

# Trading behavior of Swedish retirement investors during the COVID-19 pandemic

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## Abstract

**Purpose** – How did investors in the Swedish Premium Pension System (PPS) react to the stock market shock ignited by the COVID-19 pandemic?

**Design/methodology/approach** – The authors use fund-level data from the Swedish Pensions Agency on investment choices in the PPS. For each fund, the authors use monthly information on the number of investors and holdings' market value up to November 2020. The authors also use information on the total number of portfolio changes per day. For analyzing whether PPS investors reacted to the pandemic with claiming their pension, the authors use monthly data on the number of investors of a certain age group who initiate their public pension payment.

**Findings** – Trades more than doubled, and shifted capital from equity funds to low risk interest funds. In economic terms, however, trading stayed at low levels—less than two percent of investors traded in March 2020 and there was no effect on pension withdrawals. The increased trading during the market tumult was disproportionately concentrated among investors in the top of the pension capital distribution.

**Research limitations/implications** – With fund-level data, the authors cannot investigate what in particular made retirement investors stay calm in the midst of a severe market decline. Either, those investors have a long-term investment horizon as they save for their pension or particular features of the system's choice architecture induce inertia and discourage from trading. The sub-group analyses are more consistent with the explanation that PPS-induced inertia is responsible for the relatively small increase in trading activity, but future research could exploit individual level data to explore this in more detail.

**Practical implications** – The often-criticized PPS choice architecture provided positive side effects in times of a severe market shock by shielding retail investors from committing trading mistakes when trying to outsmart the market.

**JEL Classification** — D14, D81, G01, G11, G28

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**Originality/value** – The study complements previous evidence on the effects of COVID-19 on investor activity. The small response of PPS investors to COVID-19 is in line with earlier US findings on 401(k) accounts during the 2007 financial crisis (Tang *et al.*, 2012) and industry reports about the COVID-19 period (see, e.g. Mitchell, 2020). The authors find no effects at all on public pension withdrawals in Sweden, while evidence from US 401(k) plans indicates a small share of workers taking COVID-related early withdrawals.

**Keywords** Financial crisis, COVID-19 pandemic, Retirement investors, Trading behavior, Risk-taking behavior

**Paper type** Research paper

## 1. Introduction

In the first quarter of 2020, the COVID-19 pandemic's rapid spread sent a shock to stock markets worldwide. For example, the U.S. Dow Jones Industrial Average decreased by 34% between February 21 and March 23. Earlier shocks to markets, for example, the 2007 financial crisis, induced retail investors to increase their trading volume in response to changes (and larger disagreement) in return and risk expectations, and risk aversion (e.g. Hoffmann *et al.*, 2013). Recent evidence on the COVID-19 pandemic from the UK (Ortmann *et al.*, 2020) also shows that retail investors increased their trading volume. High trading volumes harm retail investors' net returns as they incur larger transactions costs, which are usually not offset by improved gross returns given the lack of informational advantages or superior trading skill (e.g. Hoffmann *et al.*, 2013).

We investigate whether, and if so how retirement investors altered their investment portfolios during the COVID-19 market shock. Specifically, we analyze trading activity in the Swedish Premium Pension System (PPS), which is a mandatory defined contribution (DC) pension plan for all Swedes. PPS participants can choose how to invest contributions from a large menu (ca 500) of mutual funds including one default fund. An advantage of our setting is that we cover investment choices of the full Swedish population where the stakes are large; the average capital invested in the PPS is approximately SEK 200,000 (1 SEK = \$0.12) and expected to increase as saving in the PPS only started in 2000.

We find that the average number of fund choices per day increased by 1/3 during the first month of the COVID-19 outbreak in Europe (from February 23 and onwards), after which it returned to prior levels. The share of all PPS investors (ca 7.7 million) that traded, went up to 1.7% in March 2020 from a pre-COVID-19 average of 0.7%. Overall, however, the increased trading activity had only a marginal impact on the overall reallocation of investment portfolios.

The small response of PPS investors to COVID-19 is in line with earlier US findings on 401(k) accounts during the 2007 financial crisis (Tang *et al.*, 2012) and industry reports about the COVID-19 period (see, e.g. Mitchell, 2020). There are two potential explanations why retirement investors react less to an exogenous market shock such as COVID-19 compared to retail investors. First, retirement investors (except for those close to retirement) should have a long-term perspective and can thus afford to invest more aggressively and may also feel that they have more time to recoup losses. Second, behavior in pension plans tends to be characterized by strong inertia (Thaler, 2018). In fact, the design of the PPS has been criticized for inducing substantial inertia in investor behavior by confronting participants with too many investment options (Cronqvist *et al.*, 2018; Böhnke *et al.*, 2019).

To better distinguish which of the two potential explanations is more consistent with the data, we run additional analyses where we study investors' behavior in subsamples of pension wealth and age. Previous literature has found that higher wealth is related higher financial literacy and more sophisticated portfolio strategies (Graham *et al.*, 2009; Moreira and Muir, 2017). More financially literate investors should be less likely discouraged by a complex architecture and may therefore be more attentive to the market and the performance of their PPS portfolio. Indeed, we find that the increased trading during the market tumult was disproportionately concentrated among investors in the top of the pension capital

distribution. The share of PPS investors in the top decile group ( $\geq$ SEK 500,000) that traded went up to 8.5% in March 2020 from a pre-COVID-19 average of 1.5%. In contrast, investors in the lower end of the capital distribution were only marginally more likely to trade during the market turmoil compared to before.

If age and time until retirement played a role, we would expect older investors to react more strongly to the market turmoil. However, we find that while older investors are overall more likely to make changes to their PPS portfolio than younger investors, they are also more likely to do so during the COVID-19 market tumult. In fact, the relative increase in trading activity during the market tumult is close to identical across all age groups between 30 and 70. A counteracting factor could be that young individual investors have been found to be more sensitive to recent returns when forming expectations about future returns or allocating portfolios (Malmendier and Nagel, 2011).

Based on these results, we find evidence that is more consistent with the explanation that PPS-induced inertia is responsible for the relatively small increase in trading activity (see the discussion in Section 5). Thus, the complex choice architecture might have provided positive side effects in times of crisis by shielding investors from falling prey to trading mistakes.

Finally, to ease financial shortfalls during COVID-19, several countries have facilitated the withdrawal of capital from their retirement and unemployment funds, including Australia, Chile, Peru and the US (Mitchell, 2020). We find no effects at all on public pension withdrawals in Sweden, while evidence from US 401(k) plans indicates a small share of workers (<5%) taking COVID-related early withdrawals (Bernard, 2021; Tergesen, 2021). Also, Quinby *et al.* (2021) report that the pandemic has thus far had little impact on Social Security Old-Age claiming in the US.

Next, we describe the institutional setting and data. Then we present our results and finally discuss our findings and policy implications.

## 2. The Premium Pension System (PPS)

The Swedish pension system has three pillars: a universal public pension system, quasi-mandatory occupational pensions (for workers whose employer is tied to an occupational pension plan) and private savings (Hagen, 2017).

Mandatorily, a share of 18.5% of the salary and other taxable benefits is set aside for the public pension. Thereof, 16% is set-aside for the pay-as-you-go Income Pension and 2.5% for the Premium Pension, which we analyze in this paper. The Swedish Pensions Agency (SPA) calculates that by 2030 the Premium Pension will constitute 20% of public pension payments.

PPS investors can invest in up to five of the funds available on the Premium Pension platform. If no choice is made, contributions are invested in the default fund AP7 Såfa [1]. By 2020 there were 490 eligible funds registered in the PPS [2]. The SPA administers the public pension, keeps track of the accounts, and executes the desired portfolio investments in the PPS. Investors can change their portfolio online at no cost and the fund management fees are generally low. The premium pension can be withdrawn from the age of 62.

The first choices in the Premium Pension were made after its inception in 2000. At the time, due to a widely spread advertising campaign more than two-thirds of investors decided to select their own portfolio. Since then, the share of active investors among new PPS investors has declined. As of today, around half of PPS investors manage their own portfolio. Of those, fewer than 10% make a trade per year (Thaler, 2018), indicating structurally low investor engagement.

## 3. Data and methodology

We use fund-level data from the SPA on investment choices in the PPS. For each fund, we use monthly information on the number of investors and holdings' market value. Fund-level net

trade information is available from 2018 [3]. We also have information on the total number of portfolio changes per day [4]

In our empirical analysis, we study the evolution of investor activity before and after the outbreak of the pandemic. Our main outcome variables reflecting investor activity are number of portfolio changes and net trade. We use the classification of the SPA of funds into four different categories, including equity funds, life cycle funds, mixed funds, and interest funds to study movements across funds with different risk profiles [5].

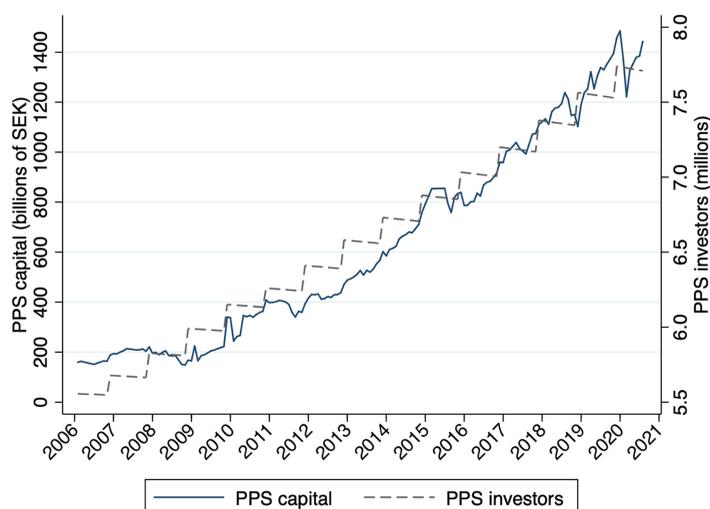
For analyzing whether PPS investors reacted to the pandemic with claiming their pension, we use monthly data on the number of investors of a certain age group who initiate their public pension payment [6]

In Figure 1, we show how the total market value of all PPS portfolios and the number of investors evolved over time. In early 2020, there were around 7.7 million investors with approximately SEK 1,500 billion in pension capital [7]. The stepwise increase in the number of investors reflects the successive entry of new cohorts into the system.

In Figure 2, we plot the average monthly return by fund category along with the return of the Stockholm All Share Index (OMXSPI) and the Dow Jones Industrial Average (DJIA). The stock markets globally began to plummet during the last week of February 2020 [8]. As the pandemic began to spread in March and shutdown measures were being implemented, stock markets continued to fall and hit the bottom around March 23. In the Swedish PPS, equity funds follow the stock market indexes closely, dropping 8.8 and 12.4% in February and March 2020, respectively. Mixed, interest, and generation funds follow a similar pattern but exhibit less volatility.

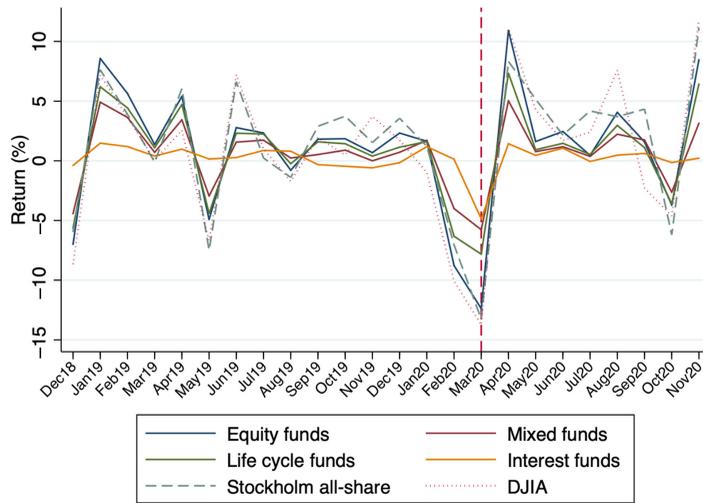
#### 4. Results

We present results of three analyses: the effect of the COVID-19 pandemic on the number of trades and net trades by fund category (4.1), a subsample analysis by age and pension wealth of number of trades (4.2) and pension withdrawals (4.3).



**Note(s):** This figure shows total market value of all PPS portfolios (left axis) in SEK (1 SEK = \$0.12) and the number of PPS investors (right axis) over time

**Figure 1.**  
Total pension capital  
and number of  
investors over time  
in PPS

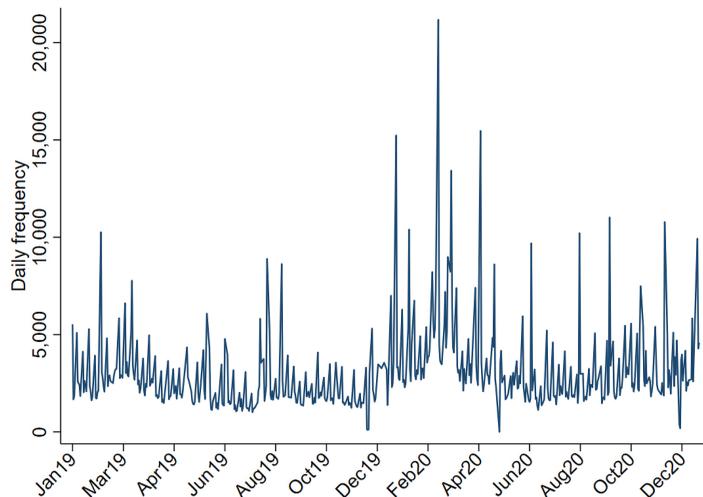


**Figure 2.**  
Average fund returns  
by fund category and  
stock market indexes

**Note(s):** This figure shows the average monthly return for each fund category as well as of the Stockholm All Share Index (OMXSPI) and the Dow Jones Industrial Average (DJIA). Monthly returns are an unweighted average of the percentage change in total capital within funds in a given category

4.1 Full sample analyses

Figure 3 shows the number of trades done by PPS investors per day between 2019 and 2020. In the first week of March, more than 36,000 trades were made. This is twice the number of trades that were done one month earlier in the first week of February.



**Figure 3.**  
Portfolio changes per  
day among PPS  
investors

**Note(s):** This figure shows the number of portfolio changes per day between 2019 and 2020

To put these numbers into perspective, we express the number of portfolio changes *per month* relative to the number of investors in Figure 4 [9]. We use this number as a proxy of the fraction of investors that traded in a specific month [10]. We find that the fraction who traded went up to 1.7% in March 2020 from a pre-COVID average of 0.7% [11]. In economic terms, the fraction of investors who traded therefore stayed small [12].

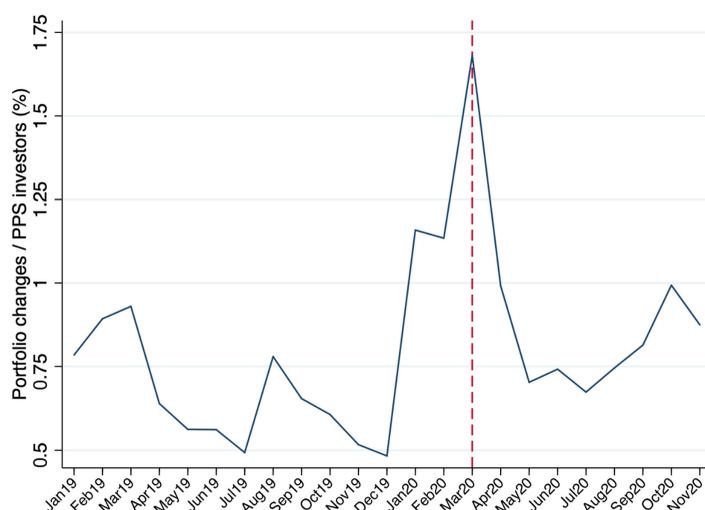
Next, we examine how the average asset allocation changed. Figure 5 plots the evolution of the total market value invested in each fund category. While capital invested in equity, mixed and life cycle funds decreased in conjunction with the COVID-19-triggered stock market crash, capital invested in interest funds increased by more than one-third (approximately SEK 10 billion). As interest funds had negative returns at that time (Figure 2) this signals an inflow of investors into this fund category.

To examine to what extent these changes are driven by investors actively moving capital between fund categories we next study the evolution of net trades in Figure 6. We include data for 2018 as an additional comparison year.

There are spikes in March 2020, which are different from the corresponding patterns in previous years. The small share of investors who traded moved capital out of equity funds and into interest funds, i.e. from a high-risk to a low-risk investment option. During the first three months of the crisis, the share of PPS investors invested in low risk bond funds increased from 5.9 to 6.7%. Meanwhile, the share invested in equity funds decreased from 70.0 to 68.8%. There is also evidence of re-adjustment during the subsequent market recovery.

Other irregularities in Figure 6 are due to the 2018/2019 deregistration of around 300 funds (capital in these funds shows up on the buy side of net trade but not on the sales side, see Section 2) and investments of new pension contributions each December (ca SEK 43,000 billion).

In Table A1 in Appendix, we look deeper into which type of funds have dominated the trade in equity funds and interest funds. Investors tended to sell off “Global funds” and funds

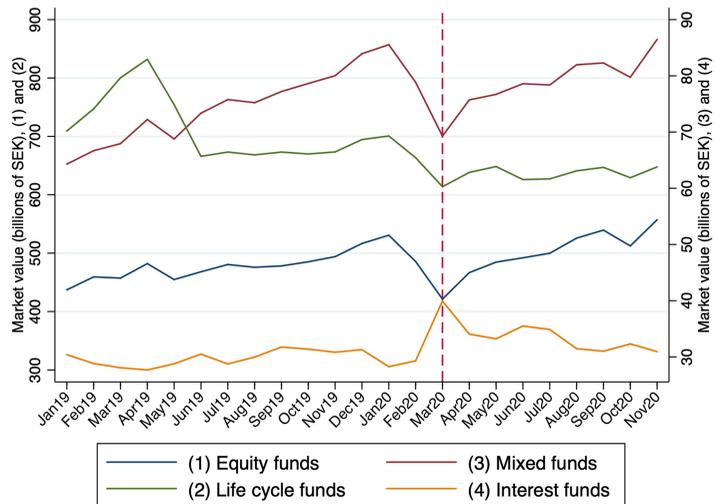


**Note(s):** This figure shows the number of portfolio changes per month between 2019 and 2020 relative to the number of PPS investors. The vertical dashed line indicate March 2020

**Figure 4.** Portfolio changes per month as a share of number of PPS investors (in %)

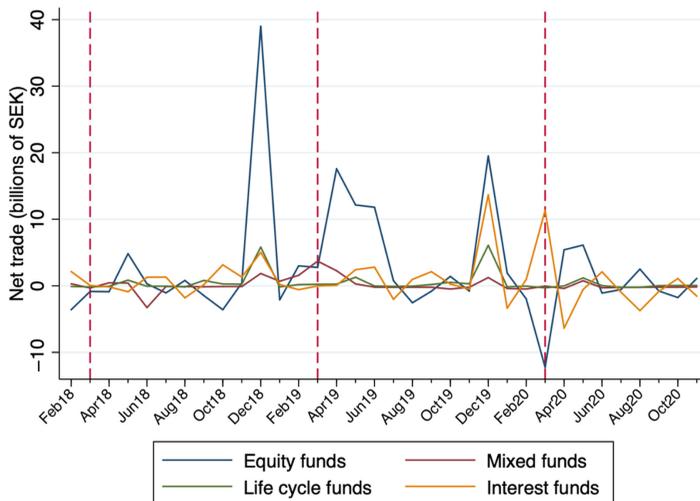
RBF  
15,5

700



**Figure 5.**  
Total capital by fund  
category, billions  
of SEK

**Note(s):** This figure shows total market value of capital (in billions of SEK) invested in the fund categories equity and life cycle (left axis) and mixed and interest (right axis). The vertical dashed line indicate March 2020



**Figure 6.**  
Net trade (billions of  
SEK) by fund category

**Note(s):** This figure shows PPS investors' net trades by fund category. Net trade is defined as fund deposits minus withdrawals, aggregated at the fund category level. The vertical dashed lines indicate March in each year

invested in raw materials and energy and moved to Swedish interest funds. Interestingly, there was a net inflow of capital to emerging markets equity funds.

#### 4.2 Subsample analyses

In this section, we examine whether the COVID-19 market turmoil had differential effects on portfolio rebalancing among different groups of PPS investors.

First, we split PPS investors into five different age groups: below 30, 30–39, 40–49, 50–59 and 60–69. The left panel of [Figure 7](#) reports the number of portfolio changes made by investors in a given age group divided by the number of investors in that particular age group in a given month. The right panel normalizes the number of trades in a given month to a reference month, here chosen to be March 2019.

From the left panel we conclude that older investors are overall more likely to make changes to their PPS portfolio than younger investors. Elderly are also more likely to trade during the COVID-19 market tumult. From the right panel of [Figure 7](#), it is clear that the relative increase in trading activity during the market tumult is close to identical across all age groups between 30 and 70.

[Figure 8](#) shows corresponding results for investors with different levels of PPS pension capital. Investors are split into five categories at intervals of SEK 100,000. In 2020, the average PPS capital amounted to around SEK 200,000. It is clear from the left panel that activity is in general positively correlated with pension capital; individuals with larger pension capital are more likely to make changes to their PPS portfolio. We also see that the increased trading during the market tumult was disproportionately concentrated among investors in the top of the pension capital distribution. The share of PPS investors in the top decile group (>SEK 500,000) that traded went up to 8.5% in March 2020 from a pre-COVID-19 average of 1.5%. In contrast, investors in the lower end of the capital distribution were only marginally more likely to trade during the market turmoil compared to before.

#### 4.3 Pension withdrawals

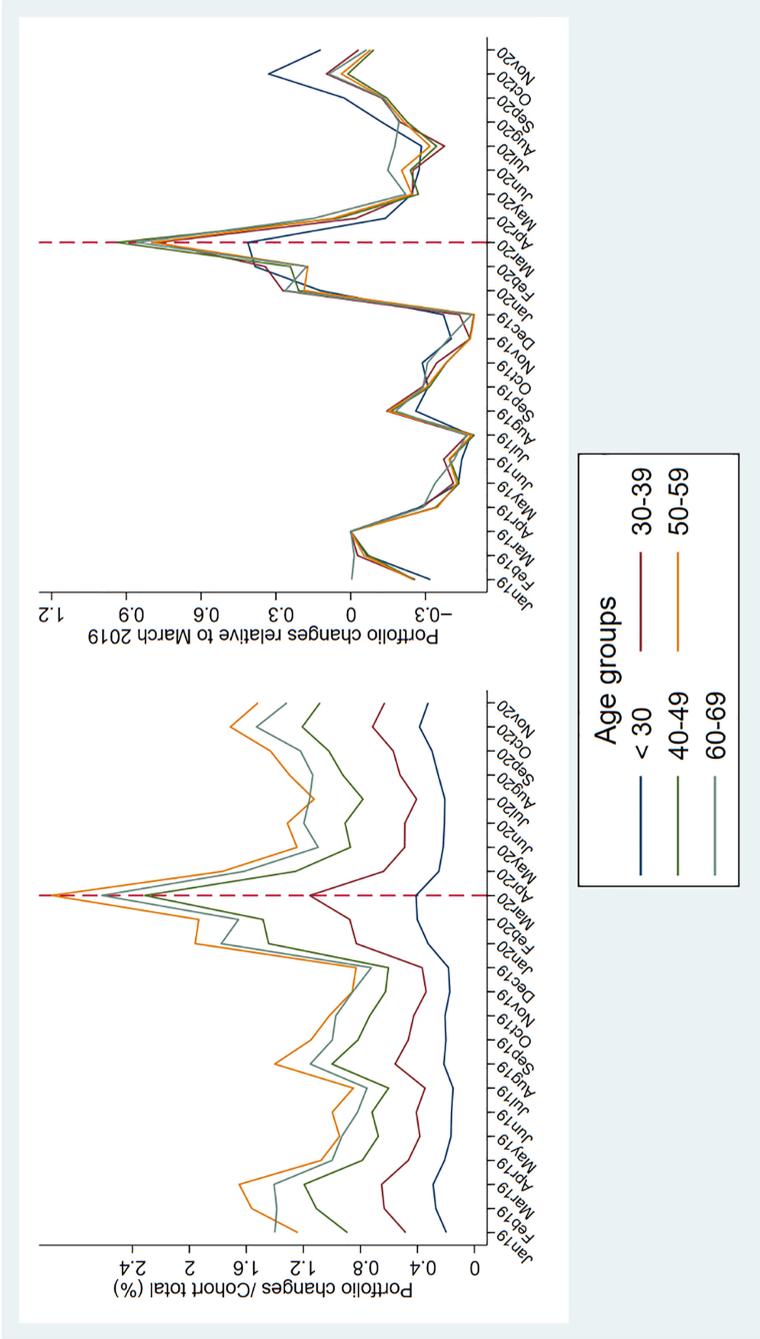
We finally analyze investors' pension withdrawals as another channel through which investors can react to the COVID-19 pandemic. [Figure 9](#) plots the number of initiated public pension withdrawals per month between 2018 and 2020. We separate between withdrawals of the income pension and the premium pension. Patterns across these three years are strikingly similar—the COVID-19 pandemic had no short-run effect on pension withdrawals.

### 5. Summary and discussion

We study how investors in the Swedish PPS reacted to the shock sent to markets by the COVID-19 pandemic in 2020. We find that the share of investors that traded more than doubled, and those trades shifted capital to low risk interest funds. In economic terms, however, trading activity stayed at very low levels common in the PPS system. Less than two percent of investors traded in March 2020. Looking at pension withdrawals as a potential reaction to the pandemic we find no effects.

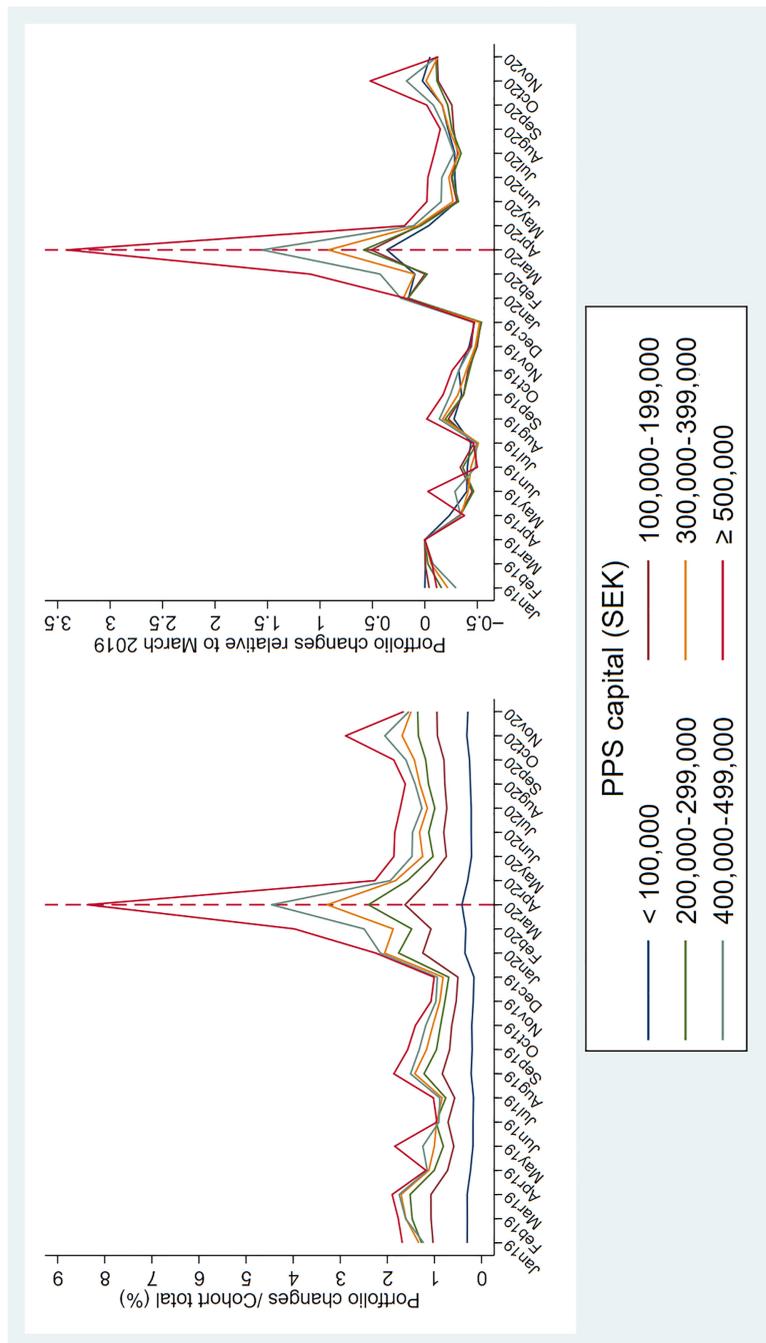
Investors' response is significantly below levels found in earlier studies on retail investors trading shares during financial crises (e.g. 63% in [Hoffmann et al., 2013](#)) and occurs in an environment with virtually no monetary transactions costs. Our results are in line with earlier US findings on 401(k) accounts during the 2007 financial crisis ([Tang et al., 2012](#)) and industry reports about the COVID-19 period (see, e.g. [Mitchell, 2020](#)).

With our data, we cannot perfectly investigate what in particular made retirement investors stay calm in the midst of a severe market decline. One potential explanation could be that investors have a long-term investment horizon as they save for their retirement and remained passive not to miss out on the market rebound. Such preferences would imply a larger relative response to the market turmoil among age groups closer to retirement. On the other hand, young individual investors have been found to be more sensitive to recent returns



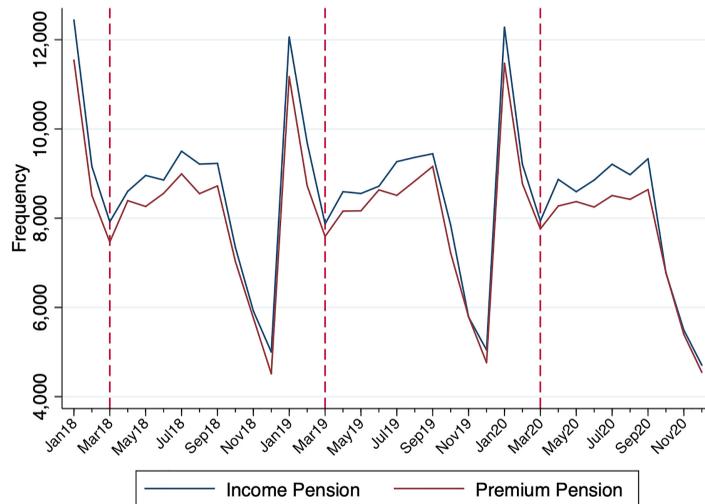
**Figure 7.** Portfolio changes per month for different age groups of PPS investors

**Note(s):** This figure shows the number of portfolio changes per month for different age groups of PPS investors. For each age group, the number of changes is divided by the number of investors in that particular age group in a given month. The right panel normalizes the number of trades to a reference month (March 2019). The vertical dashed lines indicate March 2020



**Note(s):** This figure shows the number of portfolio changes per month for different capital groups (intervals of SEK 100,000). For each capital group, number of changes are divided by the number of investors in that particular capital group in a given month. The right panel normalizes the number of trades to a reference month (March2019). The vertical dashed lines indicate March 2020

**Figure 8.**  
Portfolio changes per  
month for different  
capital groups of PPS  
investors



**Figure 9.**  
Initiated public pension  
withdrawals

**Note(s):** This figure shows the number of initiated public pension withdrawals per month in the public pension system, i.e., for the pay-as-you-go Income Pension and the Premium Pension (PPS). The minimum claiming age is 62. The vertical dashed lines indicate March in each year

when forming expectations about future returns or allocating portfolios (Malmendier and Nagel, 2011). We find that the relative increase in trading activity during the market tumult is close to identical across all age groups between 30 and 70, although the baseline trading activity rises with age.

Another potential explanation could be that particular features of the system's choice architecture induce inertia and discourage from trading. This interpretation is supported by our finding that rebalancing was disproportionately accounted for by investors with the highest pension capital. More financially literate investors should be less likely discouraged by a complex architecture and may therefore be more attentive to the market and the performance of their PPS portfolio [13]. Previous research has shown that high-income individuals have been shown to trade more often because they perceive themselves to be more knowledgeable (Graham *et al.*, 2009). Indeed, investors with large pension capital were not only relatively more likely to rebalance during the crisis but are also more active in managing their PPS portfolio in general.

Wealthy investors may also be more likely to rebalance for reasons related to investment strategy. High-income investors may be more likely to follow a volatility-timing strategy in which risk exposure falls when volatility rises (Moreira and Muir, 2017). They may also be less subject to the "disposition effect", which describes the behavioral tendency to sell stocks with capital gains and hold stocks with losses (Hoopes *et al.*, 2022). In support of this interpretation, we find that the increased trading during the COVID-19 outbreak primarily included portfolio de-risking by shifting capital from equity to low risk interest funds. We also find evidence of re-adjustment during the subsequent market recovery. In addition, the Swedish Pensions Agency (2021) finds a positive relationship between the number of fund changes and the average portfolio return in 2020, indicating that many who rebalanced during the market tumult were quite successful in timing the market.

Hoopes *et al.* (2022) discuss a third reason why sensitivity to turmoil may vary with pension wealth. They find that investors at the top of the income distribution accounted for a

disproportionate share of US stock sales during the Great Financial Crisis of 2008–2009, and argue that this pattern may be attributed to high-income individuals being less risk averse and more optimistic about pay-offs from stock investments. Such investors would be sellers of risky assets because they come into the tumultuous period with the highest risky asset exposure. In the context of the Swedish PPS, however, the portfolios of highly active – and wealthy – investors are on average not riskier, or more volatile, than that of inactive investors (Dahlquist *et al.*, 2017).

Overall, these results point into the direction, which is the inertial induced by the PPS that made investors stay rather calm. One implication from our findings is, that the often-criticized PPS choice architecture provided positive side effects in times of a severe market shock by shielding retail investors from committing trading mistakes when trying to outsmart the market. Thus, policymakers worried about low engagement in pension systems might reconsider the overall evaluation of such systems. Future research should try to disentangle the relative importance of these two mechanisms.

### Notes

1. The default fund is managed by the Seventh AP Fund (AP7), the only state actor in the PPS.
2. In [Appendix](#), we show the number of available funds investors can choose from over time ([Figure A1](#)). The number of funds grew up until 2019 when more than 300 funds were deregistered due to stricter entry and participation requirements. Investors in these funds were informed by the SPA about the deregistration. Unless they made an active choice, their capital was moved to the default fund. Importantly, for the time period we focus on (2020), there were no significant changes to the investment menu that could have triggered trade from investors.
3. These data is published by the Swedish Pensions Agency at: <https://www.pensionsmyndigheten.se/nyheter-och-press/nyheter-fondtorg/statistik-om-premiepensionens-fonder>.
4. These data were provided to the authors by the SPA upon request.
5. An equity fund is a fund that invests primarily in stocks. An interest fund contains interest-bearing securities and is therefore a low-risk option. A mixed fund contains both stock shares and interest-bearing securities. The fund manager decides on the allocation. The risk level of a life cycle fund changes with the age of the investor by reducing equity exposure when approaching retirement. The default fund, AP7 Säfa, is a life cycle fund.
6. This data was provided to the authors by the SPA upon request.
7. PPS investors include both contributors and pension recipients. Data are available at: <https://www.pensionsmyndigheten.se/statistik/pensionsstatistik/>
8. [Figure A2](#) in [Appendix](#) shows weekly changes of the DJIA.
9. Information on the number of investors is only available at the monthly level.
10. This number over-estimates the share of active investors because portfolio changes are not evenly distributed across PPS investors.
11. Close to 130,000 trades were made in March 2020 compared to 70,000 in March 2019. The monthly average number of trades in 2019 is close to 50,000. In 2020, the corresponding number is close to 74,000.
12. A Z-test comparing the fraction who traded in March with February is significant at the 1 percent level. We also tested for a structural break with an unknown break date using daily data on the number of portfolio changes. The Wald test rejects the null hypothesis of no structural break and detects a break on February 24, i.e. when the DJIA dropped more than 3% as the COVID-19 outbreak spread worsened substantially outside China over the weekend.
13. [Elinder \*et al.\* \(2020\)](#) show a strong positive relationship between pension capital and financial literacy among PPS investors with higher capital.

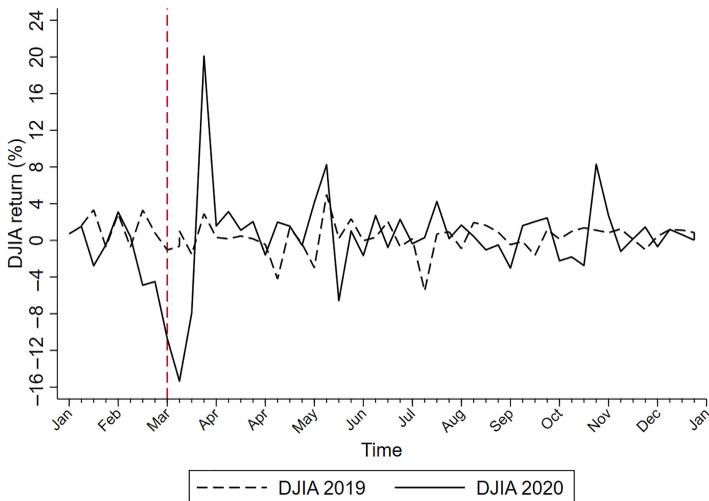
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**Note(s):** This figure shows the number of funds available to PPS investors. Around 300 funds were deregistered in 2019 as a result of more stringent rules for entry and participation of fund providers

**Figure A1.**  
Number of PPS funds



**Note(s):** This figure shows the average DJIA weekly returns for years 2019 and 2020. The vertical dashed line indicate March in each year

**Figure A2.**  
DJIA weekly returns (in %)  
for 2019 and 2020

RBF  
15,5

708

	March	April and May	Share of total assets (%)
<i>Equity funds</i>			
Global	-3	2.09	20.29
Natural resources and energy	-2.76	4.6	1.12
IT and communication	-1.88	1.67	10.13
Sweden	-0.99	0.36	21.18
Real estate	-0.82	-0.16	2.46
Small companies, Sweden	-0.63	0.24	5.29
North America (USA)	-0.62	0.02	4.41
Scandinavia	-0.35	0.05	3.35
Global and Sweden	-0.34	0.27	12.17
Pharma and biotechnology	-0.3	1.41	4.97
Russia	-0.22	0.3	1.9
Small companies, Europe	-0.1	0.04	1.41
Europe	-0.09	0.05	3.71
India	-0.08	0.1	0.48
Eastern Europe	-0.06	0.04	0.81
Other sectors	-0.06	0.01	0.15
Japan	-0.04	0	0.41
Latin America	-0.02	0.22	0.23
Other countries	-0.02	0.03	0.33
Asia	-0.01	0.04	1.74
Emerging markets	0.05	0.08	2.55
China	0.08	0.08	0.92
<i>Sum</i>	<i>-12.25</i>	<i>11.52</i>	<i>100,00</i>
<i>Interest funds</i>			
Scandinavia	-0.19	-0.32	5.86
Emerging markets	0	-0.03	1.03
Europe	0.2	-0.13	5.59
Other interest funds	0.35	-0.08	6.49
Global	0.46	-0.12	2.65
Short-term, Sweden	4.92	-4.17	30.63
Long-term, Sweden	5.59	-2.09	47.75
<i>Sum</i>	<i>11.33</i>	<i>-6.94</i>	<i>100,00</i>

**Table A1.**  
Net trade in equity funds and interest funds by fund category in 2020, billions of SEK

**Note(s):** This table shows which fund types dominated the trade in equity and interest funds. Since there was some reversed trading in April–May, we also list the net trade (in billions of SEK) in these two months (second column). The last column shows how important each fund category is (dividing total assets in a specific fund category by total assets in the respective fund category)

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