness, achieve inferior investment performance.

Finally, it is interesting to note that, ten years after the PPS was launched and despite its disappointing performance since then, the Contura fund is still one of the most popular funds in the system. Of the individuals who have ever actively chosen, 14% were still invested in Contura in 2009. It ranks as one of the top ten funds in terms of assets managed. In 2009, more than 60% of Contura's assets were from investors in the PPS and 40% from investors in the retail market—a considerable change in relative assets since the PPS was launched. Retail investors have withdrawn their assets while pension investors have continued to invest in Robur Contura.

3   The Premium Pension System in Sweden

The Swedish public pension system consists of two components: a notional defined contribution plan financed on a pay-as-you-go basis and a fully funded individual account system known as the Premium Pension System. The contribution rate to the overall system is 18.5%, 16% being paid into the notional defined contribution segment, while 2.5% is paid into the funded individual accounts of the PPS.[4]

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[4]Sweden's Premium Pension System is also described in Cronqvist and Thaler (2004) and Palme, Sundén, and Söderlind (2007). Klevmarken (2002) provides concise background to the Swedish pension reforms of

The PPS functions like a gigantic national 401(k) plan. Participation is mandatory and its coverage is universal. By the end of July 2008, more than five million individuals were covered and more than SEK 250 billion were under management. A government agency administers the plan and acts as a clearing house. Formerly called the Premium Pension Authority (PPM), since 2010 this authority has been part of the Swedish Pensions Agency (for convenience, we will refer to this authority as the PPM). Contributions are withheld by employers and submitted to the national tax authority. Individual pension rights are established when workers have filed their income taxes and these reports have been consolidated with employers' reports. When individual pension rights have been determined, investors decide how to invest their funds. Contributions are invested by the PPM in lump sums, so fund companies know the total investment of pension contributions, but not who the individual investors are. The PPM keeps records of all individual accounts and fund share values. Individuals may choose up to five funds and can change their allocations on a daily basis at no additional cost; all such transactions are aggregated by the PPM, which then transmits them as a net purchase to each fund.

The investment options offered to individual participants in the PPS are a subsample of the mutual funds offered to retail investors. In 2000, at the time of the first investment selections, approximately 460 funds were registered with the PPM, and over 750 funds were available in the PPS as of 2009. Most funds are equity funds, about half of which invest primarily in international equities. Fund managers charge the same management fees to pension investors as they do to retail investors. Information about the funds in the PPS is presented on the PPM website and in a catalogue distributed to participants on request. The funds are listed by type, for example, fixed income, balanced, life-cycle, and equity funds, and for each fund the catalogue provides information on five-year rate of return, risk

the 1990s and explains the structure of the new system. Sundén (2006) discusses the experience with the pension reforms.

(measured as the standard deviation of three-year returns), and management fees.

The government established two special funds in 2000. The first fund, the Premium Savings Fund, is the default fund for PPS investors who do not make an active investment choice. The second fund, the Premium Choice Fund, was set up for investors who wanted to make an active choice but also wanted the government involved in the management. During the sample period, the default fund has invested in stocks and bonds to achieve high long-term returns with low overall risk.[5] Because account administration is handled by the PPM, fund managers must rebate a share of their fees to the PPM, which passes the rebate through to PPS investors. In 2007, the asset-weighted average fund fee after the rebate was 0.53% of assets for active investors and 0.14% for those in the default fund. The PPM charges a fixed administration fee to all participants; it was 0.16% of assets in 2007.

We consider asset returns, net of fund management and pension administration fees, to reflect actual investor experience. Returns are also adjusted to reflect the effect of the fee rebates that the PPM negotiates on behalf of pension investors. The information necessary to make these adjustments (i.e., fund management fees, administration fees, and fee rebates) is obtained from the PPM. The total cost of investing in Swedish funds in 2002 was close to the average fee in developed markets (see Khorana, Servaes, and Tufano, 2009).

We obtain data on aggregate PPS assets invested in each fund from the PPM. The data cover all funds offered to pension investors since inception in the fall of 2000 until July 2008. They cover not only the funds available today, but also the funds that have been terminated or taken out of the system. For each fund, we have a monthly time series of assets under management and returns. Since our goal is to compare retail and pension investors, we work with pension assets managed by pension investors themselves (96% of

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[5]The default fund became a life-cycle fund in May 2010. At the same time, three state-managed lifestyle portfolios were initiated, labeled conservative, moderate, and aggressive according to the ratio between stocks and bonds in the funds. The life-cycle fund and the three lifestyle funds are all combinations of two cornerstone portfolios, one equity fund, and one fixed-income fund.

the total). Furthermore, the analysis concentrates on a subsample of these funds for which we have comparable data for the retail mutual fund industry. We obtain data on the retail market from Finansinspektionen (the Swedish Financial Supervisory Authority) and Svensk Fondstatistik.[6] Mutual fund data are only available on a quarterly basis; we do not see this as a significant restriction, given that many studies of the flow-performance relationship use annual data. We consider only equity funds, and our sample is free from survivorship and backfill biases. Because the performance measure we use is the one-year lagged return rankings of the funds, funds must have at least a one-year return history to be included in the sample. We obtain fund return data from the PPM, complementing them with data provided by Fondbolagens Förening (the Swedish Investment Fund Association).

These restrictions leave a final sample of 263 funds covered by a data series extending from October 2000 to July 2008. Table 1 presents the number of funds and total net assets in the retail market and in the PPS as of March 2008. Panel A presents summary statistics for all funds, while Panel B presents summary statistics for the funds in our sample. As of March 2008, we have data covering 40% of all the equity funds offered in the PPS but 86% of its assets. These funds comprise 26% of the funds offered in the retail market and manage 58% of retail assets. The default fund is the largest in the PPS, managing approximately SEK 75 billion but, as it is unavailable to retail investors, it is excluded from our sample. All other funds offered in the PPS are also offered in the retail market. That the coverage is greater when measured by total net assets than when measured by the number of funds indicates that our sample is tilted towards the largest and most significant funds in the PPS.

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[6]Finansinspektionen data cover more than 800 funds, including most of the Swedish-registered funds handled by the PPM but none of the foreign domiciled funds. Svensk Fondstatistik data, on the other hand, cover most of the funds managed by Swedish asset management companies, independently of where the funds are registered, and their assets-under-management figures only include assets belonging to Swedish investors, both pension and retail.

4 Results

4.1 The flow-performance relationship

We explore how retail and pension investors respond to past fund performance. As the funds offered in the PPS are also offered to retail investors, our comparison of the flow-performance relationship for retail versus pension investors is direct and explicit. If pension investors are particularly inattentive, as the literature suggests, we would expect the flow-performance relationship to be flatter for them. We view the flow-performance response as a measure of attentiveness for two reasons. First, survey evidence indicates that returns are the primary reason why investors switch funds. Second, if the only fund information that investors possess is past performance, and they rationally use it to infer manager skill, fund assets should chase performance (Berk and Green, 2004).

We consider two flow measures, computed for both the retail market and the PPS. The first measure is the absolute flow into or out of a fund, defined as the quarterly change in total net assets minus appreciation; this is given by:

$$AbsoluteFlow_{i,t} = TNA_{i,t} - TNA_{i,t-1}(1 + R_{i,t}), \tag{1}$$

where $TNA_{i,t}$ is the total net assets of fund i at date t in the retail market or the PPS, and $R_{i,t}$ is the net return of fund i between dates $t - 1$ and t. This measure captures the fund growth in excess of the growth that would have occurred if no new funds had flowed in but dividends were reinvested. The measure gauges how sensitive money is in the retail market and in the PPS. The absolute flow may be positively related to fund size, whereby larger funds attract higher inflows regardless of performance. In the regressions below, we control for such a potential size effect.

The second measure is the absolute flow relative to the total net assets in either the retail

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market or the PPS; this is given by:

$$RelativeFlow_{i,t} = AbsoluteFlow_{i,t}/TNA_{t-1}, \tag{2}$$

where TNA_t is the total net assets at date t in the retail market or the PPS.

We consider the absolute flow relative to a fund's total net assets as a third measure. This measure, however, is associated with statistical problems. A fund's absolute flow relative to its total net assets is very volatile, particularly for small funds. Accordingly, some studies apply filters to exclude small funds. We prefer to include as many funds as possible, but to evaluate the flow-performance relationship using more robust flow measures. Using the third flow measure typically yields intermediate results, lying between those obtained using absolute and relative flows.

We are mainly interested in the relationship between flows and performance. We estimate the response of flows to performance using the following regression on quarterly data:

$$Flow_{i,t} = \alpha_t + \beta Performance_{i,t-1} + \gamma NewPensionMoney_{i,t-1} + \delta'Controls_{i,t-1} + \varepsilon_{i,t}, \tag{3}$$

where $Flow_{i,t}$ is either the absolute or relative flow in the retail market or the PPS. The time-varying intercept α_t captures a general level effect of flows. $Performance_{i,t-1}$ is a performance measure of fund i at date $t-1$. We mainly report results with the ranking of a fund in relation to the other funds as the performance measure but have also considered the raw return of a fund as the performance measure. In both cases, the performance measures are based on one-year returns. One important feature of the PPS is that new money is injected every year. In addition to the general level effect, we allow for a cross-section fund-size effect when new money is injected to pension accounts. $NewPensionMoney_{i,t-1}$ is the log of total net assets of a fund, at the end of the previous period, interacted with a dummy variable for the quarter the annual contribution is injected in the pension system.

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$Controls_{i,t-1}$ is a vector of control variables specific to fund i and known at date $t-1$. We consider the past log of total net assets of a fund and the past one-year volatility of a fund. All control variables are lagged one quarter.

Note that there is one flow-performance regression for the retail market and another for the PPS; however, we estimate them jointly in a system. Each regression is a pooled cross-section time-series regression. The regressions include time-varying intercepts, but estimates of these are not tabulated. Standard errors are based on a pairwise bootstrap (1000 replications) accounting for conditional heteroscedasticity and serial correlation.

Table 2 presents the results of the flow-performance regressions for funds in the retail market and the PPS. The regressions in Panel A are for absolute flows (SEK billions), while those in Panel B are for relative flows (i.e., absolute flows relative to total net assets in the retail market or the PPS, expressed in %). The performance of a fund is measured by its raw one-year return ranking in our sample of funds. This performance variable ranges from zero to one.

The coefficients of the lagged ranking on the basis of absolute flows are positive in both the retail market and the PPS; however, the responses are many times larger in the retail market than in the PPS. Furthermore, the responses are only statistically significant in the retail market. Hence, investors in the retail market respond much more strongly to performance than do pension investors. The estimates in System I indicate that if a fund moves up one percentile in the past ranking that leads to an extra inflow of SEK 0.64 million in assets into the retail mutual fund market but only an extra SEK 0.07 million into the PPS in the current quarter. A Wald test rejects the null hypothesis of equal coefficients at usual significance levels. The bootstrap statistic refers to how often the performance coefficient for the PPS exceeds the coefficient for the retail market; this happens in approximately 1% or fewer of the bootstrap replications.

The responses in relative flows are also positive, but again only statistically significant

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in the retail market. The estimated coefficients for the PPS are imprecise, which makes it difficult to reject the null hypothesis of equal response in the retail market and the PPS. However, the economic effect is still significant. Retail investors respond approximately six to eight times as much as do pension investors to performance. Estimates in System III indicate that moving up from rank zero to rank one is rewarded with an inflow of 2.3% of all assets managed in the retail market in the upcoming quarter. The same improvement in performance is rewarded with an inflow of only 0.3% of all assets managed in the PPS.[7] This results suggest that pension investors face a larger risk of being caught in poorly performing funds.

The coefficient of the new pension money effect is positive and highly statistically significant. We interpret this as evidence of investor inertia, reflecting the mechanics of the PPS. Unless pension investors reallocate, new money is automatically injected into a previously selected fund, and the larger the fund, the more new money it receives.

The sign on the coefficients of total net assets is consistent with what is typically found in the literature. Larger (and older) funds tend to lose more assets than do smaller (and younger) funds. The opposite result holds in the PPS when we take into account the new money that is injected once per year (captured by the interaction between total net assets and the dummy for contribution quarter). The importance of the new pension money can also be seen in the R-squared values, which are much higher for funds in the PPS than in the retail market. We use volatility, the historical standard deviation of monthly returns over the past year, as a measure of risk. The coefficients on past volatility are not statistically significant, and its inclusion does not affect the coefficients of the other variables significantly.

The difference between Systems I and II and Systems III and IV is that two of them include lagged flows while the other two do not. The economic rationale for including lagged

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[7] We also explored an alternative measure of attention, average absolute or relative flows, finding generally similar results. Unfortunately, liquidity transactions, automatic pre-arranged in- and outflows, fund mergers, etc., make these alternative measures less appropriate proxies for attention.

flows is unclear; we view it simply as a way to statistically control for observed persistence in flows. The coefficients of lagged flows are significant in the retail market and in the PPS. Including the lagged flows makes the difference in responsiveness smaller.

As a robustness check, we re-estimate all models using rankings based on risk-adjusted returns or simply the risk-adjusted returns. (Risk-adjusted returns are obtained as explained in Section 4.2.) The results are very much in line with the reported results obtained using raw returns, so for brevity we do not tabulate them.

4.2   Performance

We have found that pension investors respond less than do retail investors to past performance and that, in this sense, they are less attentive. Does this mean that inattentive pension investors obtain different returns from those of retail investors? We argue that pension investors could have obtained higher returns by allocating away from the worst-performing funds. Put differently, if pension investors are inattentive, poorly performing funds may end up with a lot of pension assets and few retail assets. We attempt to assess the potential cost of pension investors' inattentiveness by comparing the performance of pension investors with that of mutual fund investors.

We first concentrate on the worst-performing funds, where the flow-performance relationship is flat and where past research has found stronger evidence of performance persistence (Carhart, 1997). Our hypothesis is that the worst performers harbor relatively more "inattentive pension assets," as inattentive pension investors fail to abandon poorly performing funds. Table 3 presents the assets and flows for the worst-performing funds, based on previous year returns, in the retail market and the PPS. Panel A presents funds in the lowest performance decile, while Panel B presents funds in the lowest performance quintile. Pension investors hold a larger proportion of their assets in the worst-performing funds: 9.18% of pension investors' assets are invested in funds in the lowest performance decile versus

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6.88% for retail investors. The 2.30% difference seems economically large and is statistically significant.

Not only do we observe that the proportion of assets invested in the worst-performing funds is larger for pension investors, we also see that these investors fail to withdraw assets from these funds. Pension investors do not remove assets from the worst 20% of funds. In fact, they continue to invest in them and even increase their holdings, while retail investors reduce their holdings. The difference between retail and pension investors' flows is 6.66% and statistically significant.

It is possible that, while pension investors may not be withdrawing assets from these poorly performing funds, they may be investing more in other funds. As pension investors have increased their holdings in all funds, raw flows may exaggerate the difference in flows between retail and pension investors. To account for this possibility we also consider flows adjusted to reflect differential growth and control for average inflows. Adjusted flows are defined as follows:

$$AdjustedFlow_{i,t} = AbsoluteFlow_{i,t} + \left(\sum_i AbsoluteFlow_{i,t}\right) TNA_{i,t-1}/TNA_{t-1}, \quad (4)$$

and variables are defined in Equations (1) and (2). The difference in adjusted flows is smaller than that observed for unadjusted flows but still large, close to 2% of assets, and statistically significant.

As presented in Table 4 pension investors' failure to withdraw assets from poorly performing funds results in that they are more heavily invested in funds that subsequently do poorly.[8] Pension investors hold a larger proportion of their assets in funds that subsequently perform the worst: 10.47% of pension investors' assets are invested in these funds versus 8.50% for retail investors. This means that pension investors' portfolio weight on badly per-

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[8]This is because funds that performed the worst in the past are more likely to be the worst performing funds of the future.

forming funds is 20% larger than that of retail investors. Differences are equally large when using risk-adjusted returns (alphas) to determine worst-performing funds. To obtain alphas, we run standard performance evaluation regressions with the excess return of the Swedish equity market (Affärsvärldens generalindex) and the excess return of the world equity market (MSCI world investable index) as factors. Excess returns are constructed by subtracting a proxy for the risk-free rate (JP Morgan's one-month cash rate for Sweden). We also find that pension investors not only invest more, but also withdraw less assets, from future worst performing funds, but for brevity we do not tabulate these results.

To assess the overall impact of this behavior in investors' portfolio performance, we compute the difference in alphas between aggregate pension holdings and aggregate retail mutual fund holdings. We consider monthly returns for two portfolios: the aggregate portfolio of pension investors and the aggregate portfolio of retail mutual fund investors, fund fees being calibrated to either the PPS or the retail market.

Panel A in Table 5 presents the performance results. The asset-weighted portfolio of all retail assets outperforms the asset-weighted portfolio of all pension assets by 0.61% or 0.69% per year, depending on whether retail or pension returns are considered. The difference between retail and pension returns is due to the fee rebates in the PPS. The outperformance is 0.43% or 0.51% per year when returns are adjusted for risk. This difference seems economically large. Compounded over the period pension savers are expected to make contributions the difference can lead to a significant reduction in retirement wealth, but it is not statistically significant at usual significance levels.[9]

We relate the performance of retail and pension assets to a fund momentum strategy. We form two portfolios based on past fund returns; Panel B in Table 5 presents these performance results. We find that past winners outperform past losers. The past winner

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[9]The actual performance difference is close to zero; this is because effective management fees are lower for pension investors due to the PPM rebate, which compensates for their poorer investment choices.

strategy has an average abnormal return of more than 6% per year, while the past loser strategy has a negative abnormal return of approximately –2% per year. The difference between past winners and past losers is statistically significant. The past winner portfolio seems implementable by an investor, whereas the past loser portfolio is not, as one can only divest a fund in which one is invested and short-selling is not allowed. Note that there are no switching costs for pension investors, so they could potentially obtain part of the returns suggested by the portfolio of past winners. Whether this result is driven by momentum in the underlying assets is an open question (see, e.g., Carhart, 1997; Bollen and Busse, 2005; and Fama and French, 2010). However, we do not find that the alphas are affected by including a momentum factor in the performance evaluation regressions.

4.3   The design of Sweden's Premium Pension System

The shift from defined benefit plans to defined contribution plans has increased the responsibility of pension participants to invest wisely. Many commentators suggest that pension plan participants are unsophisticated, inattentive investors who need further regulatory protection. Gruber (1996) conjectures that investment flows from unsophisticated investors will not respond to poor returns if their portfolios comprise pension accounts locked into inferior menus of funds. Remarkably, in this study we find that pension investors do not respond to past performance, even when the menu of alternatives available to them is rich enough to allow them to do so.

The immediate consequence of this behavior is that pension investors face a greater risk of being caught in persistently under-performing funds. In fact, they seem to invest as much money in the worst-performing funds as in other funds, and relatively more than retail mutual fund investors invest in these poor performers. Inattention and lack of responsiveness to past returns translates into poorer investment results for pension investors. However, the results would likely be even worse if it were not for some features of the PPS that help protect

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them. The most important of these features is the existence of a carefully chosen default fund. The default fund is a well-diversified, low-cost portfolio that retains the investments of most inattentive investors.[10] Despite these protective features, our results suggest that inattentive pension investors still face a greater risk of experiencing poor performance than other investors do. This is because many otherwise inattentive investors are lured out of the default fund at various times (see Cronqvist and Thaler, 2004, for evidence of this at the launch of the PPS) only to remain inattentive once they have abandoned the default fund. In this sense, investor inattention may be a hidden cost of choice in pension plans.

Thaler and Sunstein (2003) argue that, if participants are not highly motivated or highly sophisticated, maximizing choice may be more of a burden than an advantage. The idea then is for the program designer to create an environment in which unsophisticated participants are gently guided in a manner intended to make them better off without restricting the freedom of more sophisticated participants.

A potential change in the design of the PPS would be to complement the existence of the default fund with an automatic "back to the default" clause for inattentive investors. Inactive investors would regularly be required to confirm their initially chosen funds; if no confirmation is obtained, the pension authority could allocate their savings into the default fund. If investors do not actively monitor their investment funds but instead are inattentive after making the initial portfolio decision, the best alternative seems to be a carefully designed default fund managed by an institution whose incentives in principle seem better aligned with the investor's. Even choices that may have seemed sensible originally may become problematic if funds change, individuals change, or more information surfaces. This exemplifies the type of choice architecture advocated by Thaler and Sunstein (2008).

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[10]Other features are the existence of a fee reduction mechanism (high fees are arguably a main reason for under-performance) and the mingling of pension and non-pension assets in the same funds (inattentive pension investors may then benefit from the market pressure of attentive investors' performance). The market has also developed its own response to inattention, namely, specialized financial advisors/account managers, but their effectiveness and results have yet to be studied.

5 Concluding remarks

We assess the inattentiveness of pension investors and its consequences by evaluating the flow-performance relationship and investment performance of pension versus retail mutual fund investors. We use a novel dataset covering investments in Sweden's Premium Pension System, data that permit direct comparison of the investment behaviors of pension and retail mutual fund investors. We find that, unlike retail mutual fund investors, pension investors do not seem to react to past fund performance. We can speculate with different possible reasons for this result. First, pension investors are involuntary investors (pensions being mandatory) and some of them may simply not care about their locked-in savings, or discount them excessively. Second, since pension assets tend to be smaller and locked in until retirement, investors might have this on a different mental account which is not as important for them, triggering the observed inertia and inattentiveness. Finally, it is likely that the average investor in the PPS is simply less sophisticated than the average investor in the retail mutual fund market (a self-selected group of investors).

The inattentiveness of pension investors means that they face a greater risk of being caught in poorly performing funds. Our evidence suggests that this behavior may translate into poorer investment results for pension investors. We find that pension investors hold more of their assets in the worst-performing funds than do retail mutual fund investors. Moreover, pension investors continue to invest in the worst-performing funds, whereas retail investors withdraw assets from the worst-performing funds. Finally, we discuss a potential change in the design of the PPS that may mitigate costs for inattentive investors while maintaining flexibility for attentive investors.

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Table 1: Funds in the retail market and the Premium Pension System as of March 2008

	Retail market		Premium Pension System	
	Number of funds	Total net assets (SEK billions)	Number of funds	Total net assets (SEK billions)
Panel A: All funds				
Equity funds	887	609.0	580	132.5
Fixed income funds	204	349.9	119	17.7
Balanced funds	177	180.6	80	23.6
Total	1085	1139.5	779	186.8
Panel B: Sample				
Equity funds	230	356.2	230	113.7
Fraction of all equity funds	26%	58%	40%	86%

The table presents the number of funds and total net assets (SEK billions) managed by the mutual fund industry, in the retail market and in the PPS, in Sweden as of March 2008. USD 1 equaled approximately SEK 6 as of March 2008. Panel A presents the summary statistics for all funds, categorized as equity, fixed income, and balanced funds. Panel B presents the number of equity funds and the total net assets in the sample. It also presents the fraction of funds and total net assets included in the sample. All funds offered in the PPS are also offered in the retail market. The default fund, the Premium Savings Fund, managing approximately SEK 75 billion, is not included.

Table 2: Flows on past performance—rankings

| | Panel A: Absolute flows | | | | Panel B: Relative flows | | | |
| | I | | II | | III | | IV | |
	Retail	Pension	Retail	Pension	Retail	Pension	Retail	Pension
Ranking	0.064***	0.007	0.043***	0.001	0.023***	0.003	0.018***	0.003
	(0.014)	(0.009)	(0.012)	(0.008)	(0.005)	(0.012)	(0.004)	(0.012)
New pension money		4.394***		5.029***		8.205***		8.587***
		(0.691)		(0.821)		(1.348)		(1.466)
Total net assets	−0.873**	−1.839***	−0.772**	−2.382***	−0.202	−1.794***	−0.194	−2.102***
	(0.420)	(0.303)	(0.308)	(0.415)	(0.153)	(0.293)	(0.121)	(0.364)
Volatility	0.131	0.252**	0.120	0.260**	0.086	0.279	0.080	0.295
	(0.162)	(0.120)	(0.135)	(0.123)	(0.068)	(0.202)	(0.059)	(0.198)
Flows			0.241***	0.435***			0.183***	0.061***
			(0.055)	(0.111)			(0.044)	(0.021)
Adjusted *R*-squared	0.025	0.214	0.079	0.227	0.028	0.350	0.061	0.269
Wald [*p*-value]	[<0.001]		[<0.001]		[0.123]		[0.254]	
Bootstrap [percentile]	[<0.001]		[<0.001]		[0.067]		[0.133]	

This table presents the results of quarterly flow-performance regressions for mutual funds in the retail market and the PPS. The regressions in Panel A are for absolute flows (SEK billions). The regressions in Panel B are for relative flows (absolute flows relative to total net assets in the retail market or the PPS, expressed in %). The performance of a fund is measured by its ranking, based on past one-year returns relative to other funds in the market, and ranges from zero to one. In addition to the performance measure, the fund's log of total net assets and new pension money (captured by the interaction between total net assets and the contribution quarter of new pension money) are included as regressors. Systems I and III exclude and Systems II and IV include lagged flows as regressors. The regressions for funds in the retail market and the PPS are estimated jointly. The regressions include time-varying intercepts, but the estimates are not tabulated. Standard errors based on a pairwise bootstrap (1000 replications), accounting for conditional heteroscedasticity and serial correlation, are reported within parentheses. The Wald statistic refers to a test of equal performance coefficients for the retail market and the PPS. The *p*-value is reported within square brackets. The Bootstrap statistic refers to a test of how often the performance coefficient for the PPS exceeds the coefficient for the retail market. The percentile is reported within square brackets. The sample includes 263 equity funds over the October 2000 to July 2008 period. Each system includes a total of 8663 observations. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

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Table 3: Assets and flows for the worst-performing funds

	Assets (% of total assets)	Flows (% of assets)	Adjusted flows (% of assets)
Panel A: Funds in the lowest performance decile			
Retail	6.88	–0.74	–1.24
Pension	9.18	5.92	0.65
Retail minus pension	–2.30*** (0.41)	–6.66*** (2.14)	–1.89** (0.87)
Panel B: Funds in the lowest performance quintile			
Retail	13.58	–1.09	–1.60
Pension	17.07	5.20	–0.14
Retail minus pension	–3.49*** (1.17)	–6.28*** (1.98)	–1.46** (0.67)

This table presents the fraction of assets and flows for the worst-performing equity funds in the retail market and the PPS. Panel A presents statistics for funds in the lowest performance decile and Panel B for funds in the lowest quintile, performance being based on past one-year returns. "Assets" refers to the fraction of assets invested in the worst-performing funds in the market. "Flows" refers to the average flows into and out of a fund as a fraction of its total net assets. Adjusted flows are adjusted by total flows to all funds to reflect growth differentials and control for the average of inflows. Standard errors for the differences between funds in the retail market and PPS are reported within parentheses. The sample includes 263 equity funds over the October 2000 to July 2008 period. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Assets in subsequent worst-performing funds

	Assets I (% of total assets)	Assets II (% of total assets)
Panel A: Funds in the lowest performance decile		
Retail	8.50	6.21
Pension	10.47	7.65
Retail minus pension	−1.97** (0.79)	−1.44* (0.76)
Panel B: Funds in the lowest performance quintile		
Retail	17.02	13.92
Pension	20.56	16.51
Retail minus pension	−3.54* (1.86)	−2.58** (1.07)

This table presents the fraction of assets for the subsequent worst-performing equity funds in the retail market and the PPS. Panel A presents statistics for funds in the lowest performance decile and Panel B for funds in the lowest quintile. "Assets" refers to the fraction of assets invested in the subsequent worst-performing funds in the market. The first column is for assets based on one-year returns and the second column is for assets based one-year alphas, obtained in a two-factor performance model using the excess return of the Swedish stock market and the excess return of the world stock market as factors. Standard errors for the differences between funds in the retail market and PPS are reported within parentheses. The sample includes 263 equity funds over the October 2000 to July 2008 period. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Portfolio performance

	Based on retail returns		Based on pension returns	
	Average	Alpha	Average	Alpha
Panel A: Aggregate assets				
Retail	–0.27	0.41	0.03	0.72
Pension	–0.88	–0.02	–0.66	0.22
Retail minus pension	0.61 (0.43)	0.43 (0.47)	0.69 (0.43)	0.51 (0.47)
Panel B: Fund momentum				
Top performance quintile	5.21	6.38	5.57	6.75
Bottom performance quintile	–5.24	–2.29	–5.06	–2.09
Top minus bottom	10.45*** (3.53)	8.67** (3.42)	10.64*** (3.52)	8.85*** (3.41)

This table presents the performance of various investment strategies. Panel A presents the performance of the entire pool of retail and pension assets. Panel B presents the performance of portfolios of funds formed based on the past returns of these funds: the top performance quintile includes all funds in the top 20% in terms of past performance; the bottom performance quintile includes all funds in the bottom 20% in terms of past performance. Past performance is measured by past one-year returns. Funds are held in each portfolio for twelve months after inclusion. Performance calculations are based on monthly returns. The statistics in the left columns are based on returns for mutual funds in the retail market. The statistics in the right columns are based on returns in the pension market (these returns are obtained by subtracting a rebate offered by the Premium Pension Authority (PPM) to pension investors and adding the fee charged by the PPM to the returns of the mutual funds in the retail market). "Average" refers to the average return of each portfolio in excess of a proxy for the Swedish risk-free rate. "Alpha" refers to the intercept in a two-factor performance model using the excess return of the Swedish stock market and the excess return of the world stock market as factors. Average excess returns and alphas are annualized by multiplying monthly values by twelve. Standard errors, robust to conditional heteroscedasticity and serial correlation up to four lags as in Newey and West (1987), are reported within parentheses. The sample includes 263 equity funds over the October 2000 to July 2008 period. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Figure 1: Robur Contura—Total net assets, performance, and flows

The figure depicts total net assets, performance and flows for the Robur Contura fund in the retail market and the PPS, 2000Q4–2010Q1. Figure a shows the total net assets (SEK billions); Figure b shows the cumulative return indices (September 2000 = 1); Figure c shows the relative flows (absolute flows divided by total assets in the fund, expressed in %); and Figure d shows the relative flows for selected quarters (excluding quarters when new money is injected into the PPS). Lines and bars are dashed blue for the fund in the retail market and solid red for the fund in the PPS.