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How do mutual fund fee discounts affect relative performance and investors' fund choice in the Premium Pension System?

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Abstract

I calculate the fee discount on mutual funds' fees in the Swedish Premium Pension System (PPM), comparing if the internal ranking changes between mutual funds in PPM and in the retail market, and find only a few changes. The result does not support the media's recommendation to choose funds with a high fee discount. Moreover, I divide the individual value-weighted performance in PPM into retail performance and discount. I find that higher cognitive and non-cognitive skills have a positive correlation with retail performance. Individuals choose mutual funds in PPM by retail performance, not by discount. This implies that the discount does not increase the growing inequality caused by the defined contribution pension plan used in Sweden.

1 Introduction

In 1999, Sweden reformed its pension system. 2.5 percent of earnings and other taxable benefits are allocated to the Premium Pension Account, a defined contribution pension plan often referred to as PPM. All deposits to PPM are invested in the mutual fund market which implies that all individuals who pay labour income taxes participate in this market. All of these individuals have the possibility to choose up to five mutual funds in PPM, if they do not make a choice their pension is allocated in the default fund.

Most of the mutual funds in PPM are also available outside PPM, in the retail segment. Through PPM the investor receives a discount on the fund fee, which alters the bargaining power between the fund-shareholders and the fund company vis-á-vis the retail market.

The Swedish Pension Agency, who administrates PPM, highlights the important role of the discount[1] and articles in the media often recommend PPM investors to choose a mutual fund with a high discount. Joel Dahlberg, writer of the book "Pensionsbluffen" (2012), recommends mutual funds with high discount by saying: *"Avanza Zero's big advantage - that it is free of charge - does not favor the investor to the same extent in PPM. Many Sweden-focused funds are available with large discounts..."* Dahlberg is not the only one to suggest that investors should take the discount into account. Aktiespararna and the Swedish Investment Fund Association, among others, have published articles[2] [3] with the same focus.

[1]From the Swedish Pension Agency's homepage "The discount averages to 2/3 of the fees and makes the pension, when it is paid out, just over 15 % higher than it would have been without the discount" `http://secure.pensionsmyndigheten.se/FragorOSvar.html`

[2]Aktiespararna: "If you decide to invest by yourself the discount and investment horizon is well worth having in mind." `http://www.aktiespararna.se/artiklar/Fonder/Fynda-fonder-for-framtiden/`

[3]Swedish Investment Fund Association: "Assume that a person has private invest-

The first contribution of this thesis is to investigate whether the discount does matter in the sense that it makes different mutual funds perform better in PPM as compared to the retail segment. If so, are there fund characteristics that explain the change in performance?

A natural way to examine whether the fee discount matters is to compare the internal ranking between mutual funds in the retail market and in PPM. The first part of the thesis estimates risk-adjusted performance for funds in PPM and in the retail segment, using a Capital Asset Pricing Model (CAPM) and other factor models. I restrict the sample to mutual funds that are or have been a part of the PPM, and find that the difference in average risk-adjusted performance between the mutual funds in PPM and the retail market is 0.7 percent, which is equal to the average discount.

To obtain the risk-adjusted performance for the mutual fund in PPM I add the size of the fee discount to the risk-adjusted performance of the mutual fund on the retail market. There is no official statistic for the size of the discount so I estimate the price reduction with data I receive from the Swedish Pension Agency.

The next step is to divide the risk-adjusted performance for both fund markets into terciles and quintiles, where I find no systematic change of the internal ranking. Thus, if there would be any asymmetric changes depending on the discount the internal ranking between the funds would change. Then there would be a reason for choosing a mutual fund with a specific fund characteristic. Since there is no large asymmetry between the return in PPM

ments in both funds in the retail market as well as in Premium Pension System, and that he to some extent wishes to invest in mutual funds in emerging markets (a type of fund that is characterized by relatively high fees), there are rational reasons for the person to primarily use the PPM for these investments in order to enjoy the extra large discounts given." http://www.fondbolagen.se/Juridik/Framstallningar/20141/Dokument/Rapport-Mer-fakta-om-premiepensionen/

and in the retail market, the investor faces the same decision problem in both markets, thus a good fund in PPM is a good fund in the retail segment. There is just an upward shift of the distributions of risk-adjusted performance in PPM. Only 9.5 percent of the mutual funds change ranking, by construction half of the funds perform relatively better in PPM and the other half performs relatively worse. A reason for the lack of change in ranking is the low cross-sectional standard deviation of the discount, 0.4 percent, compared to a cross-sectional standard deviation of 5.3 percent for the risk-adjusted performance on the retail market.

The second contribution of the thesis investigates whether individual performance in PPM varies with investor characteristics, the individual value-weighted performance in PPM is split up into retail performance and discount. This leads to my second research question; do pension savers with certain characteristics follow media's recommendation and choose mutual funds with a higher discount?

The discount in PPM only affects 80 out of 841 mutual funds in such a way that they change ranking. There is no systematic pattern between the mutual funds that change ranking. Is the recommendation from media that strongly established and the decision support good enough that there is a correlation between individual characteristics and the size of fee discount, or is the choice of fund dependent on past performance?

The individual in the Swedish pension system has to process a lot of public information to understand how big the discount is and how it affects the return of the mutual fund compared to the retail market. This favours individuals with higher cognitive skills. Grinblatt, Keloharju and Linnainmaa (2012) find that superior ability to interpret public information is positively linked to cognitive ability. According to Heckman et al. (2006) there is a positive correlation between high cognitive and non-cognitive skill with labour market outcomes. Summarizing all of the above findings would imply that a pension plan like PPM could increase inequality in the retirement pension between individuals with higher and lower cognitive skill.

To perform this analysis I use individual data from the LINDA database, which is a random sample of the Swedish population provided by Statistics Sweden. I match LINDA with enrolment data to the Swedish military service that contains measures for cognitive and non-cognitive skills. These two data sets have been used separately. For example Cavlet, Campbell and Sodini (2009) use LINDA to investigate the dynamics of individuals' portfolios. Lindqvist and Vestman (2011) use the enlistment data to investigate labour market returns to cognitive and non-cognitive ability. I combine these two data sets in a similar way as done by Lindqvist and Vestman (2014) and investigate the investment behaviour in PPM.

I estimate value-weighted average risk-adjusted returns and discounts for each individual. Because of the way I create the data, it is possible to split up the risk-adjusted return for the mutual funds in PPM into individual value-weighted risk-adjusted returns for the retail market and the discount. This makes it possible to analyse if individuals with certain characteristics choose funds in PPM by size of discount or by past performance on the retail market. I find that high cognitive and non-cognitive skills are correlated with higher risk-adjusted retail returns and higher discounts. A one standard deviation increase in cognitive skill raises the individual's risk-adjusted return in PPM by 0.16 percentage points. To put this in relation, the average value-weighted risk-adjusted net return for an individual in PPM is -0.24 percent. When I split up the result I find that 0.15 percentage points depend on past performance and only 0.01 percentage points on the size of the discount.

This implies that individuals with high cognitive skills mostly choose mutual funds in PPM by past performance on the retail market, not by the size of discount.

The field of study that focuses on cognitive ability is growing and my findings correspond with the results from other literature. For example Grinblatt et al. (2012) show that cognitive ability (i.e. IQ) influences mutual fund choice and that investors with high cognitive skills avoid funds with a high management fee. Grinblatt et al. (2011) find that high-IQ stock investors experience lower risk and a higher Sharpe-ratio. A pension system that depends on free choices and demands that the individual absorbs and understands public information to be able to make an efficient choice is better suited for an individual with high IQ, according to Lusardi and Mitchell (2009).

The following section starts with a brief description of the Swedish pension system. Section 3 continues with a presentation of the data sets with summary statistics, Section 4 addresses the first part of the research question, which is whether the discount matters. In Section 5 I answer the second part of the research question, whether individuals with certain characteristics choose mutual funds depending on the discount. Finally, Section 6 concludes.

2 The Swedish Pension System

With the transformation of the Swedish pension system the national retirement pension (Allmänna pensionen) was introduced to the labour force. The national retirement pension is composed of two parts, an income pension account (Inkomstpensionen) and a premium pension account (Premiepensionen).

18.5 percent of earnings and other taxable benefits are transferred to the national retirement pension, with a maximum up to 7.5 times the income base amount, which was 56,600 SEK for 2013, thus a maximum of 424,500 SEK. 16 out of the 18.5 percent are allocated to the income pension account, which is an earning-based pension, that follows the earnings trend in Sweden. The pension benefit level depends on how much tax an individual has paid from taxable income over the years.

I focus on the remaining 2.5 percent of earnings that are deposited to the premium pension account. In contrast to the income pension account, this part is invested in mutual funds and supposed to increase the total retirement pension. From being 13.5 percent of the income set aside to the pension, the premium pension is supposed to be about 25 percent of the retirement pension.[4] Each investor has the possibility to choose up to five mutual funds to distribute the pension savings among and is also allowed to change mutual fund without restriction and expense.

In 2013 there were more than 800 mutual funds available where the individuals could allocate their savings. Most of these funds are available on the retail market as well. There are about 6.7 million individuals in the system. In 2013 the kickback from the discount was 3.3 billion SEK and the total investment trough PPM the 31st of December 2013 was more than 600 billion SEK, with the number increasing constantly.

3 Data

This section contains a description of the different data sets, how they are matched and what remains after the matching. An advantage of this data is

[4]Orange Report 2013

that it is register based.

3.1 Mutual funds, market and risk-free rates

The data from MoneyMate contain net returns for mutual funds on the retail market. The time span for the net returns ranges from January 1981 to April 2010. The discounts, which calculation I explain below, are only available from 2002. When matching these two data sets the time period available for analysis is thus reduced from 19 years to eight. I choose to work with all the mutual funds that have been or are available to choose in PPM, which results in a sample of 948 funds. I calculate the retail performance using a variety of factor models, controlling for multiple markets, which are: Swedish, European, global, North American, Asian markets, and an American corporate bond index.

I collect the market indices from the MSCI homepage and from the database Datastream. Table 1 displays net returns and standard deviations for each market together with the risk-free interest rate. In the bottom of the same table I add the equally weighted means of the net returns and the standard deviations of the mutual funds. Of the 948 mutual funds in the data set 38 percent are registered in Sweden, meaning that they are supervised by Finansinspektionen (FI). I calculate the means for the mutual funds, market and risk-free rates for the same time period, January 2002 to April 2010.

3.2 Fee discount

The reduction of the fund fee is called the discount. The Swedish Pension Agency calculates the discount on daily bases, then aggregates the amount and charges the fund company each quarter. Once a year the investor gets a kickback, which is the whole amount of the discount charged by the pension

Table 1: Mutual funds, market and risk-free returns

Variable	Mean (%)	Standard deviation (%)
SIXPRX	0.90	6.08
MSCI Europe Index	0.28	4.86
MSCI ACWI Index	0.24	4.37
MSCI North America	0.07	4.28
MSCI AC Pacific Index	0.44	4.92
Dow Jones Corporate Index	-0.01	3.15
STIBOR1M	0.23	0.12
3-Month Treasury Bill	0.18	0.14
Euribor 3M	0.02	0.01
BOJ Short term interest rate	0.02	0.02
Mutual funds in sample	0.46	5.32

Note: The table returns annual returns.
Time period from January 1999 to April 2010.

agency, that increases the saver's shares in that fund. The accumulated discount from year 2013 was distributed to the investors as a kickback in May 2014.

The size of the fee discount depends on the total amount invested in the fund company by PPM and the size of the gross fee. An increase in the amount invested in a fund company results in a higher discount, as well as a higher gross fee results in a higher discount. Since 2002 the same formula has been used to calculate the discount, prior to 2002 the discount was not fully returned to the investor. Hence, I cannot use the period prior to 2002 in my estimations. During the three first years of the new pension system only part of the discount was directly returned to the investor of the specific fund, the rest of the discount that the fund companies had to pay to PPM were distributed equally among all pension savers.

Unfortunately, the exact discount is not easily accessible. One reason for this is that the Pension Agency always charges the fund company an absolute amount and do not calculate the percentage of the discount. According to an interview with Fredrik Andresson, a statistician at the Swedish Pension Agency, the discount is best approximated by the following equation:

$$\Psi_{it} = \text{TER}_{it} - \text{Fund fee}_{it} \tag{1}$$

where Ψ_{it} denotes the discount for the mutual fund i in time t. TER_{it} is the Total Expense Ratio for fund i, which is a measure that contains all costs for a mutual fund except transaction costs. These costs are mainly the management fee, auditor fees, other operational expenses, etc. TER is defined as the ratio between the total annual cost for the fund divided by the mutual fund's total assets averaged over that year. It is denoted as a percentage number. The Fund fee is the fee that the investor pays in PPM for fund i. I receive data for the TER and fund fee in PPM from Fredrik Andersson and estimate the annual discount. The Swedish Pension Agency has published an article[5] where they inform the investor that they can approximate the discount of each mutual fund with the same approach as in equation (1). In the same article there is information that they will start to publish the discount this year (2014). The article continues with information that if the investor is interested in the performance of a specific mutual fund in the PPM they are supposed to provide the approximated discount to the return of the same mutual fund in the retail segment.

In my estimations of the performance of the mutual fund in PPM I need the average yearly discount for the whole time period over the years 2002 to 2010. I create the average discount, which works out fine due to that the TER and the fund fee in PPM do not fluctuate considerably during that time

[5] `http://secure.pensionsmyndigheten.se/RabattPaFondavgifterna.html`

period.

The data set I use when estimating correlation between individual's characteristics and performance of mutual funds contain the account balance in SEK for individual j and fund i. I calculate weights for each fund i that individual j holds in his/her portfolio of mutual funds. I do this by summing the total account balance for individual j, then I divide the account balance for each fund by the total account balance of individual j's portfolio. The minimum number of funds an individual can hold is one. In that case the weight is one for fund i and the individual value-weighted risk-adjusted performance and discount is equal to fund i. The maximum number of funds an individual can hold is five. In Table 2 the individual value-weighted average discount is 0.62 percent, which is lower than the average discount of 0.77 percent. The reason could be that the investors do not take the discount into account when choosing a fund. I summarize the mean in Table 2.

Table 2: Annual discount

Variable	Mean (%)	Std. Dev (%)	Observations
Fund discount	0.77	0.04	948
Individual discount	0.62	0.36	93,283

Note: Individual discount is weighted by fund weight in each individuals portfolio.

3.2.1 Complications

Mutual funds are often available in different classes and sometimes only a specific class is open for investment in PPM. This specific class can have a constructed TER that is much higher than the TER for the mutual fund in the retail segment. To be able to use these funds in my analysis I compare the total expense ratio from the retail class of the fund.

Other mutual funds have a performance based fund fee. When I compare the average fund fee from the retail market to the average TER, over the period from 2002 to 2010, there is no significant difference. I have to add that I have not been able to identify and compare all of the mutual funds with a performance based fund fee.

3.3 Individual data

When I investigate whether individuals follow a pattern in their choice of fund, by discount or by performance of the mutual fund, I will combine four data sets. The main data set LINDA (Longitudinal INdividual DAta for Sweden) is distributed by Statistics Sweden. It is a large panel that is randomly sampled, covering three percent of the Swedish population. Each year individuals are added, so the compositions of the individuals remain representative for both year and population and ensure a representative cross-sectional sample. LINDA is available from 1960 onwards, I will use the year 2007 in my analysis. Statistics Sweden creates the data set of separate registers, mainly from the Income register (Inkomst- och Förmögenhetsstatiken). Except from yearly income statistics, LINDA contains socio-economic information, for example education, marital status, age etc. For an exhaustive description of the data set and the collecting process turn to Edin and Fredriksson (2000).

Statistics Sweden also provides the data set KURU that I match on to LINDA. KURU is a tax-based source, which consists of each individual's non-pension savings. From the tax-based source it is possible to compute the value of stock, bond, and mutual fund holdings. The value in the data set is valid for the last day of each year. For a closer description of KURU see Calvet, Campbell and Sodini (2008).

The Swedish Pension Agency provides data to Statistics Sweden on each individuals' portfolio in PPM at the end of each year. The Swedish Pension Agency also delivers the amount invested by each individual in each mutual fund. I match the performance and discount of each mutual fund to the data by a unique mutual fund identifier.

To obtain the full data set I match on the last source. The military enlistment data contains cognitive and non-cognitive skills. The conscription implies that each individual has to undergo two days of testing. The military enlistment starts when a man turns 18 or 19 and the tests examine the medical status, physical fitness, cognitive skill and interviews with a psychologist. The non-cognitive score is based on a 25-minute long interview with a psychologist. Both cognitive and non-cognitive skills are measured on a scale from one to nine. To make the regressions and estimates easier to interpret the test scores are normalized with a mean of zero and variance of one. A draw back using the enlistment data is that the sample reduces to only men. Turn to Lindqvist and Vestman (2011) for a closer description of the enlistment data.

In Section 5 Table 7 summary statistics of some key variables are available. The total number of observations, after I remove individuals with missing values for educations, sums up to $93,823$. The data also contain geographic dummy variables that cluster Swedish municipalities, thus the six dummy variables consist of three main Swedish regions; Svealand, Götaland and Norrland and the three largest cities, Stockholm, Gothenburg and Malmö.

4 Discount effect on fund performance

To be able to compare the change in ranking between a mutual fund in PPM and on the retail market I compute the annual lifetime retail performance. I do this by using a variety of factor models as I describe in the section below.

4.1 Fund performance

When I estimate the abnormal return for a mutual fund I use the Capital Asset Pricing Model (CAPM). The model implies that the expected return of the mutual fund is a linear function of the benchmark return. The intercept in the model (alpha) is the risk-adjusted lifetime performance, the difference between the expected return of a mutual fund and the return of the benchmark, adjusted for the risk-free interest rate. The literature on CAPM is large, I follow Korajczyk and Viallet (1989) and Fama and French (2004). All the mutual fund net returns, market and risk-free rates, and alphas refer to annual percentage numbers. I start by estimating risk-adjusted performance for the retail market with the following base set-up:

$$r_{it,retail} - r_{t,US} = \alpha_i + \beta_i(r_{\text{t, MSCI ACWI}} - r_{t,US}) + \epsilon_{it} \tag{2}$$

where r_{it} is the net return of mutual fund i at time t in the retail segment. In equation (2) I compare the risk-adjusted return to $r_{t,MSCIACWI}$ which is a global market index from MSCI. I use the U.S. 3-month Treasury bill as the risk-free rate, denote with $r_{t,US}$, which is a short-term debt obligation hold by the United States government. α_i denotes the risk-adjusted lifetime performance that is not explained by the market for the mutual fund i. When I conduct the estimations I use monthly data and then multiply the estimate by twelve to perform my analysis with annual alphas. The number of mutual funds in the sample decreases from 948 to 841 since I impose a restriction that a mutual fund must have been active for at least 36 months. If the time period is shorter the estimate of the lifetime performance could be misleading.

Following the specification from equation (2) I obtain an average alpha of 2.87 percent i.e. the average fund has a lifetime performance that is 2.87 percent better than the MSCI's All Country World Index. This is a sign that this benchmark is not comparable to the investment focus of the mutual funds. The funds may have a different alpha if I compare them to the correct benchmark. A sign that it is not suitable to only use the global MSCI Index as a benchmark is that the mean R^2 is low, only 0.39. According to literature, for example Fama and French (2010), the net return is negative about the amount of fund expenses.

Since the sample consists of all mutual funds that are or have been a part of PPM the benchmarks are quite diverse. The funds are exposed to different markets so for that reason I add more covariates. I model five different specifications of alpha with five different factor models. The second specification (II) only contains the Swedish market as a benchmark. The reason for I test this is because Sweden has performed well compared to other countries during the time period in my analysis. In other words I compare the funds in the sample with an index that has done better than the global MSCI Index. This might reduce the average lifetime alpha. As seen in Table 3 the average alpha for this specification is negative, -1.15 percent.

The third specification (III) contains both the global and the Swedish market with an average alpha of -0.64 percent. Since the funds are exposed to markets all over the world I test specification (IV) were I control for each

Table 3: Annual alpha for five different factor models

	(I)	(II)	(III)	(IV)	(V)
Mean α_{retail} (%)	2.87 (6.54)	-1.15 (6.10)	-0.64 (6.15)	-1.41 (5.56)	-2.07 (5.38)
Mean R^2	0.39 (0.20)	0.49 (0.28)	0.52 (0.28)	0.59 (0.26)	0.64 (0.22)
MSCI All Country	Yes	Yes	Yes	No	Yes
SIXPRX	No	Yes	Yes	Yes	Yes
Europe	No	No	No	Yes	Yes
Asia	No	No	No	Yes	Yes
North America	No	No	No	Yes	Yes
Corporate	No	No	No	No	Yes

Note: The total number of alphas for each specification is 841.
Mean number of observations of alphas for each specification is 80.56.
Standard deviation in parentheses.

part of the world by using a Swedish, European, Asian and North American market index. I obtain an average alpha of -1.41 percent, which is close to the average TER for the mutual funds of 1.63 percent. As shown in Table 3, the R^2 is higher, reaching 0.59. The last specification (V) is the same as (IV) but with two additional covariates, one is a corporate bond index and the other is the same global market index as I use in specification (I) and (III).

The rest of the analysis in this thesis I conduct on all specification except specification (I) but tables, figures and graphs are based on numbers from specification (IV), which I define by the following equation:

Table 4: Cross-correlation of alphas

Alphas	(I)	(II)	(III)	(IV)	(V)
(I)	1.000				
(II)	0.919	1.000			
(III)	0.932	0.988	1.000		
(IV)	0.890	0.945	0.943	1.000	
(V)	0.800	0.891	0.870	0.932	1.000

Note: The total number of alphas for each specification is 841. All correlations are significant at a one percent significance level.

$$r_{\text{it, retail}} - r_{\text{t, Stibor}} = \alpha_i + \beta_{1i}(r_{\text{t, SIXPRX}} - r_{\text{t, Stibor}}) + \beta_{2i}(r_{\text{t, MSCI Europe}} - r_{\text{t, Euribor}}) + \beta_{3i}(r_{\text{t, Asia}} - r_{\text{t, Japan}}) + \beta_{4i}(r_{\text{t, MSCI North America}} - r_{\text{t, US}}) + \epsilon_{it} \quad (3)$$

where α_i is the retail performance I use in the following analysis. The market and risk-free rates are reported in Table 1.

The correlation between the different alphas is between 0.80 and 0.99. The alpha from specification (IV) has a high correlation with all other specifications. The R^2 does not increase that much between specification (IV) and (V) and the difference in the adjusted R^2 is even smaller. Table 4 shows the whole cross-correlation matrix between the alphas from specification (I) to (V) in Table 3. Logically the lowest correlation is between specification (I) and (V). All the other specifications have the lowest correlation with specification (I) and I will not conduct any further analysis with this specification.

To obtain the alphas for the funds in PPM, I add the discount. The relation between the two alphas is the following:

$$\alpha_{i,PPM} = \alpha_{i,retail} + \psi_i \tag{4}$$

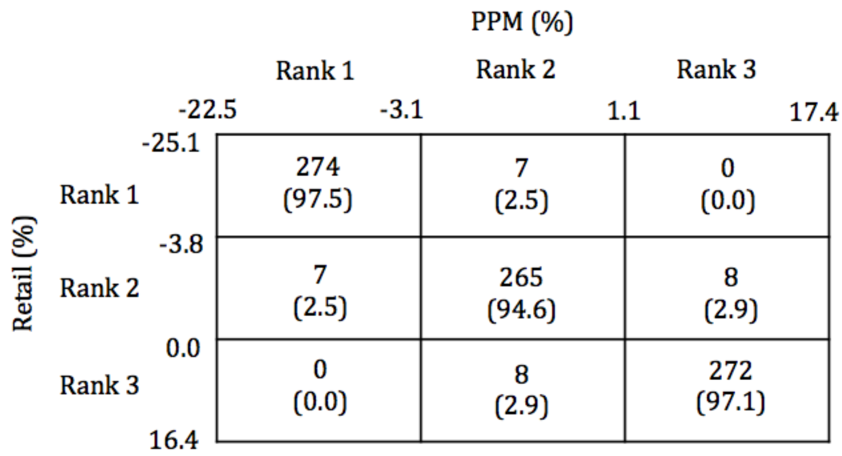
where $\alpha_{i,PPM}$ is the risk-adjusted performance for fund i in PPM. $\alpha_{i,retail}$ is the risk-adjusted retail performance for the same mutual fund. ψ_i is the average discount for fund i during the period 2002 to 2010, which is a mean of the discount (Ψ_i) defined in equation (1) in Section 3.2. The only difference between the risk-adjusted lifetime performance in PPM and on the retail market is the size of the discount for each fund.

4.2 Ranking of funds

I rank the mutual funds by their estimated performance. I divide the alphas into quantiles. I decide to compare two different set-ups. The first set-up is to rank the alphas into terciles, i.e. low, medium and high performing alphas. In each tercile there are 280 or 281 observations. Since each tercile contains 280 or 281 fund, the medium fund needs to out-perform 140 funds and increase its performance from -1.63 to 1.12 percent, to improve its ranking from the middle rank in retail to the top performing rank in PPM, thus offer a discount of 2.75 percent. A discount of 2.75 is much above the average discount of 0.7 percent. In Figure 1 I show the bounds of the ranking for the alpha in the retail and PPM segment. Rank 1 contains the lowest performing funds and Rank 3 the top performing. When I divide the data into terciles only 30 funds change ranking, this could depend on the large groups.

Since such a big change of performance is necessary for a fund to improve rank I divide the alphas into quintiles to investigate if there is more movement between the rankings when the groups are smaller. Each quintile then

Figure 1: Bounds of tercil ranking in PPM and retail segment



Note: Percentage of funds in each cell in parentheses.

contains 168 or 169 mutual funds, thus a median fund in a given quintile only needs to out-perform 84 funds. I compare the same median fund as before, this time the fund only needs to increase its performance by 1.80 percent to improve ranking as against 2.75 in the previous classifications of rankings. In Figure 2 I report the bounds for the quintile ranks and the number of funds in each cell. When dividing the alphas into quintiles 80 out of 841 mutual funds change ranking.

4.3 Fund characteristics and fee discounts

From the analysis in Section 4.2 I can conclude that 80 out of 841 mutual funds change ranking. In this part I run an ordinary least square regression with fund characteristics as control variables on the funds discount to see if any fund characteristics can explain the variation of the discount. Starting with a short specification only controlling for the fund being registered in

Figure 2: Bounds of quintile ranking in PPM and retail segment

PPM (%)

Retail (%)	Rank 1 (-22.5 – -5.0)	Rank 2 (-5.0 – -2.0)	Rank 3 (-2.0 – 0.2)	Rank 4 (0.2 – 3.3)	Rank 5 (3.3 – 17.4)
Rank 1 (-25.0 – -5.7)	160 (94.7)	9 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)
Rank 2 (-5.7 – -2.8)	9 (5.3)	151 (89.9)	8 (4.8)	0 (0.0)	0 (0.0)
Rank 3 (-2.8 – -0.4)	0 (0.0)	8 (4.76)	144 (85.7)	16 (9.5)	0 (0.0)
Rank 4 (-0.4 – 2.5)	0 (0.0)	0 (0.0)	16 (9.5)	145 (86.3)	7 (4.2)
Rank 5 (2.5 – 16.4)	0 (0.0)	0 (0.0)	0 (0.0)	7 (84.2)	161 (95.8)

Note: Percentage of funds in each cell in parentheses.

Sweden:

$$\psi_i = \alpha + \beta \text{dSwedish}_i + \epsilon_i \tag{5}$$

where ψ_i is the average discount of fund i during the time period 2002-2010. *dSwedish* is a dummy variable equal to one if the fund is registered in Sweden. The intercept α is the mean of the price reduction. In equation (5) the intercept is the mean discount for all funds not registered in Sweden. The coefficient for the dummy variable *dSwedish* is negative in all specifications. It varies between -0.31 to -0.21 percentage points. The reason for this is that mutual funds registered in Sweden have a lower average total expense ratio (TER) than the remaining mutual funds. The average TER for a mutual fund registered in Sweden is 1.19 percent compared to 1.89 percent outside of Sweden, thus they also have a lower discount. This can also be seen when looking at the ten percent of funds that have the highest discount, only 19 percent of these funds are registered in Sweden compared to 38 percent in the whole sample.

Across all specifications the intercept varies between 0.65 to 0.89 percent. Computing the mean discount in the data yields an average of 0.77 percent with a standard deviation of 0.42 percent. Since the size of the discount depends on TER, I run a regression with TER as a control variable on funds discount. In this specification the intercept decreases, TER absorbs the variation leaving the intercept insignificant in all specifications. I also create a dummy variable that indicates if the fund has a TER higher than 3.5 percent. This variable is positive and strongly significant in all specifications. The dummy variable is a part of TER, for that reason I also leave this variable out of Table 5. It is clear that the size of the discount depends very strongly on TER. This is logical since the formula that the Swedish Pension Agency uses to calculate the discount takes into account the TER, and with a higher TER, enhances the price reduction.

For the rest of the OLS regressions I leave out TER and focus on other fund characteristics. To check the robustness of the coefficients I use various specifications, adding covariates to equation (5). I specify the full model as follows:

$$\psi_i = \alpha_i + \beta_1 \text{dSwedish}_i + \beta_2 \text{dNordic}_i + \beta_3 \text{dEurope}_i + \beta_4 \text{dAsia}_i + \beta_5 \text{dRestOfWorld}_i + \beta_6 \text{dInterest fund}_i + \beta_7 \text{dOther}_i + \epsilon_i \quad (6)$$

where ψ_i, α_i and dSwedish_i are the same variables as in equation (5). The dummy variable dNordic_i indicates if the fund has investment-focus on the

Nordic region. The estimate is positive but varies a bit less than the other investment dummies. dEurope_i, dAsia_i and dRestOfWorld_i are also investment focus dummy variables. They all are positive and vary between 0.27 and 0.39 percent. The dummy variable dInterest fund_i indicates if the fund invests in interest papers. The coefficient is slightly negative, -0.17 percent, indicating that interest funds have a lower discount, which I expected since these type of funds usually have a lower TER.

I report the estimates in Table 5. Through all different specifications of the model all the fund characteristics and the intercept are at least statistically significant at a 95 percent significance level.

The interpretation of the regression is that a certain fund characteristic would make the discount deviate from the mean discount when holding everything else constant. If a fund is registered in Sweden it has a negative coefficient, i.e. a Swedish fund would have lower discount. A conclusion of this section is that funds with large discounts also have a higher TER. The mean for the TER in the top decile is 2.84 percent compared to 1.61 percent for the whole sample. Altered specifications all produce the same sign of the coefficient and the magnitude does not change remarkably as shown in Table 5.

4.4 A closer look at the funds that change ranking

In the previous section I investigate if any fund characteristics can explain the size of the discount. I conclude that the size of TER is strongly correlated with the size of the discount. Now I want to investigate how the discount can predict if a fund will change ranking. The change in the internal ranking is a binary outcome. In this section I use a probit model and will be able to establish the relationship between changes in internal ranking and some

Table 5: Discounts and fund characteristics

Variable	(I)	(II)	(III)
Swedish Fund	-0.0031^{***}		-0.0022^{***}
	(0.0003)		(0.0003)
Nordic region		0.0009^{**}	0.0015^{***}
		(0.0004)	(0.0005)
Europe		0.0041^{***}	0.0040^{***}
		(0.0004)	(0.0005)
Asia		0.0039^{***}	0.0035^{***}
		(0.0005)	(0.0005)
Rest Of World		0.0033^{***}	0.0030^{***}
		(0.0004)	(0.0005)
Interest fund			-0.0017^{***}
			(0.0005)
Other			0.0031^{***}
			(0.0005)
Constant	0.0089^{***}	0.0057^{***}	0.0066^{***}
	(0.0002)	(0.0002)	(0.0004)
Observations	841	841	841
R^2	0.13	0.18	0.33

Note: Standard error in parentheses

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

predictor variables.

The main predictor that I will focus on is the discount and how that affects the probability that a fund is a switcher. The dependent variable $dswitcher_i$ is a binary variable, indicating if fund i changes internal ranking. $dswitcher_i$ equals 1 both for funds ranked higher in PPM and for funds ranked lower in PPM than in the retail segment.

I start of with a short regression only using ψ_i (the average discount I describe in Section 4.1) as a predictor. The coefficient of ψ_i is insignificant in all specifications when I use $dswitcher_i$ as dependant variable. The reason for this is that the number of funds that improve or worsen their ranking is equally large by construction, thus the effect of discount is netted out.

To be able to look at each type of switcher individually I divide the switchers into two new binary variables, $dPositiveSwitcher_i$ and $dNegativeSwitcher_i$ indicating that a fund has a higher internal ranking on the retail market respectively a higher ranking in PPM, enabling me to estimate the prediction of the discount for funds that alter ranking. I run the same model for both $dPositiveSwitcher_i$ and $dNegativeSwitcher_i$. The equation I specify is only for funds that perform better in PPM, but the right hand-side is the same for both dependent variables:

$$\text{dPositiveSwitcher}_i = \alpha + \beta_1\psi_i + \beta_2\text{dSwedish}_i + \beta_3 X_i + \epsilon_i \tag{7}$$

where $dPositiveSwitcher_i$ is a dummy variable that equals one if the fund has a better ranking in PPM. α is the intercept. The control variables, X_i are the same as I describe in Section 4.3 equation (6). I start by running the probit model with only $dPositiveSwitcher_i$ respectively $dNegativeSwitcher_i$ to obtain the base probability. The probability for a fund to switch to a higher ranking in PPM is 4.76 percent and of course the probability is equally large for a fund to have a lower ranking in PPM. ψ_i is the average discount and the predictor I focus on. The long regression in equation (7) contains a full set of investment focus dummy variables, and a dummy variable that indicates if the fund is registered in Sweden.

The coefficients of the probit are difficult to interpret. I will focus on the marginal effect of how an increase or decrease of the discount will affect the probability to change ranking. For an increase of the discount with 0.1

percent for a fund with a mean discount the marginal probability of changing ranking to be relatively better in PPM is 0.76 percent. This for an increase in the discount from 0.7 to 0.8 percent and the probability to change ranking to a better ranking in PPM increases from 2.65 to 3.40 percent.

Using $dPositiveSwitcher_i$ i.e. funds performing better in retail, as a dependent variable, an increase of the discount from 0.7 percent to 0.8 percent yields a lower probability by 0.6 percent to change ranking and become better performing in the retail segment. The probability of performing better on the retail market decreases from 1.19 to 0.58 percent. This makes sense since a higher discount should increase the probability of a relatively higher ranking in PPM.

The estimates in Table 6 are based on specification (IV) of alpha from Section 4.1 and the ranking according to the same alpha. I run the model with all specifications of the risk-adjusted performance and the results are consistent. The only variable that is significant in all specifications is the discount.

5 Investors' fund choice in PPM

With the individual data I analyse if observable characteristics and cognitive and non-cognitive skills are correlated with risk-adjusted lifetime performance and with the magnitude of the discount. An advantage for this study is that it is mandatory to take part in PPM resulting in, no selection bias into the system. All individuals that reach the minimum amount of taxable income, 42.3 percent of the basis amount[6], participate.

We should have in mind that, on the retail market the investor chooses

[6] In 2013 the basis amount was SEK 44,500.

Table 6: Determinants for fund switchers (probit)

Variable	Negative switcher (I)	Negative switcher (II)	Positive switcher (I)	Positive switcher (II)
Average discount	110.87***	111.73***	−266.20***	−263.04***
	(18.73)	(21.45)	(37.97)	(43.79)
Swedish		0.13		−0.04
		(0.19)		(0.21)
Dummy variables for fund characteristics	No	Yes	No	Yes
Intercept	−2.71***	−2.91***	−0.40***	−0.36
	(0.21)	(−9.78)	(0.15)	(0.24)
R^2	0.12	0.13	0.29	0.29
Log likelihood	−141.51	−139.63	−114.46	−114.27

Note: Number of observations 841. Fund characteristics dummy variables are reported in Table 5. Standard error statistics in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

fund depending on risk and return. A mutual fund with a higher risk yields a higher return, but is more volatile. The discount can alter the true risk/return relation from the retail market. If a mutual fund with high risk is provided with a large discount the investor may think he/she invests in a mutual fund with a different risk and return relationship than the true underlying characteristics of the mutual fund.

5.1 Correlation between individual characteristics and discount

In Section 3.2 I explain how I calculate the individual value-weighted average return and discount. In Table 2 the average discount for an individual is 0.62 percent, which is lower than the total average discount. This already implies that the individuals do not especially choose funds with a higher discount, thus if they would be choosing after the size of the discount the individual value-weighted mean should be higher than the average discount of the whole sample.

I begin by estimating a regression of the following form:

$$\alpha_{j,PPM} = \beta_0 + \beta_1 C_j + \beta_2 N_j + \gamma X_j + \varepsilon_j \tag{8}$$

where $\alpha_{j,PPM}$ is the value-weighted alpha for individual j's portfolio of mutual funds in PPM. C_j is the normalized cognitive skill for individual j and N_j is the normalized non-cognitive skill for the same individual. X_j are observable characteristics for individual j. X_j consist of different covariates; for example age, total amount invested in PPM, education, etc.

Estimating correlation between cognitive and non-cognitive skill makes me run into some common issues. When I estimate the effect of skills on choosing high performance mutual funds I control for variables correlated with skills. The most obvious example is education level. Including education could mean that I add "bad controls" to my regression. This is a problem that Angrist and Pischke discuss in their book "Mostly harmless econometrics". When the covariates are correlated, like for example IQ and education level, I add correlation of cognitive skill within every education level and the error term when I add both cognitive skill and education dummy variables to the regression. Multicollinearity is present between cognitive skills and education as well. I approach this problem by estimating two versions of regression (8), one without controlling for education level and another specification that contains controls for the level of education.

Another issue that might be a problem is that there is a positive correlation between the two types of skills. For this reason I will estimate equation

(8) both with one skill at the time and including both skills, exploring if the coefficient of each skill would be sensitive for the change in the specification of the model. These are issues that are common in this type of literature, they are often addressed by testing different specifications of the model, which is my approach as well.

I also have to think about that there could be measurement errors in the variables cognitive and non-cognitive skills. Lindqvist and Vestman (2011) conduct a more thorough review of these two variables, using twin data to estimate a reliability ratio for cognitive and non-cognitive skills. According to them the ratio is 0.87 and 0.70 for cognitive respectively non-cognitive skills. They explain that the lower reliability ratio for non-cognitive skills is due to a relatively higher measurement error than cognitive skill, due to that the non-cognitive skills are measured by interviews with different psychologist. This implies that the coefficient of non-cognitive skill could be underestimated and biased towards zero.

In Grinblatt et al. (2012) high cognitive skill is supposed to be correlated with higher returns. Since I am focussing on the effect the discount has on the individual value weighted performance in PPM I have to split up the value-weighted performance in PPM into the value-weighted retail performance and the discount.

Because of to the discount I am able to examine if there is any correlation between the cognitive and non-cognitive skills and the discount or if the correlation only is significant for the retail performance of the fund. I therefore split up equation (8) into two parts. One part is with the individual value-weighted discount for each individual as dependent variable and the other part is with the individual value-weighted risk-adjusted retail performance.

I estimate the two following equations:

$$\omega_j = \beta_0 + \beta_1 C_j + \beta_2 N_j + \gamma X_j + \varepsilon_j \tag{9}$$

where ω_j is the value-weighted discount for individual j of the portfolio in PPM. The variables on the right hand-side are the same as in equation (8).

$$\alpha_{j,retail} = \beta_0 + \beta_1 C_j + \beta_2 N_j + \gamma X_j + \varepsilon_j \tag{10}$$

$\alpha_{j,retail}$ is the individual value-weighted alpha in retail for individual j portfolio. Also here the variables on the right hand-side are the same as in equation (8).

If there would be a significant effect of cognitive or non-cognitive skill on the discount in the regression from equation (9) it would imply that individuals do make their mutual fund choices depending on the size of the discount. This despite the fact that I find, that only 80 out of 841 mutual funds change ranking. I do find a positive effect of skill on the discount, which is a relationship I will explore closer. I add controls to equation (8) to check if the estimate is robust, also adding the same controls to equation (9) and (10) to see if the relative size between the estimation changes.

In Table 7 I summarize the common variables in the regression.[7]

[7] For variables that are defined by an amount of investments, debt or account balance, I do a logarithmic transformation of before I use those variables in the regression. I do a logarithmic transformation of gross income as well, after I add 1,490,542 to the original variable.

Table 7: Summary statistics individual data

	Mean	Std. Dev.	Min	Max
Age	42.08	8.15	22	69
Married	0.56	0.50	0	1
Elementary school	0.12	0.31	0	1
High School	0.53	0.50	0	1
College	0.10	0.29	0	1
University	0.25	0.25	0	1
PhD	0.01	0.12	0	1
Gross income	365,412	321,376	-1,490,541	27,000,000
Total debt	588,412	1,000,211	0	136,000,000
Account balance PPM	87,028	34,165	8	588,339
Value weighted α_{PPM}	-0.0024	0.04	-0.14	0.17

Note: Sample size 93,823.

5.2 Results of cognitive and non-cognitive skills correlation with discount

The starting point of this analysis comes from equation (8) with no other control variables than cognitive and non-cognitive skills. To put the estimates from the regression in relation, the average individual value-weighted alpha is -0.24 percent.

The estimate for cognitive skill is 0.0029, thus an increase of one standard deviation of cognitive skill would increase the individual portfolio alpha by 0.29 percentage points. The estimate of non-cognitive skill is also positive. An increase of one standard deviation would increase portfolio performance by 0.05 percentage points. Both estimates are significant at a one percent significance level. The result that cognitive skill (i.e. IQ) has a positive correlation with the lifetime performance of a portfolio corresponds with existing literature, for example Grinblatt et al. (2012) and Lindqvist and

Vestman (2014).

The results I present in this section, I estimate with the retail performance from specification (IV) defined by equation (3) in Section 4.1.[8] The estimate of cognitive skill varies between 0.16 and 0.29 percentage points for an increase of one standard deviation. As seen in Table 8 the estimate is positive and statistically significant at a one percent significance level through out all specifications and decreases some when adding covariates. When I add fixed effects for education, area of residence and controlling for age does not alter the estimate of cognitive skill more the 0.07 percentage points.

Cognitive skill has a relatively larger impact on the annual alpha in PPM compared to non-cognitive skills. The coefficient for non-cognitive skill is even insignificant in some specifications. The estimate for non-cognitive skill varies between -0.05 and 0.05 percentage points for an increase of one standard deviation of non-cognitive skill.

All types of private investments outside PPM are positively correlated with the individual alpha, for example investment in stock, bonds, and real estate. Participation in the stock market is also positively correlated with the alpha of individual's portfolios. In Table 8 the estimate for account balance varies between 0.0160 and 0.0270. Also debt has a positive estimate of 0.04 percentage points. This implies that an increase in debt would increase individual portfolio alpha.

Since the research focus is set on how the effects of discount change the internal ranking, and if individuals follow the recommendation suggested by the media and choose a fund with a large discount, I split up equation (8) into discount, equation (9), and retail performance, equation (10). From the short regressions defined by equation (9) and (10) the estimate of cognitive

[8]Regressions with the remaining specifications are also run with consistent results and for that reason not tabulated.

Table 8: Effect of skills on portfolio alphas

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Cognitive (C)	0.0029***	0.0022***	0.0021***	0.0029***	0.0020***	0.0023***	0.0016***
	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Non-cognitive (N)	0.0005***	0.0003*	0.0004**	0.0004**	0.0001	−0.0002	−0.0005***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Debt				0.0004***	0.0004***		
				(0.0001)	(0.0001)		
Account balance						0.0160***	0.0270***
						(0.0003)	(0.0003)
Intercept	−0.0025***	−0.0044***	0.0681***	−0.0072***	0.0481***	−0.1828***	−0.0679***
	(0.0001)	(0.0004)	(0.0045)	(0.0013)	(0.0049)	(0.0031)	(0.0044)
Education fixed effect	No	Yes	Yes	No	Yes	No	Yes
Control for age	No	No	Yes	No	Yes	No	Yes
Area fixed effect	No	No	Yes	No	Yes	No	Yes
R^2	0.01	0.01	0.01	0.01	0.01	0.04	0.09

Note: Standard error statistics in parentheses.

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Number of observations 87,002.

skill is higher for the regression on retail performance then on the discount. An increase of one standard deviation of cognitive skill would result in 0.26 percentage points higher retail performance corresponding to only 0.03 percentage point increase in discount.

The estimate from the regression on individual retail performance follows the same pattern as the estimates from equation (8). Cognitive skill is positive and highly statistically significant. It varies between 0.16 and 0.25 percentage points for an increase of one standard deviation of cognitive skill and decreases with more covariates. The estimate for non-cognitive skill fluctuates around zero and occasionally becomes insignificant.

For the regression on discount the estimate for cognitive skill is consistent, an increase of one standard deviation in cognitive skill increases the discount for an individual by 0.02 to 0.03 percentage points. In Table 9 I split up two specifications of alpha into discount and retail performance. Summing the estiamtes for each variable is equal or very close to the estimate from the regression defined by equation (8).

After dividing the individual alpha in PPM I find that the diminishing estimate of cognitive skill when adding covariates is absorbed by the individual alpha from the retail market and the estimate remains consistent for cognitive skill in the regression with individual value-weighted discount as dependent variable. The estimate for non-cognitive skill on individual discount is consistently between 0.01 and 0.02 percentage points for an increase of one standard deviation in non-cognitive skill and continues to be highly significant through-out all specifications. Due to the measurement error of cognitive and non-cognitive skill the estimate is not excessive, but rather some what under estimated. The larger part of an individual's weighted average alpha depends on the performance of the mutual fund in the retail

Table 9: Effect of skills on portfolio discounts and alphas

	discount	α_{Retail}	α_{PPM}	discount	α_{Retail}	α_{PPM}
Cognitive (C)	0.0003***	0.0025***	0.0028***	0.0002***	0.0019***	0.0021***
	(0.0000)	(0.0002)	(0.0002)	(0.0000)	0.00001	(0.0002)
Non-cognitive (N)	0.0002***	0.0002*	0.0004***	0.0001***	0.0002	0.0003*
	(0.0000)	(0.0001)	(0.0002)	(0.0000)	(0.0002)	(0.0002)
Gross income	0.0007***	0.0023**	0.0029**	0.0008***	0.0023***	0.0033***
	(0.0002)	(0.0011)	(0.0012)	(0.0001)	(0.0011)	(0.0012)
Intercept	−0.0040***	−0.0417***	−0.0446***	−0.0005	0.0118	0.0119
	(0.0010)	(0.016)	(0.0171)	(0.0015)	(0.0169)	(0.1772)
Education fixed effect	No	No	No	Yes	Yes	Yes
Control for age	No	No	No	Yes	Yes	Yes
Area fixed effect	No	No	No	Yes	Yes	Yes
R^2	0.01	0.00	0.01	0.03	0.01	0.01

Note: Standard error statistics in parentheses.

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Number of observations 87,002.

Gross income is transformed with logarithms.

market, but there is also a positive correlation between higher cognitive and non-cognitive skills and discount.

When I control for age it does not alter the estimate of cognitive and non-cognitive skill, but I find that the younger cohort has a lower average alpha in PPM. The discount is negatively correlated with age. Adding educational dummy variables to equation (9) and (10) do not alter the impact of non-cognitive skills, elementary school is used as the reference category showing that a higher education is correlated with a higher discount. These estimates are positive but not always significant, especially not for the PhD level of education.

Over all, the discount is not the main focus of individuals when they choose mutual funds in PPM. There is a positive correlation between cognitive and non-cognitive skills and a higher discount, but it is not likely that the discount would cause a larger dispersion in lifetime income. The increase in dispersion is caused by the positive correlation between cognitive skill and higher individual alphas. Individuals with higher cognitive skills choose mutual funds with higher retail performance. We should also have in mind that only one out of ten individuals was aware of the existences of the discount according to a survey conducted by TNS Sifo Prospera[9] in 2012. If this is the case individuals that have absorbed information about the discount, are able to a larger extent choose mutual funds after size of discount.

6 Conclusion

The fee discount is discussed in media but there are no statistical analyses of the impact of the discount. This thesis fills the gap. The general recommen-

[9] Fondbolagens förening `http://www.fondbolagen.se/sv/Aktuellt/Pressmeddelanden/2013/Sa-stor-roll-spelar-fondernas-rabatt-i-premiepensionssystemet/`

dation is that we are supposed to choose funds with a high fee discount, but this statement is not supported based on careful statistical analysis. I find that the internal ranking between the fund markets does not change, but the whole distribution of the performance in PPM moves up.

Individuals do not adopt the recommendation from the media to a large extent. I find that a one standard deviation increase of cognitive skill increases the performance of a portfolio in PPM by 0.16 percentage points, compared to the average performance of a portfolio in PPM that is −0.24 percent. When I split up the individuals' alpha in PPM into alphas in the retail market and discount, it yields a 0.15 percentage points increase from the alpha on the retail market and 0.01 percentage points increase by discount for a one standard deviation of cognitive skill.

The individual has to absorb a lot of public information to be able to make an efficient choice in the fund market. According to research by Beshears et al.(2013) simplifying investment choice increases participation. When the individual has to many choices, over 800 in PPM, they choose not to make an active choice of fund or they choose a fund that they recognize.

Only one out of ten individuals is aware of the existence of the discount[10] and barely six out of ten have made an active choice of fund. The decision support is not large enough for individuals to actively participate and the choices are too many.

A change during the last years, after the data set I use ends, is the fast expansion of the pension advisor business. They help individuals to make investment choices, but the individuals pay for that advice, indirectly decreasing the net return of the portfolio. The pension advisor business could also alter the results if they focus on the same mutual funds, meaning that

[10]PM: Fakta och myter om premiepensionen `http://www.fondbolagen.se/Juridik/Framstallningar/2013/Dokument/Fakta-och-myter-om-premiepensionen/`

the discount in those funds would increase more relative to those mutual funds that are not recommended by the pension advisor.

For future research an identification of what type of individuals have lower performance in PPM would be interesting. An identification of these individuals could help targeting them with a policy that would even-out inequality. A high performing default fund is of importance. Policies targeting individuals with low retirement pension already exist in Sweden for example through housing grants.

In May 2014 the Swedish Pension Agency has start to publish the size of the discount, for future research it would be interesting to see if the available information change the way individuals choose mutual funds.

A defined contribution pension plan, which is used in Sweden already, increases dispersion since high cognitive skill is positively correlated with individuals' alpha in PPM. That is one of the reasons why this thesis is an important contribution, to investigate if the impact of the fee discount will enhance the dispersion in lifetime income.

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