Financial advisory firms, asset reallocation and price pressure in the FOREX market*

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Abstract

Recommendations of financial advisory firms have become increasingly influential in the investors' decision-making in pension fund markets in many countries. Such recommendations often persuade pension fund investors eliciting coordinated portfolio readjustments with a subsequent large reallocation of pension fund holdings across asset classes. Using a proprietary database, we analyse the potential for portfolio asset reallocations in the Chilean pension fund industry to act as a mechanism for exerting price pressures in the Chilean peso FOREX market. We document significant price pressure and enhanced volatility in the nominal exchange rate surrounding pension fund transactions initiated by pension fund investors following financial advisory firm recommendations. We provide evidence that other FOREX market participants seek to exploit the anticipated portfolio adjustments following such recommendations by front-running the pension fund trades. The potential for financial asset market volatility and instability this activity creates has regulatory and policy implications for the countries affected.

Keywords: Exchange rate price pressure, exchange rate volatility, financial advisory firms.

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1 Introduction

The pension fund industry in Chile has experienced steady growth since the turn of the millennium, and in 2020 pension fund companies (PFCs) manage around $200 thousand million dollars of workers' savings, which corresponds to about 80% of the Chilean GDP. During this time, this industry has become increasingly important in fostering economic growth and contributing to the development of domestic financial market activity in Chile (Corbo & Schmidt-Hebbel 2003). PFCs are now widely recognised as among the most influential institutional investors in the Chilean economy, with recent studies analysing the effect of PFC asset allocation on trading activity and price dynamics in the country's financial markets. Both Da et al. (2018) and Ceballos & Romero (2020) find that coordinated PFC asset sales/purchases, initiated by pension fund investors' portfolio reallocations, generate significant price pressure in the Chilean equity and the Chilean government bond market, respectively.

Our focus is on the effect of PFC portfolio reallocations on trading activity and price movements in the Chilean peso foreign exchange (FOREX) market. The potential importance of PFC trading activity on FOREX trading volume and exchange rates arises as PFCs hold around half of their balance sheets in foreign assets, positioning them among the most relevant agents in Chilean peso FOREX trading. Indeed, as a result of the counter-cyclical nature of their investment decisions, PFC trading activity has been ascribed with an active role in dampening excessive volatility in the Chilean peso exchange rate. Historically, during episodes of global financial distress (prosperity), PFCs have exhibited a tendency to invest in safe (risky) assets, corresponding mainly to domestic fixed income securities (foreign equities). By so doing, PFCs trigger a sale (purchase) of FOREX denominated assets and a purchase (sale) of domestic currency securities during such periods of economic downturns (expansions), generating U.S. dollar inflows (outflows) that partially offset the domestic currency depreciation (appreciation) that usually occurs this stage of the economic cycle.

More recently, evidence suggests that the inherent counter-cyclical nature of PFC investment decisions has weakened following the enhanced activity of PFCs in the FOREX market. This coincides with more active and frequent PFC asset reallocations accompanying revisions to short-term investment strategies (Zahler 2005, Opazo et al. 2014). Indeed, pension fund investment policies seeking enhanced short-term profitability may even have contributed to more pro-cyclically aligned portfolio readjustments, in the process exacerbating asset price volatility (Levy & Zuniga 2016, OECD 2020). In particular, since 2011, PFC FOREX trading volume displays a higher level of volatility in comparison to previous years. The episode of greater activity of PFCs in the FOREX market coincides with the arrival of several un-

regulated, high profile financial advisory firms in the pension fund industry, a group that have subsequently grown in importance. One particularly influential advisory firm, *Felices y Forrados* (F&F), makes recommendations to pension fund investors to actively trade and reallocate their savings based on short-term investment strategies.[1] F&F justifies this advice on the (unfounded) claim that such behaviour generates higher investor returns in comparison to more passive investment strategies, such as buy-and-hold. Since F&F began making recommendations, investors have become more active in switching between their investment portfolios in the pension fund system. Concomitantly, PFC trading activity in the FOREX market has also increased in both magnitude and amplitude, potentially exacerbating rather than helping to mitigate exchange rate volatility.

This study's contribution is to analyse whether F&F recommendations influence investors' portfolio reallocation, with a subsequent impact on either the nature or magnitude of PFC FOREX trading activity. We aim to determine any potential effects on the pricing dynamics evident in the Chilean peso exchange rate. To the best of our knowledge, no previous evidence documents the effect of financial advisory firms' recommendations on pricing dynamics in the Chilean FOREX market. Such an analysis is revealing not only because of the specific characteristics of the Chilean pension fund industry, but also from a wider international perspective. First, in the Chilean context, since F&F started to make recommendations, pension fund investors have actively reallocated savings in the pension fund market and pension fund companies have ranked among the biggest institutional investors in Chile making large and coordinated trades in the Chilean peso sector of the FOREX market. As we later document, these PFC FOREX transactions generate significant price pressures on the Chilean exchange rate, and increase its volatility. Second, current regulations in the pension fund industry incorporate legally binding procedures which serve to delay the effective date when pension fund companies can execute asset sales/purchases in the market following receipt of investor mandates to readjust their portfolios. Using a proprietary database of daily FOREX market trading volume, disaggregated by type of agent, we find this delay in trade execution generates strategic trading complementarities where other FOREX market participants benefit from front-running the anticipated PFC portfolio realignment trades.

Examining the potential effect of financial advisors on the FOREX market is of significant interest from an economic policy and financial stability perspective. Previous studies highlight the role of PFCs and the close link between the pension fund industry and the FOREX market, noting that large pension fund flows may pose a threat to the stability of the Chilean peso FOREX market (Marcel 2020). Zahler (2005) argues the herd behaviour which charac-

[1] *Felices y Forrados* translates from Spanish to English as Happy and Loaded. Section 3 documents the evidence identifying the influence of F&F recommendations upon investor decision-making.

terises PFC asset reallocation decisions generates significant portfolio flows that may affect the exchange rate, although the study does not quantify the impact of such flows. Central Bank of Chile (2020) discusses how pension fund re-allocations impact asset trading volumes in the Chilean fixed income market. In an international context, OECD (2020) highlights how large and coordinated pension fund readjustments in domestic financial markets may impact asset prices and exacerbate FOREX market volatility. These studies mirror Raffnsøe et al. (2016) who find that the investment decisions of the pension fund companies in Denmark exhibit a significant impact on the Danish krone. The authors discuss the implications of the role of PFCs on the Danish FOREX market and their impact on the exchange rate policy implemented by the Central Bank of Denmark. In this context, our study aims to provide policy-relevant insights which can be used by Central Banks and other regulatory authorities to examine the role played by unregulated financial advisors in triggering asset price movements beyond those mandated by macro fundamentals and further exacerbating asset price volatility. This may possibly lead to greater formalisation and regulation of their activity in financial markets. In comparative terms, financial advisor regulation and associated policy considerations often take place earlier in more developed economies (Hung et al. 2008, Inderst & Ottaviani 2012). In emerging economies, however, there is often no formal quantification of the potential impact of financial advisors in FOREX markets, and our study aims to provide insights into this important area of activity. Our results contain useful discussions, not only for the Chilean economy, but also for other many other countries which adopt similar pension fund systems.[2]

Our study relates to research analysing the role of institutional investors, highlighting the mechanism through which large, coordinated investment decisions generate sustained price pressure on financial markets. For instance, recent studies document the herding behaviour of institutional investors and the impact it generates on the U.S. corporate bond market (Ellul et al. 2011, Goldstein et al. 2017, Cai et al. 2019). Others focus on the effect of large institutional investors on the U.S. stock market (Gompers & Metrick 2001, Khan et al. 2012) and the Israel stock markets (Ben-Rephael et al. 2011). From a theoretical perspective, Basak & Pavlova (2013) show that institutional investors' trading decisions exert pressure on the prices of their benchmark equity indices, generate excessive correlation among stocks and increase equity market volatility. More specifically in the context of our research, Greenwood & Vayanos (2010) analyse the case of pension funds and government bonds in the U.S. and the U.K. Similarly, Froot & Ramadorai (2005), based on a sample of

[2]Other countries adopting a defined-contribution pension fund scheme in which pension investors can freely choose the level of risk associated with different portfolio allocations are Colombia, Costa Rica, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Mexico, Peru, Poland and Romania.

eighteen currencies, find that institutional investors play a key role in explaining exchange rates movements in the short-term. While most of the research in this field covers mature financial markets, a few recent studies focus on the case of Chile, paying special attention to whether F&F recommendations influence price movements in domestic financial markets. Da et al. (2018) and Ceballos & Romero (2020) examine their effect on the stock and government bonds markets, respectively. Both studies find that the large, coordinated sales or purchases which occur following F&F recommendations generate significant price pressure within the respective market under study. We extend the scope of these studies to the Chilean FOREX market.

2 The Pension fund industry in Chile: Institutional Context

The Chilean pension system is a defined-contribution scheme which compels employees (hereafter (pension fund) investors) to allocate 10% of their wages to their individual pension saving accounts. Pension fund companies (PFCs), private institutions created by law in 1980 and regulated by the *Superintendencia de Pensiones de Chile* (Chilean regulatory body of the pension fund industry) are in charge of managing pension fund savings accounts on behalf of investors. As figure 1 shows, the aggregate savings managed by the PCFs exhibit a steady growth following their creation, totalling around $200,000 million U.S. dollars (USD) by 2020, which represents around 80% of the Chilean GDP.

[Figure 1 in here]

Currently, seven PFCs operate in the pension fund market in Chile, charging a management fee equivalent to a percentage of a investor's monthly income. Investors can switch from one company to another with no exit fees. A 2002 regulation requires each PFC to offer five types of pension fund portfolios, from which investors can choose up to two funds within the same PFC to allocate their pension savings. This regulation aims to provide investment flexibility to investors by enabling them to select portfolios according to their risk preferences. Table 1 provides details of the five portfolios, labelled A (highest risk) to E (lowest risk), that PFCs make available for investors to allocate their mandatory savings. Panel A reveals the total USD value of each fund in 2020, with fund C the medium risk portfolio being the largest. Panel B presents the asset composition of each fund, considering both the type of investment assets (equity and fixed income) and their location (domestic or overseas). Fund A is characterised as the riskiest portfolio since its investments are focused towards equities

and the majority of its asset allocation (84%) is in overseas markets. In contrast, fund E provides the safest investments, allocating most of its pension assets (88%) into domestic, fixed income markets.

[Table 1 in here]

Current regulations enforce a number of legally binding requirements restricting the asset composition of each of the PFC portfolios. First, the regulations enforce specific limits to equity allocation within each portfolio. Panel C in table 1 shows that fund A, the riskiest portfolio, may invest up to 80% and no less than 40% of the total portfolio value in equity, while, fund E, the safest portfolio, must invest no more than 5% in equities (with no specified minimum). Funds B, C, and D correspond to intermediate risk exposure alternatives lying between funds A and E. These legal limits attempt to ensure that funds are differentiated from each other based on their risk exposure. Second, current regulations also penalise PFC fund underperformance in comparison to the average returns of the rest of the PFCs. On the basis of these legal requirements, it is perhaps not surprising to discover that specific portfolios across PFCs hold similar compositions of assets in an attempt to avoid their returns departing significantly from the average of other PFCs. It is claimed these sets of regulations generate a pattern of herd-type behaviour in PFC investment decisions (Raddatz & Schmukler 2008). Third, the regulations also make it compulsory for PFCs to hedge their currency exposures. In particular, PFCs must hedge their currency risk by selling FX forward contracts after buying any FOREX (predominantly USD) in the spot market. Fourth, in terms of enacting investor-mandated portfolio reallocation, PFCs can only execute the portfolio shifts from the fourth working day following receipt of the investors' instructions.[3] Fifth, the regulations also state that PFCs cannot process switching fund reallocation requests accounting for more than 5% of the fund value on the same day. Any reallocation exceeding 5% of the total fund value takes place on the following working day, processed on a first-come, first-served basis.[4] Given the trading delays imposed by these restrictions and the similarities in portfolio composition, we conjecture this may generate incentives for other FOREX market participants to front-run any anticipated coordinated PFC asset sales/purchases. Further, these restrictions also influence investors to act quickly to request changes to their portfolio in an attempt to obtain more favourable prices before other participants trade.

[3]This delay is justified on the basis that such requests may contain clerical errors, so PFCs use this time window to evaluate the instruction's accuracy and feasibility.

[4]The 5% rule applies to any of the funds, either the current fund or the one being invested in. This measure was introduced in response to the notion that PFCs may unwittingly initiate undesirable, risky economic and financial developments due to the large value of the pension funds under management (Zahler 2005).

A major consideration in the context of this study relates to the fact that a high proportion of the PFCs balance sheet corresponds to overseas assets. Figure 2 shows that PFCs invest around 40% of their assets in overseas markets and that this proportion remains roughly constant over the last ten years. Considering this evidence, and taking in account the relatively large size of pension fund savings, the PFC investment decisions position PFCs as one of the most relevant institutional agents in the Chilean FOREX market. However, the precise impact of the asset sales/purchases by PFCs on the exchange rate depends on the type of the transaction. This is because of the binding requirements that regulations enforce on PFCs in terms of hedging currency risk. For instance, when a pension investor chooses to take a greater exposure to risky assets she instructs her PFC via a switching request to reallocate savings into a portfolio which contains a greater proportion of foreign assets, say fund A. Subsequent to this request, the PFC sells domestic assets and uses the sale proceeds to purchase foreign currency in the spot FOREX markets, which is invested in foreign currency denominated risky assets, generating capital outflows from the domestic economy. If this hypothetical portfolio reallocation scenario to riskier asset portfolios is repeated on a large, coordinated scale across several PFCs it will generate a notable increase in overall PFCs demand for foreign currency, typically USD, in the FOREX spot market. If the ensuing order flow is sufficient, this may translate into depreciation pressures on the peso in the spot market.

[Figure 2 in here]

However, one also needs to account for the mandatory hedging of currency risk that regulations specify PFCs must undertake, which may serve to partially mitigate the exchange rate depreciation. These regulations require PFCs to offset their purchases of USD in the spot market by selling the dollars forward, which generates appreciation pressures on the value of domestic exchange rate acting to reduce the original tendency towards depreciation. These FOREX hedging regulations also create a potential asymmetry, in that following large coordinated PFC investor requests to switch to less risky portfolios, say fund E, PFCs will sell external assets and use the FOREX proceeds to purchase domestic currency in the spot market which is subsequently invested into domestic fixed income assets. This process generates FOREX (mainly USD) inflows to the Chilean economy, which if sufficiently large will induce an appreciation of the domestic currency. In this case, no binding requirement in relation to currency hedging strategies exists, so any appreciation pressure induced by spot sales of FOREX can be fully transmitted to the domestic currency exchange rate. We later document the empirical importance of these effects, but we now proceed to provide context

by describing the role of financial advisory firm recommendations as a trigger of pension portfolio readjustments in the pension fund industry.

3 Unregulated Pension Advisory Companies: Felices & Forrados

The period since 2010 has witnessed sustained growth in a number of unregulated pension advisory companies operating in the Chilean pensions market. One such firm, Felices & Forrados (F&F), has been actively operating in this market since July 2011. For an annual fee (in 2020 this is $30 USD) F&F provides recommendations to investors via email subscription, advising clients into which of the five specific PFC funds available they should channel their investments. These recommendations contain little detailed market analysis and relatively few additional explanations justifying the particular strategy F&F recommends. Such pension fund advice is the main service F&F provides to its subscribers, as the firm itself does not manage investors savings. Based on its aggressive marketing strategies, F&F has gained remarkable prominence and popularity in the past ten years, consistently claiming that investors will be better off by following their recommendations in comparison to undertaking alternative investment strategies, such as passively buying and holding a specific PFC fund.[5]

[Figure 3 in here]

Two striking facts are evident since F&F began making its recommendations in July 2011. First, the number of portfolio readjustments in PFC portfolios dramatically increases in comparison to previous years. Figure 3 displays the net pension fund flows by fund through time at the aggregate pension fund industry level. Panel (a) shows a notable increase in pension fund reallocations after F&F begins providing investors with recommendations in mid-2011 (represented by the vertical line). This increased activity is noteworthy even in comparison to previous episodes of severe financial distress, such as the 2008 global financial crisis, and intensifies at the end of 2019 during the episode of civil unrest in Chile. Second, the greatest amount of pension fund asset switching coincides with F&F recommendation dates. In panel

[5]In addition to F&F, three other unregulated financial advisory firms offer similar advisory services in the pension fund market. These are (the year recommendations commence in parenthesis), *Fondo Alerta* (2008), *Tiempo para ganar* (2012) and *Previsionarte* (2013). These three companies, however, receive significantly less media attention and they have considerably fewer followers than F&F. Figure A.1 in the appendix presents Google Trends data reporting investor interest over time. Based on these Google searches, F&F is by some distance the most popular advisory firm.

(b) we present the net pension fund switches during 2011-2020, which clearly appear to increase on days F&F makes recommendations (represented by the vertical dotted lines) and tend to remain relatively high for a few days immediately thereafter. Since 2019, when F&F starts making recommendations more often, the average 5-day cumulative value of pension fund switches after recommendations sums to between 15 and 20% of the average value of fund E, the least risky fund.[6] The observed persistence in portfolio switches after recommendations is a consequence of the previously noted regulatory delay relating to the requirements imposed on PFCs when processing portfolio switch requests. In addition, the spread of recommendation information from F&F subscribers to non-subscribers potentially reinforces this effect. F&F popularity has increased during recent years, despite the Chilean pension fund regulatory body explicitly providing evidence which demonstrates that investors would have been financially better off if they had not followed F&F recommendations.[7] However, claims of outstanding initial performance along with successful media marketing campaigns has kept investors engaged with implementing F&F recommendations. F&F advertisements regularly appear on the internet (social media) and as table A.1 in the appendix reveals, F&F followers tend to be somewhat younger and wealthier than the average non-F&F follower. This evidence is consistent with studies documenting that investors hire financial advisors based on elements such as persuasive advertising, familiarity and so-called 'schmoozing', rather than superior financial performance (Gennaioli et al. 2015), and continue to do so even after advisors recommendations lead investors to significantly underperform the market (Foerster et al. 2017). In the next section, we briefly discuss relevant aspects of the Chilean Peso FOREX market and describe the role of F&F recommendations in eliciting PFCs' FOREX trading activity.

[6]While Fund E is not the largest fund, it invests a higher proportion of its assets in the Chilean economy. This provides some perspective on the size of the pension fund switches triggered following F&F recommendations.

[7]Since 2013, the *Superintendencia de Pensiones de Chile* (the regulator of the pension fund market in Chile) shows that pension fund investors following F&F recommendations exhibit lower returns in comparison to those taking passive investment strategies, such as buying and holding a specific PFC fund (Superintendencia de Pensiones de Chile 2013, 2020, 2021). The initial popularity of F&F may arise from the apparent success claimed for its early recommendations, which outperform alternative investment strategies during the first year of its operation. However, this claim seems to be spurious as the alleged outperformance is not statistically significant (Da et al. 2018).

4 The Chilean peso FOREX market, F&F recommendations and PFC trading

In 2019 trading volume on the Chilean peso FOREX market totalled around $1,400 billion USD, approximately seven times the Chilean GDP. The depth of the Chilean peso FOREX market, measured in terms of the market's size relative to GDP, is lower in comparison to advanced economies (which average around 40 times GDP), albeit it is higher than other economies in Latin American (averaging around 2.8 times GDP). Liquidity in the Chilean FOREX market has remained stable since the early 2000s and is similar in magnitude to other emerging economies in the region, albeit again lower in comparison to advanced economies.[8] Chilean FOREX market activity is mainly allocated across the spot, forward and interbank swap/repo markets, with a very small residual in other derivatives contracts (futures and options). Spot (immediate delivery) trading volumes are around $460 billion USD, with currency forward and FX swaps comprising 95% of the remaining $940 billion USD of trading activity in 2019. As is customary, the most traded counterparty currency to the Chilean peso is the USD, accounting for between 90% to 95% of trades, depending on the market segment.[9] Panel (a) figure 4 presents the trading volume in the Chilean FOREX spot market disaggregated by type of agent. The figure reveals the main agents participating in the market during the late 2000s correspond to retail and exporting companies, together with wealth management firms and mutual funds. This pattern holds throughout the sample although the participation of wealth management firms and mutual funds shrinks toward the end. The trading volume of retail and exporting companies broadly involves transactions relating to the international trade of goods and services, while wealth management and mutual fund activity reflect private investment flows in globally diversified portfolios.

[Figure 4 in here]

More recently, however, PFCs have increased their active participation in the FOREX market, largely reflecting USD transaction in response to investor portfolio reallocation requests. Indeed, figure 5 highlights the increase in PFC trading volume after F&F start making recommendations, and by 2019 PFC trading volume represents 25% of the total

[8] See Villena & Hynes (2020) who follow the BIS quarterly reporting standards to compute FOREX market depth as trade volume as a proportion of GDP and market liquidity as the bid-ask spread in the FOREX market.

[9] Based on 2019 values, currency trades denominated in euros represent only around 7% and 1% in the spot and other markets, respectively. The remaining currency trades (less than 3%) correspond to other global currencies.

trading activity in the FOREX spot market, just behind retail and export companies which together account for 28% of the total trading volume. As depicted in Panel (b) figure 4, the main agents active in the forward and FX swap sector of the FOREX market correspond to non-residents and pension fund companies, with around 50% and 25% participation on average since 2019, respectively. The non-resident trading volume relates mainly to foreign banks engaging in interbank swaps. It also includes foreign investors undertaking speculative carry trade strategies using FX derivatives. The pension funds trade volume captures the mandatory currency hedging obligations imposed upon PFCs in accordance with the regulations we previously discuss.

[Figure 5 in here]

One issue which we address subsequently is whether the increased portfolio reallocation in the pension fund system following F&F recommendations may exacerbate exchange rate volatility. Table 2 presents some preliminary facts relating to volatility, comparing the standard deviation of changes in both the exchange rate and the PFC trading volume in the FOREX market during different time periods. The first column in table 2 reveals that exchange rate volatility increases during the 2008 global financial crisis (GFC) in comparison to the pre-crisis period and remains high after F&F starts issuing recommendations, although falling somewhat from its crisis level. Columns two and three indicate that the volatility of PFC net trading volume in the FOREX spot and forward markets increases during the period of F&F recommendations, being even higher than the amplitude witnessed during the financial crisis.

[Table 2 in here]

In section 5.2, we explore this relationship more systematically controlling for additional risk factors which may influence the documented relationship. Overall, these preliminary observations suggest F&F recommendations do influence investors' portfolio reallocations and may be relevant as potential catalyst initiating large, coordinated PFC transactions in the Chilean FOREX market. Importantly, the higher volatility in PFC trading volumes since 2019 raises questions in relation to the counter-cyclical role of PFC trades in this market. We later show not only PFC USD trades do generate price pressures in the Chilean exchange rate, but also they motivate other FOREX market participants to front-run these coordinated PFC transactions. This FOREX evidence we uncover is consistent with two related papers analysing the effect of F&F in other asset markets. Da et al. (2018) find F&F recommendations generate price pressure in the Chilean equity market and, additionally, provide

evidence of other market participant front-running PFCs trades in this market. Similarly, Ceballos & Romero (2020) document that F&F recommendations generate price pressure in the Chilean bond market.

5 The effect of F&F on the Chilean FOREX market

The prima facie evidence we report in the previous sections suggests F&F recommendations are associated with an increasing number of PFC portfolio switches and enhanced trading volume in the Chilean peso FOREX market. However, to uncover the true nature of the impact of F&F recommendations on the FOREX market, we attempt to identify the news contained within the recommendation announcements to subsequently investigate if F&F recommendations induce price pressures or enhance volatility levels in the market. In this section we undertake four strands of analysis. First, we use an ordered logit model to establish which, if any, economic factors trigger F&F recommendations. Understanding the drivers of their recommendations is a relevant part of our identification strategy, as it allows to capture the specific shock component of F&F announcements on the Chilean peso FOREX market. Second, having identified the news component in F&F recommendations, we use the local projection method to explore the nature of price pressures on the Chilean nominal exchange rate. Third, utilising the same methodological framework, we analyse the impact of F&F news on exchange rate volatility. Finally, we investigate whether F&F recommendations initiate actions by other FOREX market participants, possibly in an attempt to front-run trades arising from the anticipated pension portfolio readjustments.

The data consist of both proprietary and publicly available information obtained from the Central Bank of Chile at a daily frequency. Data on the Chilean pension fund industry, such as, the value of the pension fund industry and the pension investment portfolios are available on the website of the Chilean pension fund regulatory body.[10] Data relating to macroeconomic and financial variables, such as nominal exchange rates, interest rates, VIX, S&P 500 returns, Chilean government bond returns, domestic activity and inflation surprises, and terms of trade are obtained from Bloomberg. Data detailing the daily trading volume by agent in the Chilean Peso FOREX market is a proprietary dataset from the Central Bank of Chile. The sample period under analysis covers the period from 01 March 2012 to 22 October 2020.[11]

[10]Information available on the *Superintendencia de Pensiones de Chile* website (www.spensiones.cl)

[11] Although F&F starts making recommendations in July 2011, domestic economic uncertainty index data is available only from February 2012. Further, Da et al. (2018) note that F&F does not gain marked popularity until early 2012 and Cuevas et al. (2016) document the number of F&F subscribers in 2011 is

5.1 Identifying the F&F recommendation news

To understand whether F&F recommendations impact the FOREX market, it is necessary to identify the news (unanticipated shock component) contained in the recommendation announcement. It is also important to ensure that the news pertains to the F&F recommendation and not to other alternative factors which may both impact the exchange rate and influence the recommendation. In this subsection, we investigate the factors triggering F&F recommendations to later estimate an empirical exchange rate model which includes exchange rate fundamentals and also variables affecting the probability of F&F making a recommendation which may induce exchange rate movements. To establish the factors which may trigger F&F recommendations requires an understanding of the nature of such recommendation announcements. Essentially, F&F recommendations suggest reallocating pension savings after considering the appropriateness of the differentiated investment risk exposure of the PFC portfolios in the current economic environment. The principle F&F follows to deliver recommendations lies in its short-run market timing claim, based on its ability to assess economic/financial risks in the global and domestic economy. However, we note that the F&F definition of its market timing claim is somewhat inconsistent over time, since it iterates between "maximising pension fund profitability" and "reducing the loss of value of pension funds", two goals that are not necessarily compatible and may even call for differentiated investment strategies. As a result, the brief explanations F&F provide to underpin their recommendations accommodate varying circumstances, making it challenging to identify the supporting rationale behind their recommendation announcements.

Specifically, F&F does not disclose the risk assessment model it employs to gauge the overall state of the global/domestic economy. Instead, F&F releases recommendations to subscribers and provides some limited reasoning to contextualise its advice. The most common factors F&F refers to correspond to: (i) recent economic/financial risks, and (ii) recent developments in global equity and Chilean fixed income markets. In particular, F&F often refers to both the $S\&P500$ and the Chile government bond market performance as the main elements underpinning its market analysis. Figure A.2 in the appendix shows that $S\&P500$ returns (panel a) and domestic government bond returns (panel b) are highly correlated with returns of the riskiest and the safest PFC portfolio, respectively. Therefore, a priori, the performance of these markets appears to represent an important component of F&F's risk assessment and constitutes a critical element in understanding their decision to publicise a recommendation.

significantly lower in comparison to the period starting in 2012. Hence, omitting the first four F&F outlier recommendations will have negligible impact on our findings.

5.1.1 Predicting the content of F&F recommendation announcements

These elements underpin our decision to consider the outcome of an F&F risk assessment exercise as equivalent to an unobservable latent variable, which emanates from F&F's true model as follows:

$$\Delta Y^* = X\beta + \varepsilon \tag{1}$$

where the vector ΔY^*, the unobservable latent variable, represents the change in the F&F risk assessment. X is a vector of variables corresponding to the factors F&F includes in its risk assessment, β is a vector of coefficients to be estimated, and the vector ε is a zero mean, random disturbance term which follows a standard logistic distribution. While ΔY^* is an unobservable variable, we observe F&F recommendations. We assume F&F recommendations are a function of the latent variable (i.e.: variations in F&F risk assessment) as follows:

$$Y = \begin{cases} \text{strong} & \text{if } \kappa_2 \leq \Delta Y^* \\ \text{moderate} & \text{if } \kappa_1 \leq \Delta Y^* < \kappa_2 \\ \text{no recommendation} & \text{if } \Delta Y^* < \kappa_1 \end{cases} \tag{2}$$

where Y is a vector containing the observed F&F recommendations and the κ_j's, ($j = [1, 2]$), are scalars representing the threshold points of the latent variable. According to equation 2, the change in F&F risk assessment determines the intensity and the direction of its recommendations. For instance, a substantial (slight) increase in F&F risk assessment triggers a recommendation suggesting a strong (moderate) change in investment risk exposure towards less risky portfolios. Conversely, a substantial (slight) decrease in F&F risk assessment triggers a recommendation suggesting a strong (moderate) change in investment risk exposure towards riskier portfolios. Otherwise, marginal or negligible variations in F&F risk assessment outcomes lead to suggestions of no changes in risk exposure and effectively no recommendations for portfolio readjustment.

We categorise F&F recommendations in terms of the suggested change in risk exposure as follows: A strong change in risk exposure ($y_t = 2$) occurs when a recommendation suggests changing to one extreme portfolio conditional on the existing recommendation allocating investments within the opposite extreme portfolio. For instance, a strong change in risk exposure occurs when F&F recommends allocating either 100% or a fraction of pension savings into fund A (E), the riskiest (least risky) portfolio, given the current recommendation is to allocate either 100% or some fraction of the savings into fund E (A), the least risky (riskiest) portfolio. We define moderate changes in risk exposure ($y_t = 1$) as those recommendations which suggest an increased allocation to intermediate funds (i.e.: Funds B, C or D), when

existing recommendations involve an extreme portfolio allocation. For instance, a moderate change in risk exposure occurs when F&F recommends a saving allocation of 50% into fund C and 50% into fund E, when the current recommendation is 100% into fund E. No change in risk exposure ($y_t = 0$) occurs on a day with no recommendations.

Using daily observations from 01 March 2012 to 22 October 2020, we estimate an ordered logit model to test whether the variables F&F usually cites as underpinning its recommendations actually serve as drivers of the probability of F&F delivering a specific recommendation. The ordered logit model is as follows:

$$P\left(Y_i > j\right) = \frac{\exp\left(X\beta_i - \kappa_{i,j}\right)}{1 + \exp\left(X\beta_i - \kappa_{i,j}\right)} \tag{3}$$

with $i = [more\ risk,\ less\ risk]$ and $j = [1, 2]$. Y_i corresponds to a time-series, ordered categorical variable capturing both the direction and the intensity of F&F recommendations. In terms of the direction of F&F recommendations, following Da et al. (2018) we estimate the ordered logit model in equation 3 separately for those sets of recommendations advocating taking more and less risk exposure ($i = more\ risk, less\ risk$). The intensity of F&F recommendations determines whether the ordered dependent categorical variable takes a value of 1 or 2, corresponding to situations when F&F recommends moderate or strong changes in risk exposure, respectively, and zero otherwise.

We note that our classification departs from Da et al. (2018), given the majority of their analysis focuses on the first fifteen recommendations in their sample, each of which is a strong switch either from portfolio A to E or E to A. However, from their sixteenth recommendation in March 2014, F&F starts to advocate investor allocations to funds with intermediate risk exposure (i.e.: funds B, C, and D) and splitting savings across more than one PFC portfolio. In our estimation we include all 93 F&F recommendation announcements in the period 01 March 2012 to 22 October 2020, and the classification we propose is able to account for variations in their inherent risk exposure.[12] The vector X represents the set of explanatory variables consisting of the factors F&F often refers to when proposing its recommendations. Following Da et al. (2018), to capture any short-term trend in these variables during the previous month, we include four lags of the cumulative weekly returns of the Chilean nominal exchange rate ($\Delta usdclp$), S&P 500 ($\Delta S\&P500$) and Chilean government bonds ($\Delta Bond$). In addition, for the purpose of capturing short-term recent economic and financial risks during the previous week, we include five lags of daily changes of domestic inflation expectations

[12]Due to data availability (see footnote 11), we exclude the first four F&F recommendations. Table A.2 in appendix displays F&F recommendation dates along with the suggested fund alongside the classification we use in this subsection (see column 'Ologit').

($\Delta\pi$), domestic economic uncertainty (ΔDEU) and VIX index (ΔVIX). Chilean domestic economic uncertainty corresponds with the economic uncertainty measure of Becerra & Sagner (2020). The index tracks economic-related uncertainty based on daily media news coverage. An increase in the index indicates a higher degree of economic uncertainty. Domestic inflation expectations corresponds to the break-even inflation computed as the yield difference between the 2-years nominal government bond and the 2-years inflation-linked government bonds. This inflation measure is available at a daily frequency and it is widely used by Central Banks to track inflation at a high frequency. β_i is a vector of coefficients and $\kappa_{ij},\ (j = 1, 2)$ are scalars representing the thresholds of the latent variable. We estimate the model using the maximum likelihood method.

5.1.2 Results

Table 3 displays the results of the ordered logit model estimation. The dependent variable of the model in column 'more risk' ('less risk') corresponds to the ordered categorical variable capturing the intensity of F&F recommendation to reallocate investment funds to more (less) risky portfolios.

[Table 3 in here]

We find that lagged exchange rate returns exhibit no statistically significant impact on the probability of F&F making a recommendation to re-allocate risk. While positive performance of S&P 500 returns during the previous week significantly decreases the probability of F&F recommending an adjustment to less risky pension portfolios, Chilean government bond returns have no explanatory power for the probability of F&F issuing any recommendation. This result provides some support to the belief that F&F follows short-term trends in equity markets when issuing pronouncements. We also find statistical support for the position that factors capturing short-term economic and financial risks contribute to explain the probability of F&F recommending portfolio risk-adjustments. An increase in expected inflation significantly reduces (increases) the probability of F&F recommending riskier (safer) portfolios. This is consistent with the idea that higher expected inflation makes inflation-linked bonds more attractive. Therefore, a higher expected inflation may lead a rebalancing strategy to safer funds allocating most of their assets in fixed income assets at the cost of a lower exposure to risky portfolios.[13] Both enhanced domestic economic uncertainty and increases in global risk aversion significantly reduce the probability of F&F recommending

[13]Safe PFC portfolios, particularly fund E, mainly allocate assets to both nominal and inflation-linked bonds.

riskier portfolios. The fact that the estimated latent variable thresholds ($\kappa_j,\ j = 1, 2$) exhibit high significance confirms our choice of the ordered categorical variable (Y) definition given in equation 2. Moreover, the statistically insignificant χ^2 statistic testing the parallel regression assumption in both the 'more risk' and 'less risk' models indicates that this assumption is not violated.[14] This enhances our confidence that the risk exposure classification we implement to categorise F&F recommendations not only captures their economic underpinnings, but it is also validated from a statistical perspective.

This set of results leads to the following conclusions. First, lagged exchange rate returns do not statistically influence the probability of F&F making recommendations. This finding is important for our purposes, as such evidence helps to mitigate endogeneity concerns relating to possible reverse causality issues in the estimation we introduce in section 5.2 to model price pressures in the Chilean Peso FOREX market. Second, our findings suggest that to some degree, short-term changes in fundamental economic and financial drivers influence the decision making process of F&F. In particular, factors capturing daily economic and financial risks (VIX, inflation expectations and economic uncertainty) play a primary role in comparison to financial market performance, although short-run equity returns (S&P 500) are also important. Third, despite the statistical evidence, the relatively low explanatory power of the predictive logit regression, as evidenced in the pseudo R2 in table 3, indicates there is still a large unexplained component to the F&F recommendation announcements. This suggests that the decision-making process of F&F is also governed by non-fundamental elements captured in the stochastic disturbance term (ε_t) in equation 1. Consequently, F&F recommendations seem to be somewhat arbitrary and less informative of important economic fundamentals, in this sense conveying noisy information to investors. This conclusion is not surprising as it is corroborated by Da et al. (2018) who also document that fundamental variables tend to display weak explanatory power for F&F recommendations. Indeed, evidence indicates the lack of informativeness in F&F recommendations negatively impacts the value

[14]The null hypothesis in the parallel regression assumption test states there is no statistical difference in the coefficients between models using an alternative binary definition of the dependent variable, such as a model where the dependent variable takes the value of one in the highest category and zero otherwise in comparison to a model where the dependent variable takes the value of one in the second highest category and zero otherwise. In a simplified additional exercise, instead of considering the intensity dimension to categorise the recommended change in risk exposure as in equation 3, we treat all recommendations as if they display the same extent of intensity. Under this simplified version of the model, we define a dependent categorical variable which takes the value of 1 (-1) when a recommendation suggests a higher (lower) risk exposure, and zero otherwise. We include the same explanatory variables displayed in equation 3. The outcome of this simplified exercise (available upon request) provides similar results in comparison to the model we estimate in this section.

of the pension savings of F&F followers, which reveal inferior financial performance when compared to the funds of investors who do not follow F&F (Superintendencia de Pensiones de Chile 2013, 2020, 2021).[15]

Two other important implications emerge from the previous analysis. First, the noisy process generating F&F recommendations based on short-term investment strategies appears to exacerbate the frequency and volatility of pension fund switches, as panel (b) of figure 3 depicts. As we later demonstrate, this observed higher volatility in switching between pension funds, which is triggered by F&F recommendations, relates to enhanced exchange rate pressures in the peso FOREX market and increases in exchange rate volatility. Second, the evidence suggesting that fundamental drivers only tangentially influence the F&F decision-making process leads us to interpret the news contained in F&F recommendations as an exogenous shock. From a statistical point of view, this helps to mitigate endogeneity concerns, as the news contained in F&F recommendations is unlikely to be correlated with the error term of the exchange rate model we introduce in section 5.2.

5.2 Exchange rate pressure

This section uses a time-series framework to analyse how the magnitude and the persistence of F&F recommendation announcements impact upon the Chilean peso exchange rate. We employ the local projection method (LPM) proposed by Jordà (2005), a methodology which allows the effect of F&F recommendations to be tracked over time through its employment of impulse-response functions. This is especially useful since we expect the impact of F&F recommendations to persist for some days after their actual issuance, given that existing regulations introduce time delays before allowing the PFCs to processes fund switching requests. The dissemination of recommendation announcements from F&F subscribers to non-subscribers may also reinforce the persistence of such recommendations. Consequently, we expect some delay following F&F recommendations in the impact of PFC portfolio readjustments on the Chilean peso FOREX market.

5.2.1 Local projection model

Our benchmark empirical model in this section follows that of Contreras et al. (2013) who analyse the 2011 Central Bank of Chile FOREX market intervention. In addition to the explanatory variables in Contreras et al. (2013), we include F&F recommendation announce-

[15]This evidence sparks a debate about the benefits of following noisy F&F recommendations which suggest utilising short-term investment strategies, as opposed to other strategies for focused upon generate longer-term profitability.

ments to project the impact of its news component on the Chilean nominal exchange rate through time as follows:

$$\Delta s_{t+h} = \alpha^h + \beta^h F\&F_t + \sum_{i=1}^{2} \gamma_i^h \Delta s_{t-i} + \sum_{i=0}^{2} \delta_{k,i}^h x_{k,t-i} + \sum_{i=0}^{2} \theta_{m,i}^h z_{m,t-i} + \varepsilon_t^h \tag{4}$$

where Δs_{t+h} corresponds to the nominal exchange rate return between $t-1$ and $t+h$, with $h = 0, \ldots, 30$, and t being the day on which F&F issues a recommendation announcement. $F\&F_t$ is the variable capturing the recommendation's impact. Table A.2 in appendix displays details of F&F recommendations along with the value taken by $F\&F_t$. We define $F\&F_t$ as the first difference of $finv_t$, where $finv_t = \sum_{i=1}^{5} w_{it} p_{it}$, with $i = 1, 2, 3, 4, 5$ (the five PFC funds), w_{it} represents the recommended F&F allocation in fund i at time t, and p_{it} represents the percentage of foreign assets invested in fund i at time t. $F\&F_t = 0$ during days with no recommendations. By definition, the $F\&F_t$ variable captures the direction and the magnitude of the F&F recommendation announcements on the nominal exchange rate. This variable's construction aims to quantify the pressure PFCs generate in the FOREX spot market, as it captures the proportion of foreign assets in the portfolios to which F&F suggests allocating savings. $x_{k,t}$ corresponds to the k exchange rate fundamental variables, based on Contreras et al. (2013), which consist of returns on the trade-weighted U.S. dollar index (ΔUSD) and Chilean terms of trades (ΔToT), and the change in the interest rate differential between the short-run domestic and the U.S. interest rates ($\Delta(i - i^*)$).

In order to identify the effect of F&F announcements on exchange rate returns, we control for m additional factors, not only those influencing F&F recommendations but also factors shown to influence exchange rate returns. Following section 5.1's discussion of F&F recommendation determinants, the vector $z_{m,t}$ contains the variables that F&F customarily cites as the main drivers of its recommendations, namely: the change in the VIX index (ΔVIX), the change in domestic economic uncertainty (ΔDEU), the change in domestic expected inflation ($\Delta\pi$), and returns on Chilean government bonds ($\Delta Bond$) and the S&P500 index ($\Delta SP500$). On the basis of findings in section 5.1 we interpret F&F recommendation announcements as an exogenous shock uncorrelated to the error term of the exchange rate model we introduce in this subsection. We include the set of variables in x_t and z_t both contemporaneously and with two lags. In addition, the model also includes two lags of the dependant variable to control for the persistence of exchange rate returns. In selecting the number of lags we follow the Bayesian information criterion (BIC) and panel A of table A.3 in appendix exhibits the lowest BIC when the specification includes two lags. α^h, β^h, γ_i^h, δ_i^h and θ_i^h are coefficients we estimate using ordinary least squares.

Table 4 displays the estimation of equation 4 for the period covering 01 March 2012 to

22 October 2020 using a daily observation frequency and setting $h = 1$. The results indicate that the day following a F&F recommendation announcement, the Chilean peso exhibits a significant depreciation of around 0.86% on average. The remaining coefficients, corresponding to exchange rate fundamentals, show the expected sign, a plausible magnitude and with the exception of the change in the interest rate differential are statistically significant. The rest of the control variables again display the expected sign, albeit only some are significant.

[Table 4 in here]

In order to analyse the persistence of F&F recommendations on nominal exchange rate returns we project the effect h days ahead in figure 6. The solid (blue) line depicts the cumulative response of the nominal exchange rate to F&F announcement news (i.e.: the β^h coefficient of the model in equation 4) and the grey area corresponds to 95% confidence interval bands. As documented previously, the exchange rate exhibits an average 0.86% cumulative depreciation the first day after F&F recommendations which increases to a 1.6% and 1.8% cumulative depreciation by the fifth and tenth day, respectively. The statistical effect fully dissipates around eighteen days. The persistence of the shock over time is consistent with the fact that PFCs are mandated to delay fund switches to meet regulatory requirements. This evidence shows that F&F announcement news, although noisy in its nature, generates significant pressure on the Chilean peso nominal exchange rate.[16]

[Figure 6 in here]

In order to control for the effect of overlapping recommendations, we drop any announcements that occur within a twenty-day window of the previous recommendation. Figure 7 displays the results. As we can see, after excluding overlapping recommendations, the impact of F&F news on the exchange rate is similar in magnitude, still evidencing a 1% depreciation on the first day after the recommendation. However, in line with expectations, since any overlapping recommendations augment the prior shock and induce a prolonged impact on the exchange rate, the effect now dissipates earlier, becoming insignificant by the tenth day following the initial recommendation day.

[Figure 7 in here]

[16] As a robustness check, we run the model of equation 4 again using the F&F shock definition based on Da et al. (2018). As figure A.3 in appendix depicts, the impact on the nominal exchange rate is 0.5%, 1% and 1.2%, after 1, 5 and 10 days. Although similar in terms of significance, the impact on the exchange rate is lower in magnitude compared to our F&F announcement news definition. We conjecture that this difference may arise from the fact that Da et al. (2018) omits the impact of fund switches to intermediate risk exposures (i.e.: funds B, C and D), therefore the impact on exchange rate is lower.

5.2.2 Comparison of the effect of F&F news to other FOREX market shocks

To provide further context for our results, we compare the effect on the nominal exchange rate of F&F announcements relative to the impact of historical FOREX market interventions by the Central Bank of Chile (CBCL). In particular, Contreras et al. (2013) find the 2011 FOREX market intervention depreciates the exchange rate by 4.6% and 12% one and five days after the announcement, respectively. The statistical effect of the announcement lasts between fifteen and eighteen days. As no study has quantified the exchange rate effect of the most recent CBCL interventions, we undertake the appropriate analysis on the basis of the Contreras et al. (2013) model and calculate the percentage exchange rate change to be -3% (-5.5%) and 1.4% (1.2%) one (five) day after the 2019 and 2021 CBCL intervention announcement, respectively. The results in table 5 indicate that the effect of F&F announcement news on the exchange rate is generally lower in absolute magnitude and less persistent than the impact of all these CBCL FOREX market intervention announcements, albeit comparable in magnitude to those at the lower end of the spectrum.

[Table 5 in here]

5.2.3 Exchange rate model based on FOREX trading volume

This subsection estimates whether FOREX market trading volume induced by PFC portfolio reallocations influences the Chilean exchange rate. The results of this subsection provide an additional benchmark against which to compare our previous findings that suggest significant pressures arise on exchange rate returns subsequent to F&F announcement news. Our approach closely follows Evans & Lyons (2002) who include order flow (signed, net trading volume) as a fundamental driver explaining exchange rate returns, allowing us to directly quantify the effect of PFCs on the peso FOREX market without the need to consider the effect of F&F recommendation news.

Our model specification based on the PFC trading volume in the Chilean peso FOREX market is as follows:

$$Y = NetTrdVol\,\theta + X\beta + \varepsilon \tag{5}$$

where Y is a vector containing nominal exchange rate returns. $NetTrdVol$ is a vector containing the change in the PFC net trading volume in both the FOREX spot and forward markets. X is a vector containing the first difference of other exchange rate fundamental variables based on Contreras et al. (2013). ε is a vector representing the error term. β and $\theta = [\theta_{spot}, \theta_{forward}]$ are coefficients we estimate using ordinary least squares.

[Table 6 in here]

We estimate the regression model using daily observations over the period 01 March 2012 to 22 October 2020 and present the results in table 6. The findings reveal that the change in PFC net trading volume in both the spot and the forward markets are statistically significant and exhibit the expected sign. For each additional thousand million U.S. dollars PFC purchases (sales) in the spot (forward) market the Chilean peso depreciates (appreciates) 0.32% (0.20%).[17] Since 2011, the average two-day cumulative change in PFC net trading volume in the FOREX spot market following an F&F recommendation is around $2,000 millions U.S. dollars. On the basis of the results in table 6, we infer the exchange rate depreciates 0.65% (=0.323x2) due to the cumulative direct effect of PFC activity in the FOREX spot market two days after F&F issues a recommendation. Although a little lower in magnitude, the findings in this subsection are consistent with the F&F exchange rate pressures we estimate using the LPM of equation 4, supporting the idea that F&F recommendations trigger much of the PFC net trading volume in the FOREX market which ultimately impacts the nominal exchange rate. The significant estimated coefficients associated with PFC trading volume in the FOREX market (θ) reveal that $\theta_{forward} < 0 < \theta_{spot}$ and $|\theta_{forward}| < \theta_{spot}$. These results provide empirical support for the view that the regulatory mandated hedging strategy PFCs must undertake in the FOREX forward market acts to partially offset the exchange rate depreciation pressures which ensue when these funds purchase U.S. dollars in the FOREX spot market.

5.2.4 Asymmetric impact of F&F recommendations

Now we turn to analyse any potential asymmetries induced by F&F recommendations, by separately considering the effect of those announcements which suggest investors reallocate to funds with riskier and less risky exposures. We estimate the LPM in equation 4 twice. Initially, we estimate the model using only recommendations which suggest investors enhance their risk exposure. In this case, the F&F variable takes the appropriate value given by the $F\&F$ when the recommendation suggests switching from safer to riskier portfolios, and zero otherwise. Subsequently, we re-estimate equation 4 using only those announcements which suggest investors switch from risky to safer portfolios. In this case, the F&F variable takes the value given by $F\&F \times (-1)$ when FF recommends switching from higher to lower risk exposure, and zero otherwise.

[17]The change in PFC net trading volume in FOREX spot and forward markets is measured in thousand million U.S. dollars. A positive value in Δ PFC net trading volume in the Peso FOREX spot (forward) market represents net purchases (sales) of U.S.dollars.

[Figure 8 in here]

Panels (a) and (b) in figure 8 present the cumulative impact on the exchange rate of F&F recommendations which advocate taking on more and less risk exposure, respectively. Risk enhancing (mitigating) recommendations both generate a cumulative depreciation (appreciation) of around 0.8% the day following the recommendations, the former (latter) dissipating six (twenty) days after the recommendation announcement. This asymmetric cumulative impact is illustrated in Figure 8 panel (c), in which we multiply the cumulative effect of taking less risk by minus one to facilitate comparisons. This evidence is consistent with the fact that regulations mandate that PFCs must hedge against currency risk by selling currency forwards in the FOREX derivative market after purchasing U.S. dollars in the FOREX spot market, a strategy they initiate only when enhancing their portfolio risk exposure. These results provide evidence that the compulsory forward sales of U.S. dollars partially compensate for the depreciation pressures of PFC purchases of U.S. dollar in the FOREX spot market. The results are fully consistent with the evidence we introduce in section 5.2.3.

5.3 Exchange rate volatility

In this section, we investigate if the documented pressure that F&F announcement news exerts on exchange rate returns translates into enhanced exchange rate volatility. Related studies argue that pension fund investors focusing on short-term horizon strategies, as characterised by F&F recommendations, tend to exacerbate asset price volatility (Levy & Zuniga 2016, OECD 2020). Following Diebold & Yilmaz (2009) we estimate a measure of nominal exchange rate realised volatility using intra-day observations.[18] In particular, we compute our range-based exchange rate volatility measure as follows:

$$\begin{aligned}\hat{\sigma}_t^2 = 0.511\,(H_t - L_t)^2 - 0.019\,[(C_t - O_t)\,(H_t + L_t - 2O_t) \\ -2\,(H_t - O_t)\,(L_t - O_t)] - 0.383\,(C_t - O_t)^2\end{aligned} \tag{6}$$

where H_t, L_t, O_t, C_t represent the intra-day high, low, open and close price, respectively.

[Figure 9 in here]

As shown in figure 9 preliminary evidence reveals that our measure displays volatility clusters after mid-2011, and realised volatility in the exchange rate tends to spike during the days F&F makes recommendations (vertical dotted lines). In similar fashion to section

[18] This range-based implied volatility measure is highly similar in comparison to a simpler volatility measure estimated as the square exchange rate returns. The comparative time-series plot of both volatility measures is available upon request.

5.2, we estimate the effect of F&F recommendations on exchange rate volatility using a modification of the LPM in equation 4 in which our dependent variable now corresponds to the cumulative change in the natural logarithm of the exchange rate volatility, but the explanatory variables and the F&F news definition remain the same.

[Figure 10 in here]

Figure 10 panel (a) illustrates the effect of F&F announcement news on the cumulative change in exchange rate volatility, revealing that volatility increases sharply by around 100% during the first day following F&F recommendations. This effect on exchange rate volatility is short-lived. Indeed, the statistical significance of the cumulative volatility impact quickly dissipates after the first day following the recommendation. The robust but short-lived effect on exchange rate volatility is consistent with the findings of section 5.2, which indicates the majority of the effects on the exchange rate occur during the first day after F&F recommendations and dissipate thereafter (figure 6). Comparing our results to related studies quantifying the impact of other comparable shocks to exchange rate volatility, Fuentes et al. (2014) document that the 2011 CBCL intervention in the Chilean FOREX spot market increases exchange rate volatility by 36%. The effect, however, becomes less significant after controlling for additional factors. The comparative lower impact of CBCL interventions in the FOREX market on exchange rate volatility may relate to the Central Bank's financial stability objective, suggesting FOREX market interventions are intended to reduce rather than to enhance exchange rate volatility.[19]

To validate the robustness of our findings, we analyse the effect of F&F recommendations on the conditional volatility of exchange rate returns using a GARCH model which includes F&F recommendation announcement news as an additional explanatory variable in the variance equation of the model.[20] The mean equation in the GARCH formulation corresponds to equation 4, excluding the F&F news from the set of explanatory variables. We model the conditional variance of cumulative exchange rate returns as follows:

$$\sigma^2_{t,h} = \omega^h + \alpha^h \varepsilon^2_{t-1,h} + \beta^h \sigma^2_{t-1,h} + \gamma^h FF_t \tag{7}$$

[19]Neely (2008) provides a detailed analysis of the literature discussing Central Bank interventions, revealing the lack of concensus in this area.

[20]Other studies also implement this GARCH methodology to estimate the effect of shocks to the FOREX market on exchange rate volatility. For instance, Doroodian & Caporale (2001) find that Central Bank intervention in the FOREX market generates a significant increase in volatility (measured as conditional variance of exchange rate returns) in the yen/dollar and mark/dollar sectors. Using the same methodology, Domac & Mendoza (2004) find that Central Bank interventions reduces exchange rate volatility in the case of both Mexico and Turkey.

where $\sigma^2_{t,h}$ corresponds to the conditional variance of cumulative exchange rate returns. $\varepsilon_{t,h}$ corresponds to the residuals of the mean equation. FF_t corresponds to the F&F recommendation news defined as in section 5.2. ω, α, β and γ are the coefficients we estimate via maximum likelihood. In similar fashion to the previous analysis, we formulate h days ahead projections of the effect of F&F recommendation news on the conditional variance of cumulative exchange rate returns. Figure 10 panel (b) exhibits the results. The solid line represents the cumulative response of nominal exchange rate volatility we obtain from the GARCH model in equation 7 to F&F recommendation news (i.e.: the γ coefficient projected h days ahead). The results are consistent with the original exercise, with exchange rate volatility displaying a short-lived increase with most of the effect arising during the first days following the F&F recommendations.

Viewed collectively, the evidence we present in this subsection suggests that the effect of F&F recommendations is to enhance exchange rate volatility, although its impact is short-lived. Our results are consistent with related studies arguing that investors focusing on short-term horizons make decisions which tend to exacerbate asset price volatility (Levy & Zuniga 2016, OECD 2020).

5.4 Trading volume in FOREX market

Our findings to this point suggest F&F recommendations generate enhanced pressure on the Chilean peso nominal exchange rate and exacerbate its volatility. Here we analyse the impact of these recommendations on the trading patterns of different classes of investors who engage in trading activity on the Chilean peso spot market. We employ a proprietary dataset from the CBCL containing information of the daily FOREX trading volume of six important classes of market participants: Pension fund companies (PFCs), non-residents, retail companies, insurance companies, stock brokers, and mutual funds. Our hypothesis is informed by how regulations relating to the timing of portfolio readjustments in the pension fund industry induce the possibility that other market participant may benefit by anticipating massive, coordinated PFC trading volume in the FOREX market following F&F recommendations, in particular by front-running the anticipated trades they induce.

To calculate the impact of F&F recommendations on the trading volume of each class of market participant, we estimate the following regression model over the period 01 March 2012 to 22 October 2020:

$$TrdVol_p = FF\theta_p + X\beta_p + \varepsilon_p \tag{8}$$

where $TrdVol_p$ is a vector representing the natural logarithm of trading volume in the

Chilean peso FOREX spot market of investor class p. The subscript $p = 1, \ldots, 6$ indicates a particular class of market participant described above. FF is a vector which contains categorical variables taking a value of one h days (with $h = 1, \ldots, 10$), following an F&F recommendation and zero otherwise. X represents a vector of lagged control variables and ε_p represent the error term. We use Ordinary Least Squares to estimate θ_p and β_p, the vector of coefficients.

[Table 7 in here]

Table 7 displays the results from estimating equation 8, with the main findings as follows. First, we observe that PFC trading volume significantly increases the day following an F&F recommendation announcements, reaching its peak four days later and gradually becomes less elevated over the next few days. This pronounced hump-shaped pattern is consistent with the manner in which PFCs are mandated to implement fund switches on the basis of the regulatory requirements discussed in section 2, which states that PFCs can only reallocate pension assets on the fourth day following receipt of the switching request. Consequently, viewed in isolation, these regulations initiate an expected increase in PFC trading volume in the peso FOREX spot market on and around the fourth day following F&F recommendation announcements.

Interestingly, PFC trading volume starts increasing from time $t + 1$, the day following F&F recommendations, showing that PFCs anticipate a large number of fund switching requests following F&F recommendations and immediately begin to accommodate their FOREX needs. Second, on average we observe a significant increase of 25% and a 35% in the FOREX spot market trading volume of non-resident and mutual fund companies, respectively, after F&F recommendations. Third, we observe no persistent change in the FOREX trading volume of either retail, insurance or stock broker companies following F&F recommendation announcements. Overall, this set of results raises the possibility that F&F recommendation news not only significantly increases PFC trading volume, but that it may also induce certain other classes of FOREX market participants, such as non-resident investors and mutual fund companies, to anticipate such massive and coordinated PFC transactions in the peso FOREX spot market. Our findings are also consistent with the evidence in Corsetti et al. (2002) showing that transactions by large, sophisticated investors in the FOREX market exert other market participants to trade in this market more aggressively. While we do not test the proposition directly, it is conceivable that the regulatory trading restrictions which mandate a delay to PFC portfolio switches, provide both an incentive and an opportunity enabling other market participants to attempt to profit by front-running these anticipated PFC trades. Finally, considering that PFCs and non-residents together represent more than

50% of the total trading volume in the FOREX market, this significant increase in their trading volume after F&F recommendations translates to pressures on the nominal exchange rate. This evidence is consistent with the results in figure 6 where we document that the impact on the nominal exchange rate occurs from the day immediately following F&F recommendations, despite the fact that PFCs can process switching fund requests only four days after their receipt.

6 Conclusion

The increasing prominence of Felices & Forrados (F&F), a financial advisory firm in the Chilean pension fund industry, has positioned the company as the most relevant firm in the growing market providing pension investment recommendations to investors. Focusing on short-term horizon investment strategies, F&F recommendations trigger large asset reallocations within the pension fund system. This asset reallocation translates into massive, coordinated transaction by pension fund companies in the Chilean peso sector of the FOREX market. In this study, we show that F&F recommendations, although noisy in their nature in the sense they cannot be predicted accurately by macroeconomic or financial market developments, generate a considerable pricing impact on the Chilean peso FOREX market. Among the main results, we show that the Chilean peso depreciates by 0.86% on average after F&F recommendations and the impact persists for ten days. We also find that F&F recommendations exert a substantial increase in exchange rate volatility, although the effect is short-lived and dissipates quickly over time. Collectively, our evidence suggests F&F recommendation announcements generate significant price pressures in the Chilean peso FOREX market. Our findings are consistent with related studies arguing that substantially large and coordinated asset reallocations based on short-term investment strategies tend to impact asset prices, pushing them beyond fundamentals and exacerbating price volatility. Further highlighting our findings which provide evidence that F&F recommendations exert considerable exchange rate pressures, we document that certain other classes of markets participants may anticipate the ensuing large, coordinated transactions of PFCs in the FOREX market, and attempt to profit by front-running these trades, although we leave detailed analysis of this issue to future research. Our results suggest F&F recommendations generate a meaningful impact on the Chilean peso FOREX market that may not be consistent with the CBCL's financial stability objectives. The findings contained in this study contribute to the ongoing policy discussions concerning the appropriate regulation of financial advisory companies operating in the pension fund industry in Chile. Moreover, our analysis also has implications for multiple other jurisdictions which harbour similar pension fund systems, particularly for countries whose

regulation allows investors to actively choose investment portfolios based on recommendations of unregulated financial advisory firms.

Figures

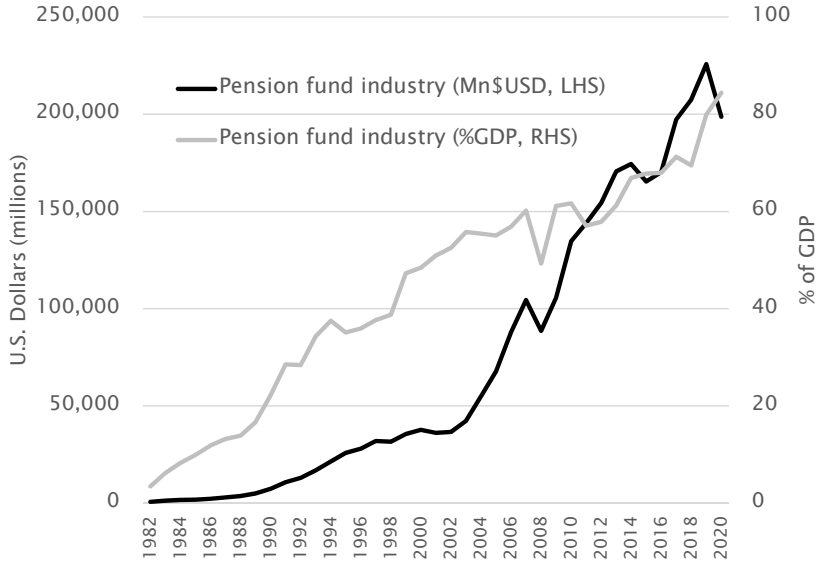


Figure 1: Pension fund industry value

Notes: Value of the pension industry in Chile, annual observations, 1982 to 2020. Black line corresponds to the value in million U.S. dollars (left-hand side axis). Grey line corresponds to values as a percentage of the Chilean GDP (right-hand side axis). Source: Chilean regulatory body of the pension fund industry.

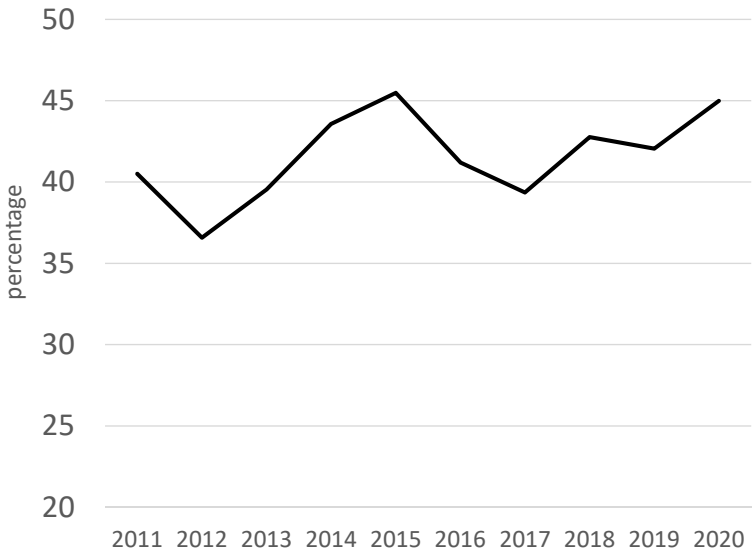
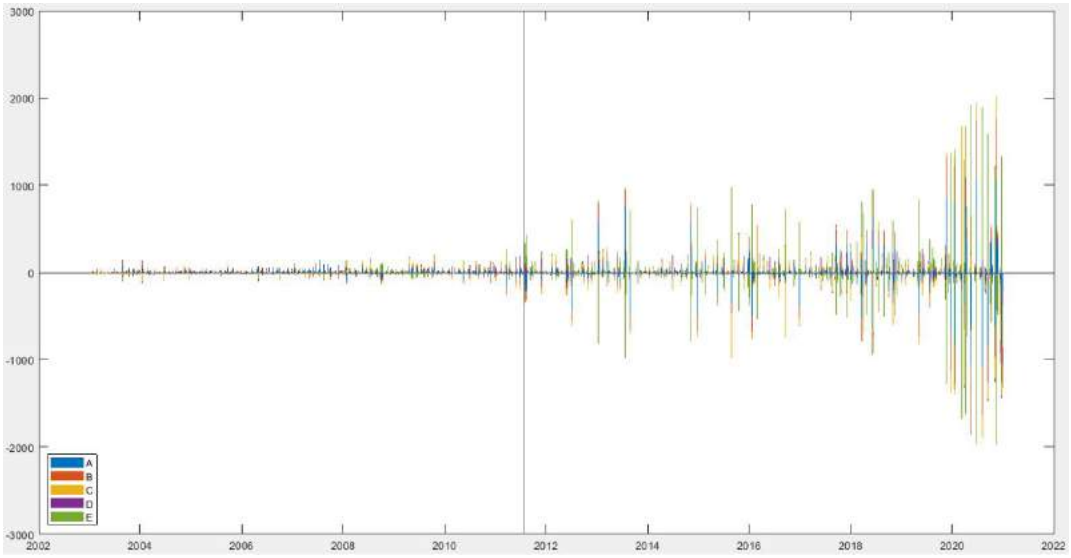
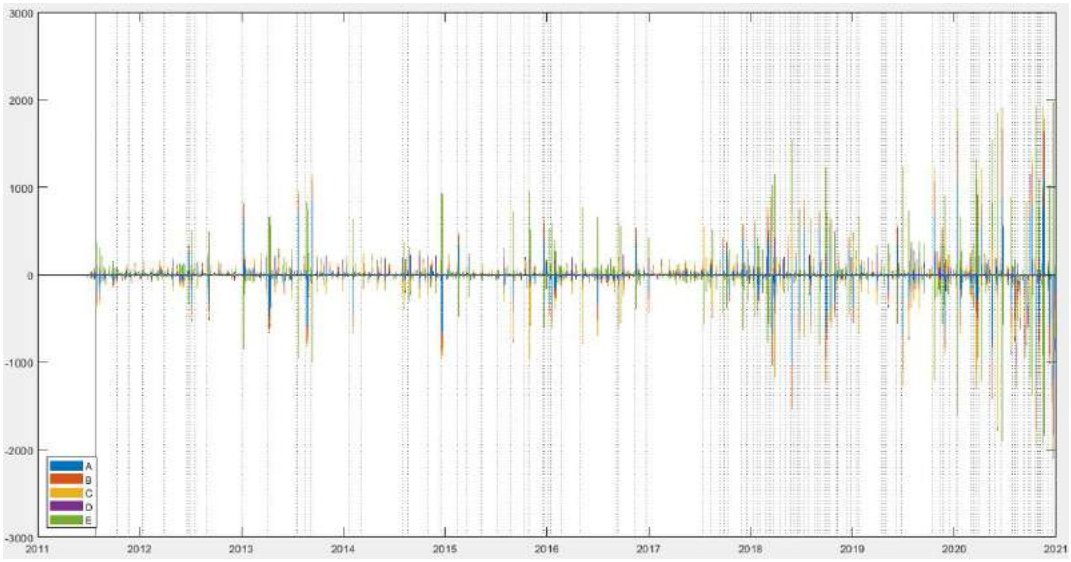


Figure 2: Percentage of assets invested in foreign markets, aggregate industry

Notes: Percentage of assets invested in foreign markets at aggregate industry level (aggregate assets of the PFCs). Annual observations, 2011-2020. Source: Chilean regulatory body of the pension fund industry.



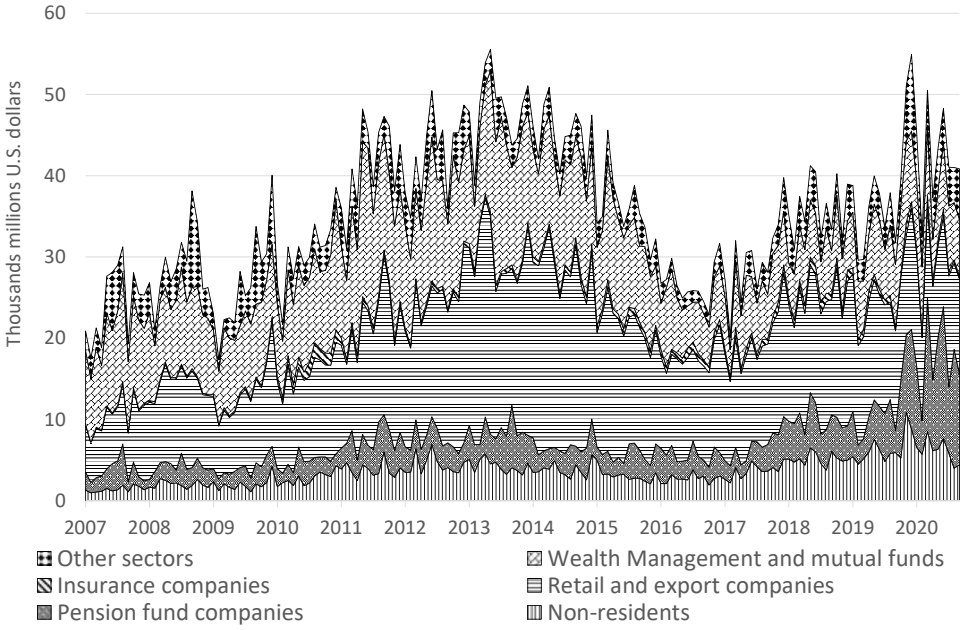
(a) 2003-2020



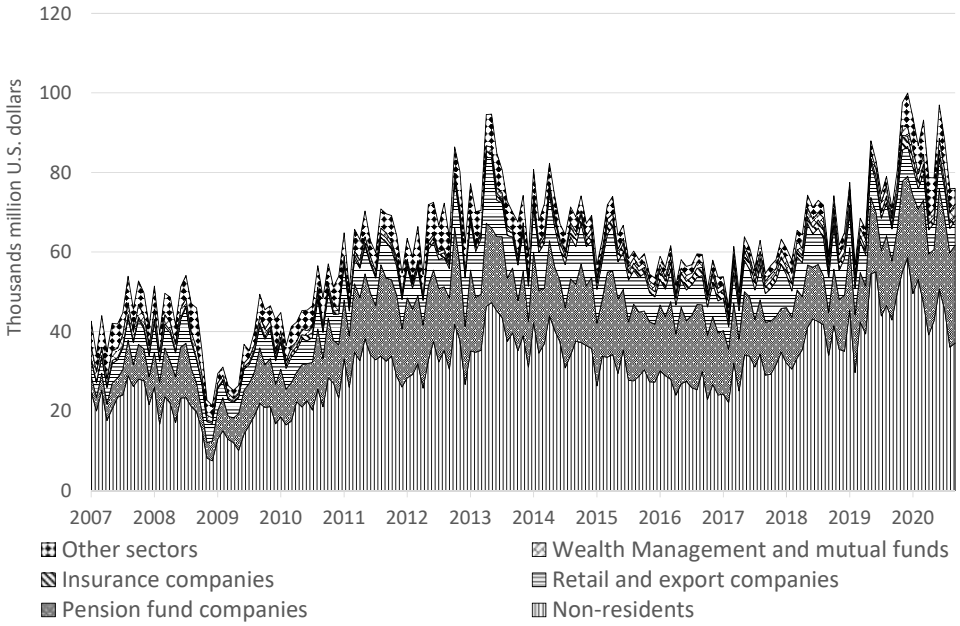
(b) 2011-2020

Figure 3: Net pension saving flows

Notes: Net pension fund flows (millions of U.S. dollars) by fund type. Fund flows correspond to the aggregate daily observations at a industry level. Vertical line in panel (a) indicates the day F&F recommendations commence (July 2011). Vertical lines in panel (b) indicate the dates F&F issues recommendations. Source: Superintendencia de Pensiones de Chile.



(a) FX spot market



(b) FX derivative market

Figure 4: Trading volume in Peso FOREX market by agent

Notes: Monthly observations, 2007 to 2020. Values in thousand million U.S. dollars. Source: Central Bank of Chile.

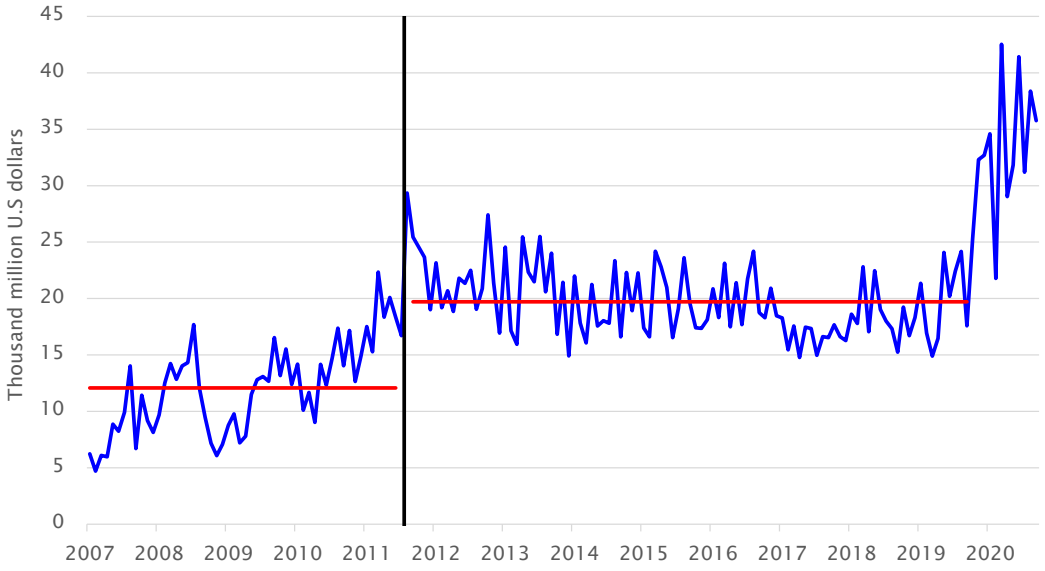


Figure 5: PFC trading volume in the FOREX market

Notes: Trading volume of pension fund companies at aggregate industry level in the Peso FOREX market (spot and derivative), thousand million of U.S. dollars. Monthly observations, 2007-2020. The vertical black line represents the date F&F commences recommendations. Horizontal red lines denote the average PFC trading volume before and after F&F recommendations. The average PFC trading volume before F&F recommendations corresponds to $12 thousand million dollars. The average PFC trading volume after F&F recommendations (excluding the period from 2020 onwards) corresponds to $20 thousand million dollars. Source: Central Bank of Chile.

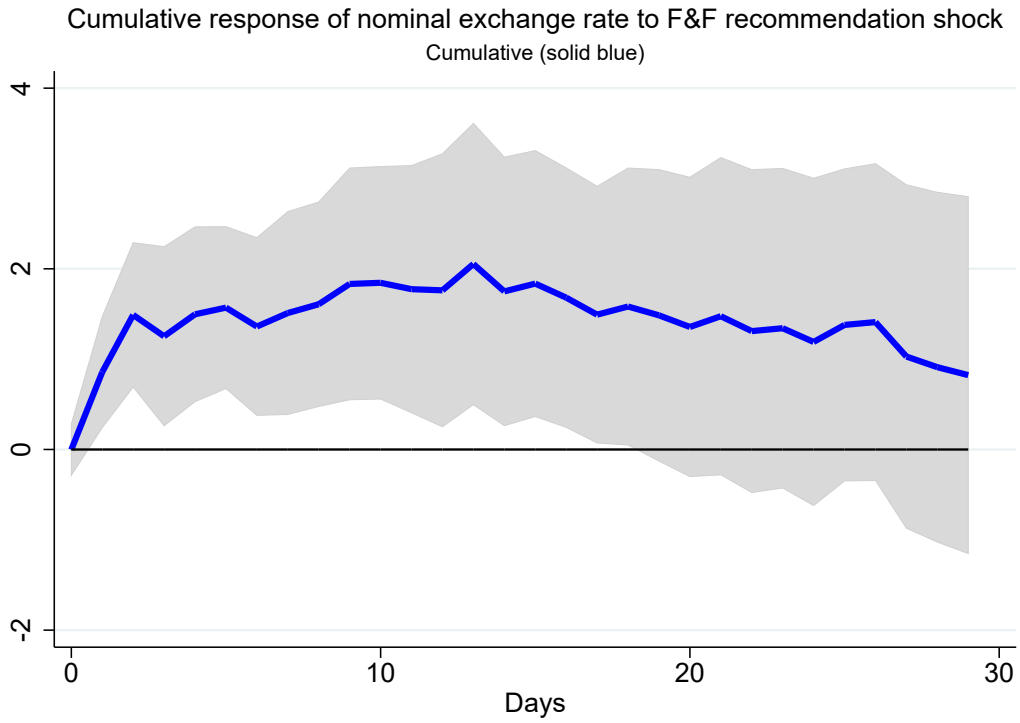


Figure 6: Cumulative response of nominal exchange rate to F&F news

Notes: Blue line represents the response of the $\Delta usdclp$ to FF news at horizon h (days). An increase indicates a Chilean Peso depreciation. Grey area represents 95% confidence bands. The definition of F&F news ($F\&F$) corresponds to the first difference of $finv$, where $finv = \sum_{i=1}^{5} w_{it} p_{it}$, with $i = 1, 2, 3, 4, 5$ (the five PFC funds), w_{it} represents the recommended F&F allocation in fund i at time t, and p_{it} represents the percentage of foreign investment in fund i at time t. Daily observations, 01 March 2012 - 22 October 2020. Source: Authors' calculations.

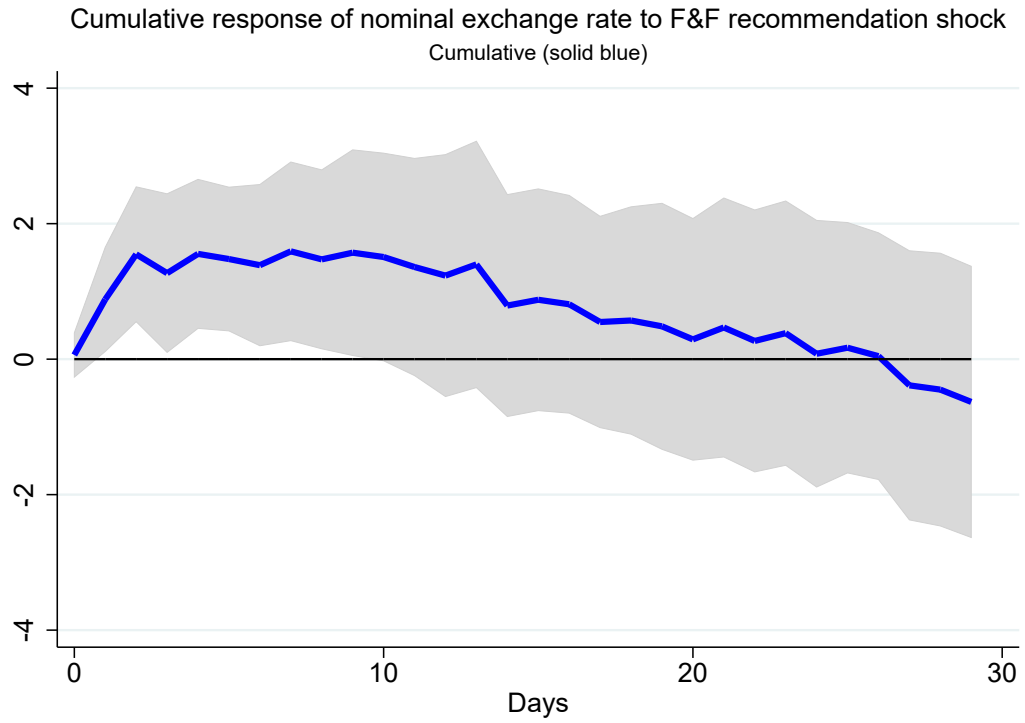
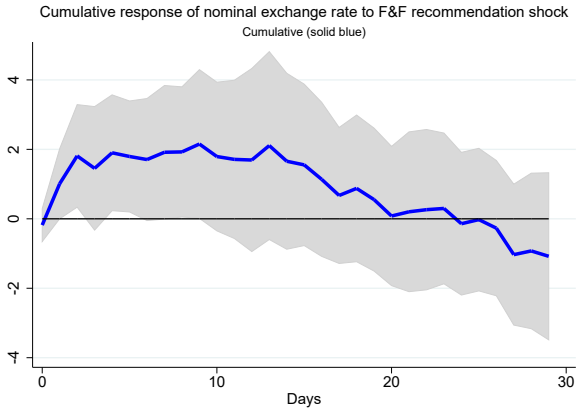
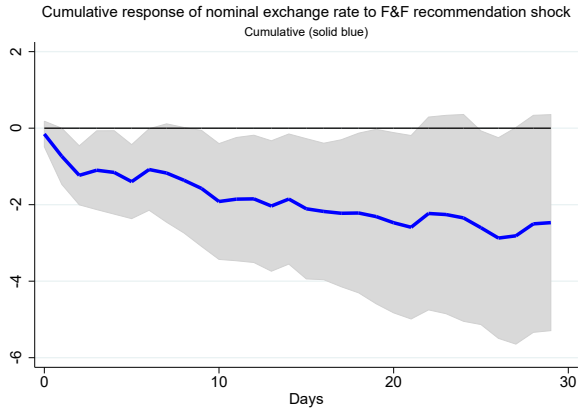


Figure 7: Cumulative response of nominal exchange rate to F&F news, excluding overlapped recommendations

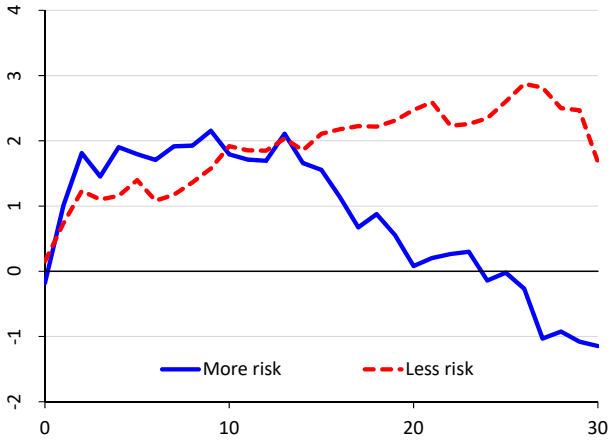
Notes: Blue line represents the response of the $\Delta usdclp$ to FF news at horizon h (days). An increase indicates a Chilean Peso depreciation. Grey area represents 95% confidence bands. The definition of F&F news ($F\&F$) corresponds to the first difference of $finv$, where $finv = \sum_{i=1}^{5} w_{it} p_{it}$, with $i = 1, 2, 3, 4, 5$ (the five PFC funds), w_{it} represents the recommended F&F allocation in fund i at time t, and p_{it} represents the percentage of foreign investment in fund i at time t. Daily observations, 01 March 2012 - 22 October 2020. This estimation excludes overlapped recommendations. See table A.2 in appendix for details of those overlapped dates, marked with an star (*). Source: Authors' calculations.



(a) More risk



(b) Less risk



(c) Asymmetric impact point estimate

Figure 8: Asymmetric impact of F&F recommendations

Notes: Blue line in panel (a) and (b) represents the response of the $\Delta usdclp$ to FF news at horizon h (days) suggesting to take more and less risk, respectively. An increase (decrease) indicates a domestic currency depreciation (appreciation). Grey area represents 95% confidence bands. Blue line in panel (c) represents the point estimate of panel (a), while the red dashed line represents the point estimate of panel (b), which is multiplied by -1 for illustration purposes only. Daily observations, 01 March 2012 - 22 October 2020. Source: Authors' calculations.

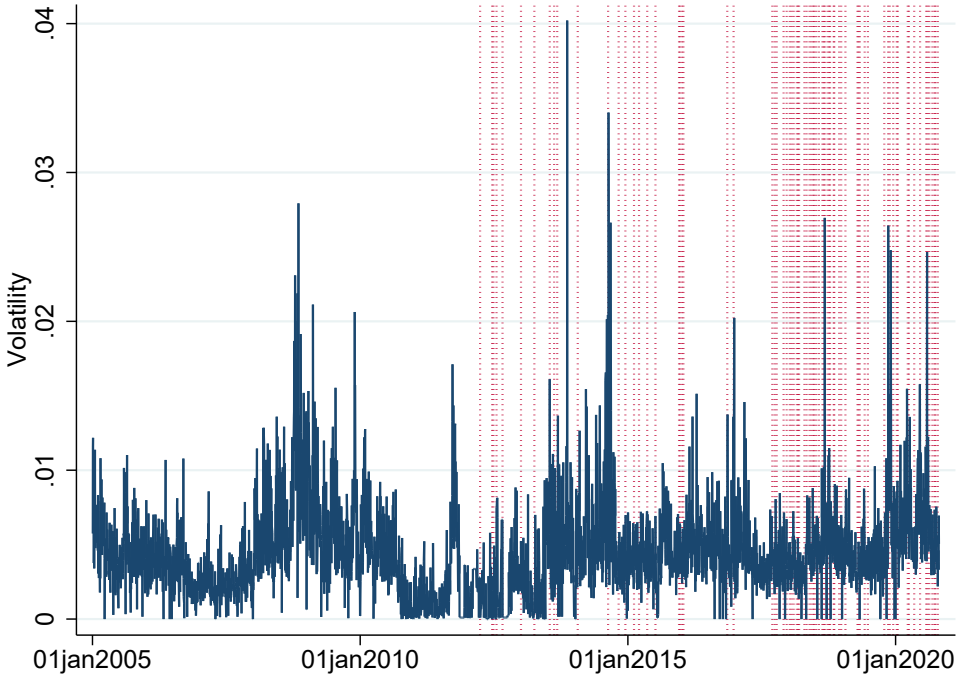
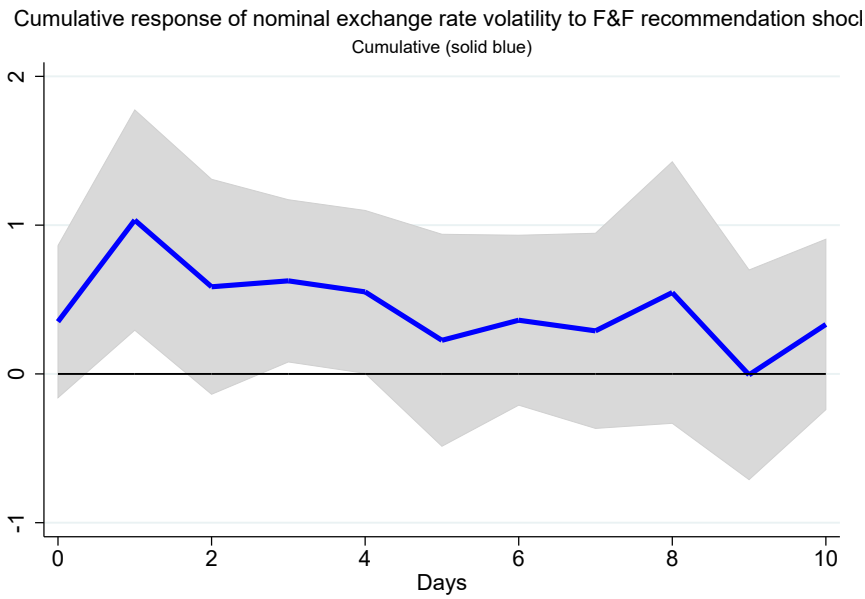
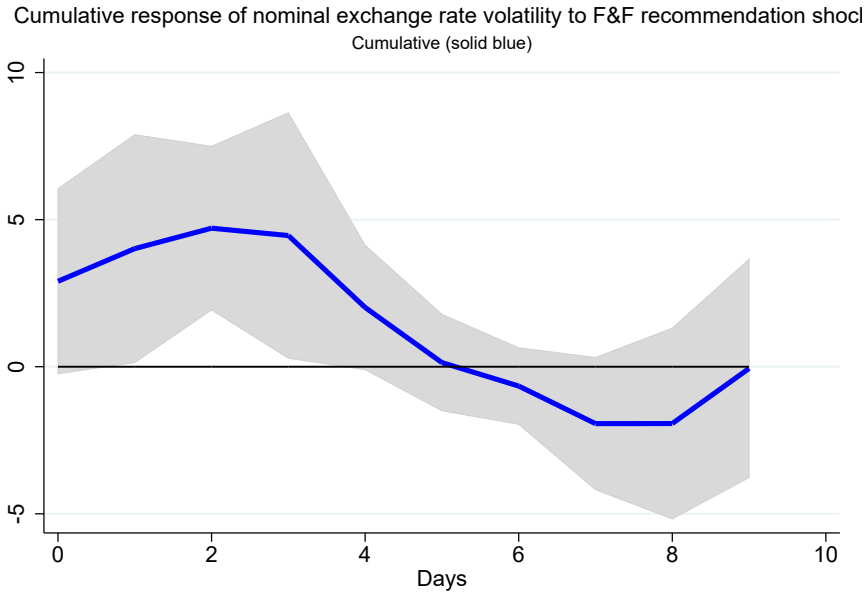


Figure 9: Nominal exchange rate volatility

Notes: Intra-day range-based volatility based on Diebold et al. (2018). Blue solid line represents the square root of the volatility measure in equation 6. Vertical dotted lines correspond to the days when F&F issues recommendations. Source: Authors' calculations.



(a) Exchange rate return volatility



(b) Conditional variance exchange rate returns

Figure 10: Cumulative response of exchange rate volatility to F&F news

Notes: Blue line in panel (a) represents the response of the cumulative change in the natural logarithm of the exchange rate volatility to F&F news at horizon h. Blue line in panel (b) represents the response of the conditional variance of cumulative nominal exchange rate returns to FF news at horizon h. Daily observations, 01 March 2012 - 22 October 2020. Grey area represents 95% confidence bands. Source: Authors' calculations.

Tables

Table 1: Pension fund company portfolio composition

	Fund					
	A	**B**	**C**	**D**	**E**	**Total**
Panel A: Value (US$ Mn)						
Value	22,274	26,665	66,024	35,977	48,475	199,416
Panel B: Composition (% of the fund)						
Domestic	16	32	51	71	88	55
Equity	13	11	7	3	2	6
Fixed income	4	22	44	68	87	49
Foreign	84	68	49	29	12	45
Equity	66	48	31	15	3	29
Fixed income	18	20	18	14	9	16
Panel C: Equity investment limits (% of the fund)						
min.	40	25	15	5	0	–
max.	80	60	40	20	5	–

Notes: Panel A displays the value in U.S. million dollars of each fund at a aggregate pension fund industry level in 2020. Panel B exhibits the composition of each fund considering the location of the invested assets (domestic or foreign markets) and its type (equity or fixed income). Panel C shows the equity investment limits as a percentage of the total fund. Source: Superintendencia de Pensiones de Chile (Chilean regulatory body of the pension fund industry).

Table 2: Preliminary facts

Episodes	Δ usdclp	PFC net trading vol FOREX	
		Δ spot	Δ forward
Pre GFC	0.55	29.3	59.3
GFC	0.90	91.9	164.7
Since F&F	0.63	174.1	174.7

Notes: Δ usdclp represents the standard deviation of daily Chilean exchange rate returns. Δ spot and Δ forward represent the standard deviation of the daily change in the pension fund company trading volume in the Chilean FOREX Spot and Derivative markets, respectively. Dates Pre Global Financial Crisis (GFC): January 2003 - July 2007. GFC: July 2007 - August 2009. Since F&F: July 2011 - September 2020. Source: Central Bank of Chile.

Table 3: Ordered logit model of F&F recommendation determinants

		More risk	Less risk
$\Delta usdclp$	$t-1$	0.180	-0.189
		(0.140)	(0.140)
	$t-2$	-0.194	0.170
		(0.140)	(0.160)
	$t-3$	-0.097	-0.176
		(0.210)	(0.150)
	$t-4$	-0.194	-0.068
		(0.140)	(0.150)
$\Delta SP500$	$t-1$	0.123	-0.255***
		(0.120)	(0.100)
	$t-2$	-0.043	0.178*
		(0.090)	(0.090)
	$t-3$	-0.105	0.013
		(0.120)	(0.090)
	$t-4$	-0.022	0.005
		(0.110)	(0.050)
$\Delta Bond$	$t-1$	-0.237	0.171
		(0.170)	(0.220)
	$t-2$	-0.153	-0.364*
		(0.230)	(0.200)
	$t-3$	0.008	0.264
		(0.270)	(0.250)
	$t-4$	-0.272	-0.001
		(0.240)	(0.340)
$\Delta\pi$	$t-1$	-7.032**	1.168
		(3.450)	(4.160)
	$t-2$	-5.638	-0.636
		(3.760)	(4.080)
	$t-3$	-6.130	11.946**
		(4.290)	(4.780)
	$t-4$	3.865	0.462
		(7.820)	(4.400)
	$t-5$	0.156	-4.120

		(4.290)	(5.420)
ΔDEU	$t-1$	-0.072	-0.024
		(0.060)	(0.040)
	$t-2$	0.058	-0.002
		(0.050)	(0.030)
	$t-3$	-0.110**	-0.020
		(0.050)	(0.040)
	$t-4$	0.022	-0.016
		(0.020)	(0.050)
	$t-5$	-0.015	0.066
		(0.040)	(0.050)
ΔVIX	$t-1$	-0.314**	0.086
		(0.150)	(0.070)
	$t-2$	-0.352***	-0.037
		(0.110)	(0.090)
	$t-3$	0.053	0.019
		(0.080)	(0.060)
	$t-4$	-0.039	-0.081
		(0.090)	(0.080)
	$t-5$	-0.114	0.037
		(0.100)	(0.080)
Latent variable thresholds			
κ_1		4.670***	4.184***
		(0.320)	(0.240)
κ_2		5.089***	4.549***
		(0.380)	(0.280)
Parallel assumption test			
χ^2		22.590	19.120
p-value		[0.707]	[0.866]
N Obs		1511	1511
Pseudo R2		0.15	0.09

Ordered logit model estimated using daily observations from 01 March 2012 to 22 October 2020. The dependent variable of the model in column 'more risk' ('less risk') corresponds to an ordered categorical variable capturing the intensity of F&F recommendation to take more (less) risk. The ordered dependent variable takes values of 1 and 2 when F&F recommends a moderate and strong change in risk exposure, respectively, and zero otherwise. The last column of table A.2 in the appendix displays this classification. P-values of the parallel regression assumption test in square brackets. (*), (**), (***) indicates statistical significance at 10, 5, and 1% level, respectively. Source: Authors' calculations.

Table 4: Effect of F&F news on Chilean exchange rate

		$\Delta usdclp_{t+h}$
F&F	t	0.857***
		(0.314)
ΔUSD	t	1.085***
		(0.074)
	$t-1$	0.125
		(0.093)
	$t-2$	-0.038
		(0.088)
ΔToT	t	-0.045***
		(0.007)
	$t-1$	-0.018**
		(0.007)
	$t-2$	-0.008
		(0.007)
$\Delta(i-i^*)$	t	-0.813
		(0.759)
	$t-1$	0.050
		(0.557)
	$t-2$	-0.847
		(0.631)
ΔVIX	t	0.037
		(0.023)
	$t-1$	0.058**
		(0.023)
	$t-2$	0.034
		(0.021)
ΔDEU	t	0.001
		(0.005)
	$t-1$	0.001
		(0.004)
	$t-2$	-0.006
		(0.004)
$\Delta\pi$	t	0.396

		(0.620)
	$t-1$	-0.873
		(0.557)
	$t-2$	0.403
		(0.608)
$\Delta Bond$	t	0.106
		(0.117)
	$t-1$	0.060
		(0.120)
	$t-2$	0.162
		(0.114)
$\Delta SP500$	t	-0.057
		(0.034)
	$t-1$	0.123***
		(0.042)
	$t-2$	0.057
		(0.036)
$\Delta usdclp$	$t-1$	0.036
		(0.049)
	$t-2$	-0.028
		(0.047)
Constant		0.016
		(0.020)
N Obs		1725
Adj. R2		0.24

Notes: Dependent variable corresponds to a time-series of cumulative exchange rate returns at $h = 1$. Increase indicates a Chilean Peso depreciation. Robust standard error in parenthesis. Daily observations, 01 March 2012 - 22 October 2020. (*), (**), (***) indicates statistical significance at 10, 5, and 1% level, respectively. Source: Authors' calculations.

Table 5: Comparison of shocks on the Chilean FOREX market

	$t+1$	$t+5$	Length[(1)]
F&F recommendation news	0.86%	1.57%	10-18
Central Bank of Chile FX market interventions			
2011[(2)] (US dollars purchase)	4.6%	12%	15-20
2019[(3)] (US dollars sales)	-3.0%	-5.5%	–
2021[(3)] (US dollars purchase)	1.4%	1.2%	–
Net FX_{PFC} trading volume model	0.65%[(4)]	–	–

Notes: (1) Length corresponds to the number of days F&F news displays statistical significant impact on exchange rate returns. (2) Based on Contreras et al. (2013). (3) Nominal exchange rate variation after the Central Bank intervention announcement. (4) Cumulative effect on exchange rate two days after F&F recommendations. Source: Authors' calculations.

Table 6: Exchange rate model based on PFCs FOREX trading volume

	$\Delta usdclp_t$
ΔPFC net trading volume	
$Spot_t$	0.323***
	(0.098)
$Forward_t$	-0.200**
	(0.082)
$\Delta(i_t - i_t^*)$	0.384
	(0.562)
ΔToT_t	-0.039***
	(0.004)
ΔUSD_t	1.045***
	(0.042)
Constant	0.009
	(0.011)
N obs	1940
Adj R2	0.35

Notes: Dependent variable corresponds to a time-series of exchange rate returns. Increase indicates Chilean Peso depreciation. Δ PFC net trading volume in Peso FOREX spot and forward markets are measured in thousand million U.S. dollars. A positive value in Δ PFC net trading volume in Peso FOREX spot (forward) market represents net purchases (sales) of U.S. dollars. Robust standard error in parenthesis. Sample: Daily observations, 01 March 2012 - 22 October 2020. In order to avoid endogeneity issues, we use a measure of PFC net trading volume in the Peso FOREX spot and forward markets which is orthogonal to other risk factors that may affect the Chilean exchange rate. Section "Auxiliary PFC FOREX trading volume regressions" on page 56 provides more details about the orthogonalisation of PFC trading volume in the FOREX market. Source: Authors' calculations.

Table 7: F&F and FOREX trading volume by agent

	PFC	Non-residents	Retail	Insurance	Brokers	M. Funds
FF						
$t+1$	0.760***	0.233***	0.070	0.144	-0.017	0.332***
	(0.165)	(0.078)	(0.046)	(0.151)	(0.079)	(0.097)
$t+2$	0.939***	0.240**	0.031	0.021	-0.124*	0.198
	(0.155)	(0.104)	(0.051)	(0.165)	(0.075)	(0.125)
$t+3$	1.264***	0.259***	-0.081	0.220	-0.117	0.363***
	(0.153)	(0.081)	(0.065)	(0.165)	(0.073)	(0.120)
$t+4$	1.457***	0.218***	0.000	0.173	-0.086	0.458***
	(0.166)	(0.077)	(0.054)	(0.119)	(0.088)	(0.105)
$t+5$	1.422***	0.140*	0.023	0.128	0.017	0.372***
	(0.139)	(0.079)	(0.066)	(0.154)	(0.070)	(0.119)
$t+6$	0.961***	0.160	-0.031	-0.089	-0.166*	0.345***
	(0.318)	(0.149)	(0.065)	(0.204)	(0.091)	(0.134)
$t+7$	1.154***	0.161*	0.045	0.154	-0.113	0.244*
	(0.106)	(0.085)	(0.067)	(0.142)	(0.078)	(0.128)
$t+8$	0.892***	0.201*	-0.037	-0.120	-0.205*	0.272**
	(0.179)	(0.116)	(0.066)	(0.211)	(0.109)	(0.115)
$t+9$	1.019***	0.251***	0.064	0.055	-0.048	0.362***
	(0.140)	(0.093)	(0.098)	(0.154)	(0.099)	(0.123)
$t+10$	0.561***	0.066	0.012	-0.005	-0.016	0.060
	(0.215)	(0.113)	(0.071)	(0.148)	(0.090)	(0.129)
ΔDEU						
$t-1$	0.009	0.008**	0.002	0.003	0.002	0.002
	(0.006)	(0.003)	(0.002)	(0.005)	(0.003)	(0.004)
$t-2$	0.015**	0.014***	0.002	0.002	-0.002	0.001
	(0.007)	(0.003)	(0.002)	(0.005)	(0.003)	(0.004)
$\Delta\pi$						
$t-1$	-0.192	-0.458	-0.220	0.275	-0.280	0.587
	(0.940)	(0.385)	(0.253)	(0.621)	(0.354)	(0.526)
$t-2$	-0.061	-0.262	-0.201	-0.424	-0.203	-0.340
	(1.021)	(0.372)	(0.258)	(0.612)	(0.336)	(0.532)
$\Delta(i-i^*)$						
$t-1$	-0.568	0.389	-0.064	0.164	0.225	-0.517

	(0.664)	(0.439)	(0.239)	(0.588)	(0.282)	(0.439)
$t-2$	0.584	0.203	-0.129	0.820	-0.058	0.531
	(0.781)	(0.361)	(0.225)	(0.516)	(0.257)	(0.480)
ΔVIX						
$t-1$	0.009	0.008	-0.003	-0.015	-0.001	0.008
	(0.016)	(0.009)	(0.006)	(0.013)	(0.007)	(0.010)
$t-2$	-0.011	-0.006	-0.007	0.004	0.000	0.004
	(0.016)	(0.008)	(0.006)	(0.011)	(0.006)	(0.011)
$\Delta SP500$						
$t-1$	-2.548*	-0.859	-0.399	-3.104***	-0.894	-2.490***
	(1.523)	(0.758)	(0.503)	(1.129)	(0.680)	(0.914)
$t-2$	0.107	0.569	0.144	-2.177**	-0.777	-0.605
	(1.386)	(0.651)	(0.446)	(1.002)	(0.586)	(0.824)
$\Delta Bond$						
$t-1$	-0.794	2.579	2.632**	1.926	-0.687	1.234
	(4.158)	(2.450)	(1.210)	(3.317)	(1.354)	(2.145)
$t-2$	3.839	-1.654	1.585	0.895	0.183	-3.438
	(4.850)	(2.258)	(1.402)	(3.522)	(1.648)	(2.236)
$\Delta usdclp$						
$t-1$	0.699	-1.909*	-0.574	2.508	0.545	-0.965
	(1.953)	(1.145)	(0.653)	(1.724)	(0.771)	(1.248)
$t-2$	0.976	1.449	0.894	2.404	2.108***	2.240*
	(2.645)	(1.046)	(0.669)	(1.671)	(0.816)	(1.240)
Constant	4.600***	5.135***	6.549***	3.150***	5.970***	3.307***
	(0.039)	(0.016)	(0.011)	(0.026)	(0.014)	(0.020)
N Obs	1762	1770	1771	1771	1771	1771
Adj R2	0.10	0.04	0.00	0.01	0.01	0.03

Notes: The dependent variable in each column represents the natural log of the trading volume in the Peso FOREX spot market by agent. Robust standard errors in parenthesis. Daily observations, 01 March 2012 - 22 October 2020. FF_{t+h}, $h = 1, \ldots, 10$, is a categorical variable taking the value of one h days after F&F issues a recommendation, and zero otherwise. (*), (**), (***) indicates statistical significance at 10, 5, and 1% level, respectively. Source: Authors' calculations.

Bibliography

Basak, S. & Pavlova, A. (2013), 'Asset prices and institutional investors', *American Economic Review* **103**(5), 1728–58.

Becerra, J. S. & Sagner, A. (2020), 'Twitter-Based Economic Policy Uncertainty Index for Chile', *Working Papers Central Bank of Chile* .

Ben-Rephael, A., Kandel, S. & Wohl, A. (2011), 'The price pressure of aggregate mutual fund flows', *The Journal of Financial and Quantitative Analysis* **46**(2), 585–603.

Cai, F., Han, S., Li, D. & Li, Y. (2019), 'Institutional herding and its price impact: Evidence from the corporate bond market', *Journal of Financial Economics* **131**(1), 139–167.

Ceballos, L. & Romero, D. (2020), 'Price pressure in the government bond market: Long-term impact of short-term advice', *mimeo* .

Central Bank of Chile (2020), 'Financial stability report', *Technical report* .

Contreras, G., Pistelli, A. & Sáez, C. (2013), 'Efecto de intervenciones cambiarias recientes en economías emergentes', *Notas de Investigación Journal Economía Chilena (The Chilean Economy)* **16**(1), 122–137.

Corbo, V. & Schmidt-Hebbel, K. (2003), 'Efectos macroeconómicos de la reforma de pensiones en chile', *Universidad Catolica de Chile working paper* .

Corsetti, G., Pesenti, P. & Roubini, N. (2002), The Role of Large Players in Currency Crises, *in* 'Preventing Currency Crises in Emerging Markets', NBER Chapters, National Bureau of Economic Research, Inc, pp. 197–268.

Cuevas, C., Bernhardt, D. & Sanclemente, M. (2016), 'The pied piper of pensioners', *University of Warwick Working Paper* .

Da, Z., Larrain, B., Sialm, C. & Tessada, J. (2018), 'Destabilizing financial advice: Evidence from pension fund reallocations', *The Review of Financial Studies* **31**(10), 3720–3755.

Diebold, F. X., Liu, L. & Yilmaz, K. (2018), 'Commodity Connectedness', *Central Banking, Analysis, and Economic Policies Book Series. Central Bank of Chile* **25**(1), 097–136.

Diebold, F. X. & Yilmaz, K. (2009), 'Measuring financial asset return and volatility spillovers, with application to global equity markets', *The Economic Journal* **119**(534), 158–171.

Domac, I. & Mendoza, A. (2004), 'Is there room for foreign exchange interventions under an inflation targeting framework ? Evidence from Mexico and Turkey', *Policy Research Working Paper Series, The World Bank* .

Doroodian, K. & Caporale, T. (2001), 'Central bank intervention and foreign exchange volatility', *International Advances in Economic Research* **7**(4), 385–392.

Ellul, A., Jotikasthira, C. & Lundblad, C. T. (2011), 'Regulatory pressure and fire sales in the corporate bond market', *Journal of Financial Economics* **101**(3), 596–620.

Evans, M. D. D. & Lyons, R. K. (2002), 'Order flow and exchange rate dynamics', *Journal of Political Economy* **110**(1), 170–180.

Foerster, S., Linnainmaa, J. T., Melzer, B. T. & Previtero, A. (2017), 'Retail financial advice: Does one size fit all?', *The Journal of Finance* **72**(4), 1441–1482.

Froot, K. A. & Ramadorai, T. (2005), 'Currency returns, intrinsic value, and institutional-investor flows', *The Journal of Finance* **60**(3), 1535–1566.

Fuentes, M., Pincheira, P., Julio, J. M., Rincón, H., García-Verdú, S., Zerecero, M., Vega, M., Lahura, E. & Moreno, R. (2014), 'The effects of intraday foreign exchange market operations in Latin America: results for Chile, Colombia, Mexico and Peru', *Bank for International Settlements working paper* .

Gennaioli, N., Shleifer, A. & Vishny, R. (2015), 'Money doctors', *The Journal of Finance* **70**(1), 91–114.

Goldstein, I., Jiang, H. & Ng, D. T. (2017), 'Investor flows and fragility in corporate bond funds', *Journal of Financial Economics* **126**(3), 592–613.

Gompers, P. A. & Metrick, A. (2001), 'Institutional investors and equity prices', *The Quarterly Journal of Economics* **116**(1), 229–259.

Greenwood, R. & Vayanos, D. (2010), 'Price pressure in the government bond market', *American Economic Review* **100**(2), 585–90.

Hung, A. A., Clancy, N., Dominitz, J., Talley, E., Berrebi, C. & Suvankulov, F. (2008), 'Investor and industry perspectives on investment advisers and broker-dealers', *RAND Corporation* .

Inderst, R. & Ottaviani, M. (2012), 'Financial advice', *Journal of Economic Literature* **50**(2), 494–512.

Jordà, O. (2005), 'Estimation and inference of impulse responses by local projections', *The American Economic Review* **95**(1), 161–182.

Khan, M., Kogan, L. & Serafeim, G. (2012), 'Mutual fund trading pressure: Firm-level stock price impact and timing of seos', *The Journal of Finance* **67**(4), 1371–1395.

Levy, E. & Zuniga, J. (2016), 'Varieties of Capital Flows: What Do We Know?', *Inter-American Development Bank, Working Papers* .

Marcel, M. (2020), 'Proyecto de ley sobre transparencia y reforzamiento de responsabilidades de los agentes de mercado', *Comisión de Hacienda de la Cámara de Diputados* .

Neely, C. J. (2008), 'Central bank authorities' beliefs about foreign exchange intervention', *Journal of International Money and Finance* **27**(1), 1–25.

OECD (2020), 'Effects of fund switches for Chilean pension members and their macroeconomic/financial impact', *OECD technical assistance report* .

Opazo, L., Raddatz, C. & Schmukler, S. L. (2014), 'Institutional investors and long-term investment : evidence from Chile', *Policy Research Working Paper Series, The World Bank* .

Raddatz, C. & Schmukler, S. L. (2008), 'Pension funds and capital market development : How much bang for the buck?', *Policy Research Working Paper, World Bank* **1**(4787).

Raffnsøe, M. D., Jensen, J. R. & Larsen, A. (2016), 'The pension sector as a foreign exchange market participant', *Danmarks Nationalbank, Monetary review* **4th quarter**.

Superintendencia de Pensiones de Chile (2013), 'Nota Técnica: Objetivo de los Fondos de Pensiones y los Traspasos Frecuentes de Fondo', *Technical report* .

Superintendencia de Pensiones de Chile (2020), 'Nota Técnica n6: Evolución y desempeño de los cambios de fondos', *Technical report* .

Superintendencia de Pensiones de Chile (2021), 'Nota Técnica n7: Actualización de la evolución y desempeño de los cambios de fondos', *Technical report* .

Villena, J. M. & Hynes, A. (2020), 'Mercado Cambiario Chileno, una comparación internacional: 1998 a 2019', *Economic Statistics Series, Central Bank of Chile* .

Zahler, R. (2005), 'Estabilidad macroeconómica e inversiones de los fondos de pensiones: el caso de Chile', *R. Ffrench-Davis (ed.), Crecimiento esquivo y volatilidad financiera, Bogotá, Mayol Ediciones/CEPAL* .

Appendices

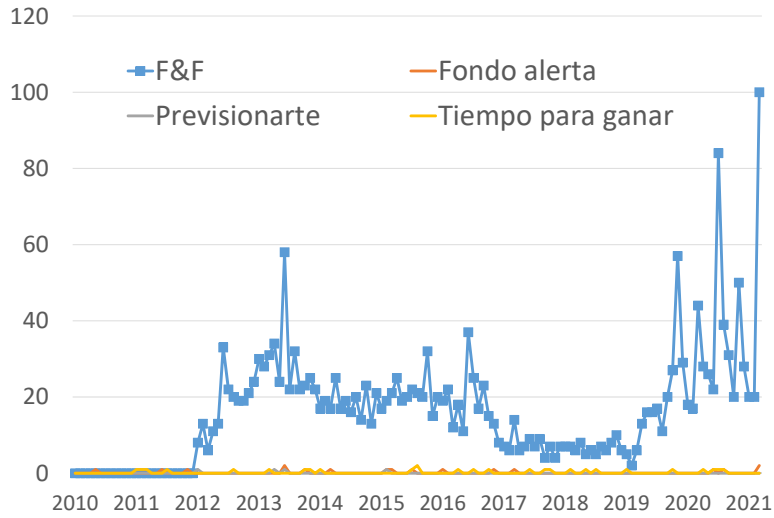
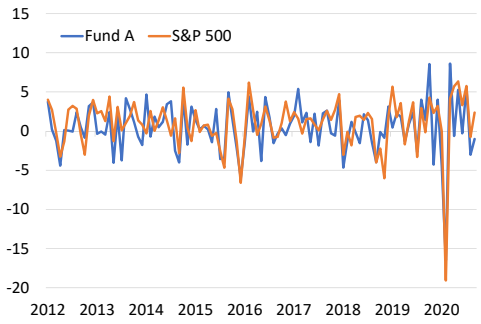
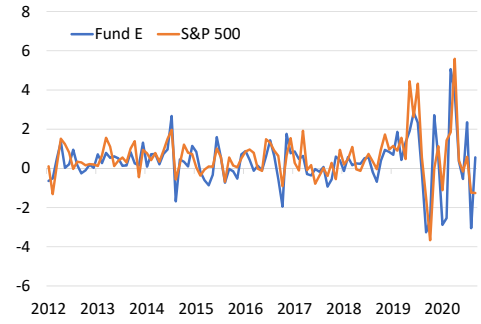


Figure A.1: Popularity of financial advisory firms in the pension fund market in Chile

Notes: Popularity based on Google trend index. Values in the y-axis capture the relative search interest. A value of 100, 50, and 0, represent the most popular search, half of the most popular, and no popular at all. Source: Google trends.



(a) Fund A and S&P 500 returns



(b) Fund E and Chilean gov. bond returns

Figure A.2: PFC portfolio returns

Notes: Monthly returns from March 2012 to October 2020. Source: Authors' calculations based on Bloomberg and Superintendencia de Pensiones de Chile.

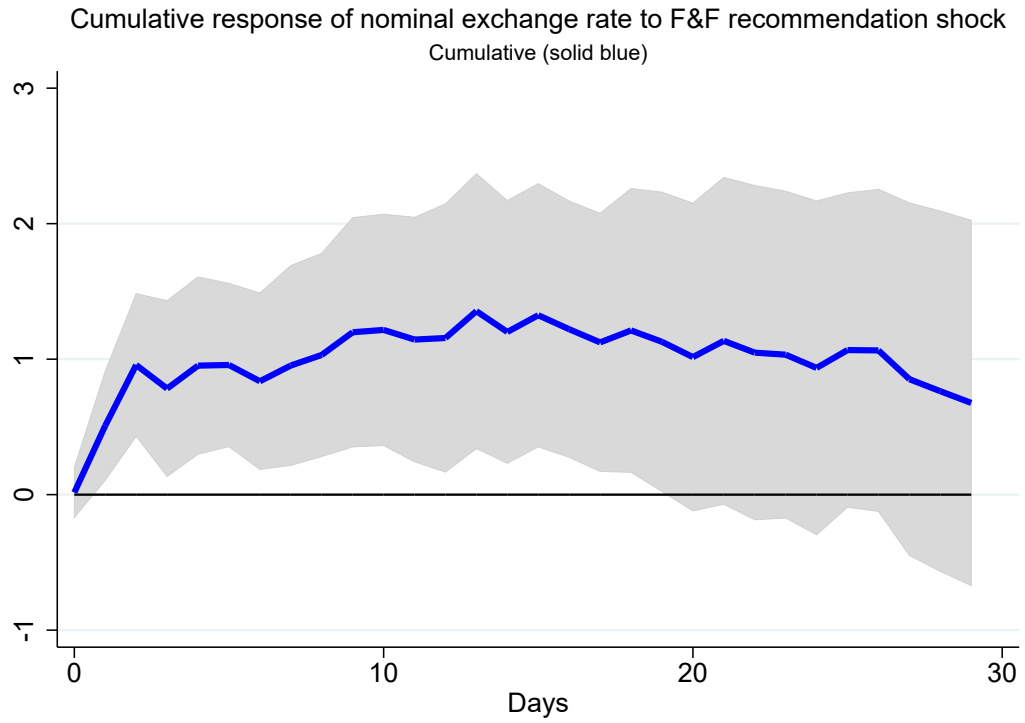


Figure A.3: Impact of F&F recommendations on exchange rate based on Da et al. (2018)

Notes: Blue line represents the response of the USDCLP to F&F news based on Da et al. (2018) definition. Increase indicates a Chilean peso depreciation. Grey area represents 95% confidence bands. Daily observations, 01 March 2012 - 22 October 2020. Source: Authors' calculations.

Table A.1: F&F followers statistics

	F&F followers	Non-F&F followers	Difference
Age	38	41	-3***
Savings	50,989	14,896	36,093***
Male	58	52	6**

Notes: Table displays average statistics by groups: F&F followers and Non-F&F followers. The last column reports the difference of averages between groups and its statistical significance. Age measured in years. Saving measured in U.S. dollars. Male corresponds to the percentage of males in each group. (*), (**), (***) indicates statistical significance at 10, 5, and 1% level, respectively. Source: Authors' calculations based on *Superintendencia de Pensiones de Chile* (regulator authority of the pension fund market in Chile).

Table A.2: F&F recommendations

#	**Date**	**FF recom.**	**F&F**	**Ologit**
1	27/07/2011	100% E	–	–
2	12/10/2011	100% A	0.627	2
3	22/11/2011	100% E	-0.644	-2
4	11/01/2012	100% A	0.652	2
5	29/03/2012	100% E	-0.645	-2
6	19/06/2012	100% A	0.641	2
7	28/06/2012*	100% E	-0.648	-2
8	19/07/2012	100% A	0.642	2
9	29/08/2012	100% E	-0.640	-2
10	02/01/2013	100% A	0.677	2
11	03/04/2013	100% E	-0.667	-2
12	17/07/2013	100% A	0.688	2
13	16/08/2013	100% E	-0.673	-2
14	06/09/2013	100% A	0.665	2
15	24/01/2014	100% E	-0.654	-2
16	06/03/2014	50% C / 50% E	0.177	1
17	01/08/2014	100% E	-0.134	-1
18	19/08/2014*	50% A / 50% E	0.343	2
19	30/10/2014	100% A	0.353	2
20	15/12/2014	100% E	-0.716	-2
21	12/02/2015	50% A / 50% E	0.363	2
22	18/03/2015	100% A	0.350	2
23	13/05/2015*	50% A / 50% E	-0.352	-2
24	08/07/2015	40% C / 60% E	-0.211	-1
25	24/08/2015	100% E	-0.150	-1
26	13/10/2015	50% C / 50% E	0.184	1
27	26/10/2015	100% E	-0.181	-2
28	16/12/2015	50% A / 50% E	0.349	2
29	22/12/2015*	100% A	0.354	2
30	06/01/2016*	50% A / 50% E	-0.340	-2
31	15/01/2016*	100% E	-0.363	-2
32	22/02/2016	50% C / 50% E	0.179	1
33	29/04/2016	100% E	-0.155	-2
34	06/09/2016*	50% C / 50% E	0.158	1
35	13/09/2016	100% E	-0.155	-2
36	09/11/2016	50% A / 50% E	0.335	2
37	22/12/2016	100% E	-0.346	-2
38	13/07/2017	50% C / 50% E	0.173	1
39	10/08/2017	100% E	-0.168	-2
40	12/09/2017*	50% A / 50% E	0.325	2
41	28/09/2017	100% A	0.326	2

42	12/10/2017*	50% A / 50% E	-0.324	-2
43	28/11/2017	100% A	0.352	2
44	19/12/2017	50% A / 50% E	-0.351	-2
45	09/01/2018	100% A	0.343	2
46	22/01/2018*	50% A / 50% E	-0.339	-2
47	05/02/2018	100% E	-0.348	-2
48	26/02/2018*	50% A / 50% E	0.339	2
49	07/03/2018	100% A	0.350	2
50	14/03/2018*	50% C / 50% E	-0.515	-2
51	23/03/2018*	15% D / 85% E	-0.145	-1
52	19/04/2018*	50% A / 50% E	0.311	2
53	04/05/2018	100% A	0.358	2
54	24/05/2018*	50% C / 50% E	-0.521	-2
55	06/06/2018	60% A / 40% E	0.242	2
56	19/06/2018*	20% A / 80% E	-0.285	-1
57	25/06/2018	100% E	-0.142	-1
58	09/07/2018*	50% A / 50% E	0.355	2
59	27/07/2018	100% E	-0.356	-2
60	20/08/2018*	50% A / 50% E	0.357	2
61	29/08/2018	100% A	0.355	2
62	05/09/2018*	50% A / 50% E	-0.359	-2
63	24/09/2018	100% E	-0.353	-2
64	05/10/2018*	50% A / 50% E	0.354	2
65	11/10/2018*	100% E	-0.360	-2
66	05/11/2018	50% A / 50% E	0.349	2
67	09/11/2018*	100% E	-0.360	-2
68	12/12/2018	50% A / 50% E	0.355	2
69	26/12/2018*	40% C / 60% E	-0.207	-1
70	18/01/2019	100% E	-0.149	-1
71	24/01/2019*	50% A / 50% E	0.351	2
72	16/04/2019	100% E	-0.343	-2
73	23/04/2019*	50% A / 50% E	0.361	2
74	02/05/2019*	100% E	-0.369	-2
75	04/06/2019	50% A / 50% E	0.366	2
76	26/06/2019	100% E	-0.367	-2
77	16/10/2019	50% A / 50% E	0.373	2
78	11/11/2019	100% A	0.402	2
79	22/11/2019*	50% A / 50% E	-0.384	-2
80	16/12/2019	100% E	-0.377	-2
81	09/01/2020	50% A / 50% E	0.399	2
82	16/01/2020*	100% E	-0.374	-2
83	03/03/2020	50% C / 50% E	0.203	1
84	12/03/2020*	100% E	-0.190	-2

85	24/03/2020	40% A / 60% E	0.297	2
86	01/04/2020*	80% A / 20% C	0.356	1
87	07/05/2020	50% C / 50% E	-0.474	-2
88	27/05/2020	100% E	-0.193	-1
89	16/06/2020	50% A / 50% E	0.389	2
90	28/07/2020	25% A / 75% E	-0.187	-1
91	06/08/2020*	50% A / 50% E	0.194	1
92	18/08/2020	25% A / 75% E	-0.181	-1
93	08/09/2020	100% E	-0.172	-1
94	23/09/2020*	30% A / 70% E	0.209	1
95	29/09/2020	60% A / 40% E	0.209	1
96	15/10/2020*	20% A / 80% E	-0.294	-1
97	26/10/2020	10% A / 90% E	-0.074	-1

Notes: Column 'Date' corresponds to the date F&F issues a recommendation. A star (*) indicates a overlapping recommendation as there is less than twenty days after the previous recommendation. 'FF recom.' column corresponds to the fund allocation F&F suggests in its recommendation. 'F&F' column corresponds to the definition of the recommendation news we introduce in section 5.2. 'Ologit' column corresponds to an ordered categorical variable taking the value of 1 and 2 when F&F recommends a moderate and strong change in risk exposure, respectively, and zero otherwise (see definition in section 5.1). Source: Authors' calculations based on *Superintendencia de Pensions de Chile*.

Table A.3: Information criteria

Panel A

	1 Lag	2 Lags
LPM	4522	4273

Panel B

	1 Lag	2 Lags
PFC	6471	6140
Non-residents	3326	3108
Retail	1981	1941
Insurance	5235	4922
Brokers	2865	2703
M. Funds	4237	4007

Note: Table contains the Bayesian Information Criterion (BIC) for two different specifications using two alternative lag order for the independent variables. Panel A and B displays the BIC for the model in equation 4 and 8, respectively. Source: Authors' calculations.

Auxiliary PFC FOREX trading volume regressions

Exchange rate models based on trading volume in FOREX market, as the one we propose in equation 5, may potentially suffer endogeneity issues due to simultaneity bias. In order to mitigate endogeneity concerns we use a measure of PFC net trading volume in the FOREX market which is orthogonal to risk factors that may also relate to Chilean exchange rate movements. In particular, the measure of PFC net trading volume orthogonal to risk factors corresponds to the error term ε_i of the following equation:

$$Trd\ Vol_i^{PFC} = X\beta_i + \varepsilon_i \tag{A.1}$$

Where $Trd\ Vol_i^{PFC}$ corresponds to the PFC net trading volume in FOREX market i, with i = [Spot, Forward]. X is a vector containing three categories of explanatory variables: global and domestic risks, economic surprises, and terms of trades. ε_i, the residual term, corresponds to the variable we use as a measure of orthogonal PFC net trading volume in the model of equation 5.

Table A.4 displays the results of the auxiliary models of PFC net trading volume in the FOREX spot market of equation A.1. As explanatory variable we include a set of variables tracking domestic economic uncertainty (ΔDEU), domestic inflation ($\Delta\pi$) and external risk factors (ΔVIX). We also include indices tracking domestic and world economic activity surprises along the Chilean terms of trades (ΔToT). The model includes all variables in first difference, excluding ΔToT which corresponds to percentage change. The results show that only external risk factors, captured by the VIX, statistically influence PFC net trading volume in the Peso FOREX market, while the rest of the variables controlling for domestic risk elements, surprises and terms of trades display no statistical significance. Moreover, the adjusted R2 of the models depicts low for all models suggesting the omission of this endogeneity analysis may not generate severe issues in the exchange rate model based on PFC net trading volume in the Peso FOREX market. The orthogonal measure of PFC net trading volume in the FOREX market we include in the model of equation 5 corresponds to the residual of model (1) in table A.4. Same procedure and conclusions apply for the case of orthogonal PFC net trading volume in the peso FOREX derivative market (results available upon request).

Table A.4: Auxiliary PFC FOREX trading volume regressions

		Δ *PFC net FOREX trading volume*			
		(1)	(2)	(3)	(4)
Risk	ΔVIX_t	0.005**	0.005**	0.005**	0.005**
		(0.002)	(0.002)	(0.002)	(0.002)
	ΔDEU_t	0.0008	0.0008	0.0008	0.0008
		(0.001)	(0.001)	(0.001)	(0.001)
	$\Delta \pi_t$	-0.044	-0.044	-0.044	-0.046
		(0.097)	(0.097)	(0.097)	(0.097)
Surprises	Global Economy		-0.00001		
			(0.000)		
	G10 Economy			-0.00001	
				(0.000)	
	Emerging market Ec.			0.00001	
				(0.000)	
ToT	Δ *Terms of Trades*				-0.0015
					(0.001)
	Constant	-0.0005	-0.0005	-0.0004	-0.0004
		(0.004)	(0.004)	(0.004)	(0.004)
	N obs	1994	1994	1994	1994
	Adj. R2	0.002	0.001	0.001	0.002

Notes: Dependent variable corresponds to the change of PFC net trading volume in the Peso FOREX spot market. Sample: Daily observations, 01 March 2012 - 22 October 2020. Robust standard errors in parenthesis. (*), (**), (***) indicates statistical significance at 10, 5, and 1% level, respectively. Source: Authors' calculations.