Destabilizing Financial Advice: Evidence from Pension Fund Reallocations

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We document a novel channel through which coordinated trading exerts externalities on financial markets. We study the impact of a financial advisory firm that recommends frequent reallocations between equity and bond funds to Chilean pension investors. The recommendations generate large and coordinated fund flows that are exacerbated by the strategic complementarity arising from fund trading restrictions. The recommendations generate significant price pressure and increased volatility in the stock market. In response to these large trade flows, pension funds shift their allocations to more liquid securities. Our findings suggest that giving retirement savers unconstrained reallocation opportunities can destabilize financial markets. (*JEL* G11, G14, G23, H55)

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The past decades have witnessed a substantial increase in institutional equity ownership in the United States and around the world (French 2008). In addition, individual investors frequently consult financial advisers when purchasing stocks or mutual funds (Hung et al. 2008). One would therefore expect that institutional investors and financial advisers would enhance financial decision making and reduce the behavioral biases of individual investors. Our paper investigates the role of financial advisers and institutional money managers taking advantage of several unique features of the Chilean pension system. We provide novel evidence that financial advisers, with the help of social media, can coordinate large flows between pension funds. The flows cause short-term price distortions at the aggregate level, affect trading volumes by retail investors, and motivate pension funds to shift their asset allocations to cash and other liquid securities.

The Chilean pension system is a fully funded defined-contribution (DC) pension system with personal retirement accounts.[1] Investors can freely allocate their balances across funds with different risk levels. A financial advisory firm called Felices y Forrados (FyF, which translates to "Happy and Loaded") started in 2011 to cater to the demand of individual investors to time the market. For a fee of around US$20 per year, FyF sends investors their recommendations by e-mail or private website login. FyF gained popularity among Chilean pension investors through an aggressive marketing campaign on social media. As a result, recommendations from FyF act as a coordination device among individual investors. This is evident from Figure 1, which shows the number of voluntary daily fund switches since 2011. The largest spikes in the number of account switches coincide with FyF recommendations.

These account switches involve large fund flows, amounting to as much as US$4 billion or 20% of funds' assets. The reallocation recommendations have a significant impact on equity prices. The price pressure in the equity market amounts to around 1% during the first three days after the FyF recommendation and reverts within five days. The price reversal confirms that the FyF recommendations are unlikely informative, consistent with our analysis of their drivers and performance.

Besides the aggregate price effects, we also find significant cross-sectional differences in the impact of the recommendations. Consistent with the findings in Greenwood and Thesmar (2011), the prediction in the cross-section is that stocks that exhibit higher portfolio weights (relative to their market capitalization) at the time of the recommendations will experience greater price pressure and excess volatility. We show that this is the case after controlling for

[1] The Chilean pension system has obtained substantial attention in economics and finance research over the past few decades due to its early adoption of personal retirement accounts. See, for example, Diamond, and Valdés-Prieto (1994), Mitchell and Barreto (1997), Edwards (1998), Benartzi and Thaler (2001), Mitchell, Todd, and Bravo (2009), and Opazo, Raddatz, and Schmukler (2014) for a discussion of the Chilean experience.

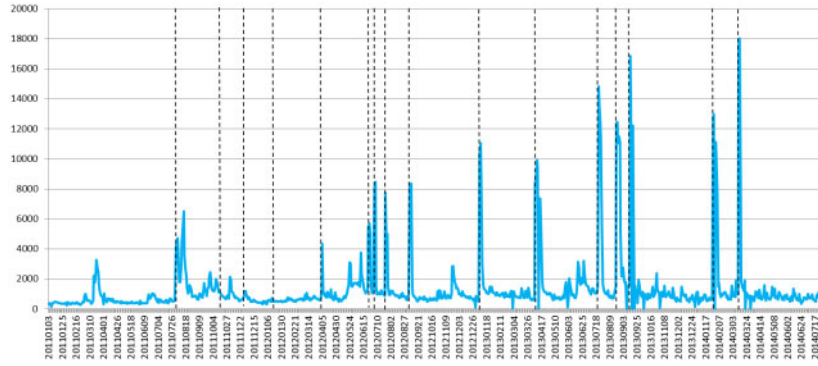

Figure 1
Daily number of individuals requesting fund switches
The figure depicts the daily number of individuals requesting pension fund switches. The figure was provided by the Superintendencia de Pensiones. It is based on data from administrative records that are not publicly available. The vertical lines with the dates when FyF sent switching recommendations were added by the authors.

other stock characteristics and using both cross-sectional and panel regressions. Therefore, excessive coordinated trading unrelated to fundamentals can affect both the level and the volatility of asset prices, consistent with Shiller (1981) and Black (1986).

The large and coordinated flows immediately following the recommendations are in part driven by a strategic complementarity among fund investors introduced by trading restrictions. In order to avoid large and abrupt changes, the Chilean pension regulator has established that switches cannot exceed 5% of the fund assets on a single day. If the requested switches exceed that amount, then the fund has to postpone the switches following a first-come first-served rule until all switches have been executed. Anticipating that later switches might be implemented at worse prices, investors might rush to switch immediately following the recommendation. Our findings thus provide support for Chen, Goldstein, and Jiang (2010), who document that strategic complementarities among mutual fund investors generate fragility in financial markets.

To better understand the drivers of the price pressure, we examine trading that is induced by the recommendations using a unique transaction-level database. Since this database includes broker information for each trade, we split brokers into institutional and retail brokers, in the spirit of Griffin, Harris, and Topaloglu (2003). We can then classify trades into three types: institutions trading with institutions, institutions trading with retail investors, and retail investors trading with other retail investors. Our analysis reveals a significant 50% increase in retail-with-retail volume during the first three days following the recommendations. Thus, investors who are not pension funds are also trading immediately following the FyF recommendation.

The large flows triggered by the recommendations also have an impact on the asset allocations within the Chilean pension plan. As a response to these frequent fund switches, pension funds have significantly reduced their holdings of less liquid securities and replaced them with cash. Furthermore, the proportion of cash varies across recommendation regimes to reduce trading costs. An increase in the proportion of highly liquid securities and a high variation in cash holdings is unlikely optimal for retirement investors who typically have long-term investment horizons.

Our paper contributes to the growing literature that studies the effects of financial advice on investor behavior.[2] While most of the literature has focused on whether financial advisers debias and improve financial decision making by individual investors, we explore the case of a financial adviser who caters to investors' preferences and biases, simultaneously reaching a large group of them through electronic communications. Our paper shows that financial advisers can impact aggregate returns, turnover, and volatility by sending simultaneous advice to a large population of investors.[3]

Our results suggest that individual investors can still leave sizable footprints in financial markets when coordinated through financial advisers or social media. In this regard, our paper also contributes to the literature on media, investor attention, and the origins of investor sentiment.[4] By considering the effect of retail investors on fund inflows and outflows, we show that retail attention can result in both positive and negative price pressure.

Our paper is also related to the large literature that documents the impact of fund flows on stock returns. Edelen (1999), Coval and Stafford (2007), Frazzini and Lamont (2008), Edmans, Goldstein, and Jiang (2012), and Lou (2012) document persistent price pressure from fund flows. Whereas mutual fund flows are often driven by crises periods or by other extreme events, the frequent recommendation changes in Chile are less likely contaminated by fundamental determinants, offering us a cleaner setting to study price pressure and the subsequent reversals. In contrast to the existing literature focusing on individual stocks, we are able to identify large price pressure even at the aggregate market level.

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[2] See, for example, Lusardi and Mitchell (2007), Bergstresser, Chalmers, and Tufano (2009), Bhattacharya et al. (2012), Inderst and Ottaviani (2012a,b), Mullainathan, Nöth, and Schoar (2012), Christoffersen, Evans, and Musto (2013), Chalmers and Reuter (2015), Gennaioli, Shleifer, and Vishny (2015), Von Gaudecker (2015), Dahlquist, Martinez, and Soderling (2017), Egan, Matvos, and Seru (2017), and Foerster et al. (2017).

[3] The contemporaneous paper by Cuevas and Bernhardt (2016) also documents the determinants and the consequences of the recommendations by FyF in Chile. Our paper focuses on the destabilizing effects of these recommendations. In particular, we study the impact of the recommendations on stock market volatility and on the asset allocations of pension plans. We also discuss cross-sectional differences in returns and trading volumes.

[4] See Shleifer and Summers (1990), Sias (2004), Baker and Wurgler (2006), Kogan et al. (2006), 2016, Reuter and Zitzewitz (2006), Tetlock (2007), Barber and Odean (2008), Cohen and Frazzini (2008), Corwin and Coughenour (2008), Fang and Peress (2009), Loughran and McDonald (2011), Da, Engelberg and Gao (2011), Engelberg and Parsons (2011), Gurun and Butler (2012), Solomon (2012), DeVault, Sias, and Starks (2014), Greenwood and Shleifer (2014), Peress (2014), Solomon, Soltes, and Sosyura (2014), Gallaher, Kaniel, and Starks (2015), Peress and Schmidt (2016), among others.

Finally, our findings have important implications for the optimal design of pension systems. The literature on DC pension plans has documented that participants are often inert, follow default investment options, and are subject to behavioral biases.[5] Our paper documents that while there are good reasons for rebalancing retirement portfolios (e.g., life cycle dynamics, changes in market environment), investors can also harm themselves and others by rebalancing their portfolios too frequently. The flexibility of investing in different funds could actually contribute to a classical limits of arbitrage problem (Shleifer and Vishny 1997), consistent with the insight from Stein (2005) about the design of open-ended funds. Our implications are also of broader interest given the possibility that robo-advisers and other advisory services may send coordinated messages to investors that may similarly cause significant swings in investor allocations and asset prices.

1. Institutional Background

We describe in this section the Chilean pension fund system and the Chilean financial advisory firm Felices y Forrados.

1.1 Chilean pension funds

The Chilean pension system was privatized in 1980 through the creation of a DC pension fund system that replaced the public pay-as-you-go system. All workers have to contribute 10% of their taxable income up to approximately US$3,000 per month to individual retirement accounts. The pension system has between 9 and 10 million participants over our sample period, 2011–2014. The average investor in the system is 38 years old and has average pension savings of around US$50,000.[6]

The pension fund industry has been instrumental for the development of the Chilean financial market. During the period from 2011 to 2014 the assets of the pension system amounted to US$150 billion on average, representing approximately 60% of Chilean GDP. Pension funds have accumulated a sizable investment in the local equity and fixed income markets. Close to 30% of the Chilean stock market free float and 30% of the Chilean government bond market are held by pension funds. Pension fund administrators (AFPs,

[5] Benartzi and Thaler (2001), Madrian and Shea (2001), Choi et al. (2002, 2006), Agnew, Balduzzi, and Sunden (2003), Huberman and Jiang (2006), Elton, Gruber, and Blake (2006, 2007), Brown, Liang, and Weisbenner (2007), Cohen and Schmidt (2009), Sialm, Starks, and Zhang (2015), Pool, Sialm, and Stefanescu (2016), and Christoffersen and Simutin (2017) discuss the structure of pension plans and the behavior of participants and administrators.

[6] The detailed data sources are described in the Appendix. Average income in Chile amounts to around US$2,000 per month, which turns into an average pension savings of US$50,000 given a contribution rate of 10% and an accumulation period of 15–20 years for a 38-year-old saver. This number corresponds to the entire pension savings of most investors in our sample.

Table 1
Characteristics of five fund classes

	Fund A	Fund B	Fund C	Fund D	Fund E
Assets (billion US$)	28.0	27.9	60.6	22.4	14.1
Portfolio weights (%)					
Cash	2.9	4.9	4.9	9.6	16.4
Chilean fixed income	9.0	25.1	43.4	60.4	80.1
Chilean equity	16.9	17.4	13.8	6.6	1.1
International mutual funds	52.0	39.6	26.6	16.5	0.4
Exchange-traded funds	13.7	7.8	5.6	3.7	0.9
Closed-end funds	4.5	4.1	4.1	2.0	0.0
Others	1.1	1.1	1.5	1.1	1.1
Demographics (%)					
Young	45.0	46.9	6.8	5.3	17.0
Middle	53.7	50.0	82.8	31.0	59.7
Old	1.3	3.2	10.4	63.6	23.3
Men	58.8	53.1	52.6	43.1	57.7

The table reports the total asset values, portfolio compositions, and investor demographics of funds A to E. The indicator variables *Young*, *Middle*, and *Old* correspond to investors under 30, between 30 and 55, and above 55, respectively. These characteristics are first aggregated across different AFPs each month, then averaged across time starting from 2011. The data are taken from administrative records published by the Superintendencia de Pensiones.

from their acronym in Spanish) charge a fee out of the contributions of the participants.

Since 2002, workers can choose between five types of funds that each AFP is required to offer. These five funds (A through E) cater to different risk preferences of investors. Investors are allowed to split their pension savings between funds but not between AFPs. As reported in Table 1, fund A has the largest share of equities among the five funds and is considered the riskiest fund. Fund E is almost entirely invested in domestic fixed income securities. Funds B, C, and D are designated as age-dependent default investment options. Investors are automatically shifted to less risky funds as they get older, unless they have explicitly expressed their preference for other funds. Funds A and E are not default options and have to be actively chosen by investors. The largest fund is fund C, which accounts for close to 40% of the assets in the pension fund system. Fund C was the only available fund prior to 2002, which partially explains its relatively large size. Fund A accounts for approximately 20% of assets, whereas fund E accounts for less than 10%.

The five types of funds are subject to different legally required investment limits. The relative proportion of equity securities has to be preserved across the five funds at all times. This ensures that the investment becomes less risky as we move from fund A to fund E. There are also limits regarding the fraction of foreign assets that pension funds are allowed to hold. Investors in funds A and B are more frequently young (under 30), investors in fund C are primarily middle-aged (between 30 and 55), and investors in funds D and E are more frequently older (above 55). Interestingly, male investors are overrepresented in the extreme portfolios, which are actively selected.

Our paper focuses primarily on Chilean domestic equities. Table 1 documents that fund A holds more domestic equity than fund E (16.9% vs. 1.1%), while fund E holds more cash than fund A (16.4% vs. 2.9%). The larger cash holdings of fund E partially insulate it from volatile fund flows.

The multi-fund system allows investors to freely transfer their accumulated pension savings between funds. Switching requests submitted before midnight are recorded on the corresponding day. Once a switching request is submitted, the portfolio change is effective four business days after the initial submission, a delay that was established to determine if the switching request contained clerical errors. Except for some situations described below, the transaction prices for the switches are based on the prices on the second day after the request was submitted by the investor. For example, an investor submitting on day t a request to switch between funds A and E, and who owns N^A shares of fund A, will receive on day $t+4$ shares of fund E equal to N^A times the ratio of the prices of A and E on the second day after the switching request was submitted. Thus, the number of shares of fund E obtained in the switching transaction amounts to $N^E = N^A \; p^A_{t+2} / p^E_{t+2}$.

In order to avoid large and abrupt changes, the regulator has established that switches cannot exceed 5% of the fund assets on a single day. If the requested switches exceed that amount for either inflows or outflows, then the fund has to postpone the switches, following a first-come, first-served rule until all switches have been executed. Thus, a 20% redemption request would delay the execution of late submitters by four days. This rule can give rise to strategic complementarities, as discussed by Chen, Goldstein, and Jiang (2010), Goldstein, Jiang, and Ng (2017), and Zeng (2017). Restricting the number of switches can motivate pension savers to front-run other participants to ensure that their switching requests are executed first.

The pension fund industry is regulated by the Superintendencia de AFPs (SAFP). The SAFP's mandate includes watching over investment limits, making sure that information is disclosed to investors, and other administrative and oversight tasks. Chilean law sets penalties for funds that perform poorly with respect to the average of their peers. This is implemented by establishing a minimum yield that is equal to the previous three-year return of the average fund in each category (A through E) less a few percentage points defined by law. Together with other forces that lead to herding among fund managers, such as competition and career concerns (see, for example, Scharfstein and Stein 1990), these penalties provide incentives for managers not to deviate too much from the investment decisions of other pension fund managers (Raddatz and Schmukler 2013). In practice, penalties for violating the minimum yield rule have not been imposed since 1998. Given the portfolio restrictions and incentives for pension funds, all of their portfolios mimic each other quite closely. For this reason, in our subsequent analysis, we aggregate portfolios of the same fund across AFPs.

Table 2
List of recommendations sent by FyF

Recommendation		Recommended change			
Number	Date sent	From fund	To fund	Buying pressure on	Weight
1	July 27, 2011	A	E	Bonds	−1
2	October 12, 2011	E	A	Equity	1
3	November 22, 2011	A	E	Bonds	−1
4	January 11, 2012	E	A	Equity	1
5	March 29, 2012	A	E	Bonds	−1
6	June 19, 2012	E	A	Equity	1
7	June 28, 2012	A	E	Bonds	−1
8	July 19, 2012	E	A	Equity	1
9	August 29, 2012	A	E	Bonds	−1
10	January 2, 2013	E	A	Equity	1
11	April 2, 2013	A	E	Bonds	−1
12	July 17, 2013	E	A	Equity	1
13	August 16, 2013	A	E	Bonds	−1
14	September 6, 2013	E	A	Equity	1
15	January 24, 2014	A	E	Bonds	−1
16	March 6, 2014	E	0.5C + 0.5E	Stocks	0.25
17	August 5, 2014	0.5C + 0.5E	E	Bonds	−0.25
18	August 19, 2014	E	0.5A+0.5E	Stocks	0.5
19	October 30, 2014	0.5A+0.5E	A	Stocks	0.5
20	December 15, 2014	A	E	Bonds	−1
21	February 12, 2015	E	0.5A+0.5E	Stocks	0.5
22	March 18, 2015	0.5A+0.5E	A	Stocks	0.5

The table lists the recommendations by FyF between July 2011 and March 2015. Recommendations are sent to subscribers after the market closes on the evening of the day in the "Date sent" column. The first 15 recommendations consider only funds A and E. The column labeled "Weight" is taken from the point of view of the price pressure caused in the equity market: 1 represents recommendations to switch to equity and −1 represents recommendations to switch to bonds. Partial weights follow a similar logic.

1.2 Felices y Forrados

Felices y Forrados is a financial advisory firm that began operating in 2011.[7] As can be seen on its website, FyF positions itself as an outsider to the financial system, catering to a relatively young audience. FyF offers a simple market timing strategy for pension fund investors. Investors receive a recommendation to switch between various funds through e-mail or website login. The recommendations are not accompanied by extensive explanations or market analyses. FyF does not recommend different AFPs; it just makes recommendations about fund types. It charges a fee equivalent to roughly US$20 per year. Table 2 provides a complete list of FyF's recommendations up to March 2015. For most of our analysis we focus on the first 15 recommendations that involve only funds A and E. If many investors follow FyF's recommendations, we predict negative (positive) price pressure on stocks (bonds) when the recommendation is to move from fund A to fund E.

The time series of the daily number of switching requests in Figure 1 displays several spikes that can be associated with the recommendations from

[7] The firm's website is http://www.felicesyforrados.cl. There are other services similar to FyF; however, they are significantly less well known and have not achieved the notoriety of FyF, both in the news and in social media. Some other financial advisers are Fondo Alerta, Previsionarte, and Tiempo Para Ganar.

FyF immediately preceding them.[8] Indeed, the last seven recommendations in Figure 1 all triggered at least 10,000 switches between funds on the next day.[9] The number of switches often remains high for a few days, potentially due to inertia or word-of-mouth effects as these recommendations are passed along from FyF subscribers to nonsubscribers. The power of FyF recommendations as a coordination device among pension investors is especially strong starting from the fifth recommendation in early 2012, when FyF began to attract investor attention by appearing on various social media platforms.[10]

While we do not observe the exact formula used by FyF for making its recommendations, the analysis in Table 3 suggests that FyF follows a short-term trend-chasing strategy. We estimate two separate logit models to account for the two types of switches. In Columns (1) to (3) (Columns (4) to (6)), the dependent variable takes the value of 1 if a recommendation to switch to fund A (E) is issued that day, conditional on fund E (A) being the currently recommended fund. The explanatory variables are lagged stock and government bond returns, lagged exchange rate changes, and lagged inflation. The models are estimated with a penalized maximum likelihood estimator because of the low prevalence of the outcome. The pseudo R^2 is calculated following an analog of McFadden's pseudo R^2 ($1 - \frac{\ln Likelihood_{full}}{\ln Likelihood_{restricted}}$), where the full model is the specification presented in each column and the restricted model is the same specification, with the constraint that all coefficients except the constant are equal to 0 using the penalized log likelihood.

We find evidence that when the Chilean stock (government bond) market has experienced good returns during the most recent week, FyF is more likely to recommend switching from fund E to A (A to E). In addition, exchange rate fluctuations are also helpful in explaining a switch to fund E. The overall goodness of fit of the models in Table 3 (i.e., the pseudo R^2) is low, however, suggesting that it is hard to associate FyF's recommendations with market data or fundamentals. Given its reliance on past returns, one would not expect the FyF strategy to generate alpha if financial markets are at least weak-form efficient. To alleviate the concern that fundamental variables that drive FyF's recommendations also drive future returns, our subsequent analysis controls for these and other fundamental variables when predicting returns.

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[8] This figure was provided to us by the Chilean pension regulator. We do not have access to the underlying data of switches at a daily frequency. Data on switching requests by fund type are only available at a monthly frequency. These data indicate that FyF's recommendations trigger primarily switches between the extreme fund allocations (i.e., between funds A and E).

[9] According to their own FAQ and online help, FyF issues switching recommendations after the market closes. As a result, most actual switching requests are placed after the recommendation date. More recently, FyF occasionally warns investors about potential recommendation changes using a traffic light system. A yellow light means that recommendations might change in the near future. These warnings could motivate some traders to switch prior to the official recommendation dates.

[10] Google started to track Felices y Forrados after the fourth recommendation in January 2012. The FyF LinkedIn profile was created on September 27, 2011, and the FyF Twitter account was created in January 2012. The oldest pictures on its Facebook page date from March 2012.

Table 3
Determinants of FyF recommendations

	Fund E to Fund A			Fund A to Fund E		
	(1)	(2)	(3)	(4)	(5)	(6)
Chilean equity index return week -1	73.42***	112.67**	88.93*	−5.34	−5.19	−2.57
	(2.71)	(2.54)	(1.87)	(−0.30)	(−0.28)	(−0.12)
Chilean equity index return week -2	26.89	16.24	7.95	12.25	4.35	3.77
	(1.41)	(0.86)	(0.26)	(0.66)	(0.23)	(0.17)
Chilean equity index return week -3	20.66	62.41*	28.75	−23.10	−27.02	−16.09
	(1.15)	(1.95)	(0.70)	(−1.28)	(−1.38)	(−0.71)
Chilean equity index return week -4	5.25	81.79**	63.77	1.25	−2.89	−6.82
	(0.28)	(2.10)	(1.42)	(0.08)	(−0.16)	(−0.29)
Chilean gov index return week -1	−5.65	57.65	60.06	219.20*	133.80	104.80
	(−0.06)	(0.35)	(0.33)	(1.66)	(1.44)	(1.05)
Chilean gov index return week -2	−52.82	−168.71	−167.52	3.43	−11.82	−10.29
	(−0.55)	(−1.49)	(−1.25)	(0.04)	(−0.15)	(−0.12)
Chilean gov index return week -3	158.08	43.22	32.95	−41.00	−23.81	−37.24
	(1.19)	(0.36)	(0.25)	(−0.43)	(−0.27)	(−0.40)
Chilean gov index return week -4	−71.70	−148.54	−145.97	−159.30**	−148.80*	−143.30
	(−0.70)	(−1.58)	(−1.38)	(−2.11)	(−1.92)	(−1.64)
Exchange rate change week -1		19.82	7.70		54.22**	53.91*
		(0.42)	(0.15)		(1.99)	(1.90)
Exchange rate change week -2		−33.23	−33.51		10.82	18.33
		(−0.79)	(−0.73)		(0.34)	(0.50)
Exchange rate change week -3		27.33	19.16		9.51	15.99
		(0.82)	(0.54)		(0.31)	(0.45)
Exchange rate change week -4		156.65***	134.28**		−6.23	−3.59
		(2.86)	(2.41)		(−0.27)	(−0.14)
Inflation		−23.55	22.52		−54.38	−62.01
		(−0.19)	(0.19)		(−0.35)	(−0.37)
Latam Index return week -1			9.41			−1.36
			(0.35)			(−0.06)
Latam Index return week -2			6.73			−3.12
			(0.25)			(−0.15)
Latam Index return week -3			26.56			−22.68
			(0.92)			(−1.30)
Latam Index return week -4			12.41			4.58
			(0.50)			(0.27)
N	323	323	323	441	441	441
Pseudo R^2	0.09	0.16	0.13	0.08	0.08	0.08

The table reports the results of logit regressions examining the determinants of FyF's recommendations. Columns (1) to (3) correspond to a logit model in which the dependent variable takes the value of 1 if a recommendation to switch to fund A is issued that day, conditional on fund E being the currently recommended fund. Columns (4) to (6) correspond to a logit model in which the dependent variable takes the value of 1 if a recommendation to switch to fund E is issued that day, conditional on fund A being the currently recommended fund. The explanatory variables in the logit models are lagged returns of stocks and government bonds, and fundamentals such as exchange rate changes and the rate of inflation. The models are estimated with a penalized maximum likelihood estimator because of the low prevalence of the outcome. We use daily data between recommendations 1 and 15. Robust standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Another way to evaluate the informativeness of FyF is to study whether investors actually made money by following these recommendations. We examine this question by comparing FyF's strategy with a contrarian strategy that moves in the opposite direction from FyF's recommendations. We also compare FyF's strategy with buy-and-hold strategies in funds A and E.

To obtain the average cumulative returns to following the three strategies, we first compute cumulative returns to the strategies for each AFP and then average the cumulative returns across the six AFPs. Due to the herding incentives set up

Table 4
Returns of different pension fund strategies

			FyF – contrarian				FyF – fund A		FyF – fund E	
	FyF	Contrarian	One period		Multiple periods		Multiple periods		Multiple periods	
Period	Mean	Mean	Mean	*t*-test	Mean	*t*-test	Mean	*t*-test	Mean	*t*-test
1	0.064	−0.166	0.230	1.362	0.020	0.901	0.013	0.511	0.007	0.555
2	−0.010	−0.032	0.022	0.116	0.002	0.110	−0.006	−0.246	0.008	0.569
3	0.063	0.116	−0.054	−0.484	0.001	0.067	−0.006	−0.279	0.007	0.617
4	0.116	0.010	0.106*	1.927	0.005	0.259	−0.003	−0.135	0.008	0.622
5	0.033	−0.083	0.116*	1.736	−0.007	−0.352	−0.003	−0.144	−0.004	−0.294
6	0.136	0.062	0.074	0.239	−0.023	−1.116	−0.019	−0.770	−0.004	−0.298
7	−0.005	−0.115	0.110	1.052	−0.025	−1.209	−0.019	−0.801	−0.005	−0.411
8	−0.013	0.034	−0.047	−0.605	−0.029	−1.398	−0.023	−0.955	−0.006	−0.412
9	0.013	0.097	−0.084**	−2.150	−0.028	−1.283	−0.025	−1.004	−0.003	−0.187
10	0.009	0.023	−0.014	−0.372	−0.012	−0.482	−0.009	−0.298	−0.003	−0.189
11	0.029	0.011	0.018	0.276	−0.012	−0.385	−0.011	−0.320	0.000	−0.018
12	−0.007	0.043	−0.050	−0.595	−0.025	−0.756	−0.025	−0.580	−0.001	−0.019
13	0.024	0.038	−0.014	−0.090	−0.022	−0.589	−0.029	−0.623	0.007	0.246
14	0.052	0.041	0.011	0.248	−0.023	−0.612	−0.031	−0.630	0.008	0.247
15	0.039	0.167	−0.128*	−1.793	−0.128*	−1.793	−0.128*	−1.793	0	–

The table summarizes the average daily returns of different pension fund investment strategies. The first strategy follows FyF's recommendations, and the second strategy follows a contrarian strategy choosing the opposite fund relative to FyF's recommendations. The second part of the table shows the means and the *t*-tests for the null hypothesis that both strategies have the same expected returns. The "One period" columns correspond to the tests for the average returns between two consecutive recommendations. The "Multiple periods" columns correspond to the tests for the average returns, including all subsequent periods. We also present the tests comparing the FyF strategy with two passive strategies: holding fund A and holding fund E. The recommendation dates are obtained from FyF's website. The fund returns are obtained from the Superintendencia de Pensiones. Average returns for all AFPs are reported in percent per day. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

by the regulator and market forces, the returns on the same fund across AFPs are very similar. For the time-varying strategies, we assume that the switching requests are submitted immediately following the recommendations on day t. Thus, these switches will be implemented at the closing prices of day $t+2$, as discussed previously in Section 1.1.

Table 4 summarizes the performance of the strategies over our sample period. We report separate performance measures for each of the 15 recommendation periods. For example, on July 27, 2011, FyF made a recommendation to switch from fund A to E, and on October 12, 2011, FyF reversed the recommendation. Table 4 reports that investors following FyF's recommendation would have generated an average daily return of 0.064% from investing in fund E during this period. On the other hand, the contrarian strategy of investing in fund A would have generated an average daily return of −0.166% during this period. Thus, during the first recommendation period, FyF outperformed a contrarian strategy by 0.230% per day. However, this performance difference is not statistically significant, as indicated by the *t*-statistic of 1.362.[11]

[11] Most of this performance difference can be attributed to the very poor worldwide stock performance on the eighth trading day following the first recommendation by FyF (August 8, 2011). Specifically, the return on the Chilean index on this day was −6.92%, and the corresponding return on the MSCI World Index (in Chilean pesos) was −4.60%.

The FyF strategy outperforms the contrarian strategy in 8 of the 15 recommendation periods. Such an outcome can easily result due to pure chance. The probability of observing 8 or more successes in 15 independent trials amounts to 50%, according to a binomial distribution with a success probability of 50%. Thus, FyF does not appear to have statistically significant timing ability.

Table 4 also reports the aggregate relative performance of FyF over different sample periods. For example, FyF's strategy outperformed the contrarian strategy by 0.020% per day over all 15 recommendation periods. This overall performance difference is also not statistically significant and corresponds to a t-statistic of 0.901. The performance difference even turns (insignificantly) negative if we exclude the first four recommendations when FyF's strategy was not widely followed. It is interesting that most of the outperformance of FyF's recommendations occurs in the first half of our sample period, when FyF did not enjoy wide visibility. These likely spurious early successes of FyF motivated pension investors to follow its recommendations.

FyF's strategy outperforms to an insignificant degree the buy-and-hold strategies in funds A and E over the whole sample period. This outperformance also disappears to a large extent when we exclude the first recommendations.[12] Our analysis suggests that the recommendations from FyF are unlikely informative.

2. Pension Fund Flows

To obtain an idea of the magnitude of correlated trading, we depict in Figure 2 the monthly net dollar flows of funds A and E from 2003 when we first observe the monthly flow data. All numbers are converted to U.S. dollars and measured in millions. Flows between funds A and E are relatively small prior to 2008. We observe a flight-to-quality episode as investors pulled money from fund A and invested in fund E during the financial crisis of 2008. As the market started to recover in 2009, we observe some flow reversals. The magnitude of these flows, however, is small compared with the large spikes after FyF became popular.

After 2011, we observe large flows to funds A and E that are almost mirror images of each other. These large flows are likely reflecting the coordinated switches triggered by FyF recommendations. Indeed, an FyF recommendation dummy can explain more than 27% of the variation in these flows post-2011 with a t-statistic of 3.24. The magnitude of the flows is often between US$1 billion and US$4 billion during recommendation months. Recall from Table 1

[12] The results from our performance analysis also echo those conducted by the Chilean Pension regulators. In June 2013, Chile's Superintendencia de Pensiones published a report stating that strategies involving frequent fund switches are unlikely to generate benefits for most investors, and potentially harming an important fraction of them. Using administrative data for a sample of investors between April 2012 and March 2013 they argue that about two thirds of those who did switch funds in the period obtained returns lower than the lowest return on any of the funds. They also explain that this same conclusion applied to investors following FyF's recommendations. The report is available at http://www.spensiones.cl/portal/informes/581/w3-article-10213.html.

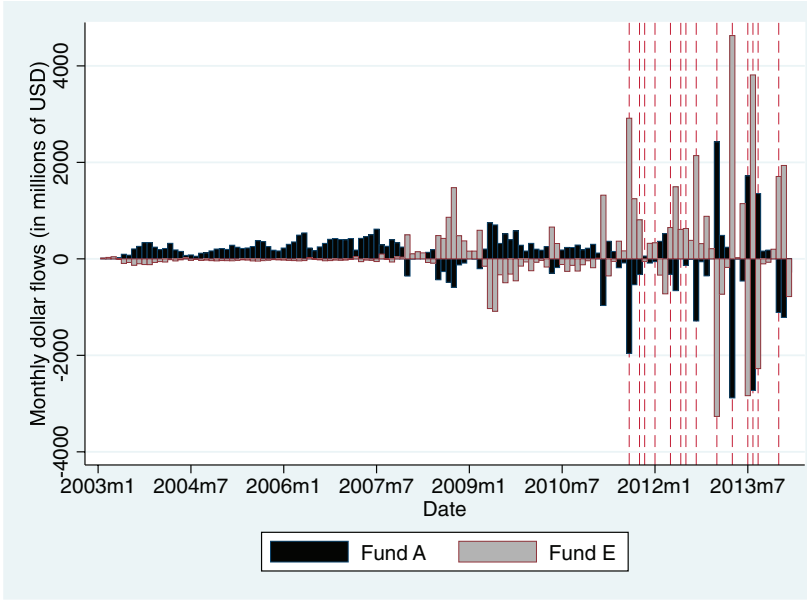

Figure 2
Monthly dollar flows of funds A and E
The figure plots the aggregate monthly dollar flows (in millions of USD) of the equity fund (A) and the fixed income fund (E). Positive and negative numbers indicate inflows and outflows, respectively. Vertical lines show the months when there was a switching recommendation by Felices y Forrados, adjusted so that a recommendation in the last three days of a month is marked in the following month.

that the average sizes of funds A and E are only US$28 billion and US$14.1 billion, respectively. Thus, the flows amount to as much as 10% for the equity funds and and 20% for the bond funds. These monthly flows may potentially underestimate the correlated trading triggered by FyF's recommendation since FyF can make two recommendations in the same month. As consecutive switches are in opposite directions, their effects can offset each other and may not leave a large footprint in the monthly flow data.

Fund flows appear even larger when compared with the average volume in the Chilean equity market. For example, if funds trade their positions proportionally, then a US$2,500 million flow implies the need to trade $\$2,500 \times (16.9\% - 1.1\%) = \$395$ million worth of domestic equity.[13] For comparison, the daily volume in the Chilean equity market is only $205 million. Not surprisingly, these trades, if forced to be implemented in a few days, can exert large price pressure.

Young investors might be more affected by FyF's recommendations given FyF's marketing strategy using the internet and social media. One pension fund administrator called Modelo has an investor base that is heavily tilted

[13] The weights of Chilean stocks in funds A and E are 16.9% and 1.1%, respectively (Table 1).

Table 5
Demographics and flows across pension companies

Panel A

	Percentage of young investors (below 35 years)	
AFP	Fund A	Fund E
MODELO	94%	53%
CAPITAL	63%	24%
CUPRUM	50%	19%
HABITAT	66%	27%
PLANVITAL	64%	40%
PROVIDA	69%	25%

Panel B

	Dependent variable: Fund flows (%)	
Variables	Fund A	Fund E
Switch to A	0.040***	−0.019
	(0.014)	(0.032)
Switch to A × Modelo AFP	0.078**	−0.072*
	(0.029)	(0.036)
Switch to E	−0.037***	0.163***
	(0.010)	(0.041)
Switch to E × Modelo AFP	−0.105***	0.053
	(0.037)	(0.043)
N	225	227
R^2	0.689	0.534

The table summarizes demographic characteristics and flows across pension companies. Panel A reports the fractions of young investors in funds A and E across different pension fund administrators (AFPs) in Chile. In Panel B, we regress monthly fund flows of different AFPs on FyF recommendation indicator variables and interaction terms. Although not reported, the regressions include lagged fund flows and returns up to six lags. The regressions also include AFP fixed effects. Standard errors are clustered by time and are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

toward younger investors (see Panel A of Table 5). Most of Modelo's investors are young because Modelo won the first auction to allocate new labor market participants to pension fund providers in 2010. In fact, in this sample period, the average age of Modelo's investors is 24, compared with a system-wide average of 38. Young investors have to stay with Modelo for at least two years, and then they are free to switch providers. Given the young investor base, we expect the flows to Modelo to be more sensitive to FyF's recommendations. In Panel B of Table 5, we regress the monthly flows to pension funds (as a fraction of assets under management for each fund) on dummy variables for months with a recommendation to switch between funds A and E. We then interact these dummy variables with an indicator variable for AFP Modelo. We control for lagged returns and flows of the same funds, plus AFP fixed effects.

We find that FyF recommendations to switch to fund A are associated with an average positive flow of 4.0% to fund A, while the flow to Modelo's fund A is further increased by 7.8%. The coefficients on the regression with flows to fund E are consistent. Modelo's fund E suffers larger outflows than other

providers (7.2% higher) when FyF recommends switching to fund A. FyF's recommendations to switch to fund E are associated with an average outflow from fund A of 3.7%, while the outflow from Modelo's fund A is 10.5% higher. The recommendations to switch to fund E are associated with an average flow to fund E of 16.3%, while the flow to Modelo is 5.3% higher (although not statistically significant). Overall, Modelo's flows are more volatile in months with FyF recommendations, as one would expect from a fund with a younger investor base.

3. Price Pressure

The evidence summarized in the previous section suggests that FyF recommendations, while containing little fundamental information, trigger large pension fund reallocations. In this section, we focus on the price pressure generated around FyF recommendations due to trading from pension funds or from other market participants.

3.1 Price pressure in event studies

Figure 3 contains event-window plots of cumulative adjusted returns and 90% confidence bands for the Chilean equity market after FyF recommendations. The adjusted returns are computed by subtracting the returns of the MSCI World Index measured in Chilean pesos from the returns of Santiago's stock exchange selective equity index (IPSA). Event day 0 corresponds to the date when FyF sends out its switching recommendation. We consider an event window of ten trading days. We average cumulative returns across the first 15 recommendations, which involve exclusively funds A and E. If the recommendation is to switch from fund E to A, we use the adjusted return. If the recommendation is to switch from fund A to E, we reverse the sign on the adjusted return. This transformation allows us to average the returns across the different recommendations to obtain an estimate of the average magnitude of the price pressure.

Figure 3 shows that the Chilean stock market reacts immediately by around 1% following FyF's recommendations. The adjusted return remains relatively stable for the subsequent eight days and reverts almost completely within ten days. The statistical significance disappears by the fifth day. The cumulative adjusted returns are statistically significantly different from zero at a 1% level for the first couple of days, as summarized in Table 6.[14] The price pressure does not revert immediately, probably due to the fact that switching requests persist for several days, as shown in Figure 1, and since pension managers might delay the implementation of the trades for several days. The eventual price

[14] If we do not adjust for the MSCI World Index we find a significant price effect of 0.63% on the first day after the recommendation.

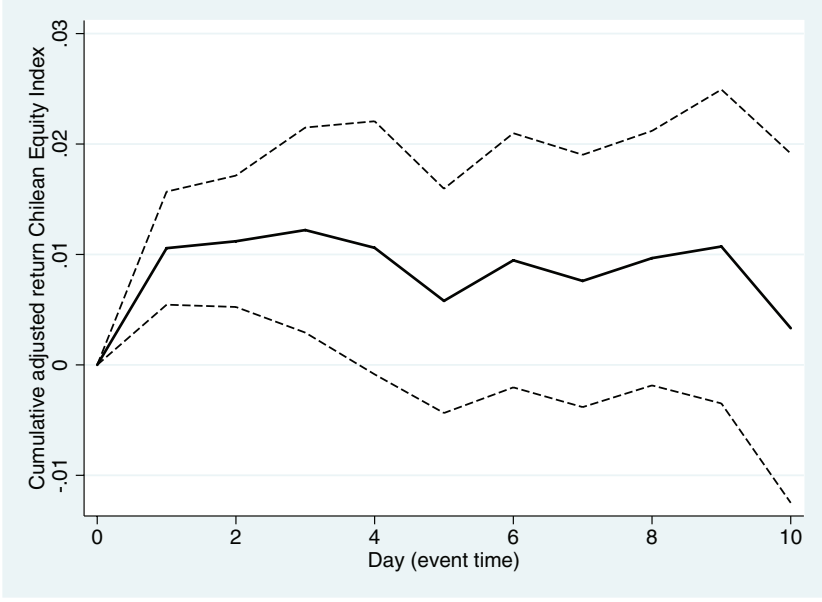

Figure 3
Cumulative average adjusted returns after FyF's recommendations
The figure shows the cumulative average adjusted returns on Chilean equity after FyF's recommendations. The adjusted returns are defined as the return on Santiago's stock exchange equity index adjusted by subtracting the MSCI World Index returns in Chilean pesos. Day 0 is defined as the day when the recommendation is sent, which occurs after the market has closed. Event days correspond to trading days after recommendations. The solid line shows the average of the cumulative adjusted returns across the first 15 recommendations of FyF in Table 2 on a given event day. Dashed lines correspond to 90% confidence intervals (using cross-sectional standard errors and a Student's t distribution).

reversal confirms that the initial price pressure is not driven by fundamentals or information.[15]

Interestingly, we also find a significant price impact of 0.64% on the day prior to the recommendations. This price impact might be due to the fact that some market participants learn about the imminent recommendation changes before the public announcement. Including the price changes prior to the publication of the recommendations would further increase the overall estimated price pressure. However, we exclude from our estimation the price pressure that occurs prior to the publication of the FyF recommendations, since these price changes might actually trigger the recommendations, as we illustrate in Table 3.

[15] The reversal within five to ten days is significantly faster than the reversal documented by Coval and Stafford (2007) and Edmans, Goldstein, and Jiang (2012) based on fire sales by mutual funds in the United States. This difference can be explained by the fact that FyF recommendations are frequently reversed within a very short time period, whereas the fire sales by mutual funds persist for several months.

Table 6
Cumulative average adjusted returns in the Chilean equity and bond markets around FyF recommendations dates

	Actual FyF recommendations					
	Equity		Bonds		Equity–bonds	
Day	CAR	SE	CAR	SE	CAR	SE
1	0.0106***	(0.0029)	0.0001	(0.0005)	0.0105***	(0.0028)
2	0.0112***	(0.0034)	−0.0000	(0.0006)	0.0112***	(0.0033)
3	0.0122**	(0.0053)	−0.0007	(0.0009)	0.0130**	(0.0054)
4	0.0106	(0.0065)	−0.0008	(0.0009)	0.0114	(0.0066)
5	0.0058	(0.0058)	−0.0009	(0.0009)	0.0067	(0.0059)
6	0.0095	(0.0065)	−0.0006	(0.0010)	0.0100	(0.0065)
7	0.0076	(0.0065)	−0.0005	(0.0012)	0.0081	(0.0064)
8	0.0097	(0.0065)	−0.0013	(0.0014)	0.0110	(0.0070)
9	0.0107	(0.0081)	−0.0017	(0.0012)	0.0124	(0.0084)
10	0.0033	(0.0090)	−0.0022	(0.0015)	0.0056	(0.0092)

The table summarizes the cumulative average adjusted returns (CAR) in the Chilean equity and bond markets around FyF recommendations. Adjusted equity returns are defined as the returns of Santiago's stock exchange selective equity index (IPSA) minus the MSCI World Index returns in Chilean pesos. Adjusted bond returns are the Dow Jones LATixx Chile Government Bond Index produced by LVA Indices minus the return on short-term deposits in prime financial institutions. Returns after recommendations to sell equity are multiplied by −1 to average across recommendations. We consider the first 15 FyF recommendations. The "Day" column indicates the event time, taking as day 0 the day when the recommendation was sent. We average cumulative returns across the 15 recommendations. Standard errors (SE) are based on cross sectional t-tests. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

These results provide evidence for downward-sloping demand curves at the aggregate market level.[16] To determine the economic significance of the price pressure, we provide a back-of-the-envelope calculation of the demand elasticities following Wurgler and Zhuravskaya (2002). The demand elasticity is defined as the percentage change in the quantity demanded divided by the percentage change in the price. The percentage change in the price on the first day of trading equals 1.06%, as shown in Table 6. On the other hand, the percentage change in the quantity demanded can be computed based on the average flows from pension investors of US$2 billion, the proportion of Chilean stocks in fund A of 16.9%, and an average free float of the Chilean stock market of US$70 billion. Thus, the percentage change in the quantity demanded can be estimated as $\Delta\%q=(2\times 16.9\%)/70=0.48\%$. Hence, the elasticity is $-\Delta\%q/\Delta\%p=-0.48/1.06=-0.45$. The demand for stocks that we estimate is more inelastic than those estimated with index additions in the U.S. market. For instance, Shleifer (1986) finds an elasticity of −1, while Wurgler and Zhuravskaya (2002) report elasticities between −5 and −11.

Table 6 also summarizes the cumulative returns for the Chilean government bond market relative to short-term Chilean deposits. The economic magnitude of the price impact of government bonds is smaller and generally not statistically significant. The average cumulative return persists for a longer period and reaches −22 basis points (bp) on day 10. The reaction of bond prices to

[16] Downward-sloping demand curves for individual securities have been discussed by Shleifer (1986), Wurgler and Zhuravskaya (2002), Greenwood (2005), Petaijsto (2008), and Hartzmark and Solomon (2013).

recommendation changes may be more muted since bond funds can hold a larger fraction of cash than equity funds without substantially increasing their tracking error. Indeed, Table 1 documents that fund A on average holds only 2.9% of cash, whereas fund E holds 16.4% of cash. The larger cash buffer of fund E enables it to accommodate large fund flows without extensive transactions in less-liquid bond securities. Furthermore, the higher persistence in the government bond market might be due to infrequent trading of bonds in the bond index.

There are several reasons why the largest price pressure on Chilean equity securities takes place on the first day after the recommendation. Although the portfolio changes of pension funds are only effective four days after the redemption requests, pension funds might start trading immediately after the recommendation to smooth their trading over time. In addition, investors anticipating the price pressure resulting from pension funds' trading may choose to "front-run" pension funds' trades. Finally, investors might also trade in non-pension accounts based on the FyF recommendations.

The results in Table 6 also give an indication of the trade impact incurred by pension fund investors submitting switching requests at different times after an FyF recommendation. The pension savers who submitted their switching requests first will be exposed to the price impact by day 2 since the Chilean pension system executes switching requests at $t+2$ prices as discussed in Section 1.1. Pension savers who submit their requests later in the day may be exposed to the price impact on later days if overall redemption requests exceed 5% of assets under management. Since most of the initial price reaction occurs on the first day after the recommendation, even early switchers will not be able to avoid the price impact. Indeed, late switchers will tend to be exposed to lower price pressure due to the reversion in prices that starts after a couple of days.

3.2 Placebo tests

To ensure that these price pressure patterns are not driven by fundamentals that trigger the FyF recommendation in the first place and to show that the results are specific to Chilean financial markets, we consider two placebo tests.

Panel A of Table 7 selects placebo event dates during the period from January 2003 (the first calendar year after the adoption of the multifund system) to May 2006 with similar economic fundamentals as the actual FyF recommendations. The placebo events are identified using a probit model in which the dependent variable takes the value of 1 if the recommended fund is fund A and 0 if it is fund E.[17] The explanatory variables in the probit model are lagged returns of stocks and government bonds and fundamentals such as exchange rate changes and inflation. The probit model is estimated in-sample during the period from

[17] This is similar to Table 3, but with an unconditional model, because we cannot condition on the state of the recommendation out of sample.

Table 7
Cumulative average adjusted returns for placebo events

Panel A: Placebo FyF recommendations between January 2003 and May 2006

	Chilean equity		Chilean bonds		Equity–bonds	
Day	CAR	SE	CAR	SE	CAR	SE
1	−0.0001	(0.0027)	0.0001	(0.0003)	−0.0003	(0.0027)
2	−0.0031	(0.0039)	−0.0003	(0.0004)	−0.0028	(0.0038)
3	−0.0026	(0.0034)	−0.0005	(0.0006)	−0.0021	(0.0033)
4	−0.0014	(0.0034)	−0.0008	(0.0006)	−0.0006	(0.0034)
5	0.0044	(0.0032)	−0.0002	(0.0007)	0.0046	(0.0035)
6	0.0011	(0.0034)	−0.0002	(0.0007)	0.0013	(0.0035)
7	−0.0003	(0.0044)	0.0001	(0.0007)	−0.0004	(0.0044)
8	0.0012	(0.0053)	0.0000	(0.0007)	0.0012	(0.0052)
9	0.0014	(0.0059)	−0.0002	(0.0008)	0.0015	(0.0058)
10	−0.0032	(0.0065)	−0.0008	(0.0009)	−0.0024	(0.0066)
Panel B: Placebo test using actual FyF recommendation dates						
1	0.0009	(0.0030)	0.0004	(0.0008)	0.0005	(0.0025)
2	−0.0012	(0.0045)	−0.0018	(0.0011)	0.0006	(0.0041)
3	−0.0006	(0.0050)	−0.0000	(0.0014)	−0.0006	(0.0043)
4	−0.0007	(0.0053)	0.0011	(0.0014)	−0.0019	(0.0051)
5	0.0013	(0.0050)	0.0009	(0.0014)	0.0004	(0.0053)
6	0.0049	(0.0082)	0.0005	(0.0012)	0.0044	(0.0083)
7	0.0095	(0.0090)	0.0001	(0.0015)	0.0094	(0.0090)
8	0.0172	(0.0113)	0.0013	(0.0020)	0.0158	(0.0117)
9	0.0124	(0.0099)	0.0010	(0.0022)	0.0114	(0.0102)
10	0.0141	(0.0117)	0.0004	(0.0024)	0.0137	(0.0124)

The table reports the cumulative average adjusted returns (CAR) for placebo events. Panel A summarizes the CARs for the Chilean equity and bond markets for placebo dates selected between January 2003 and May 2006 using a probit model in which the dependent variable takes the value of 1 if the recommended fund is fund A and 0 if it is fund E. The probit model is estimated in-sample during the period from July 2011 to January 2014, and we then compute the out-of-sample probability of FyF recommending fund A or E. Starting from a recommendation to hold fund A, we assume that a change to fund E occurs whenever the probability goes below 25%. If fund E is being recommended, we assume that a change to fund A occurs whenever the probability goes above 75%. There are 16 placebo events. The equity return is based on Santiago's stock exchange selective equity index (IPSA) minus the MSCI World Index returns in Chilean pesos. Bond-adjusted returns are the Dow Jones LATixx Chile Government Bond Index produced by LVA Indices minus the return on short-term deposits in prime financial institutions. Panel B summarizes the CARs for the MSCI World Index for stocks and the Barclays Global Aggregate Index for bonds on the actual FyF recommendation dates between July 2011 and March 2014. Returns after recommendations to sell equity are multiplied by −1 to average across recommendations. The "Day" column indicates the event time, taking as day 0 the date of the placebo events. Standard errors (SE) are based on cross sectional t-tests. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

July 2011 to January 2014. We then compute the out-of-sample probability of FyF recommending fund A or fund E. Starting from a recommendation to hold fund A, we assume that a change to fund E occurs whenever the probability decreases below 25%. If fund E is being recommended, we assume a change to fund A occurs whenever the probability increases above 75%. This method identifies a total of 16 events during the pre-FyF period. In contrast to the actual recommendation dates, we do not see any significant price pressure patterns in either the equity market or the bond market when these placebo dates are used.

The placebo tests reported in Panel B consider the returns of global stocks and global bonds on the actual FyF recommendation dates between July 2011 and 2014. We use the raw returns on the MSCI World Index for stocks and the Barclays Global Aggregate Index for bonds. On the first day after the FyF recommendations, global stocks and global bonds change by very small

Table 8
Time-series regressions of daily returns for Chilean equity and government bonds

Panel A: Daily evidence

	Equity			Govt. bonds		
Variables	Raw	Adjusted	Adjusted	Raw	Adjusted	Adjusted
Day 1	0.0063**	0.0105***	0.0077***	0.0000	0.0000	−0.0000
	(0.0025)	(0.0029)	(0.0022)	(0.0004)	(0.0004)	(0.0004)
Day 2	−0.0011	0.0006	−0.0006	−0.0001	−0.0001	−0.0000
	(0.0025)	(0.0029)	(0.0023)	(0.0004)	(0.0004)	(0.0004)
Day 3	0.0039	0.0010	0.0029	−0.0007*	−0.0007*	−0.0005
	(0.0025)	(0.0029)	(0.0022)	(0.0004)	(0.0004)	(0.0004)
Day 4	−0.0016	−0.0016	−0.0012	−0.0001	−0.0001	−0.0000
	(0.0025)	(0.0029)	(0.0022)	(0.0004)	(0.0004)	(0.0004)
Day 5	−0.0006	−0.0048*	−0.0020	−0.0000	−0.0000	0.0002
	(0.0025)	(0.0029)	(0.0022)	(0.0004)	(0.0004)	(0.0004)
Controls	no	no	yes	no	no	yes
N	1,038	1,038	1,009	1,038	1,038	1,009
R^2	0.0091	0.0162	0.4165	0.0032	0.0031	0.1073
Panel B: Cumulative evidence						
CUM [1-3]	0.0091**	0.0121**	0.0100**	−0.0008	−0.0008	−0.0005
p-value	0.0359	0.0143	0.0128	0.2537	0.2574	0.4239
CUM [4-5]	−0.0022	−0.0064	−0.0032	−0.0001	−0.0001	0.0002
p-value	0.5246	0.1091	0.3214	0.8164	0.8299	0.7736
CUM [1-5]	0.0069	0.0057	0.0068	−0.0009	−0.0009	−0.0003
p-value	0.2210	0.3753	0.1929	0.3026	0.3110	0.6614

The table reports time-series regressions of daily returns for Chilean equity and government bonds from January 2010 to February 2014. The raw equity return is the return of Santiago's stock exchange selective equity index (IPSA). The government bond return is the return of the Dow Jones LATixx Chile Government Bond Index produced by LVA Indices. The adjusted returns subtract the return in pesos of the MSCI World Index for equities and the return on short-term deposits in prime financial institutions for bonds. "Day i" variables correspond to indicator variables that take the value of 1 if the day corresponds to the $i-th$ day after a recommendation was sent. Day indicator variables are 1 when it is recommended to buy equity and −1 when it is recommended to sell equity. Control variables include the cumulative returns in each of the four previous weeks, the sums of squared returns in the same weeks, the lagged P/E ratio, the lagged 2- and 10-year government bond yields, the lagged inflation rate, the percentage change in the exchange rate the previous week, and the contemporaneous return in pesos of the MSCI World Index. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

amounts, indicating that the price reaction on these days is specific to the Chilean financial market. Furthermore, none of the cumulative returns are statistically significant. These placebo tests indicate that the price pressure associated with the actual FyF recommendations is unlikely driven by random chance or by global factors.

3.3 Time-series regressions

An alternative method to estimate the price pressure from FyF's recommendations is to run time-series regressions in calendar time. This method allows us to control for past returns and other fundamentals. The sample of daily returns covers the period between January 2010 and February 2014. The results are reported in Table 8. In these time-series regressions, we regress the daily equity or bond performance on event-day indicator variables with and without a comprehensive set of controls. The "Day i" variables equal 1 when recommending to buy equity and −1 when recommending to sell equity on the $i-th$ day after a recommendation was sent. We consider raw and adjusted

returns. The adjusted equity return is defined as the difference between the local equity index (IPSA) and the MSCI World Index return measured in Chilean pesos. The adjusted government bond return is defined as the difference between the Chilean government bond index and the rate on short-term deposits in prime financial institutions. The control variables include the cumulative returns in each of the four previous weeks, the sums of the squared returns in the four previous weeks, the lagged price-earnings ratio (P/E) ratio, the lagged two- and ten-year government bond yields, lagged inflation, the percentage change in the exchange rate during the previous week, and the contemporaneous return of the MSCI World Index. The coefficients on the indicator variables thus isolate the average magnitudes of the returns on the corresponding dates.

Panel A of Table 8 reports a large and significant price pressure in the equity market on the first day after the recommendation regardless of whether we use raw or adjusted returns or whether we include control variables. The estimated price pressure on the first day ranges between 63 and 105 basis points. Consistent with Table 6, we find insignificant price pressure on government bonds during the first days after FyF's recommendations. The price pressure is only marginally significant on day 3 for two of the three specifications.

Panel B of Table 8 repeats the analysis in Panel A using cumulative returns. We decompose the first five days (CUM [1–5]) into two parts: the first three days (CUM [1–3]) and the next two days (CUM [4–5]). Columns 1 and 2 confirm the significant cumulative price pressure in the equity market. Notice that the reversal is complete by day 5 (CUM [1,5]) in all specifications, which suggests that the price response is unlikely due to the informational content of FyF's recommendations.

3.4 Subsample analysis

The subsample analyses reported in Table 9 provide additional evidence for the price pressure caused by FyF's recommendations. We should expect the price impact to become stronger over time due to the increase in FyF's popularity over time, as documented in Figures 1 and 2. We test this hypothesis by splitting our recommendations into two subsamples. The first subsample includes the first seven recommendations, and the second subsample includes the remaining eight recommendations. Although the results are consistent across subsamples, we find significant price pressure only in the second subsample. The first-day effect is more than twice as large in the second subsample. The differences in the first-day effects across the two subsamples are statistically significant.

We also split our sample based on the direction of the recommendations. A switch from A to E (E to A) implies selling (buying) equity. We find that the effect is concentrated on day 1 for recommendations to buy equity, whereas the effect is spread over the first three days for sell recommendations. The impact of sell recommendations seems to work slowly into prices, most likely because

of Chilean short-selling constraints that limit the extent to which other investors can front-run pension funds.

Our previous analysis is focused on the first 15 recommendations, which only represent switches between funds A and E. Starting with their 16th recommendation on March 6, 2014, FyF began recommending partial fund switches between funds A, C, and E. In our final robustness check, we include all 22 recommendations. Since partial fund recommendations are predicted to trigger smaller amounts of trading, we adjust the indicator variables accordingly. The weights, reported in the last column of Table 2, are a function of the magnitude of the recommended switches. For example, a full switch from fund E to fund A receives a weight of 1, whereas a switch from fund E to an equal-weighted portfolio of funds A and E receives a weight of 0.5, since only half of fund E needs to be replaced by equity. Although the magnitude of the price pressure is reduced after we include partial recommendations, the price impact remains statistically significant, as reported in the last column of Table 9.

Table 9
Time-series regressions of daily returns for Chilean equity for subsamples

Panel A: Daily evidence

	First half	Second half	Buy	Sell	Expanded
Day 1	0.0045	0.0101***	0.0106***	0.0048	0.0044**
	(0.0033)	(0.0030)	(0.0033)	(0.0031)	(0.0020)
Day 2	−0.0026	0.0010	−0.0040	0.0023	−0.0025
	(0.0033)	(0.0031)	(0.0033)	(0.0031)	(0.0020)
Day 3	0.0012	0.0043	0.0008	0.0046	0.0037*
	(0.0033)	(0.0031)	(0.0033)	(0.0031)	(0.0020)
Day 4	−0.0001	−0.0021	−0.0019	−0.0004	−0.0015
	(0.0033)	(0.0031)	(0.0032)	(0.0031)	(0.0020)
Day 5	0.0019	−0.0054*	−0.0027	−0.0013	0.0009
	(0.0033)	(0.0031)	(0.0032)	(0.0031)	(0.0020)
N	961	967	961	967	1,326
R^2	0.4210	0.4151	0.4301	0.4054	0.2263

Panel B: Cumulative evidence

CUM [1-3]	0.0031	0.0154***	0.0074	0.0117**	0.0056
p-value	0.5872	0.0045	0.2139	0.0307	0.1080
CUM [4-5]	0.0018	−0.0075*	−0.0046	−0.0017	−0.0006
p-value	0.6959	0.0877	0.3284	0.2846	0.8167
CUM [1-5]	0.0049	0.0079	0.0028	0.0100	0.0050
p-value	0.5095	0.2703	0.7160	0.3288	0.2758

The table summarizes time-series regressions of daily returns for Chilean equity for different subsamples from January 2010 to February 2014. The dependent variable is the return of Santiago's stock exchange selective equity index (IPSA) minus the return in pesos of the MSCI World Index. In Columns (1) and (2), we separate between the first seven and the last eight recommendations. In Columns (3) and (4), we separate the sample according to the direction of the recommendation. In Column (5), we include all 22 recommendations that recommended partial switches between funds A, C, and E. "Day i" variables correspond to indicator variables that take the value of 1 if the day corresponds to the $i-th$ day after an recommendation was sent. Day dummies are 1 when it is recommended to buy equity and −1 when it is recommended to sell equity. Control variables include the cumulative returns in each of the four previous weeks, the squared returns in the same weeks, the lagged P/E ratio, the lagged 2- and 10-year government bond yields, the lagged inflation rate, the percentage change in the exchange rate in the previous week, and the return in pesos of the MSCI World Index. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 10
Time-series regressions of daily trading volume for the Chilean equity market

Panel A: Daily evidence

Type of trade:	All	Inst. with inst.	Inst. with retail	Retail with retail
Day 1	0.0994	0.0625	0.1083	0.1761**
	(0.0781)	(0.1117)	(0.0760)	(0.0846)
Day 2	0.0609	−0.0284	0.0475	0.1805*
	(0.0846)	(0.1395)	(0.0843)	(0.1033)
Day 3	0.0322	−0.0748	−0.1167	0.1714
	(0.1447)	(0.2068)	(0.1080)	(0.1253)
Day 4	0.0587	0.1536	−0.0073	0.0240
	(0.0836)	(0.1404)	(0.0637)	(0.0606)
Day 5	0.0369	0.1426	−0.0325	−0.0328
	(0.0612)	(0.1207)	(0.0694)	(0.0650)
Controls	yes	yes	yes	yes
N	1,009	1,009	1,009	1,009
R^2	0.2136	0.1280	0.1894	0.2340

Panel B: Cumulative evidence

CUM [1-3]	0.1925	−0.0407	0.0391	0.5280***
p-value	0.3032	0.8830	0.8082	0.0048
CUM [4-5]	0.0956	0.2962	−0.0398	−0.0088
p-value	0.3645	0.1148	0.6790	0.9229
CUM [1-5]	0.2881	0.2555	−0.0007	0.5192**
p-value	0.1888	0.4528	0.9975	0.0144

The table summarizes time-series regressions of the daily trading volume for the Chilean equity market from January 2010 to February 2014. The dependent variable *Volume* is the logarithm of the dollar amount traded during the day. The data are obtained from the Santiago Stock Exchange. We compute the volume for three different types of trades based on the broker identity on either side of the trade (buy or sell): institutions trading with institutions, institutions trading with retail investors, and retail investors with retail investors. "Day i" variables correspond to indicator variables that take the value of 1 if the day corresponds to the $i-th$ day after a recommendation was sent. Day indicator variables are 1 when when it is recommended to buy or sell equity. Control variables include the cumulative returns in each of the four previous weeks, the sums of the squared returns in the same weeks, the lagged P/E ratio, the lagged 2- and 10-year government bond yields, the lagged inflation rate, the percentage change in the exchange rate the previous week, the contemporaneous return in pesos of the MSCI World Index, and indicator variables for Mondays, Fridays, and the turn of the year period. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

3.5 Trading volume

In this subsection we study the trading volume after FyF recommendations. We compute our daily volume series with the transaction-level data obtained from the Santiago Stock Exchange. For each day, we compute total volume by aggregating amounts traded (price times shares traded) from the individual trades. The Appendix includes additional information on the data construction.

In the spirit of Griffin, Harris, and Topaloglu (2003), we split brokers into institutional and retail brokers. Institutional brokers handle most of the flow from pension funds, local mutual funds, foreign funds, and other institutions, although brokers are not exclusively institutional or retail in this market. Institutional brokers also correspond to the largest five brokers in the market. Since we know the broker on each side of the trade (buy or sell), we can classify trades into three types: institutions trading with institutions, institutions trading with retail investors, and retail investors trading with other retail investors. Daily volume is almost evenly split between these three types of trades.

Table 10 summarizes time-series regressions for the daily total volume and the three different types of trades. All specifications include the same control variables as Table 8, indicator variables for Mondays, Fridays, and the trading days around the turn of the calendar year (which tend to have unusually high volume). The first column summarizes the results using the total trading volume, and the remaining columns decompose the trading volume according to the investor types. The dependent variables are measured as logarithms of the total dollar amount traded on each individual day.

The first column indicates that the overall trading volume increases in each of the five days after FyF recommendations. For example, on the first day after the recommendation, total trading volume is around 10% higher than volume on non-recommendation days. Despite the economic significance of this effect, the results are not statistically significant due to the noise in the aggregate trading volume in Chile.

If we decompose the trading volume according to the parties involved, we observe that the most significant and immediate increase occurs for trades between retail investors. For these investors, we observe a statistically significant increase in trading volume of 17.61% on the first day after the FyF recommendation. This elevated trading level of retail investors persists for two additional trading days. Since these trades do not involve institutional investors such as pension funds, their first-day spikes are consistent with non-pension-fund trading following the FyF recommendations. In contrast, the trading between institutional investors spikes with a delay (15.36% on day 4 and another 14.26% on day 5), consistent with a delayed trading execution by pension funds, as described in Section 1.1.

3.6 Cross-sectional differences in price pressure and trading

We study in this section cross-sectional differences in price pressure following Greenwood and Thesmar (2011) and Lou (2012). The price impact of the recommendations should be more pronounced for stocks that are over-weighted by the pension fund managers.

We measure flow-induced pressure (FIP) as the aggregate value of the signed flows across all A funds in month t times the weight of stock i held by the A funds in month $t-1$ divided by the market capitalization of stock i in month $t-1$:

$$FIP_{i,t} = \frac{FLOW_{A,t} \times w_{i,t-1}}{MKTCAP_{i,t-1}} \tag{1}$$

$FLOW$ is computed as the sum of the flows to A funds across all pension providers. The weight of a stock w is computed as the sum of the value of stock i held by the A funds across all pension providers divided by the total value of all the holdings by A funds across all pension providers. Stocks with zero holdings are kept in the sample, but exhibit an FIP of 0 regardless of the flow. Finally, $MKTCAP$ is defined as the product of the number of shares outstanding and the price per share.

Table 11
Regressions of cumulative returns and turnover on flow-induced pressure

Panel A: Cumulative return to event day #

	1	2	3	4	5
FIP	0.714	1.355	3.613**	2.573	0.911
	(0.603)	(1.186)	(1.534)	(1.468)	(1.555)
ln Mkt cap	−0.000	−0.001	−0.001	−0.002	−0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
BM	−0.000	−0.003	−0.004**	−0.005**	−0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
MOM	−0.005	0.000	0.003	−0.000	0.001
	(0.007)	(0.007)	(0.006)	(0.005)	(0.009)
N	512	540	552	566	569
R^2	0.367	0.314	0.349	0.257	0.208
Panel B: Cumulative turnover to event day #					
Abs(FIP)	0.147	0.420**	0.665**	0.900***	1.002***
	(0.170)	(0.175)	(0.271)	(0.288)	(0.358)
ln Mkt cap	−0.000	−0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
B/M	0.000	−0.000	−0.001**	−0.001***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MOM	−0.000	−0.000	−0.000	−0.001	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
N	539	566	580	585	586
R^2	0.029	0.041	0.050	0.059	0.056
Panel C: Cumulative retail-with-retail turnover to event day #					
All recommendations					
Abs(FIP)	0.117	0.282***	0.496***	0.626***	0.748***
	(0.067)	(0.085)	(0.128)	(0.156)	(0.181)
Sell equity					
Abs(FIP)	0.048	0.185*	0.368**	0.457**	0.560**
	(0.082)	(0.082)	(0.108)	(0.136)	(0.171)
Buy equity					
Abs(FIP)	0.247**	0.461**	0.682**	0.870***	1.017***
	(0.095)	(0.147)	(0.191)	(0.201)	(0.213)

The table reports regressions of cumulative returns (Panel A), cumulative turnover (Panel B), and cumulative retail-to-retail turnover (Panel C) of individual stocks over the first five days after a recommendation on the flow-induced price pressure (FIP) and other stock characteristics. Stock turnover is defined as the number of shares traded divided by the number of shares outstanding. The FIP is measured as the signed flow of the aggregated A funds times the weight of each stock in the A funds in the previous month divided by the market capitalization of the stock in the previous month. We use the raw FIP for Panel A and the absolute value of FIP for Panels B and C. Other controls include the log of the market capitalization, the book-to-market ratio, and the momentum return. All regressions include event fixed effects. Standard errors are clustered by event and are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

We run panel regressions of cumulative stock returns over a given event window for each recommendation. Thus, the unit of observation corresponds to an event-stock combination. We are using only the dates that correspond to event days. The regressions include event fixed effects to control for aggregate factors that might differ across events. The standard errors are clustered by event date. The specification using the cumulative returns on event day j is as follows:

$$R_{i,t}^{cum\,j} = \lambda FIP_{i,t} + \gamma Z_{i,t} + \delta_t + \varepsilon_{i,t}.$$

Panel A of Table 11 confirms that stocks with higher FIPs indeed suffer from larger price pressure following the FyF recommendations. The coefficients on

Table 12
Excess volatility

	(1)	(2)	(3)	(4)
Abs(FIP)	1.506***	1.798***	0.773**	0.613*
	(0.368)	(0.407)	(0.292)	(0.359)
ln Mkt Cap		−0.000	−0.000	−0.002*
		(0.000)	(0.000)	(0.001)
BM		−0.001***	−0.000	−0.001
		(0.000)	(0.000)	(0.001)
MOM		0.002**	0.001	−0.001
		(0.001)	(0.001)	(0.001)
Turnover			0.043***	0.011
			(0.015)	(0.019)
Ret Vol			0.476***	0.206***
			(0.036)	(0.044)
Fixed effects	time	time	time	time
				stock
N	1,755	1,688	1,687	1,687
R^2	0.224	0.256	0.452	0.554
Number of cross-sections	48	48	48	48

The table summarizes regressions of stock volatility on flow-induced pressure (FIP). The dependent variable is the monthly return volatility of the stocks in the sample. The FIP is measured as the signed flow of the aggregated A funds times the weight of each stock in the A funds in the previous month divided by the market capitalization of the stock in the previous month. Other controls include the log of the market capitalization, the book-to-market ratio, the momentum return between $t-12$ and $t-2$, the average turnover over the prior 12 months, and last month's return volatility. Standard errors are clustered by time, and the regressions include stock fixed effects and time fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

FIP are positive for all time windows and are significant over the first three days, even after controlling for stock characteristics such as size, book-to-market, and momentum. The cross-sectional effect of FIP reverts during the subsequent days.

Panel B studies the relation between FIP and cumulative turnover. Stock turnover is defined as shares traded over shares outstanding for each stock. We find that stocks with higher absolute FIPs are traded more after FyF recommendations. The coefficients on FIP are always positive and are significant after day 2.

Panel C summarizes the results for turnover taking into account only trades among retail investors. We find a significantly positive relation between FIP and the retail-with-retail trading volume after day 2. We also observe that the turnover effects are more pronounced for recommendations that involve buying equity. The coefficients for buying equity are almost twice the coefficients for selling equity, and the coefficients are significant starting with the first day after the recommendation. In contrast, sell recommendations work slowly into prices (Table 9) and trading volumes (Table 11).

3.7 Excess volatility

A long strand of literature starting with Shiller (1981) and Black (1986) suggests that excessive trading unrelated to fundamentals can affect both the level and the volatility of asset prices. In this subsection, we study the impact of trading triggered by FyF recommendations on the cross-section of stock return volatility.

In Table 12, we regress the monthly return volatility (computed from daily returns) on the absolute FIP measure and on other controls, including lagged volatility. The results confirm a significant link between flow-induced pressure and return volatility. A one-percentage-point increase in the flow-induced pressure leads to an increase in the monthly stock volatility between 0.6% and 1.8%, depending on whether we control for other stock characteristics, past volatility, and stock fixed effects. This cross-sectional evidence indicates that uninformative financial advice can have a destabilizing effect on financial markets.

4. Response from Pension Funds

Given our findings that fund switches can generate large price pressure and result in excess volatility, it is natural to see how pension funds manage liquidity as a response. The changes in their portfolio holdings over time reveal some interesting insights.

Specifically, we plot in Figure 4 the portfolio weights of cash, exchange-traded funds (ETFs), and Chilean equity for fund A (left panel) and the portfolio weights of cash and Chilean fixed income securities for fund E (right panel). The portfolio weights are computed using holdings reported at the end of each month. We aggregate these holdings across AFPs. The sample period starts in July 2011, coinciding with the first FyF recommendation, and ends in December 2013.

Pension funds are increasing their holdings of more liquid assets over time. As the fund switches obtain more visibility in 2012, both funds A and E start to hold more cash. In addition, fund A starts to replace the less-liquid Chilean stocks with more-liquid ETFs. Fund E also decreases its holdings of Chilean bonds.

To show that the increase in cash holdings is likely driven by FyF recommendations rather than reflecting a general market trend, we conduct additional cross-sectional comparisons in Table 13 that examine the cash holdings of different AFPs in detail. Specifically, we regress monthly cash holdings (in percentage of total fund asset value) averaged across different AFPs on indicator variables for months with FyF recommendations, on trend variables, and on flow variables. The recommendation indicator variable is set equal to 1 during a month when the recommendation is a switch to A, -1 when the recommendation is a switch to E, and 0 otherwise. The trend variable equals to one in the first month and increases by one every month. Finally, the absolute flow variable captures the sum of the absolute flows for the different funds as a percentage of the assets under management.

Panel A summarizes the results averaged across all APFs. We observe that both funds A and E increase their cash holdings over time, as indicated by the significantly positive coefficients on the *Trend* variables. Over our 36-month period, the cash holdings of fund A increase by 4.3 bp and the cash holdings

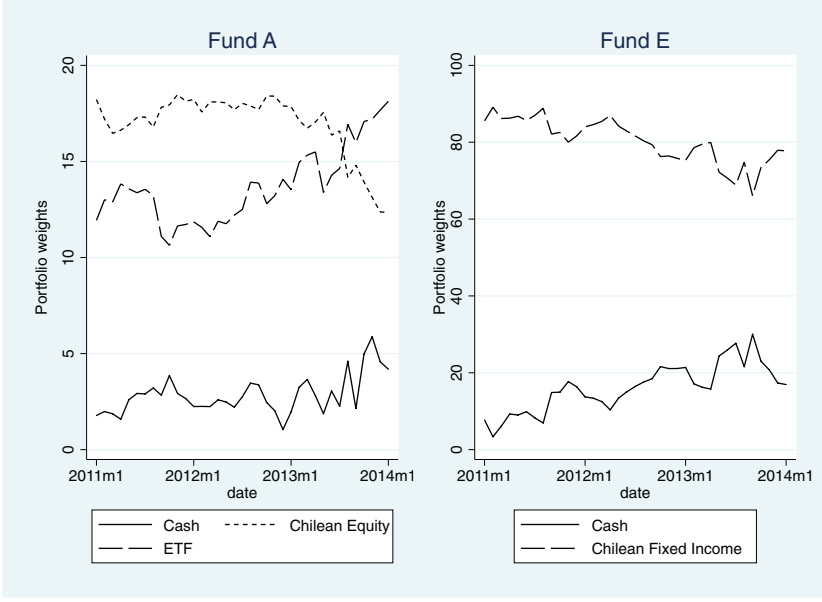

Figure 4
Portfolio holdings of funds A and E over time
The figure plots the portfolio weights of cash, ETFs, and Chilean equity for fund A (left) and the portfolio weights of cash and Chilean fixed income securities for fund E (right). The portfolio weights are computed using holdings reported at the end of each month, and we aggregate these holdings across AFPs. The sample period starts in July 2011 and ends in December 2013.

of fund E increase by 47.7 bp per month. There are several reasons why the change in cash holdings is substantially stronger for fund E compared with fund A. First, the assets of fund E are about half as large as the assets of fund A (US$14.1B vs. US$28.0B), as documented in Table 1. Due to this size difference, pension reallocations have a bigger proportional impact on the smaller funds. Second, larger allocations to cash holdings lead to larger tracking errors relative to the benchmarks for the equity portfolios than the fixed-income portfolios. Finally, holdings constraints imposed by the Chilean pension regulator reduce the flexibility of equity funds to increase cash holdings, since fund A needs to have a higher exposure to equity than fund B. On the other hand, the increases in cash holdings by fund E are less constrained since a less-risky fund does not exist.

The increases in the cash holdings of funds A and E are not driven by aggregate time trends in cash holdings, since they are not observed for funds B, C, and D. Indeed, we observe a significant decline in cash holdings of 9.2 bp per month for the balanced funds B, C, and D, which are not directly affected by the FyF recommendations during our sample period.

The significantly positive coefficient on the FyF recommendation variable suggests that fund A experiences an increase in cash holdings following a switch

Table 13
Monthly cash holding regressions

	Fund A	Funds B/C/D	Fund E	A vs. B/C/D	E vs. B/C/D
Panel A: All AFPs					
Intercept	2.091***	8.203***	7.562***	−6.112***	−0.642
	(0.254)	(0.442)	(1.234)	(0.449)	(1.055)
Trend	0.043***	−0.092***	0.477***	0.135***	0.568***
	(0.015)	(0.018)	(0.072)	(0.023)	(0.066)
FyF recommendation	0.497**	−0.089	−0.827	0.586**	−0.738
	(0.213)	(0.177)	(1.058)	(0.222)	(1.054)
R^2	0.297	0.559	0.662	0.666	0.753
Panel B: Modelo AFP					
Intercept	1.224*	11.474***	14.404***	−10.251***	2.930
	(0.680)	(2.012)	(2.920)	(1.939)	(3.027)
Trend	0.094**	−0.177**	0.023	0.271***	0.200
	(0.035)	(0.080)	(0.129)	(0.082)	(0.129)
FyF recommendation	0.971**	−0.099	−1.000	1.070*	−0.900
	(0.406)	(0.528)	(1.325)	(0.565)	(1.600)
R^2	0.298	0.228	0.010	0.387	0.094
Panel C: All AFPs with trend interactions					
Intercept	2.062***	8.199***	7.658***	−6.137***	−0.540
	(0.230)	(0.448)	(1.150)	(0.450)	(0.924)
Trend	0.042***	−0.092***	0.477***	0.134***	0.569***
	(0.014)	(0.018)	(0.070)	(0.023)	(0.062)
FyF recommendation	−0.955***	−0.317	3.928	−0.638	4.245*
	(0.304)	(0.624)	(2.351)	(0.429)	(2.274)
Trend × FyF recommendation	0.071***	0.011	−0.232**	0.060***	−0.243**
	(0.012)	(0.024)	(0.105)	(0.019)	(0.106)
R^2	0.427	0.561	0.700	0.695	0.786
Panel D: All AFPs with flow interactions					
Intercept	2.169***	8.758***	7.611***	−6.590***	−1.147
	(0.304)	(0.434)	(1.298)	(0.530)	(1.369)
Trend	0.044***	−0.103***	0.463***	0.148***	0.566***
	(0.014)	(0.016)	(0.065)	(0.021)	(0.067)
Abs flow	−0.531	−2.155	0.785	1.623	2.940
	(0.728)	(1.455)	(4.150)	(1.627)	(4.397)
FyF recommendation	−0.327	0.086	2.782	−0.413	2.696
	(0.291)	(0.347)	(1.936)	(0.453)	(1.967)
Abs flow × FyF recommendation	4.447***	−1.024	−19.536**	5.471**	−18.512**
	(1.391)	(1.789)	(7.625)	(2.266)	(7.832)
R^2	0.385	0.604	0.702	0.863	0.867

The table reports time-series regressions of monthly cash holdings (in percentage of total fund asset values) averaged across different APFs on monthly time trends, FyF recommendation indicator variables, and absolute flows. The recommendation indicator variable is 1 during a month when the recommendation is a switch to A, −1 when the recommendation is a switch to E, and 0 otherwise. All time-series regressions are based on 36 monthly observations. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

to fund A and a decrease in cash holdings following a switch to fund E. The cash holdings of fund E react in the opposite direction to FyF recommendations, although these results are not statistically significant.

In Table 5, we find that fund flows to a particular pension fund administrator called Modelo are more sensitive to FyF's recommendations. Consequently, we expect Modelo's portfolio cash holdings to be higher and to respond more

to the recommendations. Panel B of Table 13 indicates that the response of Modelo's cash holdings of fund A to FyF recommendations is about twice as large compared with the average AFP (0.971% vs. 0.497%). Furthermore, Modelo's fund A increases its cash position over time to a larger extent than other AFPs with older clienteles (9.4 bp vs. 4.3 bp per month). There is no similar trend for fund E, because Modelo's fund E holds significantly more cash from the beginning of our sample periods, as evidenced by the larger intercept (14.404% vs. 7.562%).

The recommendations of FyF become more influential over time, as documented in Figures 1 and 2. To investigate whether the impact of FyF recommendations on cash holdings changes over time, we interact in Panels C and D the signed FyF recommendation with trend and flow variables. Panel C includes an additional interaction effect between the monthly trend and the FyF recommendation variable. The interaction effects indicate that the sensitivity of cash holdings to the signed FyF recommendations becomes more positive over time for fund A and becomes more negative over time for fund E. On the other hand, we do not observe any significant interaction effects for funds B, C, and D, which are not directly affected by the FyF recommendations.

Panel D reports similar results using interactions with absolute flows. We observe that the cash holdings of both funds A and E are more sensitive to FyF recommendations in months with more pronounced flows. Whereas the sensitivity becomes significantly more positive for fund A, it becomes significantly more negative for fund E. These results are consistent with significant disruptions in asset allocations caused by FyF recommendations.

Figure 4 and Table 13 provide evidence that AFPs respond to the volatile fund flows triggered by FyF recommendations by holding more cash. While more liquid cash holdings help to buffer liquidity shocks, excessive cash holdings can be a performance drag and can hurt the long-term returns of retirement investors. Long-term retirement savers are often suggested to invest in less liquid securities that might provide a liquidity premium.

To estimate the welfare costs of these excess cash holdings we follow a welfare cost calculation by Calvet, Campbell, and Sodini (2007). We consider a textbook asset allocation problem where a mean-variance investor allocates her investments between a risky portfolio and a risk-free asset (cash). Her utility will be maximized at the optimal risky portfolio weight. Any deviation from that optimal weight will result in an utility loss equal to $0.5 \times A \times \sigma^2 \times Dev^2$, where A, σ, and Dev denote the risk-aversion parameter, the standard deviation on the risky portfolio, and the deviation from the optimal weight accordingly.[18]

[18] Let ER and Rf denote the expected return on the risky portfolio and the risk free rate, then the optimal weight on the risky portfolio is $w^* = (ER - Rf)/(A\sigma^2)$. The utility as a function of the weight on the risky portfolio is $U(w) = Rf + w(ER - Rf) - 0.5Aw^2\sigma^2$. The welfare loss can then calculated as $L = U(w^*) - U(w')$. After some algebra, it can be shown that $L = 0.5A\sigma^2(w^* - w)^2$.

The increases in cash holdings for funds A and E and the decreases in cash holdings for funds B, C, and D both lead to utility losses if pension funds have to deviate from their optimal cash allocations due to the increase in flows following FyF recommendations. Assuming a risk-aversion parameter of $A=5$ and a risky portfolio monthly standard deviation of $\sigma=0.2$, we find that a 10% change in cash holding reduces utility by $0.5\times5\times0.2^2\times0.10^2=0.10\%$, equivalent to a 10 bp reduction in annual risk-adjusted returns.

This computed utility loss from holding a suboptimal portfolio represents only an indirect cost to pension investors. Increased turnover and the associated trading costs are examples of more direct costs to pension investors, especially those investing in funds A and E.

5. Conclusions

Taking advantage of several features of the Chilean pension system, we document a novel channel through which trading coordinated by an advisory firm can exert large price impact at the aggregate level even when these markets are dominated by institutional investors.

In Chile, where pension assets account for 30% of free float in the stock market, pension investors can switch their entire pension investments from fund A (holding mostly risky stocks) to fund E (holding mostly government bonds), or vice versa, in an attempt to "time the market." After a financial advisory firm called Felices y Forrados gained popularity in 2011 by providing fund-switching recommendations, these signals served as a coordination device among pension savers. In order to implement the resulting fund switches, pension fund companies have to trade up to 10% of their domestic equity and 20% of their bond portfolios within a few days. Not surprisingly, this coordinated trading leads to a significant price pressure of around 1% in the Chilean equity market.

As a response to these frequent fund flows, pension funds in Chile significantly reduce their holdings of less liquid securities and replace them with cash. An increase in the proportion of highly liquid securities might not be optimal for retirement investors who typically have long-term investment horizons. One implication of our findings is that too much freedom in reallocating retirement portfolios may destabilize financial markets and impose social costs on retirement investors.

Our results also inform the policy debate on the structure of pension plans. An implication of our results is that the design of pension plans should internalize the externalities caused by excessive trading by plan participants. One possible solution is to impose a fee on switching that can then be rebated to the remaining investors in the fund. We also document that imposing execution delays for large fund flows can motivate smart market participants to front-run others. These strategic complementarities can further exacerbate fund flows and destabilize financial markets. The imposition of a switching fee together

with delayed pricing of fund flows should mitigate the risks of such strategic complementarities.

Appendix: Data Sources

Data used in this paper come from various sources. The Superintendencia de AFPs (SAFP) publishes data on pension funds on its website (http://www.safp.cl). The website reports daily share values for all funds, and monthly portfolio holdings, demographics of investors, and assets under management. We can compute monthly money flows from public data, but not at the daily level.[19] All information about the recommendations, including dates and funds, are taken from the Felices y Forrados website (http://www.felicesyforrados.cl). We also collect data on prices, trading volume, and accounting variables (e.g., book value of equity) for domestic stocks from the website of Santiago's Stock Exchange (http://www.bolsadesantiago.com/) and Economatica. The fixed income data are taken from LVA Indices (http://www.lvaindices.com), a provider of fixed income indices in Latin America (the Dow Jones LATixx indices). The government bond market return is measured using the "Dow Jones LATixx Chile Government Bond Index," which is a total return index, and Chilean deposits are measured by an index of 30-day nominal deposits in Chilean banks with domestic rating equal to or above N1+. Exchange rate data was downloaded from the Central Bank of Chile's online database (http://www.bcentral.cl). The P/E ratio of the Chilean equity market is taken from Bloomberg and corresponds to the value reported 30 trading days earlier. Lagged inflation is measured as the inflation rate of the month corresponding to 30 trading days earlier. Finally, the MSCI World Index, MXWO, is obtained from the MSCI website (https://www.msci.com/resources/factsheets/index_fact_sheet/msci-world-index.pdf). The Barclays Global Aggregate Total Return Index (LEGATRUU) of bonds and the S&P 500 Index are taken from Bloomberg.

We compute daily volume series with data obtained from the Santiago Stock Exchange. The data is at the transaction level, detailing the date and time of each trade, the ticker symbol, the number of shares traded, the price of the shares, and the codes for the brokers on each side of the trade (buy or sell). We have transactions for the stocks in the main stock index (IPSA). For each day we compute total volume by aggregating amounts traded (price times shares traded) from the individual trades. We exclude IPOs, SEOs, and some large block trades during our sample period. Although infrequent (only 15 trades), these transactions produce large spikes in the daily volume series. These large transactions are identified from the monthly bulletins of the Santiago Stock

[19] Money flows are computed as $Flow_t = AUM_t - (1+R_t)AUM_{t-1}$, where AUM is the assets under management of a given fund and R is the monthly return according to the per share value of the fund.

Exchange, which describe the highlights of the local stock market during each month.

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