Pension Fund Flows, Exchange Rates, and Covered Interest Rate Parity

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Abstract

Frequent, yet uninformed, market timing recommendations by a financial advisory firm generate significant flows for Chilean pension funds. These flows give rise to substantial changes in the Chilean foreign exchange due to the funds' high allocation to international equities. Hedging by local banks propagates the demand fluctuations from the spot to the forward currency market and results in deviations from covered interest rate parity. Using bank balance sheet data, we confirm that banks' risk bearing constraints create limits to arbitrage.

Keywords: Exchange rates; CIP deviations; Pension funds; Market efficiency

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1 Introduction

In a world with imperfect financial markets, non-fundamental capital flows can have an impact on asset prices, exchange rates, and arbitrage relationships, such as the covered interest rate parity (Maggiori, 2022). However, it is an empirical challenge to disentangle informed from uninformed flows, and to separately identify their effects on asset prices.

In this paper we take advantage of large flows triggered by the frequent market timing recommendations of a financial advisory firm in Chile. These recommendations give rise to sizable flows in the Chilean pension system as investors reallocate their savings between equity and bond funds. Given the high degree of international diversification of the equity funds, rebalancing generates large sales or purchases of foreign currency as an unintended consequence of the reallocations. Using these fluctuations, we are able to identify demand changes in the spot market that are largely unrelated to foreign exchange fundamentals. Because of market segmentation, these demand fluctuations are accommodated by local banks mainly through borrowing (or lending) foreign currency abroad. Due to the banks' hedging activities, demand fluctuations in the spot market then propagate to the forward currency market, which results in deviations from covered interest rate parity (CIP) (Du, Tepper, and Verdelhan, 2018).

The Chilean pension system allows retirement savers to allocate their investments across funds with different asset allocations (from funds mostly invested in global stocks to funds mostly invested in Chilean fixed income). A financial advisory firm called Felices y Forrados (FyF, which translates to "Happy and Loaded") was founded in 2011 to cater to the demand of individual investors to time the market. Between 2011 and 2020, FyF made 82 fund reallocation recommendations. As an illustration of the impact of recommendations on flows, Figure 1 shows FyF's recommendations (depicted with vertical lines) during 2018 and the daily flows to the fund with the highest allocation to stocks (i.e., fund A). The largest spikes

in the pension flows almost always coincide with FyF recommendations. Recommendations to buy fund A (depicted with dotted vertical lines) are associated with inflows to fund A and recommendations to sell (depicted with solid vertical lines) are associated with outflows from fund A. Da, Larrain, Sialm, and Tessada (2018) show that these recommendations, while not random or exogenous, are largely uninformative in the sense that they do not generate excess returns over buy-and-hold strategies on a consistent basis. We confirm their result during our expanded sample.[1] In addition, using daily fund transfer data, we confirm that FyF-induced pension flows reflect a large number of transfers by small retail investors rather than a few transfers by wealthy sophisticated investors.

Fund reallocations do not just impact Chilean stock and bond markets (see Da, Larrain, Sialm, and Tessada 2018, and Bernhardt and Cuevas 2022), but also the Chilean foreign exchange market. The most risky fund invests around 75% of its portfolio in international assets while the safest fund mostly holds assets denominated in Chilean pesos, consistent with the "home-currency bias" documented by Maggiori, Neiman, and Schreger (2020) for bond portfolios. Hence, a FyF recommendation to switch between bond and stock funds results in a need to trade almost US$850 million worth of Chilean pesos. We document that these portfolio reallocations move the exchange rate of the Chilean peso relative to the U.S. dollar by 0.59% over a few trading days.

By examining trading imbalances of the local banking sector, we confirm that domestic banks provide liquidity to the pension funds in the spot market. This is not surprising as the Chilean peso is a non-deliverable currency in our sample period, which effectively makes trading in the spot market very costly for foreigners.[2] If pension funds need to buy foreign

[1] FyF closed its operation in 2021 as it was unable to meet the new capital requirements set up by the Chilean regulator for pension advisors. The Chilean consumer protection agency (SERNAC) subsequently sued FyF for false advertising arguing that their alleged market-timing abilities were not verifiable. In July 2023, the Chilean courts found FyF guilty of false advertising.

[2] Appendix A provides more institutional details of the Chilean foreign exchange market. The Chilean situation is not uncommon among non-deliverable currencies such as the Korean Won, the Indian Rupee, the Brazilian Real, or the Argentinian Peso.

currency, then banks borrow foreign currency abroad and sell it to the pension funds. The local banks then hedge their currency exposure by taking offsetting positions in the forward market against foreigners. For instance, after a recommendation to move from bond to stock funds, local banks buy forward U.S. dollars representing close to 2% of their equity capital. Thus, local banks propagate the flow-induced shocks from the spot market to the forward market due to their hedging needs.

We find that the forward premium (the difference between forward and spot prices) moves according to whether local banks need to buy or sell in the forward market. This is consistent with the idea that local banks charge an intermediation fee for being the bridge between the spot and forward markets, or between the domestic pension funds and foreign investors (see Borio, McCauley, McGuire, and Sushko 2016; Borio, Iqbal, McCauley, McGuire, and Sushko 2018, Liao and Zhang 2021, Du and Schreger 2021, and Wallen 2022). Fluctuations in the forward spread translate into CIP deviations. For example, the cross-currency basis (CCB), which measures deviations from CIP in the foreign exchange market, falls by close to 25 basis points (from an average of -36 bp) after a recommendation to move from bond to stock funds. We confirm that changes in the forward spread are not compensated by changes in interest rate differentials, which could be derived from time-varying default risk, among other factors.

Given the difficulty for foreign investors to trade in the spot market for Chilean pesos, local banks would be in a good position to arbitrage CIP violations. However, we find that CIP deviations survive due to limits to arbitrage. Regulatory requirements on capital and liquidity impose costs for balance-sheet-intensive strategies such as trading against CIP violations. Consistent with such balance sheet costs, we find that FyF's recommendations cause greater price effects in the spot and forward markets around quarter ends (Du, Tepper, and Verdelhan, 2018). We also find that price effects are stronger when banks recently experienced a tightening capital constraint, consistent with He, Kelly, and Manela (2017),

Du, Hébert, and Huber (2023), and Cenedese, Della Corte, and Wang (2021).

Our paper contributes to several strands in the literature. First and foremost, it contributes to the literature that studies the origins of CIP violations (Du, Tepper, and Verdelhan, 2018). We show that the hedging demand by local banks propagates the shocks from the spot market to the forward market, and that their intermediary role between markets is related to CIP violations. Our data uniquely allows us to quantify banks' hedging demand and CIP violations at the daily frequency. Our findings provide direct support to the recent work on hedging demands by Borio, McCauley, McGuire, and Sushko (2016), Borio, Iqbal, McCauley, McGuire, and Sushko (2018), and Liao and Zhang (2021). Keller (2023) studies whether CIP violations can affect bank lending in an emerging economy. She shows that banks shift the lending currency according to CIP-related arbitrage activity.

The main advantage of our setup is that we can identify clean and significant shocks to the foreign exchange market. First, FyF's recommendations are high-frequency shocks, happening at irregular time intervals, in multiple directions, and with varying degrees of intensity. These shocks, and their implied back-and-forth trading in the foreign exchange market, do not follow the calendar of news releases or a slow-moving commodity cycle. The shocks are also unrelated to standard predictive variables in the foreign exchange market (Rossi, 2013). Overall, it is harder to argue that our shocks coincide with omitted variables that might drive currency flows. Second, the source of the flows can be clearly identified as the market timing recommendations by the pension advisory firm FyF.[3] Finally, the flows are large and can have macroeconomic consequences despite the lack of fundamental content. The absence of predictability implies that, despite being repeated shocks, the effects are hard to arbitrage away in advance.

Relatedly, our paper contributes to the understanding of limits to arbitrage in interna-

[3]As Maggiori (2022) points out, "If capital flows are to play a prominent role in pinning down exchange rates, then a natural question is what drives these flows and how they should be modeled (...) The literature is likely to make much progress in this investigation and move past preliminary answers that treat these flows as exogenous shocks."

tional markets (Shleifer and Vishny, 1997). The recent paper by Itskhoki and Mukhin (2021) highlights the importance of noise traders, risk averse intermediaries, and limits to arbitrage in the currency market. Our unique setting and detailed data offer a rare opportunity to showcase the interaction between noise traders (pension fund investors acting on FyF's recommendations) and financial intermediaries (local banks). According to Du and Schreger (2021), the role of large non-bank investors has received little attention in the literature on CIP violations. Limits to arbitrage arising from regulatory constraints and banks' risk bearing capacity explain why demand fluctuations can result in persistent CIP violations. Our findings complement those in Cenedese, Della Corte, and Wang (2021), Jiang, Krishnamurthy, and Lustig (2021), Wallen (2022), and Hertrich and Nathan (2023), regarding how supply restrictions, often arising from banking regulations, interact with demand imbalances to produce deviations from arbitrage relationships in currency markets.

Finally, our results also contribute to the large literature that examines the impact of financial flows on spot exchange rate movements.[4] More specifically, our paper belongs to a recent literature that estimates the slope of financial demand curves by taking advantage of relatively exogenous and uninformed demand shocks.[5] A popular empirical strategy to identify demand shocks uses changes in the composition of international equity and bond indexes (see Hau, Massa, and Peress 2010, Pandolfi and Williams 2019, and Broner, Martin, Pandolfi, and Williams 2021). Another approach is to conduct structural estimations, as illustrated by Koijen and Yogo (2020). In a contemporaneous paper, Pinto-Avalos, Bowe,

[4]See, for example, Evans and Lyons (2002), Hau and Rey (2006), Mancini, Ranaldo, and Wrampelmeyer (2013), Gabaix and Maggiori (2015), Karnaukh, Ranaldo, and Söderlind (2015), Verdelhan (2018), Camanho, Hau, and Rey (2022), Hasbrouck and Levich (2019), Ranaldo and Somogyi (2021), and Jiang, Richmond, and Zhang (2022). Maggiori (2022) provides a comprehensive review of the literature.

[5]We need large aggregate shocks to estimate macro elasticities and move beyond micro elasticities. Papers estimating micro-elasticities on the broad literature of flows and asset prices include, for example, Shleifer (1986), Wurgler and Zhuravskaya (2002), and Duffie (2010). A large number of papers study the impact of fund flows, including Warther (1995), Edelen and Warner (2001), Frazzini and Lamont (2008), Chen, Goldstein, and Jiang (2010), Ben-David, Franzoni, and Moussawi (2012), Ben-Rephael, Kandel, and Wohl (2012), Lou (2012), Ben-David, Li, Rossi, and Song (2021), Jansen (2021), and Dou, Kogan, and Wu (2022). The "inelastic market hypothesis," recently proposed by Gabaix and Koijen (2021), predicts that asset prices, even at the macro-level, respond to day-to-day flows.

and Hyde (2022) also study the impact of FyF recommendations on the Chilean spot foreign exchange market, although they do not study the forward market nor CIP violations.

The rest of the paper is organized as follows. Section 2 describes the data sources and the institutional design. Section 3 explains the empirical strategy and reports the results on fund flows. Section 4 studies the impact on the spot exchange rate. Section 5 studies the transmission of the recommendations on banking imbalances, and Section 6 investigates the impact of fund flows on CIP deviations. Section 7 concludes.

2 Data and Institutional Design

Our analysis combines multiple data sources. We divide the presentation of the data into five subsections: pension funds, the advisory firm FyF, prices and interest rates, the balance sheet of the banking system, and trading volume and banking imbalances.

2.1 Pension Funds

Private pension fund administrators (AFPs, from their acronym in Spanish) are regulated and supervised by the Superintendencia de Pensiones (SP). There are between six and seven AFPs operating throughout our sample period. Each AFP has to offer five types of funds, labeled A through E, with different asset allocations set by regulation. For example, the maximum equity allocation is 80% for fund A, 40% for fund C, and 5% for fund E. Equity investments above those thresholds are only permitted under special circumstances. There is also a limit on foreign asset holdings for the aggregate portfolio of all funds managed by each AFP, which were 80% at the beginning of our sample period in 2011. The SP makes available a wealth of information about AFPs on its website (www.spensiones.cl). At the monthly level, we obtain for each type of fund (i.e., A to E) the portfolio composition, in terms of broad asset classes and the split between foreign and domestic investments, and

some demographic information about investors.

Table 1 shows the average size of the five funds offered in the pension system. The total assets under management, amounting to approximately US$175 billion, represent close to 65% of Chilean GDP. Fund C, which started earlier than the other other funds, is the largest with US$65 billion assets under management. There are close to 11 million individual fund investments in the pension fund system. On average, 84.5% of individuals between 20 and 65 years old are investors in the pension fund system throughout our sample.[6]

At the system level, close to 42% of the assets under management are invested in foreign assets. The proportion of foreign investments equals 75% for fund A and decreases monotonically to only 6% of fund E. Thus, portfolio reallocations between different funds generate not just flows between equity and bond markets, but also in currency markets. Around two-thirds of foreign currency investments are held in equity securities (i.e., 28.05%/41.58%) and around 70% of all equity investments are invested in foreign equities (i.e., 28.05%/39.83%).

Insert Table 1 here

At the daily level (t), we get the fund share price (P_{ikt}) and assets under management (AUM_{ikt}) for each fund type i (A-E) offered by each AFP k. From there we define the daily flow as:

$$Flow_{ikt} = \frac{AUM_{ikt}}{AUM_{ikt-1}} - \frac{P_{ikt}}{P_{ikt-1}}. \tag{1}$$

According to Chilean regulations, investors are free to request their AFP to transfer their savings between funds.[7] These requests are typically filed online. The AFP has to reallocate

[6]Investors can decide to split their investment into multiple funds, so 11 million fund investments corresponds to fewer than 11 million investors. The 84.5% proportion reported above adjusts for this double counting as some people are invested in multiple funds.

[7]Beyond voluntary transfers, there are transfers between funds that are triggered by the age of the investor if the investor has always taken the default option defined by regulation. For example, fund B is the default option for participants up to 35 years old. Both are moved to fund C when they turn 36. Funds A and E are not default options under the Chilean regulation, hence flows to and from these funds need to be initiated by the investor.

the investor's balance between funds four days after the request (i.e., day *t+4*), although the transfer is executed at share prices on day *t+2*. For example, an investor with N^A shares of fund A who requests a transfer to fund E will be able to buy $N^A \times \frac{P^A_{t+2}}{P^E_{t+2}}$ shares of fund E. This pricing rule is a protection against informed investors that might request a transfer ahead of pension fund shares reflecting the information. The AFP has to delay reallocations between funds when the volume of transfer requests is especially large. In particular, the excess flow above 5% of AUM_{ikt} has to be postponed until the next day. For example, an outflow of 20% of the AUM_{ikt} takes four additional days to be fully implemented. Transfers are organized on a first-come, first-served basis.

2.2 Felices y Forrados

The advisory firm FyF gave asset allocation recommendations to their paying subscribers. Subscribers received an email telling them to sign into the FyF website when a new recommendation was issued.[8] Many more followed FyF on social media.[9] After learning about a recommendation, investors could request their AFP to implement the switch. The request had to be filed on the platform of each AFP and not on a centralized FyF platform. FyF recommended types of funds (A through E, or combinations of them) instead of particular AFPs. Table 2 shows the 82 recommendations that FyF issued between July 2011 and February 2020. There was a new recommendation approximately every six weeks between 2011 and 2017. Then, in 2018, the frequency increased to approximately one recommendation every two weeks. Most recommendations (69) involved fund A. The remaining 13 recommendations shifted assets between funds C, D, or E. Fund B has never been recommended.

Insert Table 2 here

[8]Their website, which is now mostly inactive, is www.felicesyforrados.cl.

[9]By 2020, FyF had 130,000 subscribers (paying approximately USD 3 per month) and 690,000 followers on Facebook.

Figure 1 shows the flows to the aggregate fund A of the Chilean pension system in 2018. The aggregate fund is an AUM-weighted average of all A funds offered by the different AFPs. The vertical lines mark dates of FyF recommendations. Dotted vertical lines mark days where FyF recommends a move toward fund A, and solid lines correspond to dates where FyF recommends a move away from fund A. Most spikes in flows are preceded by FyF recommendations with the correct sign: recommendations to move toward fund A precede large inflows and conversely for recommendations away from fund A. We can also discern a small time gap between the recommendations and the extreme flows, which corresponds to the four days that the AFPs have to transfer the funds between the investment options.

Insert Figure 1 here

Figure 2 shows flows for all the years in our sample. Again, most extreme flows, either positive or negative, are preceded by FyF recommendations. Daily flows after FyF recommendations can be as high as 3% (e.g., after November 11, 2019), while on non-recommendation dates the average flow is close to zero. This illustrates the high popularity of FyF, most of which was achieved using effective social media campaigns.

Insert Figure 2 here

We also obtain data on the number of daily transfers between pension funds for the years 2014-2020. These data include the number of people transferring on each day, together with the gender, age, account balance, and the history of personal transfers, which helps us to identify likely FyF followers. Figure A.1 in the Appendix shows the number of net transfers toward fund A in our sample. The general pattern looks very similar to flows based on assets under management depicted in Figure 2.

We cannot identify FyF subscribers in our data, but we can study who behaves in a manner that is consistent with FyF recommendations. We define flows that are "consistent"

with FyF recommendations as transfers that occur between the funds recommended by FyF (e.g., from fund E to fund A) and between days $t + 4$ and $t + 17$ after a recommendation. This window starts on day $t + 4$ because transfers are registered in the system four days after the initial request is made. We allow for two weeks after the recommendation since not all FyF followers might transfer on the same day. Also, funds cannot transfer more than 5% of assets under management each day, and so large flows can be delayed by several days. Between March 2014 and February 2020, 45% of fund transfers (3.6 million transfers) are consistent with FyF recommendations according to our definition. FyF-consistent transfers are made by 383,716 unique individuals. Non-FyF transfers (4.3 million transfers) are made by 1,180,826 individuals. Hence, FyF-consistent transfers are concentrated among fewer individuals, suggesting we are capturing retail investors who likely follow FyF.

Insert Table 3 here

In Table 3 we show that the requests that are consistent with FyF are made by younger individuals (40.1 vs. 44.9 years), male participants, (71% vs. 64%), individuals with smaller account balances (USD 22,476 vs. USD 39,508), and individuals that in general make more transfers (40.9 vs. 22.6). Individuals with FyF-consistent transfers are more likely to have more of their other transfers also consistent with FyF (70.5% vs. 27.3%). Thus, the same individuals seem to consistently follow FyF advice, and not random investors each time. Figure A.2 in the appendix shows the fraction of transfers consistent with FyF as the individual makes more transfers. There are 74 FyF transfer recommendations in the 2014-2020 sample (a recommendation counts as 2 transfers when 2 origin or destination funds are involved, e.g., the recommendation on October 12, 2017). The figure shows that more than 50% of transfers are consistent with FyF for individuals making 40 or more transfers. The percentage of consistency reaches almost 80% for individuals making 74 transfers. Hence, the coincidence between the transfers of individuals who make very frequent transfers and

FyF recommendations is very high. Overall, the evidence confirms that FyF recommendations are a strong driver of pension fund flows. In addition, FyF-induced pension flows seem to reflect many transfers by small retail investors rather than a few transfers by wealthy investors.

FyF started in July 2011 as an unconventional investment advisory firm. From an academic perspective, one should be skeptical about high frequency investment recommendations for unsophisticated investors. As early as 2013 the pension regulator also spoke about the dangers of frequent transfers between pension funds. In 2021 FyF had to close its operation as it was unable to meet the new capital requirements set up by the regulator for pension advisors. These requirements were put in place largely to drive pension advisors such as FyF out of the market. We only study FyF recommendations and their potential market impact up to the end of February 2020. The more recent period is excluded for two reasons that change the nature of the experiment. First, the tension between FyF and the authorities escalated during 2020, both in terms of tone and public notoriety. On top of the concerns from the pension regulator, the Chilean consumer protection agency (SERNAC) sued FyF for false advertising arguing that their alleged market-timing abilities were not verifiable.[10] Second, and more importantly, the Chilean pension system faced three big withdrawals (in July 2020, December 2020, and April 2021) allowed by regulators to smooth the financial consequences of the Covid crisis (see Díaz and Hansen 2023, and Fuentes, Mitchell, and Villatoro 2023). These withdrawals amounted to more than US$ 50 billion (30% of the AUM of the pension system). Pension funds started selling foreign assets in advance to prepare for these massive withdrawals.

FyF never disclosed the model – statistical or conceptual – behind their recommendations. Their marketing material only argued that the recommendations were tailored to avoid losses

[10]In July 2023, the Chilean courts found FyF guilty of false advertising and fined them with approximately US$ 40,000 (a high number for this type of case in Chile). The courts said that FyF "provided biased and incomplete information by using only the best historical returns." Overall, "FyF manipulated information for their own convenience." The court's decision is currently under appeal.

such as those incurred during the Great Financial Crisis. FyF recommendations related to the asset allocation decision across equity and fixed income securities. The reallocation between domestic and international securities, and the potential consequences for foreign exchange markets, seemed to be unintended consequences of their recommendations.

Insert Table 4 here

While FyF recommendations were not random, they were largely orthogonal to fundamental factors in the foreign exchange market. In order to assess this claim, in Table 4 we report a regression model to estimate the likelihood of switches toward fund A in FyF recommendations. The dependent variable takes values between 1 (i.e., move from fund E to fund A) and -1 (i.e., move from fund A to fund E). Partial moves are represented by fractional changes. For example, suppose FyF switched from recommending an allocation of 50% in fund A and 50% in fund E to an allocation of 100% in fund A. In this case, the dependent variable takes a value of 0.5. We use as explanatory variables the past returns and volatilities of funds A and E, together with standard fundamental variables studied in the foreign exchange literature. In particular, we follow the survey of foreign exchange predictability by Rossi (2013) and include monetary aggregates, income differentials, inflation differentials, interest rate differentials, the forward discount, and the Chilean net foreign asset position as candidate predictors of FyF recommendations. We also add the volatility of recent returns and of exchange rate movements. None of the foreign exchange fundamentals have significant power to explain FyF recommendations.

Perhaps the single most important predictor of the Chilean exchange rate is the price of copper since copper represents around 40% of Chilean exports, and Chile is the top producer in the world. Hence, following Chen, Rogoff, and Rossi (2010), the Chilean peso can be understood as a commodity currency. However, movements in the price of copper are not significantly related to FyF recommendations either, as also shown in Table 4. The

R-squared across all the regressions presented in Table 4 is at most 1%.

It is not clear whether FyF followed a rigorous economic model or just simple heuristics. For instance, in Table 4 we find that past returns of fund A predict FyF recommendations. FyF seem to follow a short-term momentum strategy, moving toward the risky fund after a week of strong returns. Again, this is consistent with the idea that the objective of the FyF model is to bet on the future performance of stocks against bonds, more than the foreign exchange rate.

The regulator questioned the ability of FyF to deliver superior returns almost from FyF's inception. FyF responded that the cumulative performance from their first recommendation was superior to buy-and-hold strategies of any of the other funds. However, their response did not address the statistical significance of the return differences and the fact that most subscribers started following FyF significantly later than the first recommendation. Panel A of Table 5 reports returns for investors who followed FyF recommendations in comparison to buy-and-hold returns for funds A, C, and E. We assume investors request a switch of their pension fund the same day that the FyF recommendation is issued, and that the switch is implemented at the prices on day *t+2* as defined by regulation. In 2011 and 2012, investors who followed FyF exhibited superior performance than investors who passively invested in funds A, C, or E. The outperformance of FyF was especially pronounced in 2011, the year of their founding, when the return of following FyF was 11.44% higher than the return of fund A. The advantage between FyF and fund E was smaller, showing that fixed income delivered strong returns in 2011. This high initial performance contributed to the subsequent popularity of FyF. The performance differences are, however, far from statistically significant, as reported by the t-statistics in parentheses. Additionally, the experience of subscribers who started following FyF in later years is frequently negative. For example, in six of the eight years after 2012 the FyF portfolio underperformed fund A, although the return differences are typically not statistically significant.

Insert Table 5 here

In panel B of Table 5 we add the Sharpe ratio of FyF since part of their appeal might be to deliver better returns relative to the risk they take. Again, we find no consistent advantage of FyF when compared to buy-and-hold strategies of the other funds. Over the entire sample period, the less risky funds (D and E) have higher Sharpe ratios than the FyF strategy. An alternative passive benchmark can be a portfolio that invests 60% in fund A and 40% in fund E, since FyF recommends these funds 60% and 40% of the time, on average. This passive portfolio benchmark has a Sharpe ratio of 1.109, which is again not statistically different from that of the FyF strategy. Overall, we find no support for the claim that FyF had market-timing skills to consistently beat the market.

2.3 Prices and Interest Rates

We get most of the market data from Bloomberg. The daily spot exchange rate (S) is measured in Chilean pesos per U.S. dollar. The one-month forward exchange rate (F_{1m}) is measured at closing and corresponds to the mid-point price on over-the-counter forward contracts of Chilean pesos per U.S. dollar. These contracts can be opened on any day. All contracts are non-deliverable forwards, meaning that they have to be settled in dollars and not in Chilean pesos.[11] Interest rates correspond to the 30-day LIBOR rate in U.S. dollars (R_{us}) and the local 30-day interbank interest rate in Chilean pesos (R_{chile}).[12]

Insert Table 6 here

Table 6 shows the summary statistics for the main variables in our analysis. The average spot exchange rate is approximately 595 pesos per dollar. The average daily change in the

[11]The Chilean peso was not a deliverable currency during our sample period, however this changed in December 2020: https://www.bcentral.cl/en/content/-/details/the-central-bank-of-chile-authorizes-the-use-of-the-chilean-peso-in-cross-border-transactions. See Appendix A for more institutional details of the Chilean foreign exchange market.

[12]Bloomberg tickers are as follows: CLP BGN Curncy (spot), CHN1M Curncy (forward), US0001M Index (Libor), and CLTN30DN Index (Chilean interest rate).

spot exchange rate is 0.02%, with a standard deviation of 0.62%. The average Chilean 30-day interest rate is 4.13% and the average U.S. LIBOR rate is 0.71% over our sample period.[13] The average spread between the U.S. and the Chilean rate is -3.42%, with a standard deviation of 1.92%.

2.4 Balance Sheet of the Domestic Banking System

The CMF (Comision para el Mercado Financiero) is the regulator of financial markets in Chile.[14] It regulates banks, insurance companies, exchanges, and issuers of financial securities. At the monthly level, it reports the amount of equity (CET1 or common equity tier 1) and the ratio of equity to risk-weighted assets of the aggregate balance sheet of the Chilean banking system. Chilean law requires banks to maintain a ratio of equity to risk-weighted assets of at least 8%. The CMF together with the Central Bank can decide to increase this minimum by up to 2.5% in stress situations. Banks that fall short of the required minimum face limitations on the dividends that can be paid to shareholders. Net positions in foreign currency (sum of spot and forward) enter the computation of risk-weighted assets, with weights that are comparable to those of high yield bonds (i.e., bonds with credit ratings below BBB-). Thus, the regulation incentivizes banks to hedge any imbalance in the spot market through the forward market.

2.5 Trading Volume and Banking Imbalances

The Central Bank of Chile reports trading volumes in the spot and forward markets in several ways. At the monthly level, it reports the total amount bought and sold of foreign currencies between banks (and other authorized participants of the foreign exchange market) and various counterparties: pension plans, insurance companies, mutual funds, foreigners,

[13] All interest rates and spreads are reported in annual terms in our analysis. As is standard practice, monthly rates and spreads are multiplied by 360/30.

[14] The CMF data can be downloaded from www.cmfchile.cl.

firms, and others. All foreign currencies are aggregated into a single amount, but U.S. dollars represent the lion's share of the volume. The trading volume in the forward market is between 1.5 and 2 times larger than the trading volume in the spot market. The spot and forward markets are partially segmented because of the non-deliverable feature of the Chilean peso. Trading on the spot market requires opening accounts in Chilean pesos at a local bank. Therefore, many foreigners trade exclusively on the forward market where contracts are settled in U.S. dollars. In fact, foreigners account for most of the trading in the forward market (Villena and Hynes, 2020).

At the daily level, the Central Bank reports the total amounts bought and sold of foreign currencies between the banking sector and third parties. The daily data is not split by counterparty like the monthly data. We define the daily imbalances of the banking sector as the difference between the amounts bought and sold in each market. As seen in Table 6, the average imbalances are 0.01% of the equity of the banking sector in the spot market and -0.23% in the forward market. The average net imbalance is obtained by simply adding the imbalances in the spot and forward markets.

The Central Bank also reports data for the net positions of the banking system at a daily frequency. These are accounting measures of the stock of foreign currency spot and forward contracts in the banking sector. The net spot position is the difference between assets and liabilities in foreign currency, hence, a negative net spot position implies that banks are borrowing foreign currency. The net position in the forward market encompasses the notional value of all open contracts at each point in time. Changes of the net position in the spot and forward markets correspond basically to the daily amount bought minus the amount sold by banks in each market (i.e., the daily imbalance defined in the previous paragraph). This is exactly the case in the spot market. The net forward position also varies with the expiration or closing of previous contracts, and not only with the origination of buy

and sell contracts.[15]

Besides the CMF, the Central Bank also imposes constraints on banks. For our purposes, the most relevant liquidity restriction is that the difference between inflows and outflows of foreign exchange operations with a maturity of up to 30 days cannot exceed bank equity. This requires active liquidity management from the banking system.

3 Pension Fund Flows

We study in this section the impact of FyF recommendations on fund flows. We run the following time-series regression for each type of fund i (A-E) at the aggregate level:

$$Flow_{it} = \sum_{\tau=1}^{10} \beta_\tau RecDay_\tau + \sum_{j=1}^{5} \gamma_j Flow_{it-j} + \sum_{j=1}^{5} \delta_j Return_{it-j} + \epsilon_{it} \tag{2}$$

The variable $RecDay_\tau$ captures the direction and the magnitude of FyF recommendations that have been issued $\tau \in [1, 10]$ days ago.[16] Specifically, $RecDay_\tau$ corresponds to the change in the FyF portfolio recommendation ($\Delta\omega_i^{FyF}$) times the investment in foreign assets in each aggregate pension fund with a 90-day lag ($\lambda_{i,t-90}$):

$$RecDay_\tau = \begin{cases} \sum_{i=A}^{E} \lambda_{i,t-90} \Delta\omega_i^{FyF} & \text{for days } \tau \in [1, 10] \text{ after a recommendation of FyF} \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

For example, suppose that fund A invested 75% in foreign securities at the end of the prior quarter, while fund E invested only 6% in foreign securities (see Table 1). If FyF

[15] Rather than settling an open contract, banks can trade contracts in the opposite direction in order to effectively close out their positions.

[16] In a few cases there is an overlap in the post-recommendation window for two consecutive FyF emails. In terms of the variable for post-recommendation days, the second email takes precedence. For example, a recommendation might be issued on day 8 after a previous recommendation. Under our definition, the next day is labeled as day 1 instead of day 9.

recommends a switch from a portfolio that is 50% in fund A and 50% in fund E to a portfolio that is 100% in fund A, then $RecDay_\tau = \lambda_{A,t-90} \times \Delta\omega_A^{FyF} + \lambda_{E,t-90} \times \Delta\omega_E^{FyF} = 0.75 \times 0.5 - 0.06 \times 0.5 = 0.345$. The measure is positive for switches toward fund A and increases in absolute magnitude for more extreme switches. The definition of $RecDay_\tau$ takes into account all recommendations, and not only those that involve fund A.

Insert Table 7 here

The results for regression (2) are summarized in Table 7. We show the impact of the recommendations on the flows toward A, C, and E aggregated across AFPs. The coefficients for $RecDay_\tau$ over the first three days are small, which is consistent with the delay of four days that regulations give AFPs to implement switching requests. On day 4 we find a positive and significant coefficient of 3.58 for fund A (column (1)), and a negative and significant coefficient of -6.19 for fund E (column (3)). The impact on fund C is smaller in magnitude (column (2)) since it is not typically affected by FyF recommendations. These coefficients imply that a recommendation of FyF to switch from 100% fund E (with international holdings of 6%) to 100% fund A (with international holdings of 75%) produces an inflow toward fund A of 2.47% ($=3.58 \times (0.75 - 0.06)$) and an outflow from fund E of 4.27% ($=-6.19 \times (0.75 - 0.06)$). Given the average sizes of funds A and E, these flows amount to close to US$700 and $-$US$1,000 million, respectively. Columns (4)-(6) repeat the analyses in columns (1)-(3) adding five lags of flows and returns as control variables. Controlling for past flows and returns reduces the persistence of the recommendation-induced flows, but leaves the immediate impact of FyF recommendations mostly unaffected.

Significant flows toward fund A and away from fund E continue for several days, which can be expected if investors react slowly to FyF recommendations. The bottom panel of Table 7 shows the cumulative coefficient for $RecDay_\tau$ on the first five days ($CUM[1-5]$) and the subsequent five days ($CUM[6-10]$). In column (1), the cumulative effect on fund

A over the first five days is 6.54, while it is 3.23 over the next five days. In columns (4)-(6), we see that the cumulative effect on the next five days is reduced when we control for the persistence associated with lagged flows and returns. Overall, unusual flows at the system level are mostly observed over the first week following a recommendation from FyF.

In Table A.1 we show the effects of FyF recommendations on the funds of Modelo, a small AFP that started in 2007. Modelo has a relatively young investor base because it was awarded the first government auction for the portfolios of workers who entered the labor market.[17] By having young and internet-savvy investors this AFP is more likely to be affected by FyF recommendations. As seen in columns (1)-(3), the coefficients on $RecDay_\tau$ are twice as large as in the regressions with aggregate flows in columns (4)-(6) of Table 7. In the last three columns of Table A.1 we use as the dependent variable an indicator variable equal to one for flows of 5%, which is the upper bound on daily flows allowed by the regulation.[18] This constraint is likely to bind only for small AFPs like Modelo. As implied by column (4), 5%-flows to fund A are 16.5% more likely on the fourth day after a recommendation that requires an increase in foreign holdings of 50%, while there is little effect on the rest of the days. As implied by column (6), 5%-flows away from fund E are 35.5% more likely on the fourth day after such a recommendation.

Overall, large flows are related to FyF recommendations and reflect the direction of those recommendations. Flows are exceptionally large in comparison to the average flow on any given day. The 5% upper bound is frequently hit in small AFPs after a recommendation issued by FyF. Excess flows are observed during a relatively narrow window, which fits well

[17] Every two years, the government auctions portfolios of new clients to pension fund administrators. These new clients are workers entering the labor market, and they need to stay for at least 24 months with the pension fund administrator that wins the auction (by offering the lowest commission). There is a one-time spike in flows when new investors are allocated to pension funds through this auction system. For Table A.1 we impose a 10% threshold in flows to exclude jumps produced by auctions from the data. Note that the 10% threshold does not exclude FyF flows since flows related to voluntary transfers are capped at 5% daily (e.g., a theoretical 10% flow takes two days to implement).

[18] We allow for a difference of $\pm 0.1\%$ around the 5% threshold since we can only measure flows ex-post and not in real time like the pension funds.

with the constraints derived from pension fund regulations.

4 Foreign Exchange Rates

In this section, we study the impact of FyF's recommendations on the spot foreign exchange rate.

4.1 Event study

Foreign investments represent an increasing fraction of the portfolios of pension funds as we move from fund E to fund A. Thus, a recommendation to move toward fund A implies that pension funds have to buy a significant amount of foreign currency. In Figure 3 we report the results from an event study for the effect on the spot foreign exchange rate of the 82 recommendations issued by FyF. Day 0 in the figure is the day that FyF sends an email to subscribers with the new recommendation. We plot the subsequent cumulative depreciation of the foreign exchange rate. The event study is shown from the perspective of emails that recommend a reallocation toward foreign assets, and hence imply buying pressure of foreign currency (see last column of Table 2). Buy and sell recommendations lead to opposite trades and potentially exchange rate movements. To depict exchange rate movements across both types of recommendations in a single graph, we multiply the price changes by -1 when the recommendation is to sell foreign assets (e.g., move from funds A to E). Then, we average across all events for each day.[19]

Insert Figure 3 here

We find that the exchange rate depreciates quickly and significantly after a recommendation. Thus, the purchases of foreign currency after recommendations to shift savings to the

[19]We show up to 30 event days in Figure 3, which can imply overlapping event windows in the case of frequent recommendations. The time-series regressions in Table 8 do not use overlapping data.

risky funds lead to a depreciation of the Chilean peso. By the second day after a recommendation the depreciation is approximately 0.4% and increases to around 0.5% over the first ten days. The reversal is relatively slow in terms of point estimates, although the statistical significance of the effect disappears after ten days. Given that FyF recommendations are uncorrelated with standard fundamentals, as documented in Table 4, the results in Figure 3 can be interpreted as the impact of uninformed demand shocks in the FX market.

4.2 Time-Series Regressions

To study the relation between FyF recommendations and exchange rate changes more closely, we run the following times-series regression:

$$\Delta FX_t = \sum_{\tau=1}^{10} \beta_\tau RecDay_\tau + \sum_{j=1}^{5} \alpha_j \Delta FX_{t-j} + \Gamma' X_t + \xi_t \tag{4}$$

The dependent variable is the daily percentage change in the foreign exchange rate. Our main interest is in the coefficients for $RecDay_\tau$ as defined in equation (3). In some regressions we also include five lags of the dependent variable and a vector X_t with several control variables: 30-day lags of the domestic and U.S. inflation rates, domestic and U.S. three-month interest rates, the size of the balance of the Chilean Central Bank, indicator variables for Mondays and Fridays, and the daily percentage change in the international price of copper.[20] It is worth mentioning that the literature finds almost no short-term predictability in foreign exchange rates, and only some predictability at the quarterly or annual horizons (Rossi, 2013).

[20]These control variables adjust for returns on the carry trade (e.g., Fama 1984, Brunnermeier, Nagel, and Pedersen 2008, Burnside, Eichenbaum, and Rebelo 2011, Lustig, Roussanov, and Verdelhan 2011, Lustig, Roussanov, and Verdelhan 2014; and Koijen, Moskowitz, Pedersen, and Vrugt 2018), currency momentum (e.g., Moskowitz, Ooi, and Pedersen 2012, Menkhoff, Sarno, Schmeling, and Schrimpf 2012, Burnside, Eichenbaum, and Rebelo 2011, and Zhang 2022); and commodity prices (e.g., Ready, Roussanov, and Ward 2017).

Insert Table 8 here

In column (1) of Table 8 we run the regression without controls and find a strong foreign exchange depreciation on the first two days after a recommendation. Interestingly, while the pension flows in Table 7 are delayed by four days, the foreign exchange rate reacts immediately on days 1 and 2. The four-day delay in flows is explained by institutional features of the system, since pension funds are required to transfer the fund flows only on the fourth day after participants submit their requests. Furthermore, the exact transfer amount is only known on the second day after a request has been submitted, given that the fund exchange ratio is determined by the fund prices on that day. Due to these institutional features, assets under management only change from the fourth day after FyF recommendations. The immediate reaction of prices is not surprising despite the delay in flows. Pension funds can start trading immediately after a recommendation to accommodate the imminent flows. Other market participants are also aware of the recommendations and may start trading to front-run pension funds, consistent with evidence in the stock market (see Bernhardt and Cuevas 2022, and Da, Larrain, Sialm, and Tessada 2018), and the foreign exchange market (Pinto-Avalos, Bowe, and Hyde, 2022). Thus, in line with weak-form market efficiency, prices move immediately after the recommendation is announced.

The effects are hardly sensitive to adding different controls (column (2)) or restricting the sample to when the forward price is available (column (3)), which for the most part excludes days where the U.S. market is closed because of holidays. The cumulative effect over the first five days increases to 0.96 (column (4)), which implies that a recommendation to move from fund E to fund A is associated with a depreciation of the foreign exchange rate of 0.66% ($= 0.96 \times (0.75 - 0.06)$). The effect over the first five days is statistically significant regardless of the specification. The cumulative effect on the next five days (days 6-10) is positive, but not statistically significant. Hence, we do not find a clear reversal over the ten-day window.

In Table 9 we explore several sample splits to better understand the effects of FyF recommendations.[21] First, we compare the effects after buy and sell emails, where buy (sell) refers to FyF recommendations to increase (decrease) foreign investment and therefore to buy (sell) foreign currency. The variable $RecDay_\tau$ takes into account the direction of the recommendations and, therefore, the coefficients can be compared across columns. In columns (1) and (2) we find that the five-day effect on the foreign exchange rate is similar after buy and sell recommendations. The effect after sell emails is only delayed by one day, from the first day to the second day following the recommendation.

Insert Table 9 here

Second, we split the sample into the early years of FyF (2011-2015) and the later years (2016-2020). FyF was more active (higher email frequency) and more popular (more followers) in the later years. Not surprisingly, the effects on the exchange rate are stronger in the later part of the sample. For example, the five-day effect is 0.48 in the early sample and 1.68 in the late sample.

Third, we focus on FyF recommendations that are sent near the end of a quarter, specifically, we look at the two weeks around the quarter ends in March, June, September, and December. The end of the quarter can be relevant if constraints on the balance sheets of banks are more binding during these days (Du, Tepper, and Verdelhan, 2018).[22] The effects on quarter ends start immediately during the first few days after a recommendation, but then also revert more quickly. The five-day depreciation of the foreign exchange rate is

[21] Table A.2 shows pension fund flows in these same sample splits.

[22] Du, Tepper, and Verdelhan (2018) and Cenedese, Della Corte, and Wang (2021) argue that non-risk-weighted capital requirements introduced with Basel III are responsible for quarter-end effects in CIP violations. These capital requirements are not mandatory in Chile during our sample period. However, since 2013 the local banking regulator has introduced guidelines and an implementation calendar to move toward Basel III. The local banks voluntarily comply with such recommendations. Even if local banks are not more constrained at the end of the quarter than on other days, global banks and other institutions providing funding to the Chilean banks can be more constrained. As long as the counterparties of Chilean banks face more binding constraints from their own jurisdictions at the end of the quarter, the effects can spill over to the local foreign exchange market.

consequently only slightly stronger at the end of the quarter than on other days (1.09 vs. 0.84).

Finally, in column (7) we exclude periods when the Central Bank of Chile officially intervened in the foreign exchange market. The foreign exchange rate is typically free to float, but during the entire year 2011 and between November 29, 2019 and the end of our sample the central bank intervened in a pre-announced fashion. The motives for the two interventions were different. During 2011 the objective was to increase the exchange rate and alleviate the pressure from exporters, while the objective in 2019 was to reduce the exchange rate after a period of unusually high uncertainty from social unrest. Excluding both of these periods does not change our conclusions.

4.3 Price Elasticity of the Demand for Money

The large and frequent trading in Chilean pesos arising from uninformed pension flows provides a unique setting to estimate the price elasticity of the demand for the Chilean peso. For concreteness, we focus on the effect of a portfolio switch from fund E to fund A (i.e., $RecDay_{\tau} = 0.69$). The resulting depreciation of the Chilean peso over the first five days, according to column (1) of Table 8 (CUM[1-5]), is 0.59% (= 0.85% $\times$ 0.69). The foreign currency trade associated with this portfolio switch is US$858 million, which can be obtained by multiplying: (a) Fund A's average AUM of US$27,587 million (Table 1 Panel A), (b) 4.51% (= 6.54% $\times$ 0.69) flow toward fund A over the first five days (from CUM[1-5] in column (1) of Table 7), and (c) 69% extra foreign investment in fund A compared to fund E (Table 1 Panel B). Hence, our results imply that uninformed purchases of US$1 billion produce a depreciation of the Chilean peso of 0.69%. For comparison, Evans and Lyons (2002) find that purchases of US$1 billion increase the Deutsche mark exchange rate by 0.50%. The interpretation in Evans and Lyons (2002) is that such order flow contains information. We argue that in our setup the effect occurs despite a lack of informational

content in flows.

In order to compute an elasticity we need to put the flow in relation to the stock of money available. Analogously, in the literature on downward-sloping demand for stocks (see Shleifer 1986, or Wurgler and Zhuravskaya 2002), the flow is compared to the supply of shares outstanding. In our setup there is no unambiguous measure of the supply of money in the economy, so we compute the elasticity with respect to different averages of monetary aggregates for the Chilean economy over 2011-2020. For example, the flow of US$858 million represents 1.95% of M1, 0.49% of M2, and 0.29% of M3. Alternatively, this flow represents 1.12% of the international reserves of the Central Bank of Chile over this period.

With these numbers in mind, the price elasticity of the Chilean peso can be estimated to be -0.49 ($= -0.29\%/0.59\%$) for the case of M3 and -3.30 ($= -1.95\%/0.59\%$) for the case of M1. The estimates with M2 and reserves (-0.83 and -1.90 respectively) are in between these two extremes.[23] Our estimates imply a relatively inelastic demand curve for foreign currency, in line with what can be inferred from Hau, Massa, and Peress (2010), and Pandolfi and Williams (2019). For comparison, Da, Larrain, Sialm, and Tessada (2018) document a price elasticity of -0.45 in the Chilean stock market. Both estimates support the inelastic market hypothesis proposed by Gabaix and Koijen (2021). Currency markets are among the largest and most liquid markets in the world, so it is perhaps not surprising that currency demand, although still inelastic, is more elastic than the demand in the local stock market.

5 Banking Imbalances

This section studies how FyF's recommendations affect the positions of banks in forward and spot currency markets. Figure 4 shows the outstanding net positions of the banking system in the spot and forward markets. The net position in the spot market is negative, which

[23]The elasticities over a ten-day window are similar to the elasticities over the five-day window that we report. In particular, elasticities range between -0.55 for the case of M3 and -3.74 for the case of M1.

indicates that local banks are short dollars. This short position can be interpreted as an excess demand for dollars in the market after considering netting between local participants. As emphasized by Ivashina, Scharfstein, and Stein (2015) and Du and Schreger (2021) non-U.S. banks generally do not have an ample base of dollar deposits, and they tend to borrow dollars by selling commercial paper to U.S. money market funds, or drawing on credit lines at global banks. Because of the non-deliverable feature of the Chilean peso, banks cannot exchange pesos for dollars outside the on-shore market. Deliverable currencies, such as the U.S. dollar or the Euro, can be freely exchanged in international markets. For instance, European banks can use Euros sourced from local depositors to buy spot U.S. dollars abroad. This is not an option for Chilean banks looking to exchange pesos for U.S. dollars, hence their need to borrow U.S. dollars abroad.

The hedging demand of banks follows naturally once we consider that they need to borrow dollars: local banks need to buy dollars forward to net their spot currency exposure. The net position in the forward market is positive and almost a mirror image of the spot position. Hedging follows from risk management practices and is also required by regulation. The overall net exposure (spot plus forward) is close to zero, although it is consistently negative in the second half of our sample. Carrying over an unhedged position is expensive in the sense that it uses some of the banks' balance-sheet capacity.

Insert Figure 4 here

The behavior of banks implied by Figure 4 suggests that the effects of FyF recommendations can be transmitted through local banks from the spot market to the forward market. In Figure 5 we show the monthly amount bought minus the amount sold of foreign currency by various counterparties (i.e., pension funds, foreign entities, brokers, insurance companies, mutual funds, firms, others) from the local banks. Given that this data is only reported at the end of each month (unlike the daily data we use in the rest of the tables and figures),

we focus on the net change in FyF's recommendations for fund A during each month. Dark blue (light red) bars correspond to months with recommendations to decrease (increase) allocations to fund A. We subtract from each bar the average banking imbalance with each counterparty during months without changes in FyF recommendations.

Insert Figure 5 here

In Panel A of Figure 5 we see that pension funds are selling (buying) approximately US$600 (US$750) million to banks in the spot market in months with a net decrease (increase) in fund A. The imbalances with other counterparties are small. Thus, the months with FyF recommendations are not months with broad-based buying or selling in the spot market. Also, the other counterparties are not providing much liquidity to accommodate FyF flows. In Panel B we see the mirror image in the forward market, where foreign entities are buying (selling) approximately US$700 (US$1,300) million from local banks in months with a net decrease (increase) in fund A. One interpretation is that foreigners provide hedging to local banks. However, there is more volume in the forward market than the volume directly implied by the hedging needs of banks from the spot market. In addition to hedging, there can be foreign arbitrageurs who actively lean against the purchases and sales of pension funds and bet on dollar depreciation or appreciation. They do this in the forward market since they typically do not participate in the spot market (see appendix A for a description of the Chilean FX markets). It is worth noting that pension funds are not very active in the forward market after FyF recommendations.[24]

Insert Figure 6 here

Figure 6 shows in stylized form the flows that FyF emails induce. A recommendation to move toward fund A increases the demand of foreign currency by pension funds in the spot

[24]Appendix Table A.4 shows that the fraction of derivatives volume (at the monthly level) that is accounted for by pension funds does not depend on FyF recommendations.

market. Local banks absorb that demand by selling foreign currency in the spot market. Banks borrow abroad to have foreign currency to sell to pension funds. In order to hedge their foreign currency liabilities, banks turn to the derivatives market where they buy foreign currency forward from foreign entities. Eventually, foreigners absorb the excess demand of foreign currency from the pension funds, but this is done indirectly through the local banks. Most foreigners do not provide liquidity directly to pension funds since they do not participate in the spot market.

Insert Figure 7 here

Although the volume data by counterparty is informative, it is only available at the monthly frequency. At the monthly frequency we run the risk of ignoring confounding variables that potentially drive both currency flows and foreign exchange rates. At the daily level, it is less plausible that this relation is driven by reverse causality. In particular, the frequent, back-and-forth trading associated with FyF recommendations (betting on currency appreciation today and then betting on depreciation after another recommendation in two or three weeks) is unlikely to coincide with slow-moving foreign exchange fundamentals.

At the daily frequency we can compute the total imbalance of the banking sector (not by counterparty) and link the effects more directly to the timing of FyF recommendations. Figure 7 shows the cumulative daily imbalance (i.e., buys minus sells) of the banking sector in the spot and forward markets after FyF recommendations. In the top panel we show the effects in millions of U.S. dollars, while in the lower panel we show the effects in terms of the equity of the banking sector. We find that banks sell foreign currency in the spot market by approximately US$600 million (1.8% of their equity) in the ten days that follow a recommendation to increase investment in foreign assets. At the same time, banks buy approximately US$700 million (2% of equity) in the forward market.

Insert Figure 8 here

Although we do not know the exact counterparty at the daily level, we can find traces of the role of local banks in absorbing pension fund currency flows. An indication of the correlation between pension fund movements and the banking imbalances is given by Figure 8. We first compute the implied daily foreign exchange flow of pension funds as the multiplication of the daily flow to or from each fund times the fraction invested in foreign assets in each fund. We add this up over the ten days that follow a recommendation from FyF. We then correlate this implied foreign exchange flow with the net sales of banks over the same ten days. The estimated slope in Figure 8 is 0.57, showing that the relation is strong and positive. The figure confirms that the local banking system serves as the intermediary to pension funds in the spot market.[25]

Insert Table 10 here

Table 10 shows the time-series regressions with daily banking imbalances as dependent variables. The spot imbalance decreases significantly on days 3 and 4 after a recommendation, implying that banks are selling foreign currency in the spot market. The cumulative five-day effect is -2.32% of bank equity. The forward imbalance increases strongly over the same days, and the cumulative five-day effect is 2.43% of bank equity, which is slightly stronger than the spot market. The total imbalance (spot plus forward) in the first five days is, however, small and not significantly different from zero (column (3)). Therefore, banks are almost fully hedged. The change in the net positions in column (4) incorporates in addition the expiration of previous forward contracts. The cumulative five-day effect or the change in net positions is 1.34% of banking equity, and it is statistically significant. This suggests that banks let forward selling contracts expire so the net position increases more than the net origination of forward contracts.

[25]Figure A.3 shows the relation between the sum of money amounts involved in consistent-with-FyF transfers defined earlier in Section 2 and the implied-FyF flow to the foreign exchange market based on money flows to and from pension fund A in Figure 8. The R-squared is 0.88 showing a strong correlation between consistent-with-FyF transfers and foreign exchange flows.

Underlying our analysis is the idea that the flow induced by FyF recommendations is sufficiently large that it cannot be accommodated solely by market participants and pushes banks to borrow U.S. dollars abroad. An indication of the size of the shock can be seen in columns 5 through 7 of Table 10 where we study the daily trading volume after FyF recommendations in spot and derivative markets. The data is the same we use to compute banking imbalances. We define trading volume as $(buy + sell)/MA(buy + sell)$, where the numerator is the sum of buy and sell transactions by banks in the foreign exchange market, and the denominator is the average of the sum of buy and sell transactions over the last 100 days.[26] We run regressions of trading volume on the $RecDay_\tau$ variable in absolute value since volume is always positive by definition. The coefficients in this regression can be interpreted as abnormal volume relative to the average of the last 100 days. Column 5 shows that spot volume is 54% higher in the five days that follow FyF recommendations (i.e., the FyF shock adds close to half a day of extra volume). In the next five days, spot volume decreases by 9% but not significantly. Derivatives volume (column 6) is 12% higher in the first five days and 18% higher in the next five days, although the estimates are noisy. Overall, total abnormal volume (column 7) is 27% higher in the first five days, thus it is unlikely that it can be quickly accommodated by regular market participants.

6 Covered Interest Parity Violations

In this section we study whether the FyF recommendations have an impact on CIP deviations.

[26]Please note that buy volume is not equal to sell volume because banks act as market makers holding inventory using their balance sheets. Interbank volume is not included. Volume is recorded when each order is placed, not at settlement.

6.1 Cross-Currency Basis

Using the spot foreign exchange rate S, forward exchange rate F, and the interest rates R_{US} and R_{Chile} we can define the one-month cross-currency basis (CCB_{1m}) as:

$$CCB_{1m} = (1 + R_{US}) - (1 + R_{Chile})\frac{S}{F_{1m}} \tag{5}$$

We define CCBs at other horizons analogously. All CCB measures are expressed in annual terms as is customary in the literature.[27] In a frictionless world the CCBs should be zero at all times due to arbitrage. This is not the case in practice, as shown in Figure 9. The CCB is often negative over our sample period, which implies that it is more beneficial for an investor with U.S. dollars to exchange the dollars into Chilean pesos, take a deposit in Chilean pesos, and hedge them back to U.S. dollars than to take a U.S. dollar deposit directly at the LIBOR rate. In practice, this may not represent a pure arbitrage opportunity due to default and other risks. As seen in Table 6, the average (median) one-month CCB is -0.36% (-0.29%). A similar behavior of the CCB across different currencies, particularly after the Global Financial Crisis of 2008, has been documented by Du, Tepper, and Verdelhan (2018).

Insert Figure 9 here

The forward premium, or the safe return associated with carrying dollars for one month, is one element of the CCB, which can be more easily seen if the CCB is defined in logarithms:

$$ccb_{1m} = (r_{US} - r_{Chile}) + (f_{1m} - s) \tag{6}$$

[27] We construct the one-month CCB using Bloomberg data. We get the CCB at the three and six month horizons from the Central Bank of Chile. All Central Bank data can be downloaded from https://si3.bcentral.cl/siete. We are able to match the three-month CCB reported by the Central Bank with Bloomberg data, but there is no data available in Bloomberg to compute the six-month CCB. The Central Bank does not report the one-month CCB. Most of our tests deal with the one-month CCB since this is the most liquid forward contract available. A shown by Villena and Hynes (2020), more than 50% of FX derivatives in the Chilean market have a maturity of 30 days or less.

The log-CCB can be expressed in terms of two spreads: the log-interest rate spread between the foreign and the domestic rate and the log-forward premium. In levels, the *Forward Premium* is defined as:

$$Forward\,Premium = \frac{F_{1m} - S}{S} \tag{7}$$

As seen in Table 6, the average annualized forward premium in our sample is 3.06%, with a standard deviation of 2.17%.

6.2 Event Study

We have shown that local banks trade with pension funds in the spot market and then hedge their exposure in the forward market. To the extent that the price elasticity is different across these two markets, changes in the CCB could arise. In Figure 10 we report the results of an event study of cumulative changes in the CCB at different horizons. We find that the one-month CCB falls by approximately 0.25% by day 10, which is statistically significant. The effects on the three-month and six-month CCBs are smaller, but still statistically significant. There is little evidence of a reversal of the CCBs at the horizon of the event study. Thus, the depreciation of the spot Chilean peso exchange rate associated with FyF recommendations is not fully offset by changes in the forward premium or interest rate spreads.

Insert Figure 10 here

For Figure 10, as in the previous event study figure, we multiply by -1 the changes that occur after recommendations to move away from pension fund A. This allows us to average across both types of recommendations (to and from fund A), and showcase the effects in a single figure. However, our results imply that the CCB is decreasing after a recommendation to move toward foreign assets, and increasing after a recommendation to move away from foreign assets. If the CCB is negative before the FyF recommendation, then the CIP violation

becomes worse after a recommendation to move toward foreign assets, but it improves after a recommendation to move away from foreign assets. In other words, the flows induced by FyF do not always aggravate the situation in the foreign exchange market. Some flows may alleviate price dislocations in the market.

Underlying our interpretation is the assumption that other variables that could impact the CCB do not correlate with FyF recommendations, and hence we are truly capturing CIP violations. For example, an alternative scenario would be that some omitted variable drives both pension fund purchases of foreign currency and default risk. If default risk is changing, then CCB movements do not represent a pure arbitrage opportunity. In Table A.3 in the Appendix we show that FyF recommendations do not correlate with the five-year Chilean Credit Default Swap (CDS) spread, which suggests that we are not capturing changes in default risk.

6.3 Time-Series Regressions

In Table 11 we show similar regressions to Table 8 using the change in the one-month CCB as the dependent variable. The CCB effect is spread out over the first few days after the announcement, as also shown in Figure 10. The cumulative effect is -0.44% over the first five trading days and -0.31% over the next five trading days if we include controls (column (2)). The effect is statistically significant only during the first five days.

Insert Table 11 here

In columns (3)-(6) we split the change in the CCB into two parts: the change in the forward premium and the change in the interest rate spread. We find that most of the effect is seen in the forward premium and not in interest rates. The five-day cumulative effect for the forward premium is -0.51% (column (4)), while it is a mere 0.03% for interest rate

differentials (column (6)). Hence, the market for forward contracts, and not the market for deposits, is most affected by FyF recommendations.

To decompose the sources of variation in the CCB after FyF recommendations, we plot in Figure 11 the cumulative changes of spot and forward prices, and of interest rates. In the top panels we show that the spot exchange rate reacts slightly more than the forward exchange rate in response to FyF recommendations. Thus, after a buy recommendation, the spot exchange rate increases slightly more than the forward exchange rate. The difference between the spot and forward prices is relatively small, i.e., around 2 bps following the first ten days after a recommendation, but it is statistically significant. The fact that the forward price reacts slightly less than the spot rate implies a decrease in the forward premium and consequently in the CCB.[28] The bottom panel of Figure 11 shows the behavior of Chilean and international interest rates following FyF recommendations. We find that rates, and their differential, do not move in any particular direction after FyF recommendations.[29]

Insert Figure 11 here

Our interpretation of the pricing effects in the spot and forward markets is that banks take advantage of their position as intermediaries and charge a markup. Thus, the forward premium moves in favor of banks depending on whether they need to buy or sell forward. For instance, as pension funds move toward foreign assets, banks sell spot dollars and buy forward dollars (see Figure 6). Banks gain from selling dollars and then hedging on the forward market (to cover their dollar borrowing) at a price that is slightly different from what the CIP implies. The spot price is "too high" (higher than the CIP-implied spot), or

[28]Notice that, in line with the international finance literature, we report the CCB in annual terms, which implies multiplying differentials in monthly forward contracts seen in Figure 11 by a factor of 12 (=360/30). Therefore, the change in the annualized forward premium that we estimate is around 25 basis points, which coincides with the magnitudes in CCB changes shown in Figure 10.

[29]We check that our results are robust to using AMERIBOR (American Interbank Offered Rate) instead of LIBOR. AMERIBOR is based on overnight transactions between U.S. banks, and it was developed in 2015 as an alternative benchmark in response to the LIBOR scandals. Our results still go through if we use AMERIBOR.

the forward price is "too low" (lower than the CIP-implied forward), or both. The CCB is compensation for their role as intermediaries between the spot and forward markets (see Borio, McCauley, McGuire, and Sushko 2016, Borio, Iqbal, McCauley, McGuire, and Sushko 2018, Liao and Zhang 2021, Du and Schreger 2021, and Wallen 2022).

Insert Table 12 here

In Table 12 we perform sample splits to study the heterogeneity of the CCB results. The five-day cumulative effect on the CCB is stronger after buy recommendations (-0.85%) than after sell recommendations (-0.03%). The effect after sell emails is delayed, as seen in the large effect after sell emails for days 6-10 (-0.73%). Quick changes in the CCB after buy emails could be due to the fact that the banking system is systematically short of dollars, as implied by Figure 4.

The impact of FyF's recommendations is more pronounced during the second half of our sample (2016-2020) than during the first half (2011-2015) (-0.70% vs. -0.22%), which is related to the increasing attention to FyF's recommendations over time. Furthermore, the impact is also stronger at the end of quarters (-0.92% vs. -0.36%), which points toward balance-sheet constraints of banks as one driver of the results (Du, Tepper, and Verdelhan, 2018). Finally, column (7) shows that the results are robust to excluding periods when the Central Bank of Chile intervened in the foreign exchange market.

6.4 Intermediary Capital

In Table 13 we explore the heterogeneity of our results to the risk-bearing capacity of the banking system. We identify periods when there is a decrease in the risk-weighted equity ratio of the banking system relative to the regulatory minimum (the "capital slack" of the system). As pointed out by He, Kelly, and Manela (2017), Cenedese, Della Corte, and Wang (2021), andDu, Hébert, and Huber (2023), this indicates a diminished ability and willingness

of banks to absorb shocks. We can expect price effects to be larger when banks have less capital to intermediate.

Insert Table 13 here

We run a more compact version of our regression by combining the cumulative effect of the $RecDay_{\tau}$ variables into a single variable *RecDay[1-10]*. We then interact this cumulative variable with an indicator for decreases in the capital slack, which is lagged by 30 days. We find that the interaction of *RecDay[1-10]* and the indicator for decreases in the capital slack is negative for all CCBs and larger in magnitude than the coefficient for *RecDay[1-10]*. The magnitude of the interaction coefficient is decreasing with the CCB horizon. The interaction is statistically significant for all horizon, showing that our results are stronger when banks experience a decrease in their capital slack.

Our results are consistent with the idea that CIP violations are related to limits to arbitrage (Shleifer and Vishny, 1997), and in particular to the limited capital of the local banking system. Price movements in the foreign exchange market are compensation for banks to be intermediaries, which is more challenging when they have less capital.

7 Conclusions

Taking advantage of large and frequent trading arising from uninformed fund flows in the Chilean pension system, we are able to quantify the impact of demand imbalances in the foreign exchange market. Our unique bank trading and imbalance data shed new light on the origin of covered interest rate parity violations. Local banks that provide liquidity to pension funds in the spot market subsequently hedge their exposure by taking offsetting positions in the forward market. This hedging demand, together with limits of arbitrage, result in deviations from the covered interest rate parity (Du, Tepper, and Verdelhan, 2018). Supporting

the findings in Cenedese, Della Corte, and Wang (2021) andDu, Hébert, and Huber (2023), we show that limits to arbitrage can arise from banks' risk bearing constraints. Overall, our unique setting and detailed data offer a rare opportunity to showcase the interaction between noise traders and financial intermediaries in the foreign exchange market.

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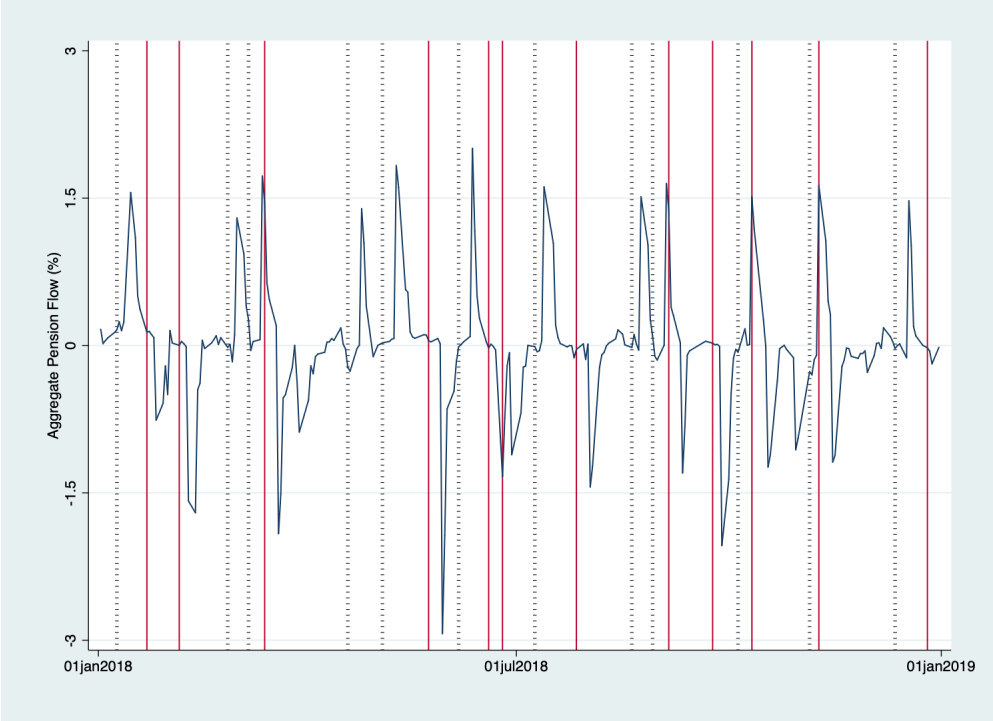
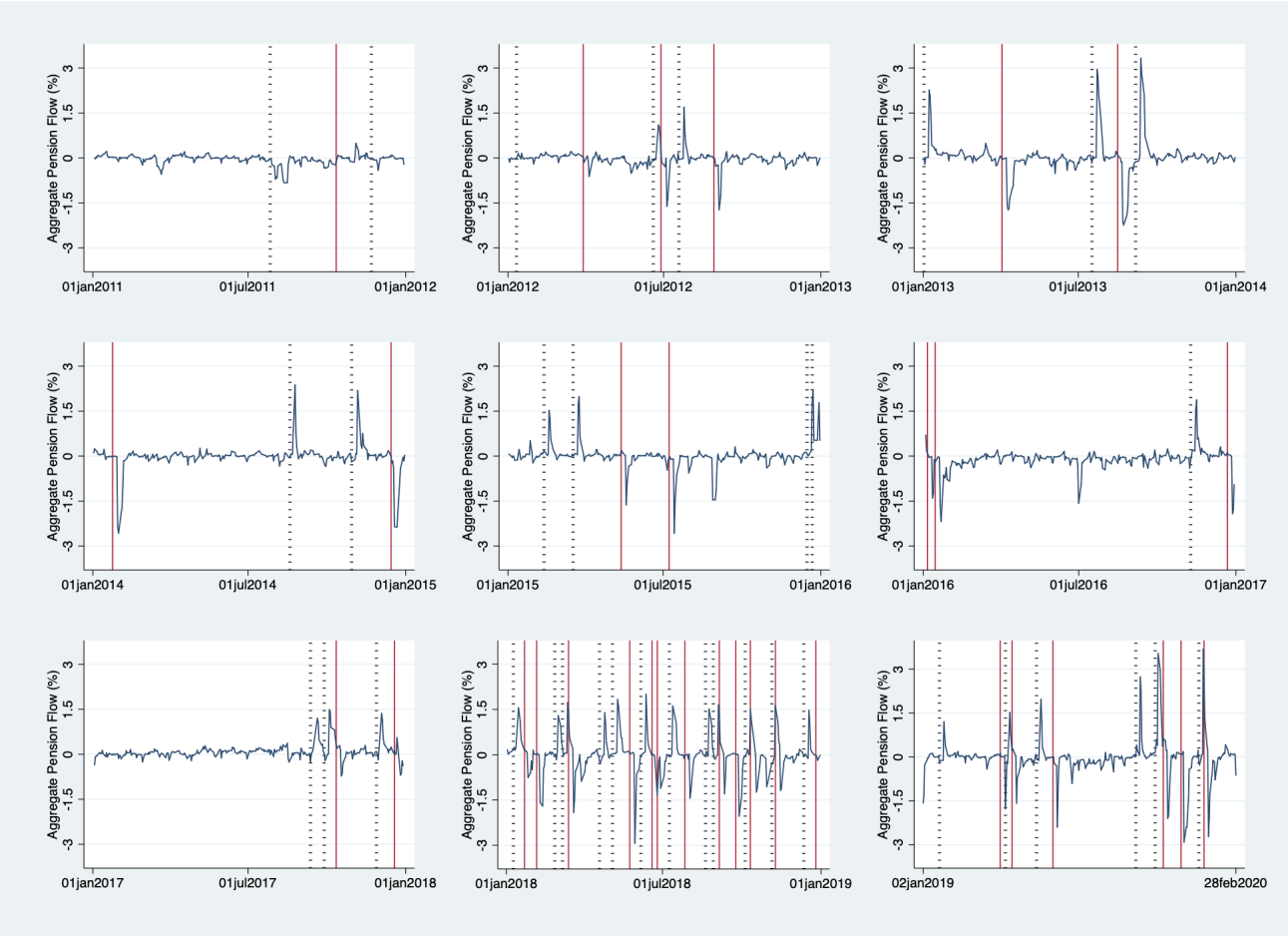
Figure 1: Daily Flows to Pension Fund A (2018)



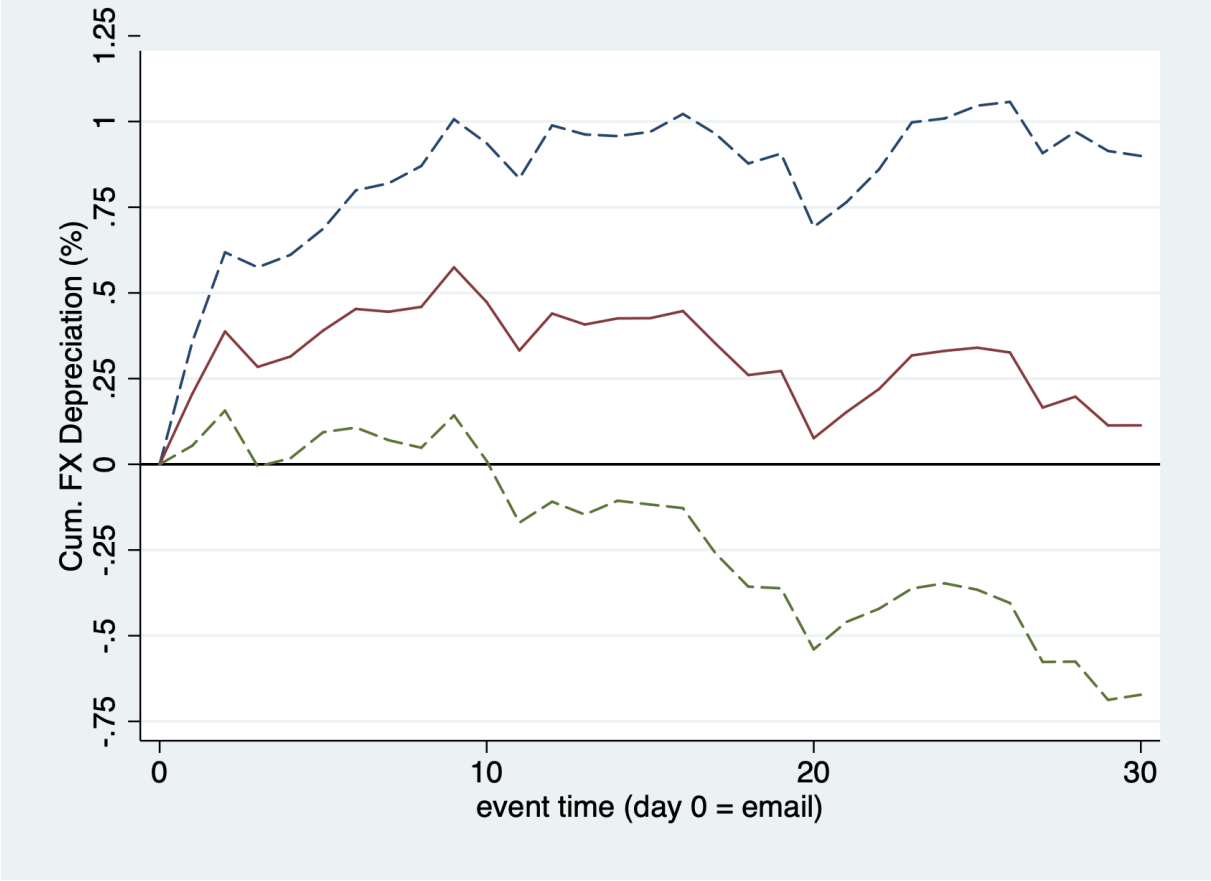
Notes: Daily flows (in percentage of AUM) for the aggregate pension fund A in Chile. Dotted (solid) vertical lines mark days of FyF emails that recommend a move toward (away from) fund A. Daily data for 2018.

Figure 2: Daily Flows to Pension Fund A (2011-2020)



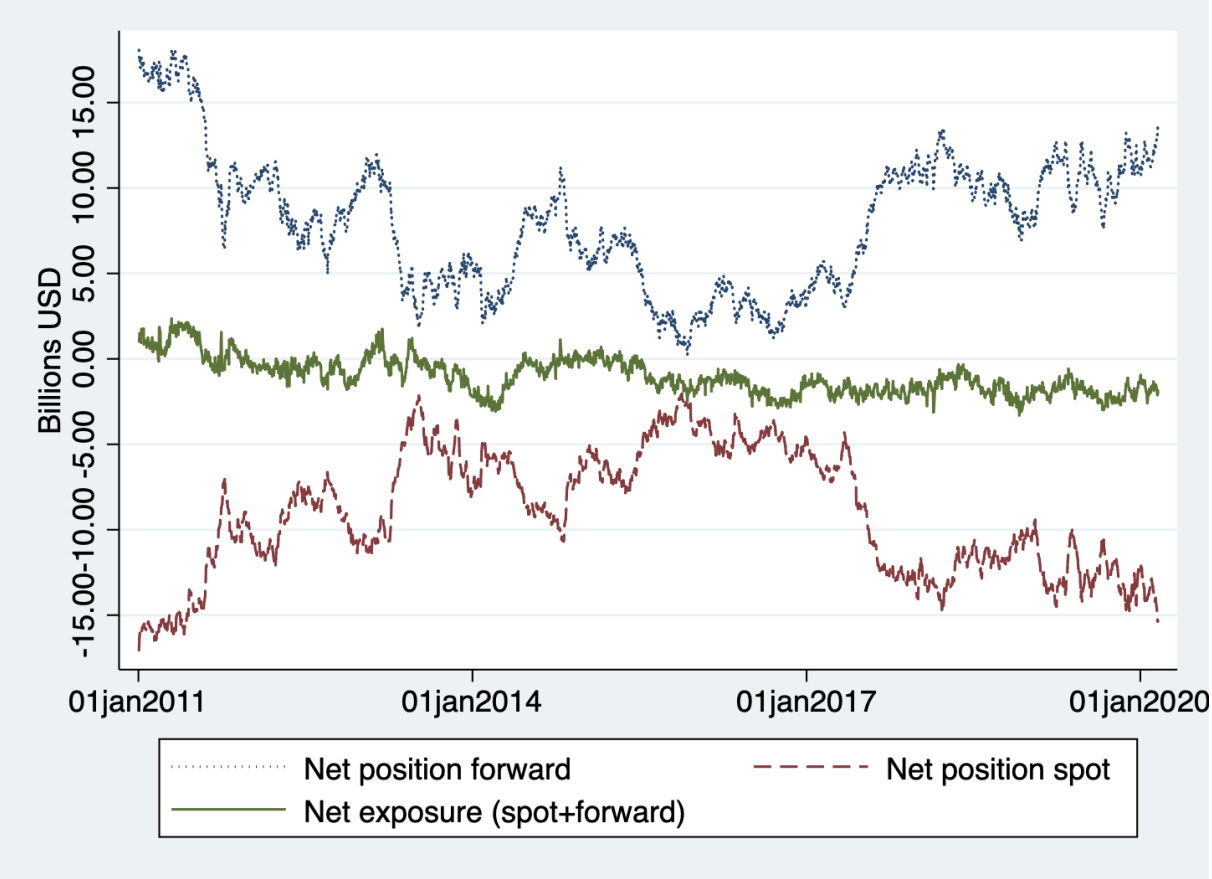
Notes: Daily flows (in percentage of AUM) for the aggregate pension fund A in Chile. Dotted (solid) vertical lines mark days of FyF emails that recommend a move toward (away from) fund A. Daily data for the sample that covers the period from January 3, 2011 to February 29, 2020.

Figure 3: The Foreign Exchange Rate after FyF Recommendations



Notes: The event study uses all 82 FyF emails from 2011 to Feb 2020. The perspective is of FyF emails that recommend a move toward foreign assets (following the last column in Table 2). Thus, the effects after an email with a recommendation to move away from foreign assets are multiplied by -1. Foreign exchange data is from Bloomberg. The figure does not adjust for overlapping events. Confidence bands based on robust standard errors are at the 95% level.

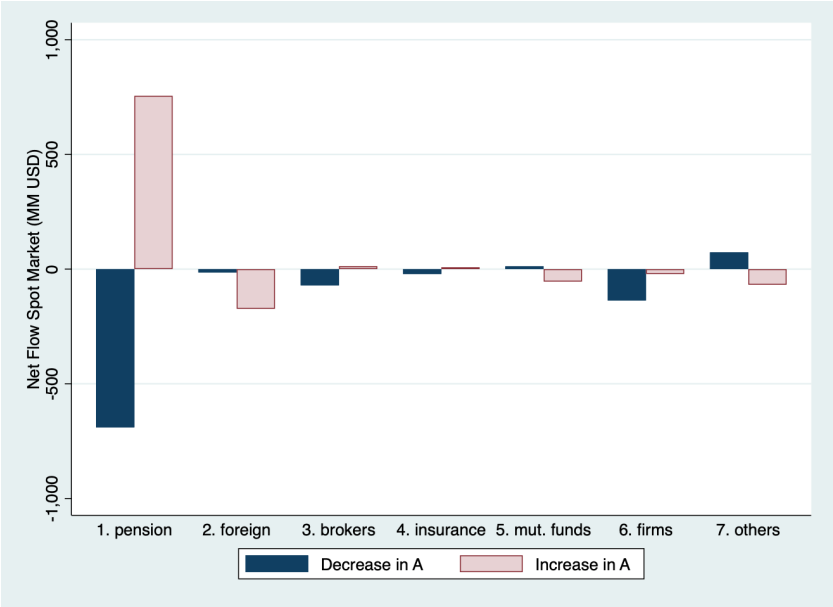
Figure 4: Banks' Net Position in Forward and Spot Markets



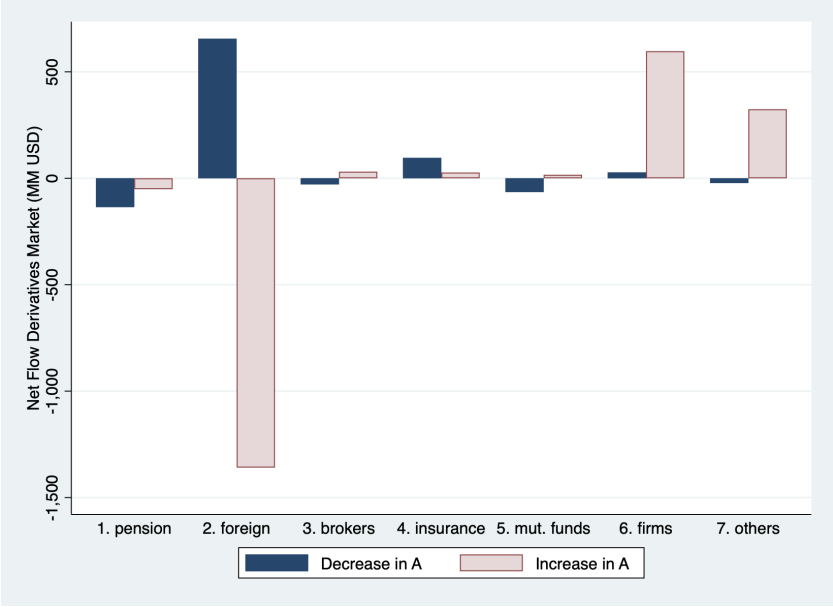
Notes: The figure presents the banks' net position in spot and forward markets as reported by the Central Bank of Chile.

Figure 5: Monthly Traded Volume in the Spot and Forward Markets by Counterparty

(a) Spot Market



(b) Forward Market



Notes: The figures show the monthly average of the net flow (buy - sell) of different counterparties with the formal exchange market (mainly banks) for months with FyF recommendations to increase or decrease the portfolio allocation to fund A. Panel (a) shows net flows for the spot market and panel (b) for the forward market. We subtract the monthly average of the net flow for each counterparty in months with no change in the FyF recommendation about fund A. All values are in millions of U.S. dollars. A positive number represents an increase in the purchases of foreign currency by each counterparty from banks. Blue (dark-coloured) bars are for months with FyF emails that result in a net decrease in fund A and red bars (light-coloured) are for months with FyF emails that result in a net increase in fund A. The others category includes households, the government, the central bank, and financial institutions not included in the previous categories. The sample covers the period from January 2011 to February 2020.

Figure 6: Flows in the Spot and Forward Markets in Response to FyF Recommendation

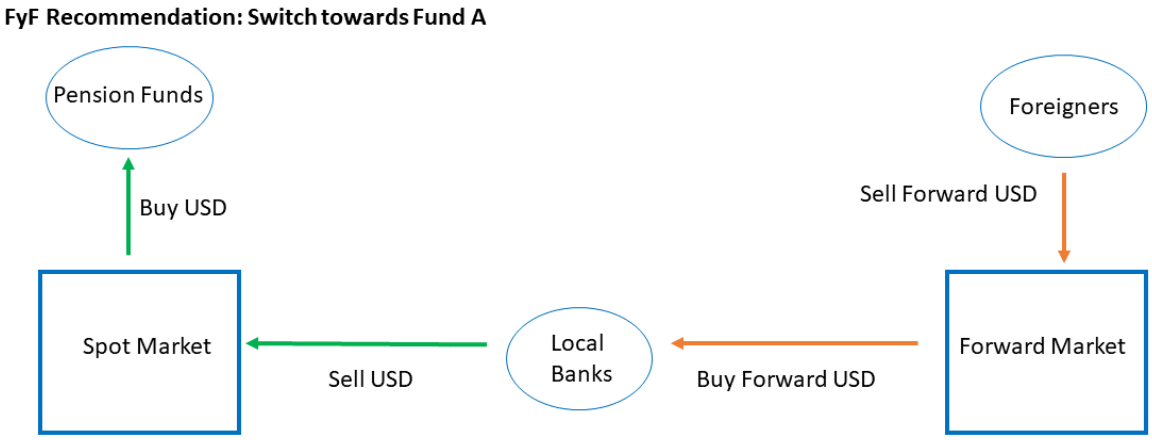
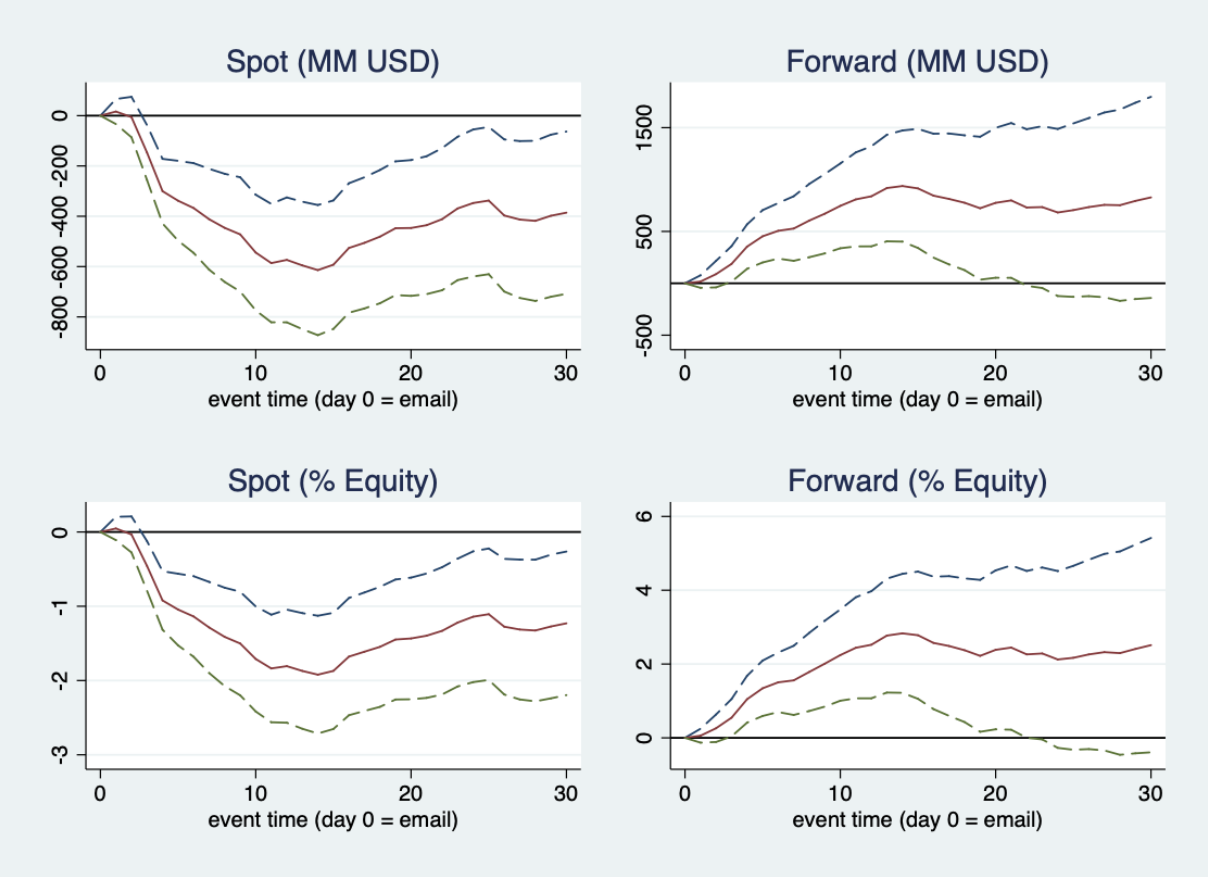
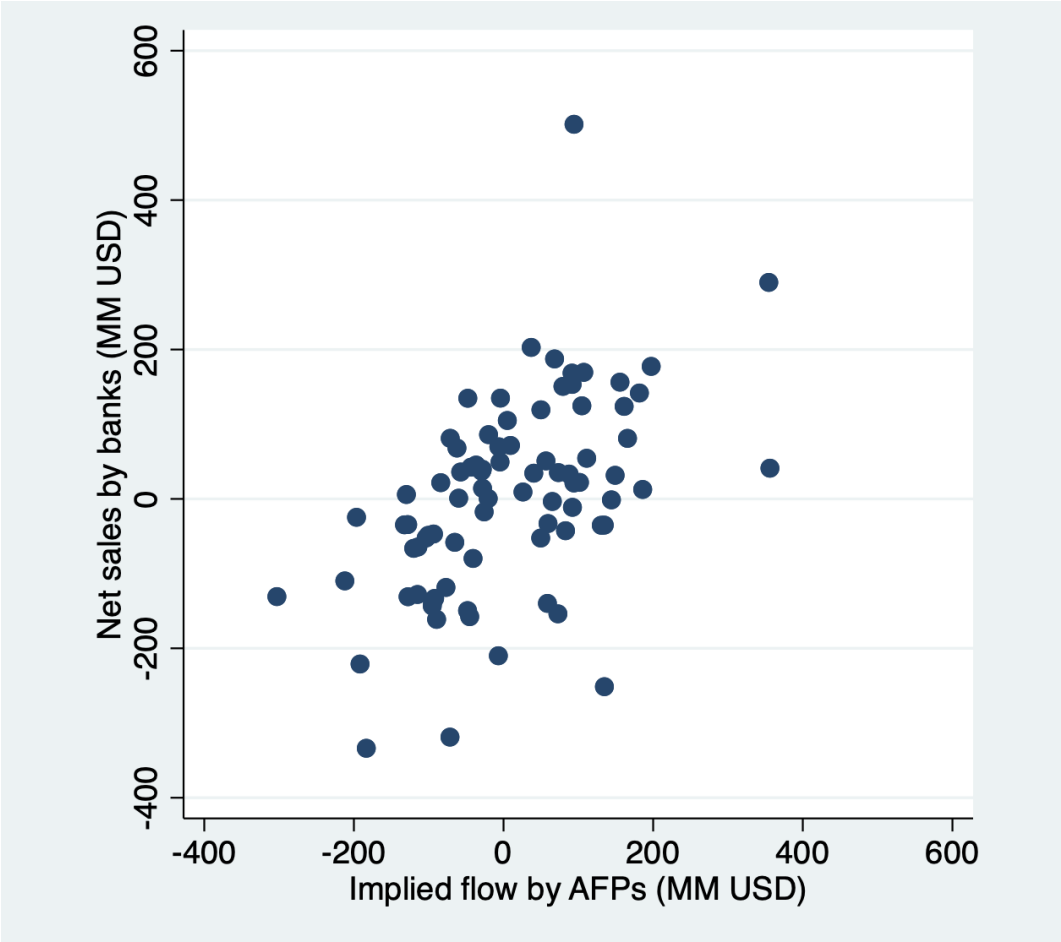


Figure 7: Banking Sector Imbalances after FyF Recommendations



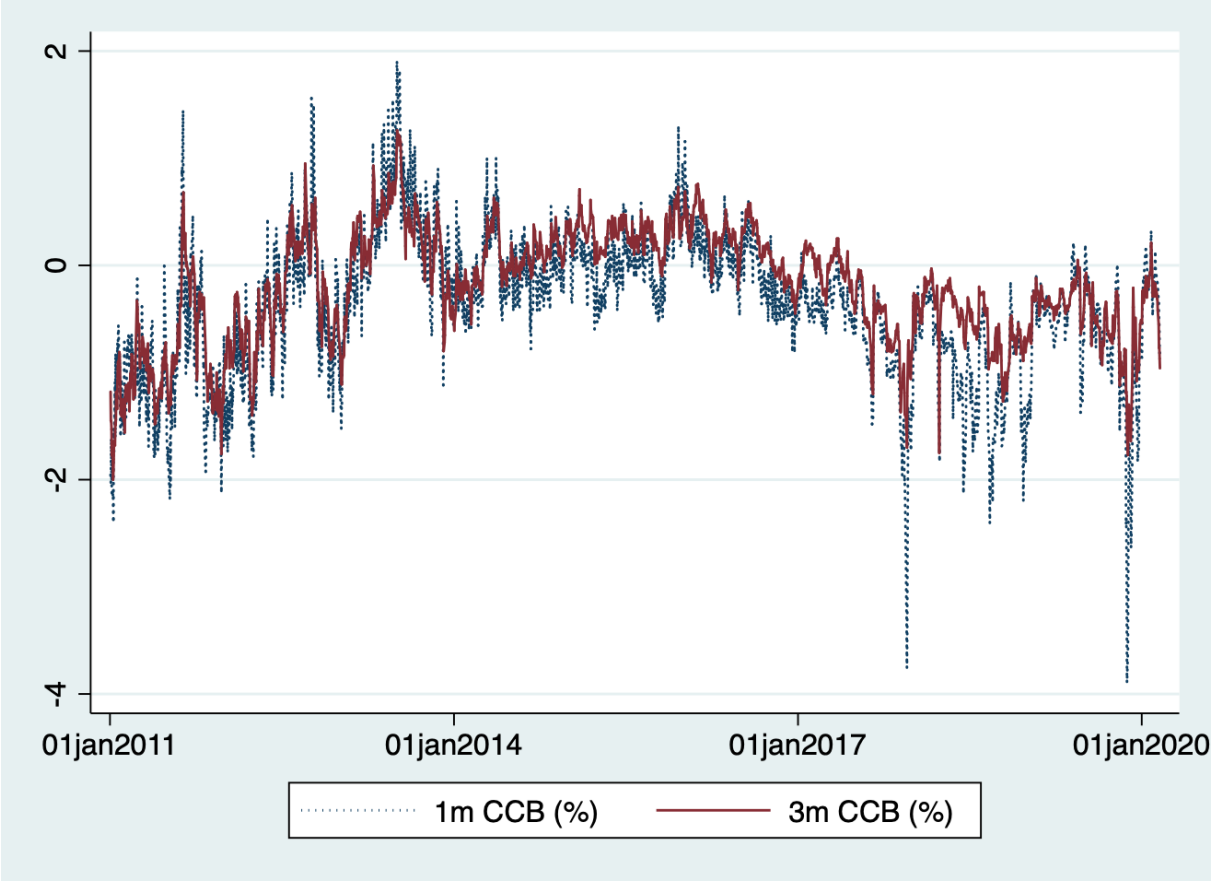
Notes: The event study uses all 82 emails from 2011 to Feb 2020. The perspective is of FyF emails that recommend a move toward foreign assets (following the last column in Table 2). Thus, the effects after an email with a recommendation to move away from foreign assets are multiplied by -1. The banking imbalance is defined as buys minus sells by the Chilean banking sector in the daily spot market or the forward market. The top row shows results in millions of U.S. dollars, while the bottom row normalizes by the total equity of the Chilean banking system, which is lagged by 30 days. The data is from the Central Bank of Chile. Confidence bands based on robust standard errors are at the 95% level.

Figure 8: Daily spot trading by the banking sector and implied flows by AFPs



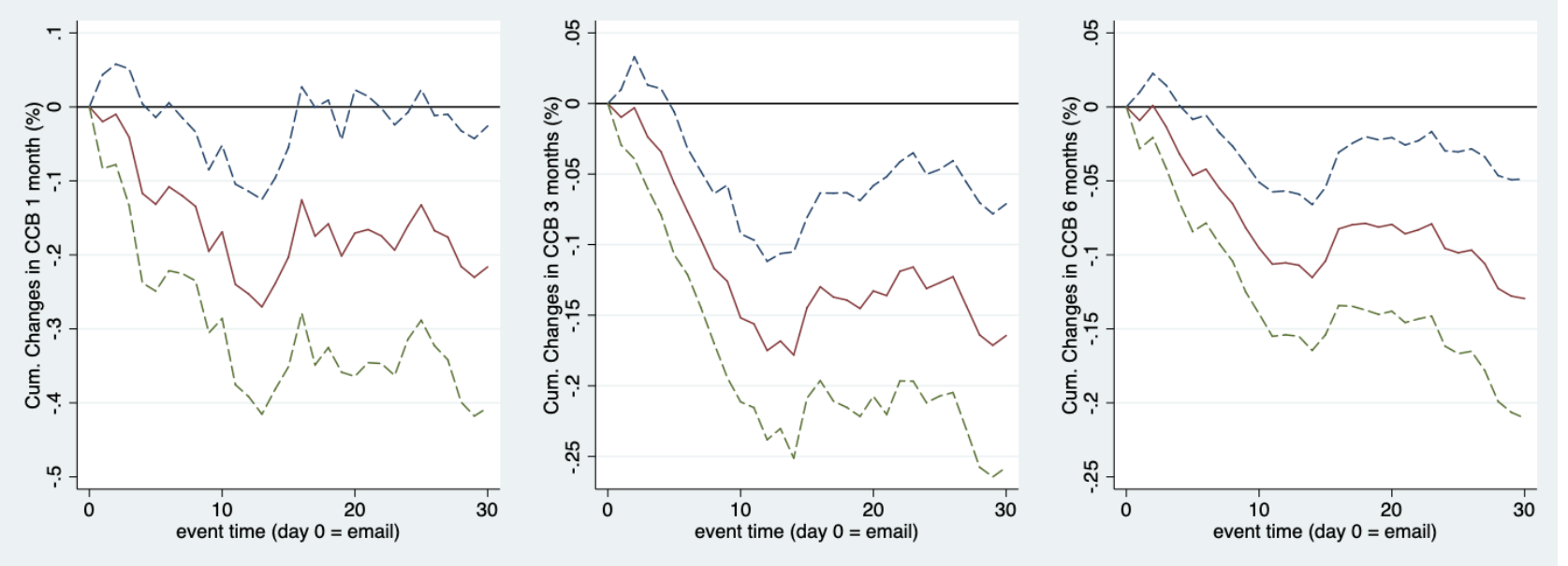
Notes: The figure uses all 82 emails from 2011 to February 2020. Each variable corresponds to the sum over the first ten days after an email from FyF. The implied flow is computed as the sum over all funds (A-E) of the daily flows times the fraction of foreign investment in that fund. A positive number implies that the amount invested by AFPs in foreign assets increased that day. The net sales of the banking sector are computed as the difference between the selling and buying of foreign currency. A positive number implies that the banking sector is selling more foreign currency than what it is buying. Data is from the Central Bank of Chile and the Chilean regulator of AFP (SAFP).

Figure 9: Cross-Currency Basis



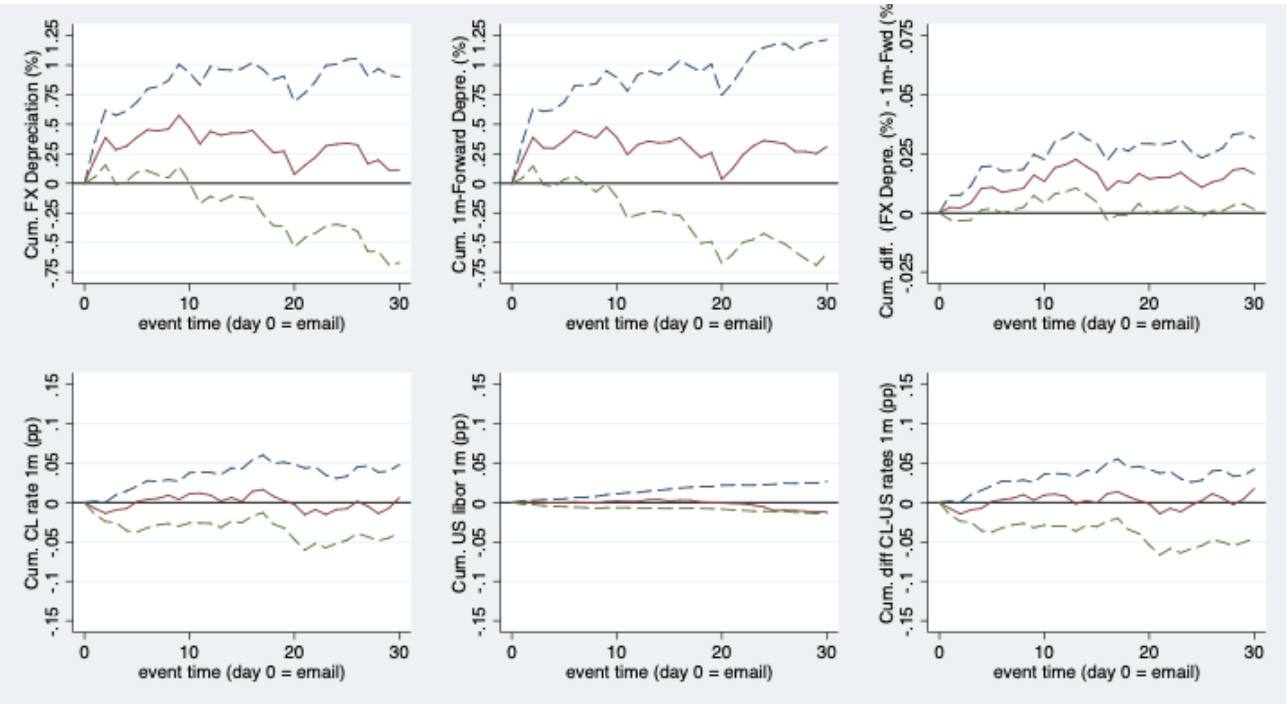
Notes: Data comes from Bloomberg (1-month CCB) and the Central Bank of Chile (3-month CCB).

Figure 10: Cross Currency Basis after FyF Recommendations



Notes: The event study uses all 82 emails from 2011 to Feb 2020. The perspective is of FyF emails that recommend a move toward foreign assets (following the last column in Table 2). Thus, the effects after an email with a recommendation to move away from foreign assets are multiplied by -1. CCB data is from Bloomberg for the one-month CCB and from the Central Bank of Chile for the 3-month and 6-month CCBs. The figure does not adjust for overlapping events. Confidence bands based on robust standard errors are at the 95% level.

Figure 11: Decomposition of CCB after FyF Recommendations



Notes: The top row presents the cumulative change in the foreign exchange rate, one-month forward, and the difference between the cumulative changes of the foreign exchange rate and one-month forward. The bottom row presents the cumulative change in the Chilean one-month rate, U.S. LIBOR one-month rate, and the difference between these cumulative rate changes after FyF recommendations. The event study uses all 82 emails from 2011 to February 2020. The perspective is of FyF emails that recommend a move toward foreign assets. Thus, the effects after an email with a recommendation to move away from foreign assets are multiplied by -1. Foreign exchange data is from Bloomberg. The figure does not adjust for overlapping events. Note that the bottom panel uses a different scale for the y-axis. Confidence bands based on robust standard errors are at the 95% level.

Table 1: Characteristics of Chilean Pension Funds

This table reports averages for total assets under management (AUM), investors, and portfolio characteristics by type of fund (A-E) offered by the Chilean pension system. Individual funds of each type are value-weighted into a single aggregate fund. Averages are computed for each aggregate fund over all months in our sample. Foreign investment refers to non-Chilean assets. The data are collected from administrative records published by the Central Bank of Chile and the pension fund regulator (SAFP).

	Fund A	Fund B	Fund C	Fund D	Fund E	Total
Panel A: Pension system characteristics						
AUM average (million US$)	27,587	29,099	65,187	28,289	24,783	174,945
AUM as % of GDP	10.33	10.88	24.38	10.56	9.22	65.38
AUM as % of total AUM in all funds	15.97	16.74	37.45	16.05	13.79	100
Investors total (thousands)	1,320	4,111	3,776	1,232	554	10,992
Investors as % total investors in all funds	12.08	37.4	34.43	11.16	4.92	100
Panel B: Portfolio characteristics						
Foreign investment (% of total AUM)						
Mean	75.17	56.29	40.62	25.98	6.19	41.58
Median	76.49	58.2	42.26	26.89	6.58	41.69
Min	64.99	44.85	30.3	17.38	1.08	35.39
Max	84.71	67.94	50.49	30.94	11.14	47.79
Foreign equity investment (% of total AUM)						
Mean	61.19	41.18	24.57	12.1	2.29	28.05
Median	61.62	42.38	25.81	13.14	2.38	28.64
Min	54.71	32.92	16.26	5.98	0.23	23.45
Max	66.33	48.09	31.77	16.83	4.36	32.78
Total equity investment (% of total AUM)						
Mean	78.36	58.21	37.93	17.81	3.63	39.83
Median	78.47	58.58	38.55	18.45	3.99	40.29
Min	74.59	53.75	32.93	13.8	0.96	32.92
Max	80.73	60.08	40.53	20.86	5.05	47.79

Table 2: FyF Recommendations

This table shows the list of the 82 portfolio recommendations sent out by FyF since their start in July of 2011 up to the end of February 2020. Fund A is the equity fund with a higher percentage invested in foreign assets (mostly denominated in USD). Fund E is the bond fund with a higher percentage invested in local fixed income (denominated in Chilean Pesos, CLP). Funds B, C, and D gradually reduce equity allocations and the percentage of U.S. dollar denominated assets. The column labeled "buying pressure" indicates whether the flows induced by the recommendation result in an increased demand for USD or CLP.

Date	**Recommendation**	**Buying pressure**	**Date**	**Recommendation**	**Buying pressure**
27-Jul-11	100% E	CLP	12-Oct-17	50% A / 50% E	CLP
12-Oct-11	100% A	USD	28-Nov-17	100% A	USD
22-Nov-11	100% E	CLP	19-Dec-17	50% A / 50% E	CLP
11-Jan-12	100% A	USD	9-Jan-18	100% A	USD
29-Mar-12	100% E	CLP	22-Jan-18	50% A / 50% E	CLP
19-Jun-12	100% A	USD	5-Feb-18	100% E	CLP
28-Jun-12	100% E	CLP	26-Feb-18	50% A / 50% E	USD
19-Jul-12	100% A	USD	7-Mar-18	100% A	USD
29-Aug-12	100% E	CLP	14-Mar-18	50% C / 50% E	CLP
2-Jan-13	100% A	USD	23-Mar-18	15% D / 85% E	CLP
3-Apr-13	100% E	CLP	19-Apr-18	50% A / 50% E	USD
17-Jul-13	100% A	USD	4-May-18	100% A	USD
16-Aug-13	100% E	CLP	24-May-18	50% C / 50% E	CLP
6-Sep-13	100% A	USD	6-Jun-18	60% A / 40% E	USD
24-Jan-14	100% E	CLP	19-Jun-18	20% A / 80% E	CLP
6-Mar-14	50% C / 50% E	USD	25-Jun-18	100% E	CLP
1-Aug-14	100% E	CLP	9-Jul-18	50% A / 50% E	USD
19-Aug-14	50% A / 50% E	USD	27-Jul-18	100% E	CLP
30-Oct-14	100% A	USD	20-Aug-18	50% A / 50% E	USD
15-Dec-14	100% E	CLP	29-Aug-18	100% A	USD
12-Feb-15	50% A / 50% E	USD	5-Sep-18	50% A / 50% E	CLP
18-Mar-15	100% A	USD	24-Sep-18	100% E	CLP
13-May-15	50% A / 50% E	CLP	5-Oct-18	50% A / 50% E	USD
8-Jul-15	40% C / 60% E	CLP	11-Oct-18	100% E	CLP
24-Aug-15	100% E	CLP	5-Nov-18	50% A / 50% E	USD
13-Oct-15	50% C / 50% E	USD	9-Nov-18	100% E	CLP
26-Oct-15	100% E	CLP	12-Dec-18	50% A / 50% E	USD
16-Dec-15	50% A / 50% E	USD	26-Dec-18	40% C / 60% E	CLP
22-Dec-15	100% A	USD	18-Jan-19	100% E	CLP
6-Jan-16	50% A / 50% E	CLP	24-Jan-19	50% A / 50% E	USD
15-Jan-16	100% E	CLP	16-Apr-19	100% E	CLP
22-Feb-16	50% C / 50% E	USD	23-Apr-19	50% A / 50% E	USD
29-Apr-16	100% E	CLP	2-May-19	100% E	CLP
6-Sep-16	50% C / 50% E	USD	4-Jun-19	50% A / 50% E	USD
13-Sep-16	100% E	CLP	26-Jun-19	100% E	CLP
9-Nov-16	50% A / 50% E	USD	16-Oct-19	50% A / 50% E	USD
22-Dec-16	100% E	CLP	11-Nov-19	100% A	USD
13-Jul-17	50% C / 50% E	USD	22-Nov-19	50% A / 50% E	CLP
10-Aug-17	100% E	CLP	16-Dec-19	100% E	CLP
12-Sep-17	50% A / 50% E	USD	9-Jan-20	50% A / 50% E	USD
28-Sep-17	100% A	USD	16-Jan-20	100% E	CLP

Table 3: Transfer Characteristics according to Consistency with FyF Recommendations

This table shows the characteristics of the individuals making transfers between Chilean pension funds splitting the sample by transfers that are consistent and inconsistent with FyF recommendations. A transfer is labeled as consistent with an FyF recommendation if the funds of origin and destination both coincide with the FyF recommendation and the transfer is made within two weeks of the FyF email. Variables in columns (5), (6), and (7) are computed excluding the current transfer. The sample period is from March 3rd, 2014 to February 29th, 2020. Data come from the Superintendencia de Pensiones (Chilean regulator of AFPs). The p-values for statistical significance of the difference between "No" and "Yes" reported in the last row are computed clustering at the individual level.

FyF consistent transfers	Number	Age (years)	Male (%)	Amount (US$)	Average number of other transfers	Average number of other FyF transfers	Consistency of other transfers with FyF (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
No	4,335,830	44.9	63.5	39,508	22.6	8.1	27.3
Yes	3,591,657	40.1	70.6	22,476	40.9	31.0	70.5
p-value		0.000	0.000	0.000	0.000	0.000	0.000

Table 4: Potential Drivers of FyF recommendations

This table shows regressions examining the factors driving FyF's recommendations. The independent variable in all columns is the change in the fraction of the portfolio that FyF recommends to invest in fund A. This variable takes values between 1 and -1 on days when there was an email and zero on all other days. For example, if the previous FyF email recommended 50% to be invested in fund A and 50% in fund E, and the current email recommends to invest is 100% in fund A, then this variable takes a value of 0.5. The explanatory variables include past returns and volatilities of Funds A and E, of the exchange rate, of the copper price and several macroeconomic variables used as predictors of FX in the literature (Rossi, 2013). The sample covers the period from July 27, 2011 (first FyF recommendation) to February 29, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)
	Net move A	Net move A	Net move A	Net move A	Net move A
Fund A return week -1	0.68***				0.59**
	(0.25)				(0.25)
Fund A return week -2	-0.33*				-0.29
	(0.18)				(0.19)
Fund E return week -1	-1.03				-1.14
	(0.78)				(0.81)
Fund E return week -2	0.89				1.21
	(0.75)				(0.80)
Fund A volatility week -1	0.26				-0.07
	(1.32)				(1.44)
Fund A volatility week -2	0.50				0.17
	(1.25)				(1.43)
Fund E volatility week -1	-2.31				-0.58
	(1.52)				(1.69)
Fund E volatility week -2	-0.80				0.23
	(0.98)				(1.13)
FX rate change week -1		-0.31			-0.22
		(0.25)			(0.26)
FX rate change week -2		-0.18			-0.36
		(0.22)			(0.26)
FX volatility week -1		0.05			-0.36
		(1.02)			(0.98)
FX volatility week -2		-0.55			-0.58
		(0.99)			(1.24)
Copper price change week -1			0.17		-0.04
			(0.11)		(0.12)
Copper price change week -2			-0.09		-0.18
			(0.10)		(0.11)
Copper price volatility week -1			0.74*		0.93*
			(0.42)		(0.53)
Copper price volatility week -2			-0.08		-0.04
			(0.63)		(0.63)
Log output differentials				0.07	0.07
				(0.08)	(0.08)
Log money differentials				-0.06	-0.05
				(0.09)	(0.09)
Net foreign assets				-0.26	-0.06
				(0.49)	(0.47)
Interest rate differentials				-0.00	-0.01
				(0.01)	(0.01)
Forward discount 1m				-4.03	-6.47
				(12.99)	(12.82)
Forward discount 3m				-0.42	0.30
				(5.30)	(5.08)
Inflation differentials				-0.00	-0.00
				(0.01)	(0.01)
Constant	-0.00	0.00	-0.01	0.03	0.07
	(0.01)	(0.01)	(0.01)	(0.21)	(0.22)
Observations	1904	1904	1886	1861	1844
R^2	0.01	0.00	0.00	0.00	0.01

Table 5: FyF Performance

This table shows the difference in returns and Sharpe ratios between following FyF recommendations and passive strategies. In panel A the passive strategies correspond to buy-and-hold returns for funds A, C, or E. Each row considers returns for different years. The last row shows the cumulative return difference for an investor who followed FyF recommendations for the whole period. Return differentials are reported as percentage points. Panel B presents the annualized Sharpe ratios computed from daily returns for funds A, B, C, D, E, and for a portfolio that follows FyF recommendations. We assume investors request a switch in their pension fund portfolio the same day that the recommendation is issued and that the switch is implemented at day *t+2* prices according to Chilean regulations. The sample covers the period from August 1, 2011 (two business days after first FyF recommendation) to February 29, 2020. In parentheses we report the t-statistic for the difference based on daily returns. *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: Mean Annualized Return						
	FyF-A	t-stat	FyF-C	t-stat	FyF-E	t-stat	N trading days
2011	11.44	(1.10)	6.22	(1.10)	0.79	(0.14)	104
2012	2.60	(0.47)	4.11	(1.13)	5.32	(1.13)	248
2013	-0.73	(-0.14)	1.52	(0.44)	1.43	(0.34)	249
2014	-6.48	(-1.57)	-6.51***	(-2.97)	-4.54	(-1.31)	250
2015	-2.17	(-0.33)	-0.59	(-0.19)	1.45	(0.37)	250
2016	0.60	(0.09)	-1.77	(-0.60)	-3.62	(-1.61)	251
2017	-11.47**	(-2.30)	-4.32*	(-1.75)	2.05	(0.84)	247
2018	7.03	(1.16)	2.16	(0.72)	-1.82	(-0.54)	246
2019	-0.55	(-0.10)	1.34	(0.32)	6.35	(0.86)	249
2020	-1.69	(-0.37)	-0.85	(-0.42)	0.02	(0.02)	42
All years	-0.15	(-0.07)	0.16	(0.12)	0.86	(0.56)	2136

	Panel B: Annualized Sharpe Ratios						
	A	B	C	D	E	FyF	N trading days
All years	0.541	0.658	0.975	1.249	1.362	1.005	2136

Table 6: Summary Statistics

This table shows summary statistics for the main variables used in the analysis. All rates, spreads, flows, and variable changes are reported as percentage points. The sample covers the period from January 3, 2011 to February 29, 2020.

	N. of Obs.	Mean	Std. Dev.	p10	Median	p90
Panel A: Prices and rates (daily)						
Spot foreign exchange rate (CLP/USD)	2,041	595.27	90.76	474.05	612.90	700.40
Daily change of the spot foreign exchange	2,041	0.02	0.62	-0.69	0.01	0.75
1-month Chilean interest rate	2,041	4.13	1.29	2.62	3.85	6.04
1-month U.S. LIBOR interest rate	2,041	0.71	0.76	0.16	0.25	2.09
Spread between the 1-month LIBOR and local rates	2,041	-3.42	1.92	-5.82	-3.55	-0.53
Daily change of the spread between LIBOR and local rates	2,041	0.00	0.05	-0.05	0.00	0.05
Forward premium	2,041	3.06	2.17	-0.23	3.54	5.58
Daily change of the forward premium	2,041	0.00	0.27	-0.29	-0.02	0.33
1-month cross-currency-basis (CCB)	2,041	-0.36	0.67	-1.26	-0.29	0.36
Daily change of the 1-month CCB	2,041	0.00	0.28	-0.30	-0.02	0.34
Daily change in the price of copper	2,041	-0.02	1.24	-1.48	-0.04	1.43
Panel B: Quantities (daily)						
Spot imbalance of banking sector (% bank equity)	2,034	0.01	0.74	-0.81	-0.02	0.89
Forward imbalance of banking sector (% bank equity)	2,034	-0.23	1.09	-1.46	-0.19	0.96
Net imbalance (spot + forward imbalances)	2,034	-0.22	1.02	-1.34	-0.22	0.88
Daily Flow Aggregate Fund A	2,286	-0.01	0.48	-0.24	0.00	0.17
Daily Flow Aggregate Fund C	2,286	0.00	0.13	-0.07	0.00	0.08
Daily Flow Aggregate Fund E	2,286	0.09	0.88	-0.33	0.01	0.58
Panel C: Monthly variables						
Chilean inflation	101	0.26	0.28	0.00	0.20	0.60
U.S. inflation	101	0.14	0.20	-0.11	0.18	0.38
Banking sector capital (% total assets)	101	13.31	0.38	12.81	13.30	13.77
Monthly change in bank capital	100	-0.00	0.19	-0.24	-0.01	0.24
Chilean central bank balance sheet (% GDP)	101	16.41	1.74	14.03	16.55	18.00

Table 7: Aggregate Daily Pension Fund Flows and FyF Recommendations

This table shows time-series regressions of daily pension fund flows at the system level. The main independent variables capturing the impact of the recommendations at different daily lags are explained in equation (3) of the main text. Results for funds A, C, and E are reported separately. Controls include five lags of daily flows and fund returns. In the bottom panel, CUM[1-5] and CUM[6-10] report the cumulative effects over the first five trading days and the next five trading days respectively. The sample covers the period from January 3, 2011 to February 29, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	Flow to Fund:					
	A	C	E	A	C	E
	(1)	(2)	(3)	(4)	(5)	(6)
RecDay 1	-0.11	-0.05**	0.29*	0.08*	0.00	-0.13**
	(0.10)	(0.02)	(0.15)	(0.05)	(0.01)	(0.07)
RecDay 2	0.03	0.01	0.05	0.05	0.03	-0.13*
	(0.05)	(0.02)	(0.09)	(0.04)	(0.02)	(0.07)
RecDay 3	0.10**	0.00	-0.05	0.01	-0.01	-0.07
	(0.05)	(0.02)	(0.10)	(0.04)	(0.02)	(0.07)
RecDay 4	3.58***	0.22***	-6.19***	3.45***	0.21***	-6.14***
	(0.29)	(0.07)	(0.42)	(0.28)	(0.07)	(0.40)
RecDay 5	2.95***	0.18***	-5.36***	0.62***	0.05**	-0.90***
	(0.24)	(0.05)	(0.37)	(0.14)	(0.02)	(0.30)
RecDay 6	1.54***	0.10***	-2.90***	0.04	0.02	0.34
	(0.18)	(0.03)	(0.37)	(0.13)	(0.02)	(0.30)
RecDay 7	0.94***	0.07***	-1.73***	0.04	0.02	0.29
	(0.16)	(0.02)	(0.32)	(0.10)	(0.02)	(0.22)
RecDay 8	0.43***	0.03	-0.89***	-0.05	-0.01	0.17
	(0.12)	(0.02)	(0.26)	(0.08)	(0.02)	(0.15)
RecDay 9	0.20***	0.02	-0.47**	-0.07	0.02	0.30*
	(0.07)	(0.02)	(0.19)	(0.10)	(0.02)	(0.16)
RecDay 10	0.12**	0.01	-0.37**	-0.07	0.01	0.13
	(0.06)	(0.03)	(0.16)	(0.07)	(0.03)	(0.14)
Controls	no	no	no	yes	yes	yes
Observations	2277	2277	2277	2272	2272	2272
R-squared	0.631	0.041	0.597	0.786	0.320	0.810
Cumulative evidence						
CUM [1-5]	6.54***	0.37***	-11.25***	4.20***	0.29***	-7.74***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
CUM [6-10]	3.23***	0.23***	-6.37***	-0.11	0.05	1.23***
p-value	0.00	0.00	0.00	0.66	0.28	0.01

Table 8: Foreign Exchange Rates and FyF Recommendations

This table shows time-series regressions for the daily depreciation of the spot foreign exchange rate. The main independent variables capturing the impact of the recommendations at different daily lags are explained in equation (3) of the main text. We report the coefficients for the first five days, but we omit the individual coefficients for days 6–10. CUM[1-5] and CUM[6-10] report the cumulative effects over the first five trading days and the next five trading days respectively. The dependent variable is expressed in percentage points. Macroeconomic controls include the daily change in the price of copper, 30-day lags of Chilean and U.S. inflation, three-month Chilean and LIBOR interest rates, the size of the Chilean central bank balance sheet as a fraction of GDP, and dummies for Mondays and Fridays. The lagged dependent variable (DV) includes five lags of the foreign exchange rate depreciation. The sample covers the period from January 3, 2011 to February 29, 2020 and in columns (3)–(6) is restricted by the availability of a one-month futures price in Bloomberg. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	ΔFX (1)	ΔFX (2)	ΔFX (3)	ΔFX (4)	ΔFX (5)	ΔFX (6)
RecDay 1	0.45**	0.49***	0.45**	0.49***	0.48**	0.50***
	(0.21)	(0.18)	(0.21)	(0.19)	(0.21)	(0.19)
RecDay 2	0.54***	0.50***	0.52***	0.48***	0.49***	0.47***
	(0.17)	(0.17)	(0.18)	(0.17)	(0.18)	(0.17)
RecDay 3	-0.29	-0.28	-0.22	-0.20	-0.28	-0.24
	(0.17)	(0.17)	(0.18)	(0.17)	(0.19)	(0.18)
RecDay 4	0.09	0.07	0.06	0.05	0.05	0.03
	(0.18)	(0.16)	(0.20)	(0.17)	(0.19)	(0.17)
RecDay 5	0.06	0.17	0.05	0.14	0.08	0.18
	(0.19)	(0.18)	(0.20)	(0.20)	(0.20)	(0.19)
Sample	All	All	F1m available	F1m available	F1m available	F1m available
Macro Controls	no	yes	no	yes	no	yes
Lagged DV	no	yes	no	no	yes	yes
Observations	2277	2181	2041	2041	2041	2041
R-squared	0.020	0.145	0.020	0.138	0.031	0.142
Cumulative evidence						
CUM [1-5]	0.85**	0.96**	0.87**	0.96**	0.81*	0.94**
p-value	0.04	0.01	0.05	0.02	0.06	0.02
CUM [6-10]	0.28	0.39	0.39	0.42	0.37	0.44
p-value	0.50	0.32	0.38	0.29	0.39	0.28

Table 9: Foreign Exchange Regressions in Sub-Samples

This table follows the style of Table 8. The sample is restricted by the availability of a one-month futures price in Bloomberg. Buy (sell) emails refer to emails that recommend increasing (decreasing) the allocation to foreign assets. The sample in the case of the buy (sell) column includes the post-recommendation days that follow buy (sell) emails plus days that do not immediately follow any recommendation. The end-of-quarter sample includes trading days in the last week of March, June, September, and December and, in order to estimate post-event effects, trading days in the first week of January, April, July, and October. The free float sample excludes periods of central bank intervention in the foreign exchange market (the year 2011 and from November 29, 2019 up to the end of our sample on February 29, 2020). Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Sample	Buy Emails	Sell Emails	2011-15	2016-20	Q-end	Not Q-end	Free Float
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
RecDay 1	0.84***	0.16	0.26	0.87**	0.66*	0.46**	0.50**
	(0.30)	(0.22)	(0.20)	(0.34)	(0.39)	(0.21)	(0.20)
RecDay 2	0.27	0.64***	0.37*	0.64*	0.65**	0.42**	0.56***
	(0.28)	(0.20)	(0.20)	(0.34)	(0.32)	(0.19)	(0.18)
RecDay 3	-0.18	-0.32	-0.25	-0.22	-0.57**	-0.19	-0.27
	(0.28)	(0.23)	(0.17)	(0.38)	(0.29)	(0.20)	(0.20)
RecDay 4	-0.03	0.05	0.17	-0.25	0.28	-0.02	-0.05
	(0.31)	(0.15)	(0.15)	(0.36)	(0.53)	(0.18)	(0.18)
RecDay 5	-0.06	0.35	-0.06	0.63	0.07	0.17	0.13
	(0.27)	(0.29)	(0.20)	(0.39)	(0.27)	(0.23)	(0.20)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1715	1741	1189	852	268	1773	1749
R-squared	0.145	0.149	0.199	0.107	0.198	0.140	0.125
Cumulative evidence							
CUM [1-5]	0.84	0.89*	0.48	1.68**	1.09	0.84*	0.87**
p-value	0.20	0.09	0.25	0.04	0.23	0.07	0.04
CUM [6-10]	0.60	0.17	0.18	1.11	0.17	0.43	0.48
p-value	0.30	0.77	0.70	0.18	0.94	0.30	0.23

Table 10: Daily Banking Imbalances, Trading Volume, and FyF Recommendations

This table shows time-series regressions for daily banking sector imbalances, and for the daily traded volume in the spot and derivatives markets. Net imbalance in the spot and forward markets in columns (1) and (2) are defined as the amount bought minus the amount sold by banks to third parties, divided by the 30-day lagged equity of the banking sector. Spot+Forward in column (3) corresponds to the the sum of the net imbalances in the both markets. In column (4) we use the daily change in a bank's net exposure (spot position + forward position). The dependent variables in columns (5) to (7) are computed as the ratio of the daily traded volume (buy+sell) in each market over the 100-day moving average of the same variable (lagged 10 days). Since volume is always positive, the daily shocks for columns (5) to (7) are computed by replacing $\Delta\omega_i^{FyF}$ in equation (3) with the absolute value of this variable: $abs(\Delta\omega_i^{FyF})$. We report the coefficients for the first five days, but we omit the individual coefficients for days 6–10. CUM[1-5] and CUM[6-10] report the cumulative effects over the first five trading days and the next five trading days, respectively. Columns (5) and (6) presents the results for the traded volume in the spot and derivatives markets, and their sum in Column (7). Interbank trading is not included. Controls include the daily change in the price of copper, 30-day lags of Chilean and U.S. inflation, three-month Chilean and LIBOR interest rates, the size of the Chilean central bank balance sheet as a fraction of GDP, dummies for Mondays and Fridays, and five lags of the dependent variable. The sample covers the period from January 3, 2011 to February 29, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	Banking Imbalances				Trading Volume		
	Spot	Deriv.	Spot + Deriv.	Δ Net Position	Spot	Deriv.	Spot + Deriv.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
RecDay 1	0.31	0.09	0.39*	0.50**			
	(0.24)	(0.26)	(0.22)	(0.23)			
RecDay 2	-0.36*	0.37	0.10	0.11			
	(0.20)	(0.39)	(0.40)	(0.23)			
RecDay 3	-0.88***	0.54*	-0.31	0.41			
	(0.27)	(0.30)	(0.32)	(0.25)			
RecDay 4	-1.13***	1.06***	-0.16	0.19			
	(0.25)	(0.38)	(0.30)	(0.27)			
RecDay 5	-0.26	0.37	0.00	0.14			
	(0.30)	(0.35)	(0.33)	(0.26)			
abs(RecDay 1)					0.03	0.05	0.04
					(0.05)	(0.05)	(0.04)
abs(RecDay 2)					0.04	-0.03	-0.00
					(0.05)	(0.06)	(0.05)
abs(RecDay 3)					0.15**	0.02	0.06
					(0.07)	(0.07)	(0.05)
abs(RecDay 4)					0.16**	0.00	0.06
					(0.06)	(0.06)	(0.05)
abs(RecDay 5)					0.15**	0.08	0.11**
					(0.06)	(0.05)	(0.05)
controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2029	2029	2029	2028	2041	2041	2041
R^2	0.117	0.082	0.057	0.143	0.260	0.222	0.278
Cumulative evidence							
CUM [1-5]	-2.32***	2.43***	0.02	1.34**	0.54***	0.12	0.27**
p-value	0.00	0.0	0.98	0.02	0.00	0.38	0.02
CUM [6-10]	-1.40***	1.34	0.15	-0.13	-0.09	0.18	0.06
p-value	0.01	0.12	0.85	0.85	0.60	0.28	0.64

Table 11: Cross Currency Basis and FyF Recommendations

This table shows regressions for the change of the one-month cross-currency basis ($\Delta CCB1m$), the change of the forward premium ($\Delta FwdPremium$), and the change of the spread between the one-month LIBOR rate and the local rate ($\Delta Rates$). The rest of the table follows the style of Table 8. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	$\Delta CCB1m$	$\Delta CCB1m$	$\Delta FwdPremium$	$\Delta FwdPremium$	$\Delta Rates$	$\Delta Rates$
	(1)	(2)	(3)	(4)	(5)	(6)
RecDay 1	-0.05	-0.07	-0.07	-0.10	0.02**	0.02**
	(0.09)	(0.08)	(0.09)	(0.08)	(0.01)	(0.01)
RecDay 2	0.04	-0.02	0.02	-0.05	0.02	0.02
	(0.06)	(0.06)	(0.07)	(0.06)	(0.01)	(0.01)
RecDay 3	-0.03	-0.04	-0.02	-0.03	-0.02	-0.01
	(0.07)	(0.08)	(0.07)	(0.08)	(0.01)	(0.02)
RecDay 4	-0.18**	-0.18**	-0.18**	-0.19**	0.01	0.01
	(0.08)	(0.09)	(0.08)	(0.08)	(0.02)	(0.02)
RecDay 5	-0.12**	-0.14**	-0.12**	-0.14**	-0.00	-0.01
	(0.06)	(0.06)	(0.06)	(0.06)	(0.02)	(0.02)
Sample	F 1m available	F 1m available	F 1m available	F 1m available	F 1m available	F 1m available
Controls	No	Yes	No	Yes	No	Yes
Observations	2041	2041	2041	2041	2041	2041
R-squared	0.056	0.131	0.057	0.146	0.009	0.024
Cumulative evidence						
CUM [1-5]	-0.34**	-0.44***	-0.37**	-0.51***	0.03	0.03
p-value	0.04	0.01	0.02	0.00	0.32	0.38
CUM [6-10]	-0.21	-0.31	-0.17	-0.27	-0.03	-0.03
p-value	0.28	0.09	0.33	0.12	0.38	0.43

Table 12: Cross Currency Basis Regressions in Sub-Samples

This table follows the style of Table 9 for changes of the one-month cross-currency basis as the dependent variable. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Sample	Buy Emails	Sell Emails	2011-15	2016-20	Q-end	Not Q-end	Free Float
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
RecDay 1	-0.09	-0.04	0.08	-0.28**	-0.04	-0.07	-0.07
	(0.15)	(0.08)	(0.09)	(0.14)	(0.15)	(0.10)	(0.09)
RecDay 2	-0.16*	0.12	-0.03	0.04	0.05	-0.04	-0.01
	(0.09)	(0.08)	(0.09)	(0.08)	(0.18)	(0.06)	(0.07)
RecDay 3	-0.10	0.05	-0.02	-0.07	-0.00	-0.04	-0.10
	(0.13)	(0.09)	(0.11)	(0.12)	(0.21)	(0.08)	(0.08)
RecDay 4	-0.27*	-0.07	-0.06	-0.38**	-0.65***	-0.09	-0.20**
	(0.15)	(0.09)	(0.09)	(0.15)	(0.16)	(0.09)	(0.09)
RecDay 5	-0.22**	-0.08	-0.20***	-0.01	-0.28**	-0.12*	-0.16**
	(0.11)	(0.05)	(0.07)	(0.10)	(0.13)	(0.06)	(0.07)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1715	1741	1189	852	268	1773	1749
R-squared	0.141	0.155	0.206	0.077	0.211	0.138	0.157
Cumulative evidence							
CUM [1-5]	-0.85***	-0.03	-0.22	-0.70**	-0.92**	-0.36**	-0.54***
p-value	0.00	0.89	0.26	0.01	0.03	0.04	0.00
CUM [6-10]	0.20	-0.73***	-0.25	-0.27	0.70	-0.25	-0.16
p-value	0.46	0.01	0.23	0.36	0.22	0.20	0.38

Table 13: Cross Currency Basis Regressions with Banking Interactions

This table shows regressions in the style of Table 11 for changes of the cross-currency basis at one, three, and six months. The main independent variable (RecDay[1-10]) corresponds to the aggregation of $RecDay_\tau$ (see equation (3)) for the first ten days that follow an email from FyF. We divide this variable by 10, so the coefficient is the cumulative effect over the ten days. This variable is interacted with an indicator for days when bank capital slack decreased over 30 days in the previous month ($Decrease\,in\,Capital\,Slack$). Bank capital slack is defined as the difference between banking equity as a fraction of total assets and the regulatory limit for this ratio. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	$\Delta CCB1m$	$\Delta CCB3m$	$\Delta CCB6m$
	(1)	(2)	(3)
RecDay [1-10]	-0.06	-0.16	-0.12
	(0.31)	(0.15)	(0.12)
RecDay [1-10] * Decrease in Capital Slack	-1.21**	-0.52***	-0.28*
	(0.50)	(0.20)	(0.17)
Decrease in Capital Slack	0.01	0.00	0.00
	(0.01)	(0.00)	(0.00)
Controls	Yes	Yes	Yes
Observations	2004	2004	2004
R-squared	0.132	0.039	0.038

Appendix

A Institutional Details of the Chilean FX Markets

As seen in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (several years), Chile is an open economy, well-integrated with global financial markets, and with a free-floating foreign exchange rate. For example, the trade to GDP ratio is 57%, which is comparable to developed markets such as France or the UK. The regulation that caps the risk exposure (including currency risk) of banks is in accordance with the recommendations of the Basel Committee on Banking Supervision (BCBS).

Villena and Hynes (2020) provide an overview of the Chilean market in comparison to other FX markets in the period 1998-2018, and we refer the interested reader to their study for more details.[30] We summarize the market features that are most relevant for our setup. In comparison to foreign exchange markets in emerging economies, the Chilean foreign exchange market is among the most developed. In particular, the annual turnover in the spot market is around USD 1 trillion.

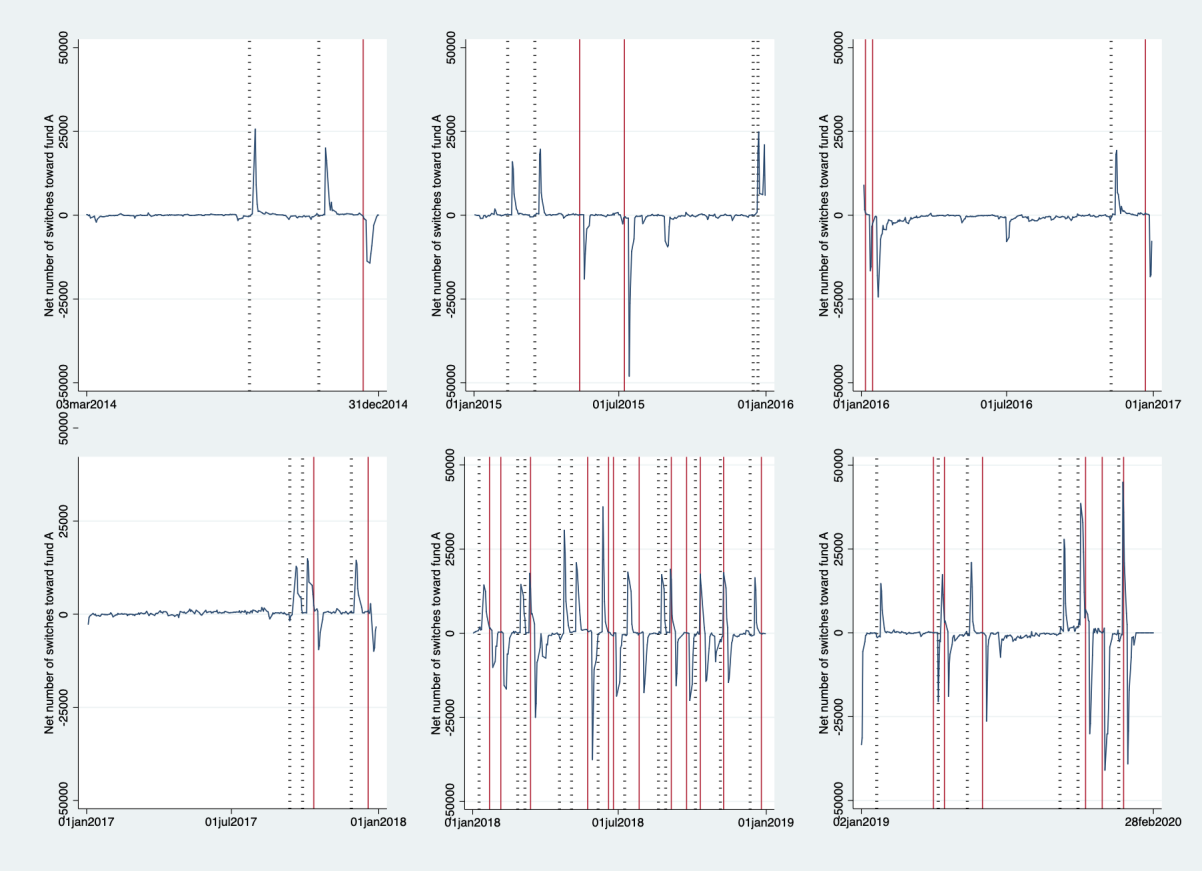
The non-deliverable feature of the Chilean peso means that, although the law allows foreign exchange transactions between residents and non-residents, non-residents have to open accounts with registered participants of the on-shore formal exchange market (domestic banks, local subsidiaries of global banks, and a few other domestic institutions such as local brokers). For instance, it is not possible for a resident to deposit Chilean pesos in, say, an account at the Bank of America in New York. The regulation is basically designed so that Chilean pesos cannot easily leave the country. The Chilean peso was a non-deliverable currency during our sample period, but the law changed at the end of 2020. However, it is yet unclear whether the commercial incentives exist for foreign banks (beyond their local branches) to offer accounts in Chilean pesos.

The non-deliverable feature implies partial segmentation between the spot and derivatives markets. The spot market, which requires the exchange of pesos and foreign currencies, is by and large a domestic market. Foreigners are very active in derivatives, but not in the spot market. Derivatives are traded on-shore and off-shore in the form non-deliverable forwards (NDFs). The trading of NDFs is allowed without restrictions since they are settled in US dollars and not in domestic currency. Foreign exchange swaps have a spot and a forward leg, but these two legs are in practice hard to combine given the segmentation. Therefore,

[30] The 2021 Report on Financial Stability of the Central Bank of Chile (Informe de Estabilidad Financiera Segundo Semestre 2021, p. 48-63) also provides a summary of institutional features of the Chilean FX market.

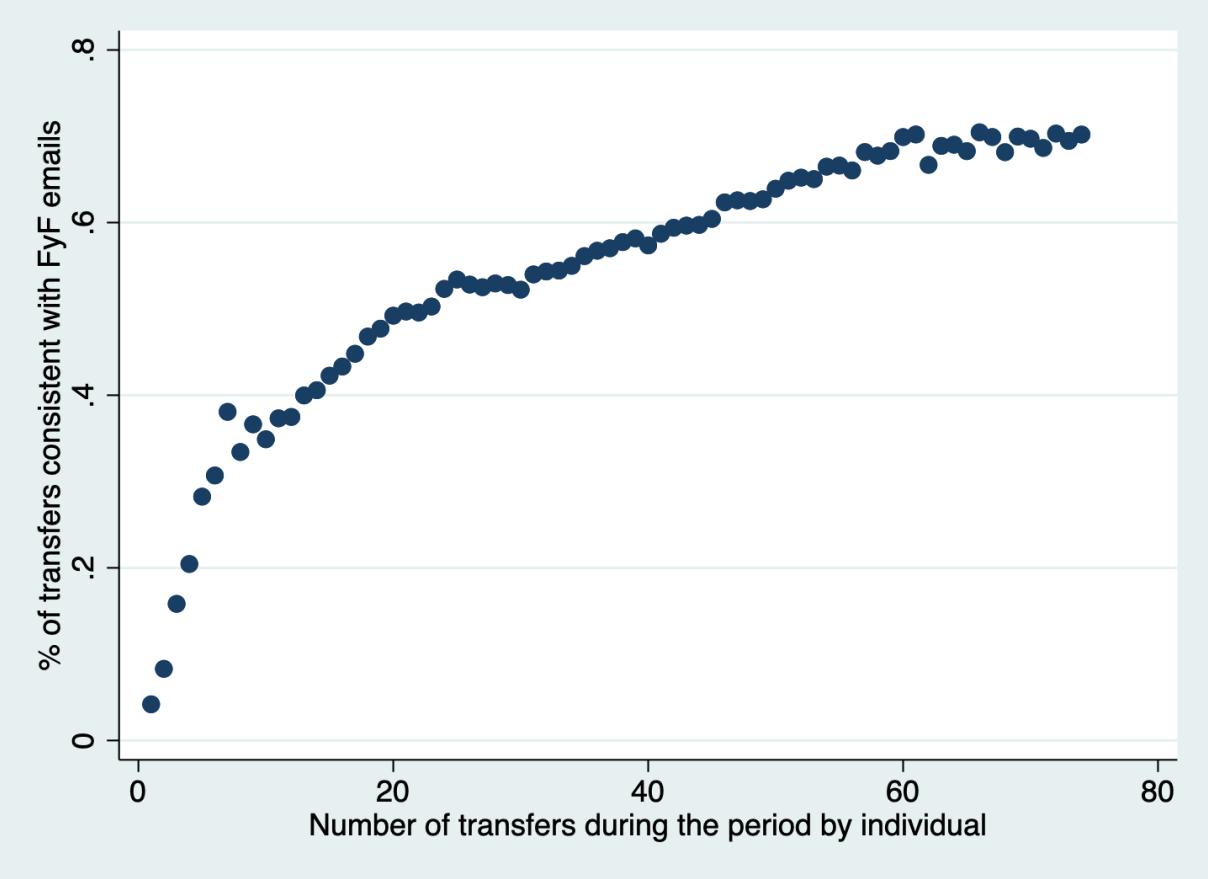
swaps are used less frequently in Chile than in other markets with deliverable currencies (e.g., Euro, US dollar, British pound, Swiss franc, etc.). Swaps are around three times larger than forwards in global markets. Forwards, instead, dominate the Chilean market. However, the Chilean situation is not uncommon among non-deliverable currencies such as the Korean Won, the Indian Rupee, the Brazilian Real, or the Argentinian Peso.

Figure A.1: Daily Net transfers toward Fund A (2014-2020)



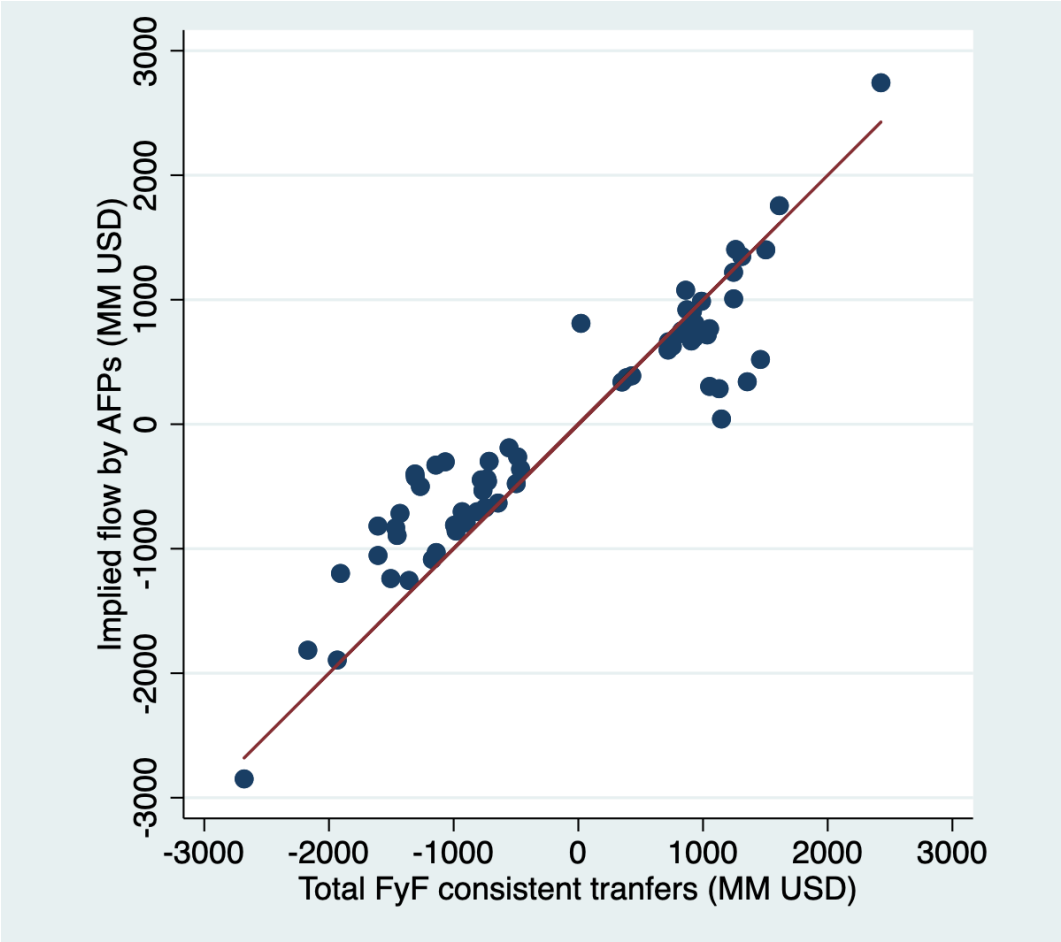
Notes: Daily net inflow of individuals into fund A for the aggregate pension fund system. Dotted (solid) vertical lines mark days of FyF emails that recommend a move toward (away from) fund A. Daily data for March 2014 - February 2020.

Figure A.2: Percentage of transfers consistent with FyF emails as a function of the number of transfers during the period by individual.



Notes: There are 67 FyF emails during the 2014-2020 sample, but 7 of these emails considered a recommendation involving more than one fund of origin and/or destination. Hence, the total number of FyF recommended transfers was 74 over this period. The start date of the period is restricted by the availability of the individual change of funds transfers data made public by the regulator, which starts on March 3rd, 2014. The end date is February 29th, 2020. There are some individuals with more that 74 transfers in the study period that are not included in the figure. A transfer is labeled as consistent with an FyF recommendation if the funds of origin and destination both coincide with FyF recommendation in that email and the transfer was made within two weeks of the FyF email.

Figure A.3: Implied flows by AFPs and total FyF consistent transfers' flow (2014-2020)



Notes: The figure uses all emails between March 2014-Feb 2020. Each variable corresponds to the sum over days 4 to 10 after an email from FyF. The implied flow is computed as the sum over all funds (A-E) of the daily flows times the fraction of foreign investment in that fund. A positive number implies that the amount invested by AFPs in foreign assets increased that day. The total FyF consistent transfers' flow is computed as the sum of the dollar amounts of tranfers that are consistent with an FyF email (same origin fund and same destination fund). A positive number implies that funds are increasing in the funds with more in foreign assets. The figure includes a 45 degree line. Data are from the Chilean regulator of AFP (SAFP).

Table A.1: Daily Flows for a Small Pension Plan and FyF Recommendations

This table shows regressions in the style of Table 7 for the case of a small pension fund administrator (AFP) called Modelo. The main independent variables capturing the impact of the recommendations at different daily lags are explained in equation (3) of the main text. Flows that are larger than 10% are dropped to exclude events related to government auctions of new clients. Columns (4)-(6) use a dummy for days with flows that are equal to 5% (±0.1%) as dependent variable. The sample covers the period from January 3, 2011 to February 29, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	Flow to Fund:			5% Flow to Fund:		
	A	C	E	A	C	E
	(1)	(2)	(3)	(4)	(5)	(6)
RecDay 1	0.05	0.19	0.66**	0.00	-0.00	0.01
	(0.24)	(0.26)	(0.33)	(0.00)	(0.00)	(0.01)
RecDay 2	-0.42	-0.09	-0.73*	-0.00	-0.00	0.01
	(0.33)	(0.31)	(0.40)	(0.00)	(0.00)	(0.01)
RecDay 3	0.12	-0.01	-0.32	0.00	-0.00	-0.04
	(0.30)	(0.24)	(0.39)	(0.00)	(0.00)	(0.05)
RecDay 4	7.83***	0.29	-8.72***	0.33***	0.01	-0.71***
	(0.62)	(0.40)	(0.73)	(0.09)	(0.01)	(0.13)
RecDay 5	3.47***	-0.17	-5.56***	0.02	-0.00	-0.03
	(0.50)	(0.26)	(0.53)	(0.02)	(0.00)	(0.03)
RecDay 6	1.87***	0.70*	-3.17***	0.04	0.00	-0.10
	(0.40)	(0.36)	(0.55)	(0.05)	(0.00)	(0.07)
RecDay 7	1.28***	-0.06	-2.43***	0.00	0.00	-0.07**
	(0.39)	(0.38)	(0.62)	(0.01)	(0.00)	(0.03)
RecDay 8	0.72*	0.01	-1.05**	0.00	0.00	-0.03
	(0.39)	(0.23)	(0.45)	(0.01)	(0.00)	(0.03)
RecDay 9	0.35	0.47	-0.00	0.00	-0.00	-0.08**
	(0.33)	(0.39)	(0.68)	(0.01)	(0.00)	(0.03)
RecDay 10	0.12	0.10	-0.10	0.00	0.00	-0.06**
	(0.28)	(0.17)	(0.33)	(0.01)	(0.00)	(0.02)
Controls	yes	yes	yes	yes	yes	yes
Observations	2248	2239	2164	2248	2239	2164
R-squared	0.566	0.061	0.528	0.101	0.008	0.253
Cumulative evidence						
CUM [1-5]	11.05***	0.20	-14.67***	0.35***	0.01	-0.77***
p-value	0.00	0.77	0.00	0.00	0.75	0.00
CUM [6-10]	4.33***	1.22*	-6.75***	0.05	0.00	-0.33**
p-value	0.00	0.09	0.00	0.35	0.50	0.02

Table A.2: Aggregate Daily Pension Fund Flows in Sub-Samples - Funds A and E

This table shows time-series regressions of daily pension fund flows at the system level. The main independent variables capturing the impact of the recommendations at different daily lags are explained in equation (3) of the main text. We report the coefficients for the first five days, but we omit the individual coefficients for days 6–10. Controls include five lags of daily flows and fund returns. In the bottom panel, CUM[1-5] and CUM[6-10] report the cumulative effects over the first five trading days and the next five trading days respectively. Buy (sell) emails refer to emails that recommend increasing (decreasing) the allocation to foreign assets. The sample in the case of the buy (sell) column includes the post-recommendation days that follow buy (sell) emails plus days that do not immediately follow any recommendation. The end-of-quarter sample includes trading days in the last week of March, June, September, and December and, in order to estimate post-event effects, trading days in the first week of January, April, July, and October. The free float sample excludes periods of central bank intervention in the foreign exchange market (the year 2011 and from November 29, 2019 up to the end of our sample on February 29, 2020). The sample covers the period from January 3, 2011 to February 29, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Fund A

Sample	Original	Buy Emails	Sell Emails	2011-15	2016-20	Q-end	Not Q-end	Free Float
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RecDay 1	0.08*	0.10	0.04	0.10*	0.01	-0.01	0.11**	0.11**
	(0.05)	(0.09)	(0.04)	(0.06)	(0.07)	(0.10)	(0.05)	(0.05)
RecDay 2	0.05	-0.00	0.08	0.03	0.08	0.08	0.04	0.04
	(0.04)	(0.06)	(0.05)	(0.05)	(0.07)	(0.10)	(0.04)	(0.04)
RecDay 3	0.01	0.02	0.01	0.01	0.04	0.23	-0.01	0.02
	(0.04)	(0.04)	(0.07)	(0.04)	(0.10)	(0.23)	(0.04)	(0.05)
RecDay 4	3.45***	3.72***	3.19***	2.49***	4.83***	2.69***	3.58***	3.60***
	(0.28)	(0.42)	(0.37)	(0.34)	(0.25)	(0.66)	(0.31)	(0.25)
RecDay 5	0.62***	0.54**	0.76***	0.44***	0.98***	1.06***	0.50***	0.77***
	(0.14)	(0.23)	(0.15)	(0.17)	(0.22)	(0.22)	(0.16)	(0.16)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2272	1879	1933	1241	1031	316	1956	1962
R-squared	0.786	0.771	0.745	0.786	0.855	0.729	0.799	0.822
Cumulative evidence								
CUM [1-5]	4.20***	4.37***	4.08***	3.07***	5.95***	4.05***	4.22***	4.54***
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CUM [6-10]	-0.11	-0.74***	0.14	-0.09	-1.17***	-0.67	-0.06	-0.39
p-value	0.66	0.01	0.67	0.70	0.00	0.39	0.83	0.13

Panel B: Fund E

Sample	Original	Buy Emails	Sell Emails	2011-15	2016-20	Q-end	Not Q-end	Free Float
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RecDay 1	-0.13**	-0.20*	-0.10	-0.05	-0.02	-0.03	-0.19**	-0.13*
	(0.07)	(0.11)	(0.08)	(0.08)	(0.09)	(0.15)	(0.08)	(0.07)
RecDay 2	-0.13*	-0.09	-0.16	-0.08	-0.13	-0.19	-0.13	-0.11
	(0.07)	(0.11)	(0.11)	(0.11)	(0.09)	(0.25)	(0.08)	(0.08)
RecDay 3	-0.07	0.03	-0.17	-0.11	-0.07	-0.17	-0.06	-0.10*
	(0.07)	(0.08)	(0.11)	(0.10)	(0.10)	(0.15)	(0.08)	(0.06)
RecDay 4	-6.14***	-5.93***	-6.32***	-5.42***	-7.21***	-4.95***	-6.36***	-6.36***
	(0.40)	(0.58)	(0.56)	(0.57)	(0.36)	(1.06)	(0.43)	(0.35)
RecDay 5	-0.90***	-0.58	-0.95**	-0.87**	-1.29***	-2.69***	-0.49*	-1.37***
	(0.30)	(0.37)	(0.40)	(0.38)	(0.31)	(0.50)	(0.28)	(0.35)
controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2272	1879	1933	1241	1031	316	1956	1962
R-squared	0.810	0.787	0.780	0.801	0.860	0.761	0.823	0.832
Cumulative evidence								
CUM [1-5]	-7.37***	-6.77***	-7.70***	-6.52***	-8.72***	-8.03***	-7.24***	-8.07***
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CUM [6-10]	1.23***	1.74***	1.41**	1.11*	1.80***	2.38**	1.13**	1.17**
p-value	0.01	0.00	0.04	0.08	0.00	0.02	0.03	0.02

Table A.3: Chilean Five-Year CDS and FyF Recommendations

This table shows time-series regressions for the daily Chilean five-year CDS and the daily change in this variable. We report the coefficients for the first five days, but we omit the individual coefficients for days 6–10. CUM[1-5] and CUM[6-10] report the cumulative effects over the first five trading days and the next five trading days respectively. The dependent variable is expressed in basis points. Controls include the daily change in the price of copper, 30-day lags of Chilean and U.S. inflation, three-month Chilean and LIBOR interest rates, the size of the Chilean central bank balance sheet as a fraction of GDP, dummies for Mondays and Fridays, and five lags of the dependent variable. The sample covers the period from January 3, 2011 to February 29, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VARIABLES	CDS 5y Chile	CDS 5y Chile	Change in CDS 5y Chile	Change in CDS 5y Chile
	(1)	(2)	(3)	(4)
RecDay 1	1.53	0.95	0.54	0.88
	(8.83)	(0.91)	(0.92)	(0.89)
RecDay 2	0.71	0.53	0.70	0.45
	(8.83)	(0.75)	(0.86)	(0.75)
RecDay 3	-1.56	0.38	0.63	0.33
	(8.80)	(0.59)	(0.60)	(0.59)
RecDay 4	-2.41	-0.57	-0.37	-0.63
	(8.55)	(0.92)	(0.92)	(0.92)
RecDay 5	0.52	1.22	0.87	1.13
	(8.70)	(0.76)	(0.78)	(0.76)
Controls	No	Yes	No	Yes
Observations	2040	2037	2040	2036
R-squared	0.001	0.990	0.005	0.073
Cumulative evidence				
CUM [1-5]	-1.22	2.51	2.37	2.17
p-value	0.95	0.17	0.20	0.23
CUM [6-10]	25.56	-0.56	-0.45	-0.37
p-value	0.18	0.80	0.84	0.87

Table A.4: Trading by AFPs in the derivatives market

This table shows regressions examining the effect of FyF recommendations on AFPs trading in the derivatives market. The dependent variable in all columns is the ratio of total trading by AFPs with the formal exchange market (mainly banks) over the total trading in this market excluding interbank trading. The independent variable in column (1) is the net monthly change in fund A recommendation by FyF. The independent variable in column (2) is the monthly sum of all increases in Fund A recommendation by FyF emails in a given month. This variable is always positive or zero. The independent variable in column (3) is the monthly sum of all decreases in Fund A recommendation by FyF emails in a given month. This variable is always negative or zero. The independent variable in column (4) is the monthly sum of the increases in Fund A recommendation and the absolute value of all decreases in Fund A recommendation. This variable captures the total possible incentive to trade by FyF recommendations in a given month and it is always positive. Data comes from the Chilean Central Bank at the monthly frequency. The sample covers the period from July, 2011 (first FyF recommendation) to February, 2020. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
	Derivatives AFPs	Derivatives AFPs	Derivatives AFPs	Derivatives AFPs
Net change in fund A rec.	0.006			
	(0.007)			
Sum of increases in fund A rec.		-0.006		
		(0.012)		
Sum of decreases in fund A rec.			0.017*	
			(0.010)	
Sum of abs changes in fund A rec.				-0.011
				(0.007)
Constant	0.229***	0.230***	0.232***	0.234***
	(0.004)	(0.004)	(0.005)	(0.005)
Observations	104	104	104	104
R^2	0.006	0.002	0.024	0.021