# The Pied Piper of Pensioners[*]

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## Abstract

We document how pension investments by individuals in the Chilean social security system are influenced by portfolio recommendations of Happy and Loaded (H&L), a pension advice firm. Following H&L's recommendations about which of five portfolios to invest in, investors shift amounts that often exceed 20% of portfolios value and 1.3% of Chilean *annual* GDP, in a week. We uncover what drives investment recommendations, the resulting return consequences for the Chilean stock market and social security portfolios, and the characteristics of followers and their investment outcomes. Paradoxically, investors who followed H&L's advice would have earned more by sticking with their original portfolio over time, regardless of the portfolio selected. These findings provide a cautionary tale for the design of privatized social security systems.

# 1  Introduction

On March 6, 2012, the Chilean government took the unprecedented step of ordering *Felices y Forrados* (Happy and Loaded, henceforth H&L) to cease providing pensioners guidance on portfolio choice for their retirement savings. The government's action stemmed from concerns that massive swings in investment flows induced by investors following H&L's advice were destabilizing the Chilean economy. The order was revoked on April 24, 2012. Still, the government's worries did not cease, as indicated by an April 26, 2013 report from the Financial Stability Board [13] stating "...movements between different pension funds have increased markedly...movements of this quantity, in such a short term, affect the system as a whole by affecting the prices of some financial assets, creating stress on market infrastructures..."

The Chilean social security system is a fully funded, defined contribution, multi-fund, personal account system. On December 31, 2014, total savings were \$165 billion USD, or roughly 60% of the Chilean GDP in 2014. Average pension savings were \$38,600 USD, or about 54% of total net wealth (Behrman et al. [4]). Formal workers must save 10% of monthly earnings. Workers choose a Pension Fund Administrator (AFP) to manage their investments.

AFPs only offer five types of funds ordered from A to E by their riskiness. Fund A is the riskiest—it is largely invested in foreign mutual funds, ETFs and domestic stocks. Fund E is the safest—it is invested mainly in government and Central Bank bonds, and bank deposits. The behavioral logic underlying the limited choice set reflects that many pension investors are unsophisticated. To let investors align investments with risk attitudes while protecting them from unscrupulous managers or from investments that could endanger retirement savings, the state sharply restricts choices.[1] Our paper highlights the adverse general equilibrium market consequences of such limited choice sets that can arise when many investors simultaneously receive correlated information in the form of common investment advice.

Our analysis matters: Chile's social security design is widely-emulated, adopted in some form by over 20 countries (Berstein et al. [6]).[2] Aspects of the Chilean design are central to Blackstone's proposed privatized social security plan for the United States (Ghilarducci and Hamilton [16]). This makes it important to understand the design's impacts on Chile, and for

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[1]A similar behavioral logic, supported by extensive research, underlies proposals to nudge individuals toward saving more by forcing them to actively opt out of retirement savings.

[2]Sweden, Denmark, Peru, Colombia, Argentina, Uruguay, Bolivia, Mexico, El Salvador, Costa Rica, Dominican Republic, Nicaragua, Ecuador, Bulgaria, Croatia, Estonia, Hungary, Latvia, Poland, Russia, Slovakia, Nigeria), Kazakhstan and Singapore.

how they might vary across countries, to gain insights into how the design could be improved.

Our paper shows how the design of Chile's social security system led to massive, coordinated portfolio reallocations following the recommendations of a single financial advisor, H&L. These transfers often exceeded one percent of Chile's annual GDP, sometimes exceeding the *total monthly trading volume* in domestic stocks. We uncover what drives H&L's recommendations, and show how they altered investment strategies of pensioners. We derive the impacts on asset prices in domestic financial markets, including portfolio and stock market returns. Administrative data and a survey analysis reveal that followers of H&L are far wealthier than the typical pension investor, with over twice the savings. Followers are also more educated, *very* financially sophisticated, and informed about how their pension returns compare to alternative buy-and-hold strategies. Nonetheless, *most* investors who flocked to follow H&L's advice would have done better to stick with their original portfolio over time, *no matter which portfolio they held.* Most of this underperformance emerges because not only have pension investors come to believe that H&L's recommendations have value, but so has the market. As a result, stock prices adjust to reflect H&L's recommendations before followers can transfer their funds, so that followers end up buying high and selling low. These findings provide a cautionary tale for the design of privatized social security systems.

H&L, founded in July 2011, charges a small annual fee of about $24 USD for advice.[3] Advice takes the form of emails, issued after the close of a trading day, typically instructing clients to switch 50% or 100% of savings from portfolio A to portfolio E, or vice versa. Between July 2011 and September 2016, H&L issued instructions to switch savings from one portfolio to another on 35 occasions. Using daily flow data from October 2011 to September 2016, we first document that investors come to *believe* that H&L's advice is sound. H&L started with 54 paid followers, and did not have new customers until after its 4th recommendation.[4] Remarkably, beginning with the sixth recommendation, accompanied by surges in Google trends and Google searches for H&L, each new recommendation led to net shifts of more than 25,000 investors (a mix of paid subscribers and second-hand followers) to the newly endorsed portfolio, and away from the portfolio that had been endorsed. Strikingly,

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[3]H&L's founder claims to have a statistical model that can forecast the performance of social security portfolios.

[4]We have H&L's administrative data through September 30, 2016. The data include payment histories of clients plus basic demographics like gender and age. H&L has two types of clients: premium and basic. Premium followers pay an annual fee of $24USD, while basic followers have a free three month trial period, in which they receive announcements with a three day lag. There were 66,000 premium followers in August 2016.

the five recommendations issued between April 2013 and January 2014 on a date $t-1$,[5] on average, led over 100,000 (net) investors to switch to the recommended portfolio over the first six trading days that requests could be executed. The average funds shifted following these recommendations exceeded 20% of portfolio E's value at the time of the recommendation, equivalent to *more than 1.3% of the Chilean GDP in 2013.* H&L-recommended changes directly precede *every* large shift in pension investments.

Having established the remarkable impact of H&L's advice on pension investments, we investigate what drives H&L's advice, whether investors benefit, and whether and how H&L's advice affects portfolio returns, and domestic stock markets.

1. We find that H&L's advice primarily reflects the immediate past performance of the Chilean stock market: very high past returns on the Chilean market directly precede recommendations to transfer funds into risky portfolio A and out of safe portfolio E; while very bad returns are associated with the opposite recommendation pattern.

2. We find positive announcement effects on the day following a recommendation of portfolio A (negative announcement effects after a recommendation of portfolio E) for portfolios A through D and Chilean stock market indexes, followed by positive cumulative excess returns on days $t+3$ to $t+7$ where portfolio transfers are high.

These results suggest a conjecture that the induced transfers of funds in and out of portfolios must have had short-run price impacts on domestic equity prices. This conjecture is *false.* These transfers had *no impact* on stock market volume. Domestic stock market volume is *not* unusually high on days where portfolio transfers are high: AFPs seem to accommodate mass transfers by adjusting positions in liquid foreign markets, and not illiquid domestic markets. Moreover, the excess returns on days $t+3$ to $t+7$ reflect high market returns following the very first handful of recommendations that almost no one followed—it looks as if H&L got lucky initially, and this good luck drew followers; and the market also responded, with a large announcement day return that reflected the recommendation.

We then ask: do investors benefit from following H&L's advice? To do this, we compare the performance of H&L's strategy with that of holding the other portfolios, starting at *any* of the first twenty announcements through September 30, 2016. Without adjusting for risk,

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[5]The timing convention is that date $t-1$ is the date on which the recommendation is made (after the close of trading), so that the recommendation is known at the open of trading day $t$.

an investor would have done better following H&L from the first announcement than investing in any of the other five portfolios. However, only 54 investors did this; and at any other starting point H&L is not the option with the highest return. Indeed, at almost all other starting points, investors would have done better to stick with whichever portfolio they held, *no matter what it was.* To reinforce this negative finding, we use H&L's payment records to compute returns for each follower starting with the first announcement he could follow until the last announcement for which his account was active, i.e., until his subscription expired, and compare the follower's return over that period with that from a buy-and-hold strategy for each portfolio. We find that most followers are hurt by following H&L's advice: fewer than 10% of followers beat portfolio E and fewer than 30% beat their riskiest option.

These results beg the question: why do so many investors come to believe that H&L's recommendations have value? We establish a sense in which H&L's recommendations look very good. Someone who started following H&L beginning at *any* of the first 14 recommendations and who hypothetically could transfer funds at the *exact* moment a recommendation was made—rather than one day later—would have earned returns that exceed those from buying and holding *any* other portfolio. Paradoxically, what harms followers is not that they believe H&L's recommendations have value, but rather that the *entire market* believes: the Chilean stock market experiences a large positive announcement effect following a recommendation to switch to risky portfolio A, and a large negative announcement effect after a recommendation to switch away from portfolio A. Followers cannot switch portfolios in time to benefit—they end up buying high and selling low, reducing their cumulative portfolio returns by 20-25%.

These findings lead us to investigate further *why* individuals follow H&L, despite the under-performance of their investments. To identify whether followers are less financially sophisticated or less informed, we surveyed a *large* sample of over 8,700 current followers of H&L. We contrast our survey results with findings regarding the population characteristics of pension investors derived from the broad Social Protection Survey (EPS).

Surprising results obtain. H&L followers are *far* more sophisticated than the average investor. They are more educated, with higher incomes and over twice the savings of the average investor. They are also far more likely to have voluntary savings, highlighting their patience and understanding of the tax benefits. Answers to questions related to risk diversification and compound interest underscore that H&L followers are *extremely* financially sophisticated. One striking illustration is that 64% of followers correctly calculate a com-

pound interest problem vs. only 3-5% of non-followers! One might then posit that followers are uninformed about portfolio returns or that they over-estimate returns from following H&L vis à vis buy-and-hold strategies. This conjecture is also false. Followers are well informed about portfolio returns. Among followers providing full rankings, 57% correctly rank the 12 month returns on portfolios A, C and E, and just over half correctly rank portfolio $E$'s return above H&L's. Paradoxically, the key reasons that investors give for why they follow H&L are: higher returns, minimize losses, and they trust H&L more than their AFP.

Our findings have implications for the design of social security systems in which individuals have some choice over investments that may serve as a primary source of retirement funds. These lessons are especially relevant for countries using variants of the Chilean design. One goal of such systems is to align investments better with individual risk attitudes. A second goal is to minimize risks of inadequate retirement savings due to bad investment choices. The Chilean design addresses this by sharply limiting portfolio choices. We show that despite these constraints—or perhaps because of them—investors may be harmed due to responses by the market. Further, with few alternatives, information arrival, here taking the form of recommendations by H&L, can lead to massive coordinated reallocations of funds. In Chile, liquidity provision is not overwhelmed due to the limited portfolio exposure to the domestic market—AFPs accommodate large portfolio transfers by adjusting holdings of liquid foreign assets. However, greater exposure to domestic markets—as might occur in the United States or England—could magnify the impacts of transfers induced by such information arrival.

Ghilarducci and Hamilton [16] lay out a personal savings plan to confront what they term "the US retirement savings crisis." This Blackstone plan contains many features of the Chilean system: savings are mandatory, private accounts are managed by professionals, and it is built on personal choice. The authors do not detail the set of portfolio alternatives or specify how individuals can shift investments. Our paper highlights mechanisms and considerations that should enter the design of these details.

We next discuss related literature and provide details about the Chilean social security system. We then present our empirical analysis and survey findings. A conclusion follows.

## 1.1   Related Literature

Our paper contributes to the literature studying how the design of a social security system affects the economy. Edwards [12] argues that the massive amount of assets held by AFPs

helped Chile by contributing to a more dynamic and modern capital market, allowing private firms to rely on long-term financing. Joubert [22] builds a dynamic model analyzing how the Chilean pension system affects a household's labor supply, formal/informal sector choice, and saving decisions. Arenas de Mesa et al. [1] analyze savings, participation patterns and the financial literacy of investors in the Chilean social security system. They find that very few investors know basic key details such as the payroll tax or commission rates.

Our analysis also pertains to a literature on the informativeness of analyst recommendations. Just as investors come to believe H&L's recommendations, as reflected by the announcement returns, researchers find that recommendation upgrades by financial analysts are associated with positive announcement returns (Stickel [26], Womack [29], Barber et al. [3], Ivković and Jegadeesh [19], Loh and Stulz [23]). More generally, analyst recommendation changes contain relevant information, and investment strategies based on portfolio constructions that use recommendation information have positive value (Barber et al. [2], Jegadeesh et al. [21], Jegadeesh and Kim [20], Boni and Womack [7]). Dahlquist et al. [11] find that active investors in Sweden's Premium Pension System tend to follow recommendations of financial advisors, and that, gross of advisor fees, active investors seem to outperform passive ones. Jegadeesh et al. [21] show that analysts often recommend stocks with positive momentum; we show that H&L adopts an even shorter-horizon momentum strategy.[6]

Our analysis also relates to a literature showing that better-performing mutual funds draw greater cash inflows (Chevalier and Ellison [9], Sirri and Tufano [25], Zheng [30], Bernhardt and Davies [5]). Of note, the advent of H&L changed how individuals made pension investments. Prior to H&L, shifts in investments reflected long-term portfolio performances: much as the literature finds, investments flowed to portfolios that had higher returns over the previous three months. Once H&L began to have influence, only its recommendations (which we show are based on the *immediate* past market performance) affected portfolio flows.

Carlin and Davies [8] theoretically analyze the implementation of state sponsored retirement plans, showing how the optimal menu of options and default option depends on the financial sophistication of participants and their behavioral biases. They assume that only unsophisticated investors make bad active trading decisions, making it optimal to limit access to risky portfolios. Here we provide evidence that agents adopting active strategies tend to do worse; but that these investors are far more sophisticated than the average investor.

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[6]Inderst and Ottaviani [17] and Gennaioli et al. [15] analyze strategic financial advisor behavior.

## 1.2 Chilean Social Security System

The Chilean Social Security System has three key pillars: a welfare pillar, a mandatory contribution pillar and a voluntary savings pillar. For a full description see Superintendence of Pensions [27]. The mandatory contribution pillar is a defined contribution, multi-fund, personal account system. Each worker accumulates savings in a personal account until retirement. Formal workers must save at least 10% of monthly wages up to a cap. Participation by self-employed workers was voluntary prior to 2015.

The accounts are privately managed by AFPs. There are currently six AFPs. AFPs are highly regulated and face investment constraints. Individuals choose among five portfolios, portfolios A to E, which differ in their exposure to stocks and other variable yield instruments. The portfolios are ordered by riskiness: Portfolio A is the riskiest, while portfolio E is the safest. Table 1 presents the distribution of assets in each portfolio on the last day of 2014. Of note, less than 20% of the risk exposure in portfolios A and B is to domestic securities; most risk exposure is to foreign assets such as ETFs or mutual funds. Further (unreported) investigation reveals that the *composition* of domestic stock holdings is *very* similar across portfolios; the portfolios largely differ only in the *scale factor* weighting domestic stock holdings. This composition can vary within a month: AFPs alter holdings in response to market conditions. In particular, we provide evidence that following large portfolio shifts, AFPs do not alter investments in domestic equities. Instead, they adjust their holdings of liquid (foreign) assets. In practice, the returns of portfolios A through E are similar across AFPs; see Table 2.[7]

Individuals make two important choices—the choice of administrator and the allocations of savings across portfolios. Men under the age of 55 and women under 50 face no constraints on portfolio choices; and no restrictions apply to voluntary savings. Older workers cannot select portfolio A, and pensioners cannot select portfolio B (for mandated savings). A worker who does not choose a fund is assigned a default option that places weights on portfolios B, C and D that depend on the worker's age. Workers are otherwise free to shift savings from one portfolio or AFP to another, and there are no fees associated with such transfers. Transfers among portfolios within an AFP are made four working days after a request, unless the total transfer request from a portfolio exceeds 5% of its value, in which case the excess is delayed

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[7] AFPs differ more in terms of the fees that they charge. H&L's recommendation that its followers select one of two specific AFPs—one due to higher returns, and the other due to lower fees—has not varied over time. However, H&L's motto is "if you are happy with your AFP, stick with it."

Table 1: Total assets of each portfolio (millions $US) and asset distribution (in %) on 12/31/2014.

|  | A | B | C | D | E |
|---|---|---|---|---|---|
| Total assets | 26,348 | 27,169 | 61,277 | 26,385 | 24,253 |
| Asset distribution | | | | | |
| Domestic stocks | 11.8 | 12.8 | 10.0 | 3.8 | 0.7 |
| Domestic mutual and investment funds | 2.5 | 2.6 | 2.4 | 0.9 | 0.1 |
| Foreign ETFs | 16.6 | 12.2 | 9.4 | 6.5 | 3.7 |
| Foreign mutual and investment funds | 61.9 | 45.3 | 32.6 | 21.5 | 1.9 |
| Other foreign assets | 1.2 | 1.0 | 1.0 | 1.5 | 1.7 |
| Central bank bonds | 0.4 | 3.7 | 5.9 | 9.4 | 15.0 |
| Government bonds | 0.7 | 7.6 | 14.4 | 22.7 | 28.3 |
| Bank bonds | 1.6 | 4.6 | 8.5 | 11.6 | 11.7 |
| Domestic firm bonds | 1.8 | 4.5 | 8.6 | 9.4 | 10.2 |
| Deposits | 0.3 | 3.5 | 3.3 | 8.9 | 22.9 |
| Others | 1.2 | 2.4 | 3.8 | 3.9 | 3.8 |

Table 2: Real annual returns across AFPs: 27 Sept 2002-Aug 2015

| Portfolio | CAPITAL | CUPRUM | HABITAT | PLANVITAL | PROVIDA* |
|---|---|---|---|---|---|
| A | 6.78% | 6.83% | 6.88% | 6.43% | 6.78% |
| B | 5.75% | 5.90% | 5.85% | 5.67% | 5.50% |
| C | 5.13% | 5.68% | 5.65% | 5.29% | 5.08% |
| D | 4.86% | 5.18% | 5.19% | 4.58% | 4.67% |
| E | 4.23% | 4.20% | 4.33% | 3.47% | 3.78% |

*MODELO, the 6th AFP, entered 2010, and had similar returns over that subperiod.

to the next working day, on a prorated basis. Transfers between AFPs are delayed until the first working day of the following month if made during the first fifteen days of a month; otherwise they are delayed until the fifteenth day of the following month. Using the convention that date $t$ is the first trading day after a recommendation to switch savings from one portfolio to another, AFPs first transfer savings based on a recommendation on trading day $t+3$. Importantly, when a transfer is made on $t+3$ due to an investor acting on a recommendation made after close on day $t-1$, an AFP uses asset prices on day $t$ (e.g., weighted average for domestic stocks and closing prices for foreign stocks) to value the funds being transferred.

# 2  H&L's Impact

## 2.1  Portfolio Transfers

H&L makes recommendations after the close of a trading day. Figure 1 presents overwhelming evidence that social security investors come to believe in H&L recommendations: their new recommendations explain the bulk of transfers between portfolios.[8]  Beginning with H&L's fifth recommendation, advice to switch from A to E causes funds to flow from portfolio A to E, and advice to switch from E to A leads to flows from E to A. Not only is *every* large shift in pension investments directly preceded by a recommendation from H&L to redirect investments in that way, but so is *every moderate* shift, save one.

H&L's administrative records provide us the number of official (paid) followers. To estimate the number of second-hand followers, we use recommendations to move all money in or out of portfolio $E$ that all investors can follow (there are age restrictions on who can hold portfolios A and B). A conservative estimate of the number of second-hand followers is given by the *net* number of accounts shifted on days $t+3$ through $t+8$ in the direction suggested by a recommendation minus the number of official followers. The measure is conservative because some paying followers may not follow a recommendation.[9]  Table 3 shows that by the 11th recommendation, H&L had more than 100,000 followers. The table also reveals that followers have more than double the average savings of typical pension investors.

Investors who followed H&L's first few recommendations earned higher returns than those who did not change portfolio allocations. Figure 2 shows that H&L then experienced a massive upsurge in media coverage and investor attention followed by massive numbers of investors starting to follow H&L's advice. We document this surge using data from Google trends, searching for the phrase "Felices y Forrados." Figure 2 shows the Google trend index, taking on the value of 100 in the month where the most users "Googled" H&L, and a "Google search" series, constructed using a monthly search on Google of the same phrase. We only count results from media sites, news sites, and opinion blogs. Both series show similar trends. H&L was almost unknown before 2012. Media coverage and interest from Internet users increase and then explode, peaking in July 2013; after this point, interest in H&L remains steady. The numbers of new clients closely track these Google indexes.

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[8]Daily data on portfolio flows around the initial recommendation on July 27, 2011 do not exist.

[9]Mean savings of followers are even more conservatively estimated as they may only shift some savings.

Figure 1: H&L recommendations and daily net flows to portfolios $A$ and $E$ (billions of CLP).
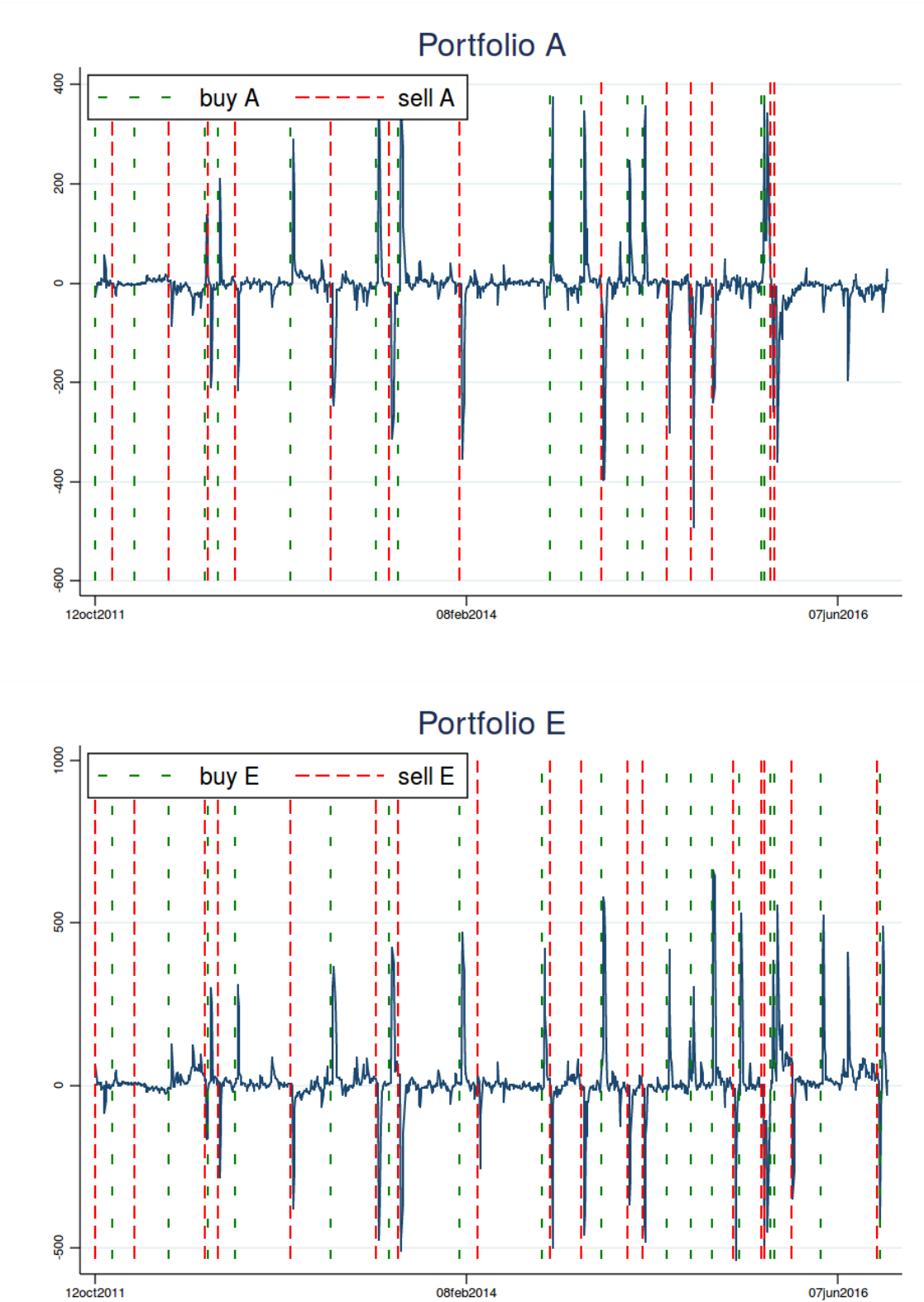
Table 3: Number of followers, estimated number of second hand followers and their average savings switched (CLP), and total number of members of the system and their average savings in the month of the announcement.

| Recommendation | | Followers | | | System | |
|---|---|---|---|---|---|---|
| Number | Type | Official | Second hand | Mean savings switched | Members | Mean savings |
| 5 | buy E | 1,113 | 8,201 | 16,124,583 | 9,169,709 | 7,061,000 |
| 6 | sell E | 3,168 | 19,430 | 19,020,284 | 9,169,709 | 7,061,000 |
| 7 | buy E | 3,587 | 30,688 | 17,687,873 | 9,220,325 | 7,165,000 |
| 8 | sell E | 4,456 | 21,627 | 17,643,342 | 9,220,325 | 7,165,000 |
| 9 | buy E | 7,486 | 46,309 | 17,106,715 | 9,220,325 | 7,165,000 |
| 10 | sell E | 17,130 | 45,696 | 18,414,688 | 9,373,955 | 7,521,000 |
| 11 | buy E | 18,010 | 86,994 | 17,434,146 | 9,461,060 | 7,453,000 |
| 12 | sell E | 27,132 | 76,054 | 17,426,833 | 9,509,439 | 7,637,000 |
| 13 | buy E | 42,304 | 79,830 | 16,582,820 | 9,509,439 | 7,637,000 |
| 14 | sell E | 44,935 | 45,818 | 16,565,331 | 9,509,439 | 7,637,000 |
| 15 | buy E | 45,736 | 66,489 | 17,093,872 | 9,634,711 | 8,149,000 |
| 20 | buy E | 51,431 | 55,226 | 19,634,988 | 9,746,467 | 9,079,000 |

Figure 2: Investors interest, media coverage, and new subscriptions.
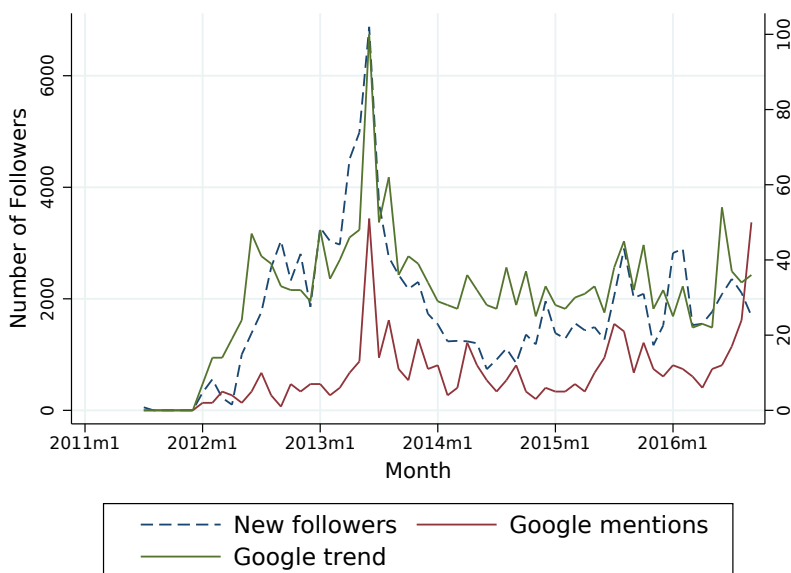


Table 4 shows daily net flows to portfolios after recommendations. For the last six recommendations to shift all funds from portfolio $A$ to $E$ or vice versa,[10] the net inflows/outflows for each of these portfolios exceed 1,000 billion CLP. These flows represent as much as 25% of the total value of portfolio E as of day $t+2$.

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[10] All other recommendations were to shift 50% of funds from one of portfolios $A$, $C$ and $E$ to another.

Table 4: Net flows to portfolios (in billions of CLP) around new recommendation days. Day $t$ represents the first trading day after a recommendation is made. Net flow to portfolio $X$ on day $t+s$ is defined as the inflow minus the outflow to portfolio $X$ on day $t+s$.

| | | | | | | | | | | Portfolio A |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | From | To | $t+3$ | $t+4$ | $t+5$ | $t+6$ | $t+7$ | $t+8$ | sum | $\frac{\text{sum}}{\text{value on } t+2}$ |
| 13-Oct-2011 | E | A | 0 | -3 | 1 | -1 | -2 | 1 | -4 | 0.00 |
| 23-Nov-2011 | A | E | -8 | -21 | -26 | -16 | -3 | -3 | -76 | -0.01 |
| 12-Jan-2012 | E | A | -1 | 0 | -3 | -3 | -1 | -2 | -12 | 0.00 |
| 30-Mar-2012 | A | E | -18 | -87 | -9 | 1 | -1 | 3 | -110 | -0.01 |
| 20-Jun-2012 | E | A | 137 | 130 | 99 | 20 | 2 | -4 | 385 | 0.03 |
| 29-Jun-2012 | A | E | -209 | -177 | -10 | -6 | -2 | -7 | -412 | -0.03 |
| 20-Jul-2012 | E | A | 211 | 109 | 61 | 4 | -3 | 3 | 384 | 0.03 |
| 30-Aug-2012 | A | E | -217 | -193 | -153 | -22 | -12 | -8 | -605 | -0.05 |
| 3-Jan-2013 | E | A | 289 | 273 | 191 | 50 | 26 | 21 | 850 | 0.06 |
| 4-Apr-2013 | A | E | -223 | -245 | -244 | -208 | -160 | -142 | -1223 | -0.08 |
| 18-Jul-2013 | E | A | 378 | 357 | 281 | 249 | 95 | 22 | 1382 | 0.11 |
| 19-Aug-2013 | A | E | -304 | -313 | -269 | -248 | -207 | -63 | -1404 | -0.10 |
| 9-Sep-2013 | E | A | 405 | 356 | 272 | 116 | 10 | 2 | 1162 | 0.09 |
| 27-Jan-2014 | A | E | -353 | -348 | -273 | -242 | -134 | -22 | -1372 | -0.09 |
| 7-Mar-2014 | E | E+C | -13 | -29 | -16 | -6 | -9 | -17 | -89 | -0.01 |
| 4-Aug-2014 | E+C | E | -52 | -30 | -27 | -24 | -7 | -9 | -148 | -0.01 |
| 20-Aug-2014 | E | E+A | 375 | 133 | 48 | 16 | 18 | 13 | 603 | 0.04 |
| 3-Nov-2014 | E+A | A | 345 | 291 | 61 | 37 | 108 | 39 | 881 | 0.05 |
| 16-Dec-2014 | A | E | -397 | -394 | -305 | -232 | -67 | -6 | -1400 | -0.08 |
| 13-Feb-2015 | E | E+A | 247 | 206 | 94 | 31 | 24 | 11 | 613 | 0.04 |
| 19-Mar-2015 | E+A | A | 311 | 355 | 117 | 85 | 14 | 6 | 888 | 0.05 |
| 14-May-2015 | A | E+A | -301 | -170 | -61 | -50 | -4 | 2 | -584 | -0.03 |
| 9-Jul-2015 | E+A | C+E | -492 | -292 | -108 | -46 | 4 | -2 | -936 | -0.05 |
| 25-Aug-2015 | C+E | E | -239 | -210 | -180 | -45 | 7 | -14 | -681 | -0.04 |
| 14-Oct-2015 | E | E+C | 8 | -22 | -9 | 16 | 1 | -3 | -9 | 0.00 |
| 27-Oct-2015 | E+C | E | -29 | -30 | -15 | -12 | -4 | -2 | -93 | -0.01 |
| 17-Dec-2015 | E | E+A | 293 | 363 | 87 | 87 | 201 | 342 | 1372 | 0.08 |
| 23-Dec-2015 | E+A | A | 201 | 342 | 140 | 31 | 14 | 5 | 733 | 0.04 |
| 7-Jan-2016 | A | E+A | -259 | -235 | -52 | -44 | -9 | -7 | -605 | -0.03 |
| 18-Jan-2016 | E+A | E | -282 | -360 | -100 | -115 | -109 | -60 | -1026 | -0.06 |
| 23-Feb-2016 | E | E+C | -14 | -24 | -19 | -20 | -11 | -19 | -107 | -0.01 |
| 2-May-2016 | E+C | E | -34 | -58 | -29 | -23 | -9 | -6 | -158 | -0.01 |
| 7-Sep-2016 | E | E+C | -5 | -11 | -12 | -14 | -3 | -57 | -101 | -0.01 |
| 14-Sep-2016 | E+C | E | -57 | -32 | -11 | -19 | -8 | -7 | -135 | -0.01 |

| | | | | | | | | | | Portfolio E |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | From | To | $t+3$ | $t+4$ | $t+5$ | $t+6$ | $t+7$ | $t+8$ | sum | $\frac{\text{sum}}{\text{value on } t+2}$ |
| 13-Oct-2011 | E | A | 3 | 8 | 5 | 7 | 10 | 2 | 35 | 0.01 |
| 23-Nov-2011 | A | E | 18 | 36 | 45 | 30 | 9 | 8 | 146 | 0.03 |
| 12-Jan-2012 | E | A | 7 | 3 | 8 | 9 | 7 | 7 | 41 | 0.01 |
| 30-Mar-2012 | A | E | 22 | 128 | 10 | -3 | -1 | -5 | 150 | 0.03 |
| 20-Jun-2012 | E | A | -166 | -161 | -106 | -17 | 5 | 14 | -430 | -0.06 |
| 29-Jun-2012 | A | E | 299 | 253 | 19 | 13 | 9 | 13 | 606 | 0.09 |
| 20-Jul-2012 | E | A | -281 | -133 | -64 | 3 | 10 | 5 | -460 | -0.06 |
| 30-Aug-2012 | A | E | 310 | 285 | 240 | 40 | 27 | 18 | 920 | 0.13 |
| 3-Jan-2013 | E | A | -379 | -366 | -270 | -71 | -38 | -32 | -1157 | -0.13 |
| 4-Apr-2013 | A | E | 303 | 353 | 364 | 313 | 250 | 248 | 1831 | 0.25 |
| 18-Jul-2013 | E | A | -474 | -475 | -360 | -335 | -127 | -27 | -1799 | -0.17 |
| 19-Aug-2013 | A | E | 402 | 424 | 376 | 365 | 330 | 128 | 2025 | 0.23 |
| 9-Sep-2013 | E | A | -508 | -474 | -367 | -147 | -8 | 0 | -1504 | -0.13 |
| 27-Jan-2014 | A | E | 469 | 466 | 385 | 352 | 209 | 38 | 1918 | 0.19 |
| 7-Mar-2014 | E | E+C | -253 | -252 | -90 | -7 | 3 | 21 | -579 | -0.05 |
| 4-Aug-2014 | E+C | E | 422 | 221 | 107 | 70 | 33 | 19 | 871 | 0.07 |
| 20-Aug-2014 | E | E+A | -500 | -181 | -57 | -20 | -30 | -19 | -807 | -0.06 |
| 3-Nov-2014 | E+A | A | -458 | -395 | -80 | -51 | -155 | -53 | -1191 | -0.09 |
| 16-Dec-2014 | A | E | 578 | 561 | 452 | 383 | 111 | 9 | 2094 | 0.17 |
| 13-Feb-2015 | E | E+A | -366 | -295 | -152 | -52 | -34 | -20 | -919 | -0.06 |
| 19-Mar-2015 | E+A | A | -429 | -479 | -154 | -119 | -19 | -8 | -1208 | -0.09 |
| 14-May-2015 | A | E+A | 419 | 234 | 86 | 66 | 5 | 0 | 809 | 0.07 |
| 9-Jul-2015 | E+A | C+E | 304 | 212 | 83 | 10 | -14 | -1 | 594 | 0.05 |
| 25-Aug-2015 | C+E | E | 661 | 642 | 510 | 168 | 1 | 42 | 2025 | 0.14 |
| 14-Oct-2015 | E | E+C | -535 | -278 | -88 | -90 | -22 | -4 | -1016 | -0.06 |
| 27-Oct-2015 | E+C | E | 529 | 359 | 103 | 60 | 12 | 3 | 1065 | 0.07 |
| 17-Dec-2015 | E | E+A | -422 | -496 | -108 | -108 | -272 | -450 | -1857 | -0.11 |
| 23-Dec-2015 | E+A | A | -272 | -450 | -185 | -38 | -17 | -8 | -970 | -0.06 |
| 7-Jan-2016 | A | E+A | 384 | 342 | 75 | 70 | 22 | 15 | 907 | 0.06 |
| 18-Jan-2016 | E+A | E | 436 | 553 | 157 | 194 | 186 | 110 | 1635 | 0.11 |
| 23-Feb-2016 | E | E+C | -348 | -264 | -50 | -16 | 19 | 14 | -644 | -0.03 |
| 2-May-2016 | E+C | E | 404 | 523 | 114 | 91 | 23 | 17 | 1173 | 0.06 |
| 7-Sep-2016 | E | E+C | -392 | -408 | -95 | -61 | -2 | 489 | -470 | -0.02 |
| 14-Sep-2016 | E+C | E | 489 | 368 | 105 | 100 | 42 | 23 | 1127 | 0.05 |

Table 5 provides other metrics for the amounts of funds transferred. For each recommendation, we compare the cumulative net transfers to portfolio E on days $t + 3$ to $t + 8$ with measures of the "size" of the Chilean economy. These net portfolio reallocations can exceed 5% of GDP for the associated quarter, sometimes exceeding the total value of *all* trade of domestic stocks on the Santiago Stock Exchange in the month of a recommendation.

These flows reveal that pension investors *believe* that H&L's recommendations contain material information about the future performances of portfolios. The data show heavy flows of savings into the recommended portfolio following a recommendation on date $t$ on days $t + 3$ to $t + 8$, but *not* at earlier dates.[11] Underscoring the high fraction of active investors influenced by H&L's advice, the Superintendence of Pensions (2013) using data through May 2013, found that 60% of pension investors used the default investment strategy.

We next estimate flow regressions of the form:

$$y_\tau = \alpha + \sum_{s=-3}^{10} \beta_s \delta_{E\tau}(s) + \epsilon_\tau,$$

where $y_\tau$ are daily flows on date $\tau$ (in percentage terms) as a function of indicator functions:

$$\delta_{E\tau}(s) = \begin{cases} \rho & \text{if } \tau - s \text{ is the first trading day after a recommendation to sell fraction } \rho \text{ of portfolio E,} \\ -\rho & \text{if } \tau - s \text{ is the first trading day after a recommendation to buy fraction } \rho \text{ of portfolio E,} \\ 0 & \text{otherwise.} \end{cases}$$

Thus, $\delta_{E\tau}(0) = 1$ if on the previous day $\tau - 1$, H&L recommended shifting all holdings from portfolio E to portfolio A.

Table 6 presents the results. The coefficients on the indicator functions are very large and highly statistically significant on dates $t+3$ to $t+9$. The astonishing fit (adjusted $R^2$ of 0.64 for portfolio E) reveals that H&L's advice is *the* primary driver of fluctuations in transfers of funds between portfolios.[12] The findings indicate that (a) investors respond quickly and massively to recommendations; (b) there is no leakage of information about a recommenda-

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[11] The patterns in Figure 1 and Table 4 also show up in net numbers of accounts shifted. Portfolios B and C follow similar patterns to those documented in Figure 1 and Table 4 for portfolio A, but they are of smaller magnitudes. This reflects that some investors are over the age limit for investing in portfolio A, making portfolios B or C their closest feasible alternative.

[12] Empirical identification of the causal impact of H&L's recommendations is clean: (a) Figures 1 and 2 show that reallocations and recommendations coincide only after investors started showing interest in H&L as measured by the Google indicators; (b) the fact that only tiny numbers of investors switched portfolios in the direction of H&L's first few recommendations reveals that a common force does not drive both recommendations and reallocations. Indeed, H&L only had 54 paid followers for its first four recommendations.

Table 5: Net flow to portfolio E ($t+3$ to $t+8$) as percentage of: the value of portfolio E in $t+2$, the domestic GDP in the quarter of the recommendation, and the total value of transactions in domestic stocks in the Santiago stock exchange in the month of the announcement.

| Recom. # | Direction of Recom. | % Value at $t+2$ of Portfolio E | % of Quarterly GDP shifted | % monthly total dollar trading volume in domestic stocks |
|---|---|---|---|---|
| 5 | A to E | 2.894 | 0.48 | 7.52 |
| 6 | E to A | -6.020 | -1.36 | -15.13 |
| 7 | A to E | 8.950 | 1.91 | 21.35 |
| 8 | E to A | -6.133 | -1.47 | -22.75 |
| 9 | A to E | 12.578 | 2.93 | 57.34 |
| 10 | E to A | -12.789 | -3.48 | -46.11 |
| 11 | A to E | 25.438 | 5.48 | 99.24 |
| 12 | E to A | -17.081 | -5.33 | -105.40 |
| 13 | A to E | 22.760 | 6.00 | 137.09 |
| 14 | E to A | -13.257 | -4.45 | -83.67 |
| 15 | A to E | 18.671 | 5.35 | 83.14 |
| 16 | E to E+C | -4.647 | -1.62 | -40.21 |
| 17 | E+C to E | 6.942 | 2.41 | 43.93 |
| 18 | E to E+A | -5.856 | -2.23 | -40.68 |
| 19 | E+A to A | -8.882 | -3.01 | -38.71 |
| 20 | A to E | 16.784 | 5.29 | 169.24 |
| 21 | E to E+A | -6.290 | -2.38 | -75.35 |
| 22 | E+A to A | -8.849 | -3.12 | -78.12 |
| 23 | A to E+A | 6.734 | 2.10 | 56.24 |
| 24 | E+A to E+C | 4.568 | 1.54 | 61.22 |
| 25 | C+E to E | 14.438 | 5.24 | 198.62 |
| 26 | E to E+C | -6.231 | -2.44 | -99.69 |
| 27 | E+C to E | 6.971 | 2.56 | 104.55 |
| 28 | E to E+A | -11.424 | -4.46 | -205.00 |
| 29 | E+A to A | -6.413 | -2.33 | -107.08 |
| 30 | A to E+A | 6.455 | 2.20 | 71.39 |
| 31 | E+A to E | 10.875 | 3.97 | 128.68 |
| 32 | E to E+C | -3.463 | -1.56 | -75.26 |
| 33 | E+C to E | 6.298 | 2.88 | 92.27 |
| 34 | E to E+C | -1.955 | -1.15 | -37.72 |
| 35 | E+C to E | 4.859 | 2.76 | 90.41 |

tion prior to its announcement—investors do not systematically shift in or out of a portfolio before a new recommendation; and (c) investors respond to a recommendation within a week.

To see whether investor responses differ according to the direction of a recommendation (i.e., to or from A) we estimate the following regression:

$$y_\tau = \alpha + \sum_{s=2}^{10} \beta_s \delta_{E\tau}(s) + \sum_{s=2}^{10} \phi_s \delta_{A\tau}(s) + \epsilon_\tau,$$

Table 6: Recommendations and portfolio transfers. OLS regression of $y_\tau = \alpha + \sum_{s=-3}^{10} \beta_s \delta_{E\tau}(s) + \epsilon_\tau$ and $y_\tau = \alpha + \sum_{s=2}^{10} \beta_s \delta_{E\tau}(s) + \sum_{s=2}^{10} \phi_s \delta_{A\tau}(s) + \epsilon_\tau$ using daily data for the period 12Oct2011–30Sep2016, where $y_\tau$ is the percentage net flow to portfolio $X$ on day $\tau$: $y_\tau$ is the value of the inflow minus the value of the outflow to portfolio X on $\tau$ divided by the value of the portfolio on day $\tau - 1$.

|  | A | B | C | D | E | A | B | C | D | E |
|---|---|---|---|---|---|---|---|---|---|---|
| $\delta_E(-3)$ | 0.007 | -0.002 | -0.002 | 0.007 | 0.036 | | | | | |
| | (0.036) | (0.013) | (0.014) | (0.004) | (0.074) | | | | | |
| $\delta_E(-2)$ | 0.010 | 0.002 | -0.027 | 0.006* | 0.049 | | | | | |
| | (0.029) | (0.012) | (0.025) | (0.003) | (0.047) | | | | | |
| $\delta_E(-1)$ | 0.061 | 0.018 | -0.031 | 0.001 | -0.018 | | | | | |
| | (0.044) | (0.018) | (0.026) | (0.003) | (0.065) | | | | | |
| $\delta_E(0)$ | 0.062 | 0.016 | -0.015* | -0.002 | -0.034 | | | | | |
| | (0.046) | (0.017) | (0.008) | (0.002) | (0.070) | | | | | |
| $\delta_E(1)$ | 0.030 | -0.000 | -0.011* | -0.002 | 0.013 | | | | | |
| | (0.022) | (0.010) | (0.007) | (0.003) | (0.073) | | | | | |
| $\delta_E(2)$ | 0.062*** | 0.020** | -0.003 | -0.002 | -0.096* | 0.061** | 0.017* | -0.003 | -0.003 | -0.039 |
| | (0.022) | (0.009) | (0.003) | (0.002) | (0.053) | (0.024) | (0.010) | (0.005) | (0.002) | (0.048) |
| $\delta_E(3)$ | 1.629*** | 0.469*** | 0.278*** | -0.014** | -3.683*** | 1.749*** | 0.482*** | 0.260** | -0.031*** | -3.464*** |
| | (0.224) | (0.065) | (0.082) | (0.007) | (0.410) | (0.370) | (0.101) | (0.117) | (0.010) | (0.596) |
| $\delta_E(4)$ | 1.520*** | 0.472*** | 0.240*** | -0.018** | -3.458*** | 1.501*** | 0.470*** | 0.219** | -0.038*** | -3.143*** |
| | (0.206) | (0.064) | (0.068) | (0.008) | (0.360) | (0.342) | (0.107) | (0.097) | (0.011) | (0.588) |
| $\delta_E(5)$ | 0.951*** | 0.303*** | 0.095*** | -0.007 | -2.051*** | 0.882*** | 0.272*** | 0.078** | -0.030*** | -1.835*** |
| | (0.167) | (0.055) | (0.025) | (0.006) | (0.330) | (0.234) | (0.076) | (0.032) | (0.007) | (0.443) |
| $\delta_E(6)$ | 0.602*** | 0.197*** | 0.063*** | 0.000 | -1.263*** | 0.439** | 0.136** | 0.048** | -0.017*** | -0.931*** |
| | (0.147) | (0.049) | (0.015) | (0.005) | (0.294) | (0.173) | (0.055) | (0.019) | (0.004) | (0.358) |
| $\delta_E(7)$ | 0.325*** | 0.113*** | 0.028*** | -0.004 | -0.648*** | 0.198*** | 0.069*** | 0.012 | -0.011*** | -0.374** |
| | (0.099) | (0.034) | (0.010) | (0.004) | (0.208) | (0.074) | (0.027) | (0.010) | (0.003) | (0.167) |
| $\delta_E(8)$ | 0.175*** | 0.064** | -0.005 | 0.002 | -0.338** | 0.165** | 0.055** | -0.039 | -0.009** | -0.227** |
| | (0.062) | (0.026) | (0.023) | (0.004) | (0.145) | (0.074) | (0.025) | (0.048) | (0.004) | (0.107) |
| $\delta_E(9)$ | 0.097*** | 0.040*** | -0.006 | -0.001 | -0.191*** | 0.122*** | 0.043*** | -0.030 | -0.005 | -0.181*** |
| | (0.032) | (0.014) | (0.017) | (0.003) | (0.069) | (0.042) | (0.015) | (0.037) | (0.003) | (0.068) |
| $\delta_E(10)$ | 0.104*** | 0.038*** | 0.015 | -0.004 | -0.162** | 0.093** | 0.034** | 0.004 | -0.007* | -0.089 |
| | (0.037) | (0.015) | (0.011) | (0.003) | (0.073) | (0.043) | (0.015) | (0.014) | (0.004) | (0.117) |
| | | | | | | | | | | |
| $\delta_A(2)$ | | | | | | -0.076* | -0.028* | 0.004 | 0.001 | 0.173* |
| | | | | | | (0.040) | (0.016) | (0.007) | (0.004) | (0.095) |
| $\delta_A(3)$ | | | | | | -1.643*** | -0.503*** | -0.108 | 0.005 | 3.617*** |
| | | | | | | (0.291) | (0.095) | (0.081) | (0.010) | (0.549) |
| $\delta_A(4)$ | | | | | | -1.624*** | -0.499*** | -0.142** | 0.007 | 3.614*** |
| | | | | | | (0.249) | (0.077) | (0.071) | (0.013) | (0.395) |
| $\delta_A(5)$ | | | | | | -1.032*** | -0.330*** | -0.063*** | -0.006 | 2.166*** |
| | | | | | | (0.247) | (0.081) | (0.020) | (0.009) | (0.494) |
| $\delta_A(6)$ | | | | | | -0.781*** | -0.260*** | -0.058*** | -0.012 | 1.577*** |
| | | | | | | (0.236) | (0.081) | (0.019) | (0.008) | (0.465) |
| $\delta_A(7)$ | | | | | | -0.461*** | -0.159*** | -0.042*** | -0.003 | 0.948*** |
| | | | | | | (0.177) | (0.061) | (0.016) | (0.007) | (0.368) |
| $\delta_A(8)$ | | | | | | -0.185* | -0.075 | -0.024 | -0.012** | 0.459* |
| | | | | | | (0.103) | (0.047) | (0.015) | (0.006) | (0.274) |
| $\delta_A(9)$ | | | | | | -0.069 | -0.037 | -0.014* | -0.005** | 0.207 |
| | | | | | | (0.053) | (0.026) | (0.009) | (0.003) | (0.126) |
| $\delta_A(10)$ | | | | | | -0.118* | -0.046* | -0.014* | 0.000 | 0.246** |
| | | | | | | (0.066) | (0.026) | (0.008) | (0.004) | (0.107) |
| | | | | | | | | | | |
| Obs. | 1,239 | 1,239 | 1,239 | 1,239 | 1,239 | 1,239 | 1,239 | 1,239 | 1,239 | 1,239 |
| $R^2$ | 0.545 | 0.481 | 0.161 | 0.030 | 0.649 | 0.566 | 0.500 | 0.087 | 0.080 | 0.603 |
| Adj. $R^2$ | 0.539 | 0.475 | 0.151 | 0.018 | 0.645 | 0.560 | 0.493 | 0.073 | 0.067 | 0.597 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Intercept not reported

where $y_\tau$ are daily flows on date $\tau$ (in percentage terms) as a function of:

$$\delta_{j\tau}(s) = \begin{cases} \rho & \text{if } \tau - s \text{ is the first trading day after a recommendation to sell fraction } \rho \text{ of portfolio } j \in \{A, E\}, \\ 0 & \text{otherwise.} \end{cases}$$

The right panel of Table 6 shows that investor responses do not differ materially according to the direction of a recommendation: a recommendation of portfolio A leads to transfers into A and out of E that roughly equal transfers from portfolio A and into E following a recommendation of E. Table 6 also reveals clear but muted responses of investors in portfolios B and C to recommendations to switch to/from E: the funds shifted in and out of portfolios B and C

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are less than 25% of those for portfolio A. These "echo" shifts reflect that some investors are too old to invest in portfolio A, making portfolios B or C their closest feasible alternative.

**Did H&L change in other ways how investors allocated savings?** Chevalier and Ellison [9] and Sirri and Tufano [25] find that higher past returns of a mutual fund increase cash flows into the fund. We modify Sirri and Tufano's approach to study the relationship between measures of past performance of portfolio $A$ and net flows to portfolios $A$ and $E$ to determine whether this relationship changed once investors began following H&L's advice. Because there are no daily data on portfolio flows prior to October 2011, we use monthly data for the period October 2002–September 2016. Table 7 presents OLS estimates of

$$\text{Flow}_t = \alpha + \left( \sum_{s=1}^{3} \beta_{1,s} \text{Return A}_{t-s} + \sum_{s=1}^{3} \beta_{2,s} \text{Risk A}_{t-s} + \beta_3 \log \text{TA}_{t-1} \right) \times (1 - d_t)$$
$$+ \left( \sum_{s=1}^{3} \beta_{4,s} \text{Return A}_{t-s} + \sum_{s=1}^{3} \beta_{5,s} \text{Risk A}_{t-s} + \beta_6 \log \text{TA}_{t-1} \right) \times d_t + \beta_7 d_t + \epsilon_t.$$

Flow$_t$ is the net flow to portfolio X in month $t$ as a percent of the total assets in X on the last day of month $t-1$; Return A$_{t-s}$ is the monthly return on portfolio A computed as the log difference using the price on the last day of month $t-s$ and the price on the last day of month $t-(s+1)$; Risk A$_{t-s}$ is the standard deviation of the daily returns of portfolio A in month $t-s$; and $TA_{t-1}$ is the total assets of portfolio A on the last day of month $t-1$. We consider two formulations for the dummy variable $d_t$ indicating H&L's presence in the market: one where $d_t = 1$ once H&L enters the market in October 2011, so $d_t = 0$ before October 2011; and one where $d_t = 1$ starting in April 2012, when substantial numbers of investors began shifting investments in line with H&L's recommendation.

Table 7 shows how H&L's entry changed investor behavior. Prior to H&L, and consistent with Chevalier and Ellison [9] and Sirri and Tufano [25], higher lagged monthly returns of portfolio A led investors to shift funds into A and out of E. After H&L's entry, investments no longer vary with the long-term performance of portfolio A—investors only rely on H&L.

## 2.2   Returns

Having established how H&L's recommendations affected the flow of investors and money in and out of portfolios, we now investigate asset returns around the recommendation announcements. This lets us (a) uncover what drives H&L's recommendations to switch portfolios;

Table 7: The effect of past performance on monthly cash flows to portfolios $A$ and $E$, before and after the emergence of H&L.

| | $d_t = 1$ starting October 2011 | | $d_t = 1$ starting April 2012 | |
|---|---|---|---|---|
| | Port. A | Port. E | Port. A | Port. E |
| **Before H&L** | | | | |
| Return $A_{t-1}$ | 0.212* | -1.456*** | 0.223** | -1.437*** |
| | (0.110) | (0.342) | (0.099) | (0.322) |
| Return $A_{t-2}$ | 0.210*** | -0.882*** | 0.204*** | -0.876*** |
| | (0.077) | (0.277) | (0.070) | (0.261) |
| Return $A_{t-3}$ | 0.176* | -0.288 | 0.163* | -0.282 |
| | (0.098) | (0.192) | (0.089) | (0.178) |
| Risk $A_{t-1}$ | 1.057 | -9.436** | 1.117 | -8.940** |
| | (1.417) | (4.608) | (1.309) | (4.393) |
| Risk $A_{t-2}$ | 1.311 | -3.457 | 1.133 | -3.744 |
| | (1.243) | (4.665) | (1.040) | (4.280) |
| Risk $A_{t-3}$ | -0.697 | 2.237 | -0.695 | 2.373 |
| | (0.851) | (2.702) | (0.782) | (2.469) |
| log $TA_{t-1}$ | -0.022*** | 0.016** | -0.022*** | 0.015** |
| | (0.007) | (0.007) | (0.006) | (0.007) |
| **After H&L** | | | | |
| Return $A_{t-1}$ | -0.097 | 0.022 | -0.063 | 0.020 |
| | (0.219) | (0.406) | (0.236) | (0.468) |
| Return $A_{t-2}$ | 0.131 | -0.264 | 0.150 | -0.253 |
| | (0.180) | (0.365) | (0.236) | (0.502) |
| Return $A_{t-3}$ | -0.178 | 0.319 | -0.190 | 0.410 |
| | (0.163) | (0.331) | (0.217) | (0.460) |
| Risk $A_{t-1}$ | -2.180 | 1.132 | -2.534 | 1.176 |
| | (4.286) | (9.147) | (5.067) | (11.381) |
| Risk $A_{t-2}$ | -3.968 | 10.778 | -6.495 | 15.470 |
| | (3.551) | (6.997) | (5.182) | (11.411) |
| Risk $A_{t-3}$ | 4.346* | -9.525* | 6.813** | -11.427 |
| | (2.350) | (4.962) | (3.220) | (7.191) |
| log $TA_{t-1}$ | -0.047 | 0.066 | -0.040 | 0.040 |
| | (0.049) | (0.097) | (0.059) | (0.118) |
| | | | | |
| $d_t$ | 0.770 | -1.612 | 0.573 | -0.864 |
| | (1.488) | (2.935) | (1.782) | (3.546) |
| Constant | 0.641*** | -0.376* | 0.638*** | -0.354* |
| | (0.192) | (0.191) | (0.189) | (0.182) |
| | | | | |
| Obs. | 164 | 164 | 164 | 164 |
| $R^2$ | 0.399 | 0.359 | 0.408 | 0.363 |
| Adj. $R^2$ | 0.338 | 0.294 | 0.348 | 0.298 |

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

(b) derive the informational consequences (announcement effects) of recommendations for different assets; and (c) probe the impacts of the portfolio transfers on asset returns.

To do this, we estimate regressions of the form:

$$y_\tau = \alpha + \sum_{s=-2}^{0} \beta_s \delta_{E\tau}(s) + \beta_1 \delta_{E\tau}(1:2) + \beta_2 \delta_{E\tau}(3:7) + \beta_3 \delta_{E\tau}(8:10) + \epsilon_\tau,$$

where $y_\tau$ is the daily return[13] on day $\tau$ of a selected asset (social security portfolios A and E,[14] and IPSA stock market index[15]). $\delta_{E\tau}(0)$ takes on the value $\rho$ if a recommendation was made on the previous day $(\tau - 1)$ to sell fraction $\rho$ of portfolio E, it takes on the value $-\rho$ if

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[13]Returns are defined as: $r_\tau = 100 \left( \log(p_\tau) - \log(p_{\tau-1}) \right)$.

[14]The website of the superintendency of pensions provides daily data on official prices for all portfolios of all AFPs. These official prices reflect regulations that specify the prices used to value each asset (e.g. closing price for foreign equity, or weighted average price for domestic stocks). We use the weighted average price, lagged one day because the price of a portfolio on day $\tau$ reflects the day $\tau - 1$ prices of the underlying assets.

[15]IPSA is an index of the 40 stocks with the highest annual volume from the set of stocks with a market capitalization that exceed USD 200 MM and a free-float of at least 5%. The index is market capitalization weighted and free float adjusted, and includes dividends.

a recommendation was made on the previous day to buy fraction $\rho$ of portfolio E, and it is zero otherwise. $\delta_{E\tau}(1:2)$ is the analogous function for recommendations made one or two days earlier (i.e., on days $\tau - 2$ or $\tau - 3$); $\delta_{E\tau}(3:7)$ captures days where portfolio transfers are high following recommendations; and $\delta_{E\tau}(8:10)$ captures days where portfolio transfers have largely returned to normal.

To control for market returns, we also augment regressions by adding the return of a foreign stock market index as a regressor. We use the return on the MSCI ACWI and MSCI World indexes as controls when using portfolio returns as a dependent variable.[16] When using the return of a domestic stock market index as a dependent variable, we use returns on the MSCI Emerging Markets and MSCI Emerging Markets Latin America indexes.[17,18]

**What drives H&L's advice?** Table 8 reveals that H&L's advice overwhelmingly reflects the *immediate* past performance of the Chilean stock market. On the two trading days *prior* to a recommendation to switch into portfolio A and out of E, on average, the Chilean stock market rose by 1.8%. Roughly the opposite occurs prior to recommendations to switch out of portfolio A and into E. That is, following good returns on the Chilean stock market, H&L recommends that investors hold the risky portfolio A, and following bad returns on the market, H&L recommends that they hold the safe portfolio E. This suggests that H&L employs a simple, very short-term, momentum strategy.

To reinforce this conclusion, we show that the cumulative return (the sum of daily returns) of the ACWI and VIX indexes in the week before an announcement predict the nature of the recommendation.[19] Table 9 divides recommendations according to whether the direction of the recommendation represents an increase or a reduction in risk exposure. A momentum strategy suggests that preceding a recommendation to increase risk exposure, we should see

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[16]The ACWI index captures large and mid-cap representation in 23 developed market and 24 emerging market countries. The World index captures large and mid cap representation in 23 developed market countries.

[17]The Emerging Markets index captures large and mid-cap representation in 24 emerging market countries. The Emerging Markets Latin America index captures large and mid-cap representation for five emerging market countries in Latin America.

[18]Results similar to those for portfolio A obtain for portfolios B and C. The magnitude of the effects fall due to the lower risk exposure of these portfolios. Findings similar to those for the IPSA index obtain for the IGPA index of all stocks on the Santiago Exchange with an annual volume above UF 10,000 (US$400,000-450,000), free float of at least 5% and a market presence of at least 5%, and for the INTER-10 index, which consists of 10 stocks selected from the IPSA, listed in foreign markets through ADRs, with the highest annual volume or if we use indexes without dividends. We also considered the US$ over CLP exchange rate and indexed Central Bank bonds. All results are available upon request.

[19]The CBOE Volatility Index (VIX) is a measure of market expectations of near-term volatility conveyed by S&P 500 stock index option prices.

Table 8: Recommendations and asset returns. OLS regression of $y_\tau = \alpha + \sum_{s=-2}^{0} \beta_s \delta_{E\tau}(s) + \beta_1 \delta_{E\tau}(1:2) + \beta_2 \delta_{E\tau}(3:7) + \beta_3 \delta_{E\tau}(8:10) + \epsilon_\tau$ using daily data for the period 3Jan2011–30Sep2016, where $y_\tau$ is the daily return (in %) of a social security portfolio, or stock market index.

| | Social Security Portfolios | | | | Stock Market | | |
|---|---|---|---|---|---|---|---|
| | A | A | A | E | IPSA | IPSA | IPSA |
| $\delta_E(-2)$ | 0.479*** | 0.225*** | 0.250*** | -0.00379 | 0.750*** | 0.308* | 0.352** |
| | (0.0809) | (0.0741) | (0.0736) | (0.0184) | (0.177) | (0.174) | (0.162) |
| $\delta_E(-1)$ | 0.642*** | 0.184** | 0.204*** | 0.000443 | 1.024*** | 0.467*** | 0.432** |
| | (0.106) | (0.0758) | (0.0756) | (0.0249) | (0.186) | (0.179) | (0.172) |
| $\delta_E(0)$ | 0.251* | 0.176** | 0.199** | -0.0110 | 0.541** | 0.264* | 0.351** |
| | (0.143) | (0.0810) | (0.0847) | (0.0254) | (0.224) | (0.146) | (0.152) |
| $\delta_E(1:2)$ | -0.0635 | -0.00894 | -0.0147 | -0.00210 | -0.0220 | 0.0674 | 0.103 |
| | (0.0767) | (0.0508) | (0.0525) | (0.0175) | (0.137) | (0.119) | (0.116) |
| $\delta_E(3:7)$ | 0.233*** | 0.112*** | 0.116*** | 0.00642 | 0.280** | 0.142 | 0.146* |
| | (0.0699) | (0.0370) | (0.0382) | (0.00863) | (0.120) | (0.0869) | (0.0782) |
| $\delta_E(8:10)$ | -0.0519 | -0.0388 | -0.0353 | -0.0384* | -0.252 | -0.267* | -0.251** |
| | (0.0716) | (0.0393) | (0.0391) | (0.0210) | (0.159) | (0.150) | (0.128) |
| ACWI | | 0.419*** | | | | | |
| | | (0.0206) | | | | | |
| World | | | 0.403*** | | | | |
| | | | (0.0209) | | | | |
| Emerging Markets | | | | | | 0.488*** | |
| | | | | | | (0.0312) | |
| Latin America | | | | | | | 0.355*** |
| | | | | | | | (0.0207) |
| Observations | 1,436 | 1,436 | 1,436 | 1,436 | 1,437 | 1,437 | 1,437 |
| $R^2$ | 0.048 | 0.501 | 0.484 | 0.006 | 0.045 | 0.356 | 0.385 |
| Adjusted $R^2$ | 0.044 | 0.499 | 0.482 | 0.002 | 0.041 | 0.353 | 0.382 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Intercept not reported

positive cumulative returns on the ACWI index, and negative returns on the VIX index; and prior to a recommendation to reduce risk exposure, the opposite should obtain. This is precisely what we find. Prior to *every* recommendation to increase risk, the five day cumulative return on the ACWI index is positive, and the analogous return on the VIX index is negative. The opposite happens for the vast bulk of recommendations to reduce risk exposure.[20]

Putting these results together with those in Table 7 proves revealing: it is not that investors no longer base investments on past performance; rather, via the model that H&L uses to formulate recommendations, investors switched from basing investments on intermediate-term historical performance to basing investments on very recent market performance.

**Consequences of H&L's advice.** Table 8 also reveals positive announcement effects on the day after a recommendation of portfolio A. Notably, there are abnormal returns of half a percent on the Chilean stock market, and smaller announcement effects for portfolio $A$ that remain significant when we control for foreign market returns. In addition, after a recommendation of risky portfolio A on day $t-1$ there are positive abnormal returns on both the stock market and portfolio A on days $t+3$ to $t+7$ where pension transfers are high, followed by slight reversals. Similar return patterns emerge for portfolios B, C and D, where the mag-

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[20]These results are robust to choosing different short term horizons (e.g. four, six or seven days).

Table 9: Cumulative returns of the ACWI and VIX indexes in the five trading days preceding an announcement.

| Recom. to increase risk exposure | | | Recom. to reduce risk exposure | | |
|---|---|---|---|---|---|
| | ACWI | VIX | | ACWI | VIX |
| 2 | 0.07 | -0.19 | 1 | 0.00 | 0.19 |
| 4 | 0.00 | -0.05 | 3 | -0.06 | 0.02 |
| 6 | 0.03 | -0.18 | 5 | 0.00 | -0.01 |
| 8 | 0.03 | -0.17 | 7 | -0.01 | -0.02 |
| 10 | 0.02 | -0.19 | 9 | 0.00 | 0.12 |
| 12 | 0.02 | -0.03 | 11 | 0.00 | 0.11 |
| 14 | 0.02 | -0.06 | 13 | -0.01 | 0.07 |
| 16 | 0.01 | 0.01 | 15 | -0.02 | 0.37 |
| 18 | 0.02 | -0.15 | 17 | -0.02 | 0.29 |
| 19 | 0.02 | -0.13 | 20 | -0.04 | 0.36 |
| 21 | 0.01 | -0.09 | 23 | 0.01 | -0.10 |
| 22 | 0.03 | -0.19 | 24 | -0.02 | 0.08 |
| 26 | 0.01 | -0.09 | 25 | -0.10 | 1.14 |
| 28 | 0.00 | -0.09 | 27 | 0.01 | 0.02 |
| 29 | 0.00 | -0.23 | 30 | -0.04 | 0.25 |
| 32 | 0.04 | -0.27 | 31 | -0.03 | 0.00 |
| 34 | 0.01 | -0.07 | 33 | -0.01 | 0.17 |
| | | | 35 | -0.03 | 0.40 |

nitudes decline as the riskiness of the portfolio declines, and there are no systematic return patterns for portfolio E, which is comprised of very liquid, information-insensitive securities.

At first blush, these results suggest that reinvestments by AFPs in response to the portfolio reallocations on days $t + 3$ to $t + 7$ had price impacts. It *looks* as if the domestic stock market was not sufficiently liquid to absorb the reinvestments. To investigate, we explore the impact of portfolio reallocations on domestic stock market trading volume, regressing log of total daily trading volume in millions of CLP on indicator functions that take on the value of one $s$ trading days after a new recommendation, for $s = -2, -1, 0, 1...10$. Figure 3 and Table 10 reveal that there is *no pass through from portfolio re-allocations to stock market trading volume*—re-allocations are unrelated to stock market trading volume to the extent that the adjusted $R^2$ is negative. Trades by AFPs induced by portfolio re-allocations do *not* drive the excess returns on dates $t + 3$ through $t + 7$.

The question becomes: what does underlie these return patterns? Insights come from decomposing the sample into early recommendations (recommendations one to six) and later recommendations (recommendations seven onwards)—as individual investors only began switching between pension portfolios in large numbers beginning with the seventh rec-

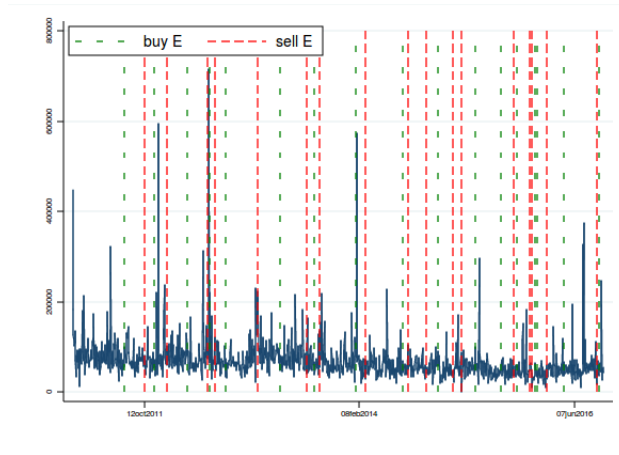Figure 3: Trading volume of IPSA and H&L's announcements



Table 10: Trading volume around new recommendations. OLS regression of $y_\tau = \alpha + \sum_{s=-2}^{10} \beta_s \delta_{E\tau}(s) + \epsilon_\tau$ using daily data from 3Jan2011–30sep2016, where $y_\tau$ is daily volume of a stock market index, and $\delta_{E\tau}(s)$ is an indicator function that equals 1 $s$ days after a new recommendation.

|  | IPSA | IGPA | INTER-10 |
| --- | --- | --- | --- |
| $\delta_E(-2)$ | -0.040 | -0.061 | 0.038 |
|  | (0.079) | (0.084) | (0.096) |
| $\delta_E(-1)$ | 0.057 | 0.029 | 0.127 |
|  | (0.065) | (0.071) | (0.079) |
| $\delta_E(0)$ | -0.005 | -0.023 | 0.029 |
|  | (0.077) | (0.079) | (0.077) |
| $\delta_E(1)$ | -0.267 | -0.080 | -0.047 |
|  | (0.202) | (0.093) | (0.111) |
| $\delta_E(2)$ | -0.035 | -0.051 | -0.000 |
|  | (0.115) | (0.113) | (0.141) |
| $\delta_E(3)$ | -0.062 | -0.063 | -0.099 |
|  | (0.063) | (0.068) | (0.084) |
| $\delta_E(4)$ | -0.040 | 0.007 | -0.037 |
|  | (0.071) | (0.084) | (0.100) |
| $\delta_E(5)$ | -0.100 | -0.115 | -0.030 |
|  | (0.091) | (0.097) | (0.114) |
| $\delta_E(6)$ | -0.079 | -0.103 | -0.065 |
|  | (0.079) | (0.078) | (0.100) |
| $\delta_E(7)$ | -0.037 | -0.030 | -0.014 |
|  | (0.076) | (0.083) | (0.083) |
| $\delta_E(8)$ | 0.009 | -0.034 | 0.085 |
|  | (0.068) | (0.069) | (0.070) |
| $\delta_E(9)$ | -0.024 | -0.043 | -0.035 |
|  | (0.088) | (0.089) | (0.110) |
| $\delta_E(10)$ | 0.135 | 0.088 | 0.147 |
|  | (0.114) | (0.117) | (0.132) |
| Obs. | 1,436 | 1,436 | 1,436 |
| $R^2$ | 0.012 | 0.005 | 0.006 |
| Adj. $R^2$ | 0.003 | -0.004 | -0.003 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Intercept not reported

ommendation (see Figure 1). We estimate regressions of the form:

$$y_\tau = \alpha + \sum_{s=-2}^{0} \beta_s \delta_{E\tau}(s) + \beta_1 \delta_{E\tau}(1:2) + \beta_2 \delta_{E\tau}(3:7) + \beta_3 \delta_{E\tau}(8:10)$$

$$+ \sum_{s=-2}^{0} \phi_s \gamma_{E\tau}(s) + \phi_1 \gamma_{E\tau}(1:2) + \phi_2 \gamma_{E\tau}(3:7) + \phi_3 \gamma_{E\tau}(8:10) + \epsilon_\tau.$$

The $\delta_E$ indicators are active (taking on values of $\pm\rho$) only for the first six recommendations, and the $\gamma_E$ indicators become active starting with the seventh recommendation, and the notation is as before. Table 11 reveals that portfolio reallocations do not underlie these excess returns. For early recommendations that almost no investors acted on, there are large abnormal returns on days $t+3$ to $t+7$ of about 0.7-0.8% on stock market indexes and 0.5% on portfolio A. Thus, initially investors would have benefited from following H&L's advice. However, once large numbers of investors began to follow H&L's recommendations, there are *no* excess returns in the stock market on days $t+3$–$t+7$ when re-allocations occur: portfolio reallocations and market illiquidity do *not* drive the observed return patterns.[21]

Instead, following later recommendations, the market immediately responds with announcement effects on stock market indexes of 0.5–0.6%. Thus, it appears that at the outset H&L correctly anticipated the near-term performance of the risky portfolio $A$. In turn, this seems to have led to a shared belief among individual investors *and* the market that H&L's recommendations contain valuable information. As a result, large numbers of individual investors started to follow H&L's advice. Paradoxically, though, *because* the market also comes to believe that H&L's advice has value, this information is incorporated into portfolio valuations and stock prices before followers of H&L can transfer funds between portfolios. Consequently, investors following H&L's advice fail to benefit from these announcement effects.

As a placebo test, the last column of Table 11 reports results using daily returns of the S&P 500 index as the dependent variable, as returns on this index are highly correlated with those on the domestic stock market and portfolio A. For early recommendations, we expect results similar to those for the domestic stock market indexes; but for later recommendations, we expect positive lagged returns and no announcement effects. This is exactly what we find.

## 2.3 Do followers gain?

We next investigate whether investors benefit from following H&L's advice. Table 12 compares the cumulative returns starting at each of the first twenty announcements through September 30, 2016 from following H&L's strategy vs. investing and then holding any given portfolio. The comparison considers an investor who starts following H&L at recommendation $k$ for $k = 1, ..., 20$ and continues to do so until September 30, 2016. That is, we compare

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[21]A recent working paper (Da et al. [10]) also looks at H&L's returns, positing that trades by AFPs might drive the return patterns. The absence of increased trading volume in domestic stock marketsindicates that this premise is incorrect.

Table 11: Recommendations and asset returns. OLS regression of $y_\tau = \alpha + \sum_{s=-2}^{0} \beta_s \delta_{E\tau}(s) + \beta_1 \delta_{E\tau}(1:2) + \beta_2 \delta_{E\tau}(3:7) + \beta_3 \delta_{E\tau}(8:10) + \sum_{s=-2}^{0} \phi_s \gamma_{E\tau}(s) + \phi_1 \gamma_{E\tau}(1:2) + \phi_2 \gamma_{E\tau}(3:7) + \phi_3 \gamma_{E\tau}(8:10) + \epsilon_\tau$ using daily data for the period 3Jan2011–30Sep2016, where $y_\tau$ is the daily return (in %) of a social security portfolio or stock market index.

| | Social Security Portfolios | | | | Stock Market | | | Placebo |
|---|---|---|---|---|---|---|---|---|
| | A | A | A | E | IPSA | IPSA | IPSA | S&P500 |
| $\delta_E(-2)$ | 0.678*** | 0.154 | 0.185 | -0.027 | 1.160*** | 0.453 | 0.561 | 0.645** |
| | (0.115) | (0.139) | (0.134) | (0.035) | (0.333) | (0.414) | (0.364) | (0.258) |
| $\delta_E(-1)$ | 0.398** | 0.056 | 0.062 | -0.009 | 1.035*** | 0.688* | 0.587* | 0.768*** |
| | (0.166) | (0.105) | (0.101) | (0.050) | (0.364) | (0.358) | (0.337) | (0.280) |
| $\delta_E(0)$ | 0.312 | 0.151 | 0.174 | 0.013 | 0.531 | 0.210 | 0.259 | 0.326 |
| | (0.200) | (0.104) | (0.113) | (0.055) | (0.443) | (0.268) | (0.268) | (0.371) |
| $\delta_E(1:2)$ | -0.059 | -0.019 | -0.030 | 0.006 | -0.016 | 0.107 | 0.052 | -0.318 |
| | (0.113) | (0.073) | (0.079) | (0.049) | (0.203) | (0.171) | (0.194) | (0.384) |
| $\delta_E(3:7)$ | 0.475** | 0.198*** | 0.208** | -0.012 | 0.755** | 0.441** | 0.459*** | 0.702** |
| | (0.193) | (0.076) | (0.081) | (0.020) | (0.317) | (0.215) | (0.177) | (0.354) |
| $\delta_E(8:10)$ | 0.099 | 0.067 | 0.089 | -0.120* | -0.434 | -0.641 | -0.455 | -0.020 |
| | (0.193) | (0.096) | (0.094) | (0.063) | (0.437) | (0.424) | (0.351) | (0.526) |
| $\gamma_E(-2)$ | 0.410*** | 0.242*** | 0.266*** | 0.021 | 0.621*** | 0.255 | 0.291* | 0.603** |
| | (0.100) | (0.091) | (0.092) | (0.019) | (0.204) | (0.186) | (0.176) | (0.252) |
| $\gamma_E(-1)$ | 0.758*** | 0.244*** | 0.269*** | 0.004 | 1.055*** | 0.402** | 0.397** | 1.130*** |
| | (0.127) | (0.095) | (0.095) | (0.029) | (0.211) | (0.197) | (0.193) | (0.252) |
| $\gamma_E(0)$ | 0.242 | 0.192** | 0.215*** | -0.021 | 0.583** | 0.314* | 0.417** | 0.080 |
| | (0.174) | (0.104) | (0.108) | (0.026) | (0.246) | (0.174) | (0.185) | (0.235) |
| $\gamma_E(1:2)$ | -0.055 | 0.002 | -0.000 | -0.011 | -0.036 | 0.027 | 0.110 | -0.275 |
| | (0.099) | (0.066) | (0.067) | (0.014) | (0.179) | (0.157) | (0.145) | (0.175) |
| $\gamma_E(3:7)$ | 0.130** | 0.076* | 0.079* | 0.013 | 0.072 | 0.009 | 0.011 | 0.148 |
| | (0.055) | (0.042) | (0.042) | (0.009) | (0.100) | (0.083) | (0.081) | (0.101) |
| $\gamma_E(8:10)$ | -0.115* | -0.082** | -0.086** | -0.005 | -0.181 | -0.117 | -0.169 | -0.162 |
| | (0.061) | (0.038) | (0.038) | (0.011) | (0.134) | (0.113) | (0.107) | (0.134) |
| ACWI | | 0.417*** | | | | | | |
| | | (0.021) | | | | | | |
| World | | | 0.401*** | | | | | |
| | | | (0.021) | | | | | |
| Emerging Markets | | | | | | 0.487*** | | |
| | | | | | | (0.030) | | |
| Latin America | | | | | | | 0.353*** | |
| | | | | | | | (0.020) | |
| Observations | 1,436 | 1,436 | 1,436 | 1,436 | 1,437 | 1,437 | 1,437 | 1,446 |
| $R^2$ | 0.058 | 0.503 | 0.486 | 0.019 | 0.056 | 0.363 | 0.391 | 0.037 |
| Adjusted $R^2$ | 0.050 | 0.498 | 0.481 | 0.011 | 0.048 | 0.357 | 0.385 | 0.029 |
| Testing equality of before and after coefficients (p-value) | | | | | | | | |
| $\delta_E(-2) = \gamma_E(-2)$ | 0.079 | 0.594 | 0.614 | 0.225 | 0.167 | 0.660 | 0.502 | 0.906 |
| $\delta_E(-1) = \gamma_E(-1)$ | 0.085 | 0.176 | 0.128 | 0.816 | 0.962 | 0.482 | 0.623 | 0.340 |
| $\delta_E(0) = \gamma_E(0)$ | 0.790 | 0.783 | 0.790 | 0.570 | 0.918 | 0.744 | 0.628 | 0.577 |
| $\delta_E(1:2) = \gamma_E(1:2)$ | 0.976 | 0.832 | 0.774 | 0.744 | 0.941 | 0.727 | 0.812 | 0.919 |
| $\delta_E(3:7) = \gamma_E(3:7)$ | 0.086 | 0.160 | 0.160 | 0.250 | 0.040 | 0.062 | 0.022 | 0.135 |
| $\delta_E(8:10) = \gamma_E(8:10)$ | 0.289 | 0.150 | 0.083 | 0.071 | 0.581 | 0.231 | 0.435 | 0.795 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Intercept not reported

the return from beginning to follow H&L at different points in time with all possible buy and hold strategies. Column H&: shows the return assuming a follower acts the same day the recommendation is made. With the exception of the very first recommendation, any other starting point is outperformed by at least one of the five portfolios, and, in almost all cases, H&L's strategy ranks last. This qualitative result obviously holds if returns are adjusted by risk (see Appendix C for details). Column *inst* compares returns were investments transferred at the exact moment H&L made its recommendation at prices based on close of that trading day—returns that H&L can highlight, and returns that an investor would obtain if he could benefit from the announcement effect. For the first 14 recommendations, this return exceeds that

from buying and holding *any* portfolio, essentially reversing the true return pattern. Comparing these columns reveals the impact of the announcement effect, which results in investors buying portfolio A high, and selling it low, and the consequences for cumulative returns— followers would have done far better if they could have benefitted from the stock market announcement effect. Plausibly, this finding can reconcile why some individuals follow H&L despite their poor actual performance—they may not have recognized this poor performance.[22] The complex pricing rules used by AFPs to value portfolio transfers may make it difficult for followers to realize that the announcement effect is hurting them rather than helping them.

Table 12: Nominal cumulative return for H&L's strategy and the five social security portfolios starting with any of the first 20 recommendations until September 30, 2016. Column H&L: cumulative return for follower acting the day a recommendation is made. Column *inst* captures the return that would obtain were investments transferred at the moment a recommendation is made, before the market response.

| Starting | Benchmark | | | | | | |
| recomm. | A | B | C | D | E | H&L | *inst* |
|---|---|---|---|---|---|---|---|
| 1 | 0.399 | 0.393 | 0.461 | 0.484 | 0.514 | 0.525 | 0.632 |
| 2 | 0.535 | 0.480 | 0.504 | 0.485 | 0.460 | 0.470 | 0.573 |
| 3 | 0.541 | 0.483 | 0.509 | 0.492 | 0.472 | 0.476 | 0.553 |
| 4 | 0.483 | 0.438 | 0.474 | 0.462 | 0.440 | 0.444 | 0.519 |
| 5 | 0.390 | 0.367 | 0.420 | 0.430 | 0.433 | 0.354 | 0.429 |
| 6 | 0.458 | 0.410 | 0.438 | 0.428 | 0.409 | 0.331 | 0.407 |
| 7 | 0.443 | 0.399 | 0.426 | 0.419 | 0.402 | 0.318 | 0.413 |
| 8 | 0.466 | 0.414 | 0.435 | 0.424 | 0.403 | 0.318 | 0.415 |
| 9 | 0.472 | 0.422 | 0.439 | 0.418 | 0.388 | 0.324 | 0.419 |
| 10 | 0.360 | 0.337 | 0.377 | 0.380 | 0.376 | 0.312 | 0.403 |
| 11 | 0.349 | 0.327 | 0.361 | 0.362 | 0.355 | 0.302 | 0.389 |
| 12 | 0.342 | 0.326 | 0.348 | 0.337 | 0.329 | 0.277 | 0.359 |
| 13 | 0.345 | 0.329 | 0.346 | 0.330 | 0.314 | 0.279 | 0.351 |
| 14 | 0.339 | 0.322 | 0.341 | 0.326 | 0.312 | 0.277 | 0.347 |
| 15 | 0.277 | 0.271 | 0.286 | 0.269 | 0.260 | 0.217 | 0.252 |
| 16 | 0.216 | 0.221 | 0.245 | 0.241 | 0.247 | 0.205 | 0.241 |
| 17 | 0.130 | 0.142 | 0.168 | 0.174 | 0.182 | 0.142 | 0.175 |
| 18 | 0.097 | 0.113 | 0.140 | 0.149 | 0.160 | 0.120 | 0.153 |
| 19 | 0.123 | 0.129 | 0.146 | 0.147 | 0.150 | 0.111 | 0.142 |
| 20 | 0.123 | 0.125 | 0.135 | 0.136 | 0.135 | 0.110 | 0.128 |

This evidence is striking given that H&L only had 54 followers at the time of the first announcement, and did not attract new clients until announcement five (see the top panel of Figure 4, which plots the matrix of clients according to the first and last announcement they could follow according to their payment records).[23]

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[22]In the next subsection we show that this fact can only partially explain why so many follow H&L. In particular, many followers *know* that H&L underperformed buy and hold in the previous 12 months.

[23]Our sample features 35 announcements, but the matrix in Figure 4 has 36 rows and columns because

Figure 4: Membership length of H&L followers according to their payment records. The top figure shows the heat map of the matrix with the first and last announcement while the account was active for each follower. The bottom table shows the distribution of followers according to the length of their membership in years, and we decompose each category in whether they are active or inactive (expired) as of September 30, 2016.
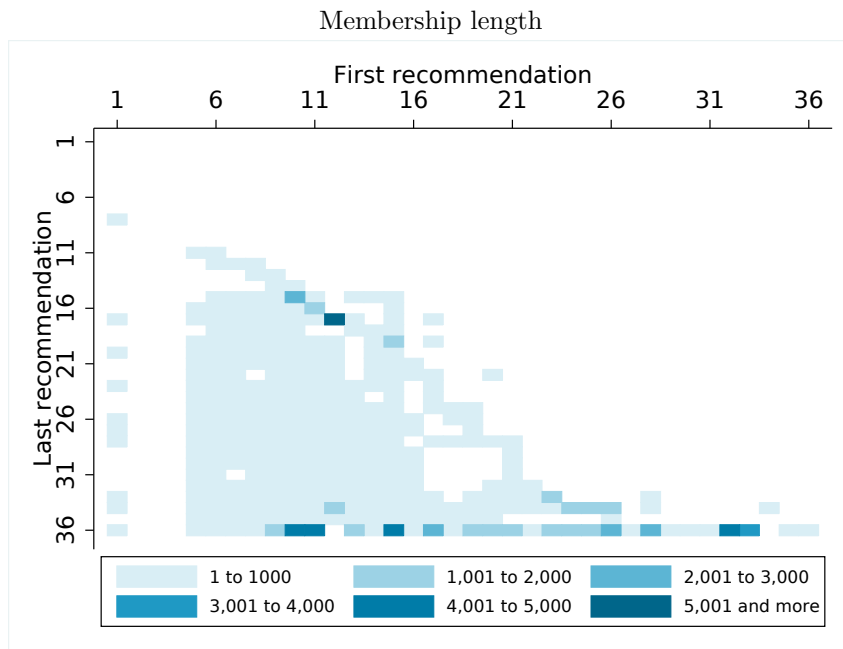


Membership length

Distribution of membership length

| | Number of followers | Inactive | Active |
|---|---|---|---|
| One year or less | 53,037 | 29,594 | 23,433 |
| | 47% | 56% | 44% |
| Between 1 and 2 years | 7,862 | 3,686 | 4,176 |
| | 7% | 47% | 53% |
| Between 2 and 3 years | 17,022 | 8,267 | 8,755 |
| | 15% | 49% | 51% |
| Between 3 and 4 years | 18,494 | 5,469 | 13,025 |
| | 16% | 30% | 70% |
| More than 4 years | 15,833 | 716 | 15,117 |
| | 14% | 5% | 95% |
| Total | 112,248 | 47,732 | 64,516 |
| | 100% | 43% | 57% |

To confirm this negative result, we use H&L's payment records to compute returns for each follower starting with the first announcement he could follow through the last announcement before his subscription expired. We determine whether a follower's return exceeded that from a buy-and-hold strategy for each feasible portfolio over that period of time. Because some investors must select from less risky portfolios due to their age or gender, we

some followers joined after the last announcement (or their membership has not expired).

divide followers into risk categories according to the riskiest portfolio that they can choose. We drop observations if age or gender is missing, or if the age when an account was opened is below eighteen.[24]

Table 13 reveals the percentage of followers that obtained a higher return than they would have obtained from holding an alternative (age and gender) feasible portfolio presuming that followers request that investments be shifted as soon as a recommendation is received. Over 70% obtained lower returns than they would have received from investing in the riskiest portfolio that they could choose, and over 90% would have done better to hold the safe portfolio $E$. The table also plots the distribution of net returns: the median is negative and a non-trivial fraction of followers earn net returns of -10% or worse; while those who outperformed the social security portfolios, barely did so.

Table 13: Percentage of followers by risk type that beat a *Buy & Hold* strategy for different feasible portfolios. Followers are assumed to act immediately on all recommendations while their subscription is active.

| Risk type | A | | | | | B | | | | C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benchmark | A | B | C | D | E | B | C | D | E | C | D | E |
| | 0.27 | 0.21 | 0.12 | 0.11 | 0.08 | 0.24 | 0.11 | 0.08 | 0.06 | 0.25 | 0.23 | 0.05 |

Distribution of net returns
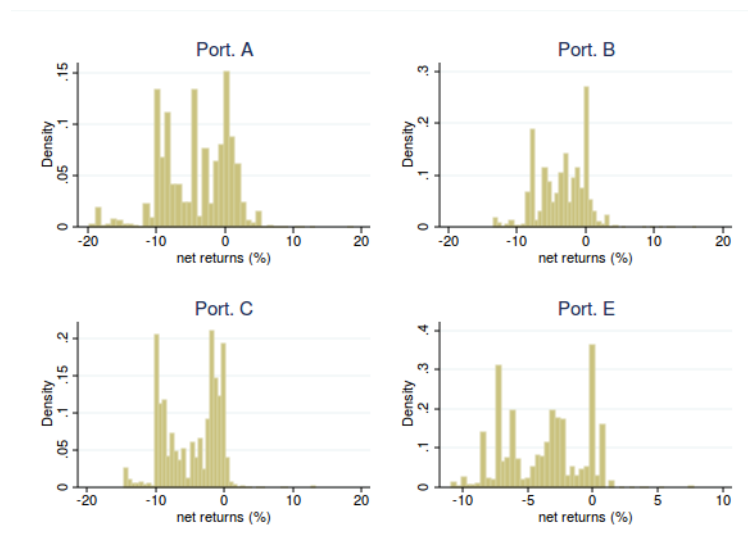


Figure 4 shows that many of H&L's subscribers were still active for the last announcement

in our sample, and many had been following for over a year. The bottom panel reveals that over half of H&L's customers renew their subscriptions despite their seemingly poor realized returns. This leads us to ask: Why do followers act on H&L's recommendations? Are they aware of their performance? We investigate these questions using a survey of H&L clients.

## 2.4   Characterizing followers

Table 3 reveals that paid and second-hand followers of H&L have over twice the savings of the average investor, consistent with Fuentes et al. [14] who find that active investors in the system have higher savings than those who do not change portfolio choices. To glean more insights, we conducted a survey during October and November 2016 of followers of H&L and other advisers providing a similar service. We invited them to distribute the survey to followers by email. Appendix A lists the questions. We also launched our survey in Facebook. The Facebook post was randomly displayed to stratified segments of adults in Chile according to age and gender. We now compare the results of our survey with the EPS.

The vast majority of respondents—almost 87%—claim to be current followers of H&L (see Table 18 in appendix B), so our analysis focuses on this sub-population. We contrast these respondents with the 68% of respondents from the 2015 EPS who claim to be members of the AFP system. We divide AFP members into two groups according to whether they claim to know which portfolio(s) they are holding. About 77% of AFP members do *not* know their portfolio (see Table 19 in appendix B). We label these groups AFP DNK if do not know the portfolio, and AFP otherwise. Table 14 provides some demographics of these groups. Striking differences appear when comparing education and income: H&L followers are far more educated (almost 75% have university degrees vs. 36% for AFP members who know their portfolios, and only 14% for those who do not), they have incomes that are several multiples of the other two groups, and they are more than twice as likely to hold savings other than mandatory savings. These three findings are consistent with Fuentes et al. [14]. The three groups do not differ substantially in risk aversion. Interestingly, a *smaller* proportion of followers self-describe themselves as having a good or very good financial knowledge.

Greater savings and income, and higher education suggest that followers are more sophisticated than typical members of the other two groups. Our survey features two questions pertaining to financial sophistication. These questions belong to a group of "sophisticated" questions designed by the United States Health and Retirement Study (HRS) to identify knowl-

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edge of key financial concepts (Behrman et al. [4]). These two questions were also asked in the 2009 and 2012 EPS. One question is a TRUE/FALSE question about risk diversification; and the other question asked respondents to compute a two-period compound interest problem. We coded answers as correct or incorrect. Table 15 reveals that 85% of followers answered the diversification question correctly, but non-followers did no better than would be expected by chance. The question related to compound interest is even more telling: 64% of followers answer this complex question[25] correctly versus only 3-5% of non-followers. In sum, followers are *very* financially sophisticated, whereas the typical investor is quite unsophisticated.

The fact that followers are sophisticated does not necessarily mean that they are aware of the poor performance of H&L's strategy. To test their awareness we had respondents rank portfolios A, C, E and their own savings in terms of returns over the past twelve months. The survey was "open" from October to November 2016; Figure 5 plots these twelve month returns starting on the 30th September until the end of November. The figure shows that the ranks of portfolios A, C and E do not change over this period, but the rank of H&L's strategy varies depending on the specific day survey respondents computed the ranking. Therefore, we only compare the relative rank of their own savings with respect to portfolio E.

Figure 5: Twelve month return during survey period for each portfolio and for H&L's strategy.



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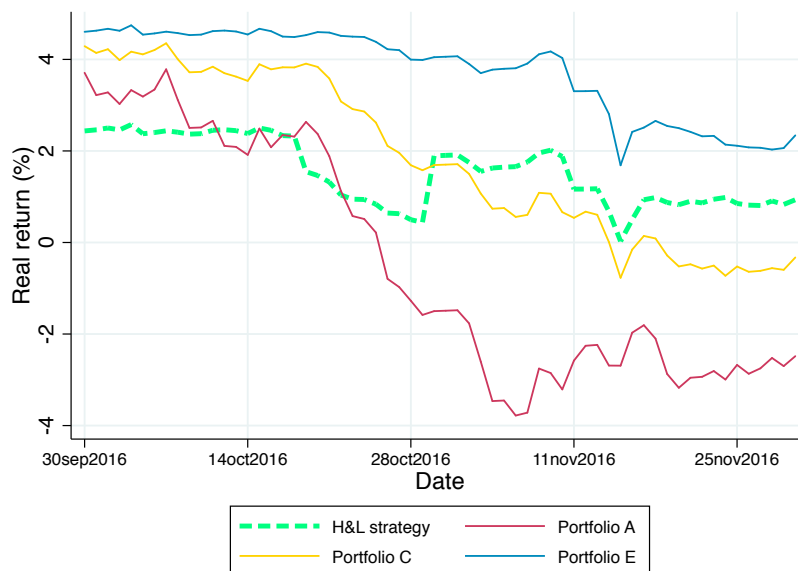
[25]Let's say you have 200 in a savings account. The account pays 10% interest per year. How much do you have after two years?

Table 14: Demographics from our survey and the 2015 EPS. Table entries represent percent of observations in that category.

| | Gender | |
| --- | --- | --- |
| | Male | Female |
| H&L | 79.3 | 20.7 |
| AFP | 61.4 | 38.6 |
| AFP DNK | 51.8 | 48.2 |

| | Hold other savings | |
| --- | --- | --- |
| | Yes | No |
| H&L | 69.4 | 30.6 |
| AFP | 32.4 | 67.6 |
| AFP DNK | 19 | 81 |

| | Age | | | |
| --- | --- | --- | --- | --- |
| | 18-34 | 35-54 | 55-64 | 65+ |
| H&L | 25.6 | 57.2 | 15 | 2.3 |
| AFP | 29.2 | 58.1 | 10.5 | 2.3 |
| AFP DNK | 35.9 | 43.9 | 12 | 8.1 |

| | Income (USD) | | | |
| --- | --- | --- | --- | --- |
| | 500 | 500-1,000 | 1,000-2,000 | 2,001+ |
| H&L | 2.5 | 11.6 | 37.3 | 48.5 |
| AFP | 31.8 | 32.2 | 27.6 | 8.5 |
| AFP DNK | 65.9 | 25.5 | 7.3 | 1.3 |

| | Education | | | | |
| --- | --- | --- | --- | --- | --- |
| | Primary | Secondary | Tech. Degree | Uni. Degree | Postgraduate |
| H&L | 0 | 4 | 21.7 | 56.5 | 17.8 |
| AFP | 3.7 | 40.1 | 20.9 | 30.1 | 5.2 |
| AFP DNK | 19.6 | 53.6 | 13.2 | 12.7 | 1 |

| | Financial knowledge self perception (2012 EPS) | | | | |
| --- | --- | --- | --- | --- | --- |
| | Very bad | Bad | Intermediate | Good | Very good |
| H&L | 6.7 | 28.2 | 53.5 | 10.7 | 0.9 |
| AFP | 6.8 | 16.1 | 47.7 | 24.9 | 4.6 |
| AFP DNK | 16.9 | 29.2 | 41.8 | 11.1 | 1 |

| | Risk aversion (2012 EPS) | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| H&L | 2.45 | 1.76 | 3.57 | 5.93 | 6.81 | 23.44 | 15.39 | 20.78 | 14.12 | 2.39 | 3.38 |
| AFP | 5.01 | 1.86 | 2.77 | 5.46 | 6.08 | 17.9 | 12.62 | 13.6 | 14.24 | 8.75 | 11.71 |
| AFP DNK | 7.81 | 4.39 | 6.13 | 6.98 | 7.12 | 17.39 | 11.18 | 11.65 | 10.71 | 4.59 | 12.05 |

Using only observations of individuals who had followed H&L for over a year, we divide respondents who ranked portfolios into groups. The "full-ranking" group consists of those who ranked all three portfolios and their own savings. We divide those who only give a partial ranking into three groups: partial ranking group 1 consists of those who ranked portfolio E, their own portfolio, and either A or C. Partial ranking group 2 consists of those who provided rankings for at least two portfolios but failed to provide a ranking for their own savings. Partial ranking group 3 consists of those who ranked portfolio E and their own savings only. About 40% of followers do not provide rankings, and about 9% only give his

Table 15: Percent of correct answers to questions related to financial sophistication.

|  | Risk diversification | Compound interest |
|---|---|---|
| H&L followers | 85% | 64% |
| AFP | 55% | 5% |
| AFP DNK | 48% | 3% |

own ranking and a portfolio other than E, and are omitted.

Table 16 shows that those who rank portfolio returns tend to be well informed—over 60% rank the returns on portfolios A, C and E correctly; a little over half correctly recognize that the return on the safe portfolio E exceeded the return from following H&L's strategy; and over 75% of those giving a response correctly assessed that the real return on their savings from following H&L's strategy in the past twelve months was between 0 and 4%.[26] In sum, most investors have good ideas of their actual return, and a non-trivial majority of followers pay extensive attention to the relative performance of different pension portfolios. Some investors overestimate the performance of H&L's strategy relative to the safe portfolio E, but even then a majority get this ordering right.

Table 16: Portfolios ranking and H&L relative performance.

| Group | Sample size Num. respondents | (A <C <E) Correct answers | (H&L <E) Correct answers |
|---|---|---|---|
| Full ranking | 2,964 | 1,693 | 1,489 |
|  |  | 57% | 50% |
| Partial ranking 1 | 300 | 197 | 191 |
|  |  | 66% | 64% |
| Partial ranking 2 | 1,083 | 702 |  |
|  |  | 65% |  |
| Partial ranking 3 | 89 |  | 50 |
|  |  |  | 56% |

Respondents are classified into four groups: (i) Full ranking, those who ranked all portfolios including their own savings; (ii) Partial ranking 1 have rankings for portfolio E, their own portfolio and either A or C; (iii) Partial ranking 2 have rankings for at least two portfolios but not for their own savings; (iv) Partial ranking 3 have rankings for portfolio E and their own savings only.

In sum, we have documented that: (1) followers are highly financially sophisticated—far more so than the average investor—and they have a lot more at stake; (2) most followers were harmed by following H&L; and (3) a majority of followers is aware of the bad performance. Why then do investors follow H&L? Our survey asks respondents to rank five

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[26]This question is demanding—a reader should reflect on how the 12-month return on their own portfolio ranked vis à vis the S&P 500 or MSCI World Index.

Table 17: Real returns on own savings over the previous 12 months. Actual return on H&L's strategy fluctuated between 0 and 4%.

| Group | Num. of respondents | Less than 0% | Between 0 and 4% | Higher% than 4% | Don't know / No Response |
|---|---|---|---|---|---|
| Full ranking | 1,859 | 37 | 1,202 | 361 | 259 |
| | | 1.9% | 64.7% | 19.4% | 13.9% |
| Partial ranking 1 | 178 | 1 | 122 | 33 | 22 |
| | | 1% | 69% | 19% | 12% |
| Partial ranking 2 | 676 | 13 | 435 | 129 | 99 |
| | | 2% | 64% | 19% | 15% |
| Partial ranking 3 | 60 | 0 | 45 | 8 | 7 |
| | | 0% | 75% | 13% | 12% |
| No ranking | 1,852 | 39 | 953 | 267 | 593 |
| | | 2% | 52% | 14% | 32% |

Respondents are classified into four groups: (i) Full ranking, those who ranked all portfolios including their own savings; (ii) Partial ranking 1 have rankings for portfolio E, their own portfolio and either A or C; (iii) Partial ranking 2 have rankings for at least two portfolios but not for their own savings; (iv) Partial ranking 3 have rankings for portfolio E and their own savings only.

possible reasons for why they follow their current advisor.[27] Figure 6 presents a puzzle: it reveals that current H&L followers indicate that the most important reasons for following H&L are: higher returns, loss minimization and trust...

Of course, inverting the standard investment caveat, past bad performance is no guarantee of future bad performance. The fact that most respondents cite trust in H&L as a key reason for following, may indicate that they believe that H&L offers them a higher *expected* return, or that they value having someone "looking after" their savings for them. Moreover, some followers over-estimate relative returns of H&L, possibly due to the complex pricing rules used by AFPs to value transferred funds, and some may also confuse the good performance of a portfolio just prior to H&L's recommendation. The bottom line remains that understanding how and why individuals allocate pension investments as they do is germane not only to the Chilean Social Security system, but to retirement savings everywhere.

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[27]Only a few respondents selected an "other" option, and its average importance level is low.

Figure 6: Why current followers follow H&L.
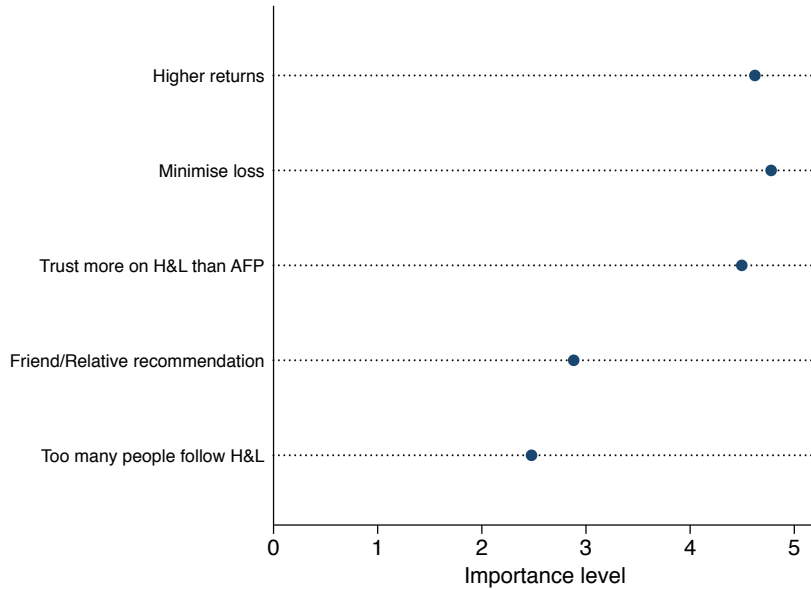


## 3 Conclusion

Our paper documents the massive effects that portfolio recommendations by the pension advisory service H&L have had on pension investments by individuals, and the consequences for the Chilean stock market. Investors have come to believe that H&L's recommendations contain information with predictive value—leading to pension transfers that amount to as much as 25% of total portfolio holdings and 1.3% of GDP. Prior to investors following this advice in large numbers, investors could have benefited from it; but once investors started following H&L's advice, stock prices responded before investors could reallocate pension investments in time to benefit. As a result, pension investors are harmed by following H&L's advice; most investors would have done better to stick with *whatever* pension position they had at the outset.

We establish that H&L bases recommendations on the immediate past performances of the Chilean stock market—recommending riskier portfolios after the market rises, and recommending safer portfolios after it falls. The extreme short-run nature of the recommendation model means that others cannot forecast and frontrun H&L's advice; consistent with this, we do not observe abnormal portfolio flows or stock volume before new recommendations.

Individuals following H&L have high incomes and are highly educated and financially sophisticated, especially relative to non-followers. Moreover, followers have a good under-

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standing of the relative performances of different portfolios, albeit modestly over-estimating the returns from following H&L. Remarkably, despite evidence of poor past performance, the key reasons that individuals give for following H&L are: high returns, minimize risk and trust.

Our findings suggest care in the design of "privatized" social security. "Privatized" systems seek to align individual investments with risk attitudes, while avoiding shortfalls in savings due to bad investment choices or moral hazard by investment advisors. One way to do this is to limit the set of investment alternatives. We show that even with sharp limitations, sophisticated pension investors can still be harmed. Our analysis also highlights a potentially adverse consequence of limited choice sets. With few investment alternatives, common information arrival—here taking the form of portfolio recommendations by H&L— can result in massive portfolio reallocations. In Chile, these reallocations did not overwhelm liquidity provision because AFPs can allocate them to liquid foreign equity markets, avoiding volume surges in the Chilean stock market. This might not be possible for savings plans with greater exposure to domestic equity markets.

# References

[1] Arenas de Mesa, Alberto, David Bravo, Jere R. Behrman, Olivia S. Mitchell, and Petra E. Todd. With assistance from Andres Otero, Jeremy Skog, Javiera Vasquez, and Viviana Velez-Grajales. (2008). "The Chilean Pension Reform Turns 25: Lessons from the Social Protection Survey." In Lessons from Pension Reform in the Americas. Stephen Kay and Tapen Sinha, Eds. Oxford: OUP 23-58. (Go back)

[2] Barber, B.; R. Lehavy; M. F. McNichols; and B. Trueman. "Can Investors Profit From The Prophets? Security Analyst Recommendations and Stock Returns." *Journal of Finance* 56 (2001): 531–563. (Go back)

[3] Barber, B.; R. Lehavy; M. McNichols; and B. Trueman. "Buys, holds, and sells: The distribution of investment banks' stock ratings and the implications for the profitability of analysts' recommendations." *Journal of Accounting and Economics* 41 (2006): 87–117. (Go back)

[4] Behrman, Jere R., Olivia S. Mitchell, Cindy K. Soo, and David Bravo."How financial literacy affects household wealth accumulation." *American Economic Review* 102, no.

3 (2012): 300. (Go back)

[5] Bernhardt, Dan, and Ryan J. Davies. "Smart fund managers? Stupid money?." *Canadian Journal of Economics* 42, no. 2 (2009): 719-748. (Go back)

[6] Berstein, Solange, Guillermo Larran, Francisco Pino, and Eduardo Morn."Chilean Pension Reform: Coverage Facts and Policy Alternatives [with Comments]." *Economía* (2006): 227-279. (Go back)

[7] Boni, L., and K. L. Womack. "Analysts, industries, and price momentum." *Journal of Financial and Quantitative Analysis* 41 (2006), 85–109. (Go back)

[8] Carlin, Bruce I., and Shaun William Davies. "The Implementation of State Sponsored Retirement Plans." (2016). (Go back)

[9] Chevalier, Judith, and Glenn Ellison. "Risk Taking by Mutual Funds as a Response to Incentives." *Journal of Political Economy* 105, no. 6 (1997): 1167-1200. (Go back)

[10] Da, Zhi and Larrain, Borja and Sialm, Clemens and Tessada, Jos, Coordinated Noise Trading: Evidence from Pension Fund Reallocations (March 11, 2016). Available at SSRN: http://ssrn.com/abstract=2558773 or http://dx.doi.org/10.2139/ssrn.2558773. (Go back)

[11] Dahlquist, Magnus, José Vicente Martinez, and Paul Söderlind. "Individual investor activity and performance." *The Review of Financial Studies* 30.3 (2016): 866-899. (Go back)

[12] Edwards, Sebastian."The Chilean pension reform: A pioneering program." In *Privatizing social security*, pp. 33-62. University of Chicago Press, 1998. (Go back)

[13] Financial Stability Board. *Minutes of meeting held on July 26, 2013.* (Go back)

[14] Fuentes, Olga, Pamela Searle, and Félix Villatoro. "Active Investment Decisions of Members in the Chilean DC Pension System: Performance and Learning over time". 2013. Working Paper. (Go back)

[15] Gennaioli, Nicola, Andrei Shleifer, and Robert Vishny. "Money doctors." *Journal of Finance* 70, no. 1 (2015): 91-114. (Go back)

[16] Ghilarducci, Teresa and Tony Hamilton, 2016. "A Comprehensive Plan to Confront the Retirement Savings Crisis: A withe Paper." Schwartz Center for Economic Research, The New School, NY, NY. (Go back)

[17] Inderst, Roman, and Marco Ottaviani. "Financial advice." *Journal of Economic Literature* 50, no. 2 (2012): 494-512. (Go back)

[18] Israelsen, Craig. "A refinement to the Sharpe ratio and information ratio." *Journal of Asset Management* 5.6 (2005): 423-427. (Go back)

[19] Ivković, Zoran, and Narasimhan Jegadeesh. "The timing and value of forecast and recommendation revisions." *Journal of Financial Economics* 73, no. 3 (2004): 433-463. (Go back)

[20] Jegadeesh, N., and W. Kim. "Do analysts herd? An analysis of recommendations and market reactions." *Review of Financial Studies* 23 (2010): 901–937. (Go back)

[21] Jegadeesh, N.; J. Kim, S. Krische; and C. Lee. "Analyzing the Analysts: When do recommendations add value?" *Journal of Finance* 59 (2004): 1083–1124. (Go back)

[22] Joubert, Clement. "Pension Design with a Large Informal Labor Market: Evidence from Chile." *International Economic Review* 56, no. 2 (2015): 673-694. (Go back)

[23] Loh, R., and R. M. Stulz. "When are Analyst Recommendation Changes Influential?" *Review of Financial Studies* 24 (2011): 593–627. (Go back)

[24] Powdthavee, Nattavudh, and Yohanes E. Riyanto. "Would you pay for transparently useless advice? A test of boundaries of beliefs in the folly of predictions." *Review of Economics and Statistics* 97.2 (2015): 257-272. (Go back)

[25] Sirri, Erik R., and Peter Tufano. "Costly search and mutual fund flows." *Journal of Finance* 53 (1998): 1589-1622. (Go back)

[26] Stickel, S. "The Anatomy of Performance of Buy and Sell Recommendations." *Financial Analysts Journal* 51 (1995): 25–39. (Go back)

[27] Superintendence of Pensions. *The Chilean Pension System.* 2010. (Go back)

[28] Superintendence of Pensions. *Objetivo de los Fondos de Pensiones y los Traspasos Frecuentes de Fondo.* Nota Técnica, Junio 2013. (Go back)

[29] Womack, K. L. "Do Brokerage analysts' recommendations have investment value?" *Journal of Finance* 51 (1996): 137–167. (Go back)

[30] Zheng, Lu. "Is money smart? A study of mutual fund investors' fund selection ability." *Journal of Finance* 54, no. 3 (1999): 901-933. (Go back)

# Appendix A   Survey questions

1. Do you currently follow the recommendation of an adviser to manage your social security savings? Which one?

2. Currently do you follow any of the following advisers in social media?

   **If Yes in 1**:

3. When did you start following the recommendations of your current adviser?

4. Why do you follow the announcements of your current adviser?

5. In the last twelve months, what is the return on your savings?

6. Rank portfolios A, C, E and your own savings in terms of returns in the last twelve months

7. How much time did it pass since you first heard about your current adviser and when you started following the recommendations?

8. Usually, how fast do you act upon recommendations?

9. Did you follow the recommendations of another adviser before?

   **If No in 1**:

10. What is the return on your savings in the last twelve months?

11. Rank portfolios A, C, E in terms of returns in the last twelve months

12. Are mandatory savings your main source of savings for retirement?

13. Did you follow the recommendations of another adviser before?

    **For everyone**:

14. Gender

15. Education

16. Age

17. Income (monthly individual income)

18. Where do you live?

19. Generally, how is your knowledge on financial issues?

20. In a scale from 0 to 10, how risk averse are you? (where 0 is not willing to take any risk)

21. True or false: buying share of a single firm is less risky compared to buying, with the same money, shares of different companies.

22. Let's say you have 200 in a savings account. The account pays 10% interest rate per year. How much do you have after two years?

23. Do you have voluntary savings?

# Appendix B   EPS and survey samples

This appendix reports sample statistics for followers and members of the AFP system. Table 18 reports the number of observations in our survey, and the number of observations in the different EPS. Table 19 decomposes the observations used in our analysis.

Table 18: Survey observation numbers by method of collection

| Own survey | | EPS† survey | | |
|---|---|---|---|---|
| Source | Obs. | Source | Obs. | Obs.(iw) |
| H&L email list | 9,373 | EPS 2015 | 16,906 | 13,560,981 |
| Other advisors | 118 | EPS 2012 | 15,998 | 12,718,525 |
| Facebook | 547 | EPS 2009 | 14,463 | 12,765,015 |

† The Obs. (iw) column refers to the expanded sample by "importance weights" provided in the EPS.

Table 19: Sample selection

| Source | | Sample size | Per cent of total N |
|---|---|---|---|
| Our survey | current H&L followers | 8,703 | 86.7 |
| EPS 2015 | in AFP system | 9,253,512 | 68.2 |
| | Know portfolio | 2,090,012 | 22.5 |
| | Don't know portfolio | 7,163,500 | 77.5 |
| EPS 2012 | in AFP system | 8,431,177 | 66.3 |
| | Know portfolio | 2,577,376 | 30.5 |
| | Don't know portfolio | 5,853,801 | 69.5 |
| EPS 2009 | in AFP system | 8,288,982 | 64.9 |
| | Know portfolio | 2,905,235 | 35.0 |
| | Don't know portfolio | 5,383,747 | 65.0 |

# Appendix C    Modified Sharpe ratio

In this appendix we show the modified Sharpe ratio (Israelsen [18]) for H&L's strategy and for each portfolios besides portfolio E. We use Portfolio E as the risk free portfolio when calculating the modified Sharpe ratio. The original Sharpe ratio is not valid when the excess return is negative. The modified ratio corrects this. As Table 12 reports, portfolio E yields the highest return for the period analyzed. Interpretations of the modified ratio are similar to those of the original Sharpe ratio: a higher ratio reveals a higher return after controlling for risk.

Let ER be the average of the daily excess return of portfolio X relative to portfolio E, and SD the standard deviation of the daily excess return. The modified Sharpe ratio is defined as:

$$\text{Modified Sharpe ratio } = \frac{\text{ER}}{\text{SD}^{\text{ER/abs ER}}}, \tag{1}$$

where abs ER is the absolute value of ER. From equation (1) we see that if ER is positive then the Sharpe ratio and the modified version coincide. If ER is negative then the exponent in the denominator is -1, and so the modified Sharpe ratio becomes the product of ER and SD, instead of their ratio.

The results presented in Table 20 are obtained adjusting equation (1) in two ways: first we multiply the ratio by 252, the (average) number of trading days in a year; and second, because both ER and SD are close to zero, when ER is negative the ratio becomes very small, therefore we multiply negative entries by 100,000 so that scales are similar.

Table 20: Modified Sharpe Ratios for H&L's strategy and social security portfolios A, B, C & D starting with any of the first 20 recommendations until September 30, 2016. Column H&L: cumulative return for follower acting the day a recommendation is made. Column *inst* captures the return that would obtain were investments transferred at the moment a recommendation is made, before the market response.

| Starting recomm. | Benchmark A | B | C | D | H&L | *inst* |
|---|---|---|---|---|---|---|
| 1 | -6.46 | -5.65 | -1.59 | -0.48 | 0.83 | 4.64 |
| 2 | 2.70 | 1.24 | 2.97 | 3.21 | 0.85 | 4.71 |
| 3 | 2.63 | 0.88 | 2.63 | 2.73 | 0.58 | 3.89 |
| 4 | 1.97 | 0.33 | 2.62 | 3.22 | 0.58 | 3.92 |
| 5 | -1.86 | -3.02 | -0.30 | -0.03 | -3.45 | 0.21 |
| 6 | 2.38 | 0.49 | 2.54 | 3.07 | -3.72 | 0.33 |
| 7 | 2.13 | 0.25 | 2.18 | 2.76 | -4.05 | 0.99 |
| 8 | 2.95 | 1.01 | 2.86 | 3.57 | -4.13 | 1.05 |
| 9 | 3.81 | 2.24 | 4.52 | 5.06 | -3.13 | 2.19 |
| 10 | -0.14 | -2.06 | 0.38 | 0.93 | -3.55 | 2.08 |
| 11 | 0.39 | -1.52 | 0.87 | 1.50 | -3.14 | 2.67 |
| 12 | 1.30 | 0.26 | 2.40 | 2.04 | -3.57 | 2.56 |
| 13 | 2.21 | 1.50 | 3.87 | 3.63 | -2.35 | 3.13 |
| 14 | 2.08 | 1.21 | 3.76 | 3.54 | -2.42 | 3.11 |
| 15 | 1.67 | 1.40 | 3.82 | 2.72 | -3.60 | -0.36 |
| 16 | -3.25 | -2.30 | 0.01 | -0.20 | -3.85 | -0.18 |
| 17 | -8.74 | -5.08 | -1.11 | -0.34 | -4.95 | -0.40 |
| 18 | -11.53 | -6.29 | -1.67 | -0.46 | -5.09 | -0.28 |
| 19 | -4.43 | -2.81 | -0.26 | -0.12 | -5.65 | -0.69 |
| 20 | -1.43 | -1.22 | 0.23 | 0.57 | -3.77 | -0.73 |