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

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May 2024

Introduction

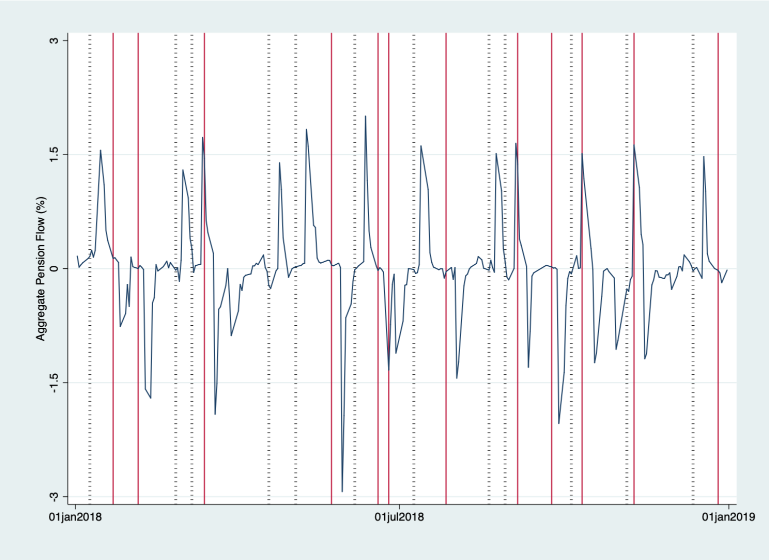
- In a world with imperfect financial markets, non-fundamental capital flows can have an impact on asset prices, exchange rates, and arbitrage relationships, such as the covered interest rate parity.
- It is an empirical challenge to disentangle informed from uninformed flows, and to separately identify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

Taking advantage of unique features of the Chilean pension system, we aim to understand the impact of non-fundamental shocks on currency markets.

Pension Fund Flows in Chile

- The Chilean pension system allows individual participants to reallocate their investments across funds with different risk levels.
  - The investment options range from mostly equity to mostly fixed income.
- The equity funds are internationally diversified.
  - Thus, reallocations require trading not just in equity and bond markets, but also in currency markets.
- A financial advisory firm called "Felices y Forrados" (FyF, "Happy and Loaded") makes frequent market timing recommendations.
  - Between 2011 and 2020, FyF sent out 82 reallocation recommendations.
  - These recommendations are largely uninformative, as they do not predict future returns.
  - The financial advisory firm serves as a coordination device among individual investors (Da, Larrain, Sialm, and Tessada (2018)).

Fund Reallocations Towards Equity in 2018



Preview of the Results

- Pension investors make large adjustments to their asset allocations after market timing recommendations.
- Foreign exchange rates are very sensitive to these uninformed flows.
  - We estimate a price elasticity of 0.83 for the Chilean exchange rate.
- Using bank balance sheet and trading data, we confirm that bank's hedging demand, regulatory capital requirements and banks' risk bearing constraints generate deviations from covered interest rate parity (Du, Tepper, and Verdelhan (2018)).

Related Literature

- Inertia of Pension Plan Participants:
  - Benartzi and Thaler (2001), Madrian and Shea (2001), Choi, Laibson, Madrian, and Metrick (2002), Agnew, Balduzzi, and Sunden (2003), Duflo and Saez (2003), Huberman and Jiang (2006), Dahlquist and Martinez (2015), and Sialm, Starks, and Zhang (2015)
- Price Pressure in Different Asset Classes:
  - Hau and Rey (2006); Hau, Massa, and Peress (2010); Gabaix and Maggiori (2015); Da, Larrain, Sialm, and Tessada (2018); Broner, Martin, Pandolfi, and Williams (2021); Pandolfi and Williams (2019); Gabaix and Koijen (2021); Itskhoki and Mukhin (2021);Janson (2021); Bernhardt and Cuevas (2022); Pinto-Avalos, Bowe, and Hyde (2022)
- Deviations from Covered Interest Rate Parity:
  - Borio, McCauley, McGuire, and Sushko (2016 and 2018); Du, Tepper, and Verdelhan (2018); Cenedese, Della Corte, and Wang (2021); Du and Schreger (2021); Du, Hébert, and Huber (2021); Jiang, Krishnamurthy, and Lustig (2021); Wallen (2022); Hertrich and Nathan (2022); Keller (2023)

Overview

- **Institutional Setting**
- Data and Summary Statistics
- Pension Plan Flows
- Foreign Exchange Changes
- Banking Balances
- Covered Interest Rate Parity
- Conclusions

Chilean Pension Plan System

- Chilean pensions were privatized in the 1980s through the creation of a private Defined Contribution (DC) pension system.
- 85% of Chilean working-age population participate in the system.
- The pension system holds assets worth US$175 billion, which corresponds to 65% of Chilean GDP.
- The Chilean pension system received substantial attention in economics and finance research due to its early adoption of personal retirement accounts.
  - See Diamond and Veldes-Prieto (1994), Diamond (1996), Mitchell and Barreto (1997), Edwards (1998), Benartzi and Thaler (2001), Mitchell, Todd, and Bravo (2009), and Opazo, Raddatz, and Schmukler (2014)

Chilean Pension Plan System

- There are seven pension fund companies (AFPs) that offer fairly homogeneous investment funds:
  - Investment limits imposed by pension regulator
  - Relative under-performance is penalized
- Each AFP offers five funds:
  - Fund A: Mostly invested in globally-diversified equity
  - ...
  - Fund E: Mostly invested in Chilean fixed income
- Investors can switch their entire investments at any time.
  - Fund exchanges are based on the prices two days after the reallocation request has been submitted.
  - Fund exchanges are implemented four days after the request has been submitted.
  - If switching requests exceed 5% of assets, then the exchanges are deferred on a first-come first-serve basis.

Felices y Forrado (FyF)

- Felices y Forrados (FyF; translated as “happy and loaded”) gave recommendations to its on-line subscribers about the best pension fund (i.e., A to E) to hold.
- After seeing the recommendation investors could request their AFP to implement the switch.
- The service was closed in June 2021 after Chilean regulators imposed restrictions and capital requirements for such financial advisory firms.

FyF


Descubre cómo mejorar tus ahorros en AFP
Te avisamos cuándo cambiarte de fondo para aumentar tus ahorros
Únete a Felices y Forrados
CONOCE
FELICES Y FORRADO$
0:00 / 5:12
YouTube
A
E
Inscríbete ahora
Menos pérdida
Más rentabilidad
Mejor calidad de vida

Data

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Data and Summary Statistics

- Pension Fund Data: Superintendencia de Pensiones (SP)
- Asset Allocation Recommendations: Felices y Forrados
- Market Data: Bloomberg
- Cross-Currency Basis: Central Bank of Chile
- Bank Balance Sheet Data: Comision Para el Mercado Financiero
- Trading Volume and Banking Imbalances Data: Central Bank of Chile

Characteristics of Chilean Pension Funds

	Fund A	Fund B	Fund C	Fund D	Fund E	Total
AUM average (million US$)	27,587	29,099	65,187	28,289	24,783	174,945
AUM as % of GDP	10.3	10.9	24.4	10.6	9.2	65.4
AUM as % of total AUM in all funds	16.0	16.7	37.4	16.1	13.8	100.0
Investors total (thousands)	1,320	4,111	3,776	1,232	554	10,992
Investors (in %)	12.1	37.4	34.4	11.2	4.9	100.0
Total equity investment (% of total AUM)	78.4	58.2	37.9	17.8	3.6	39.8
Foreign investment (% of total AUM)	75.2	56.3	40.6	26.0	6.2	41.6
Foreign equity investment (% of total AUM)	61.2	41.2	24.6	12.1	2.3	28.1

Drivers of FyF Recommendations

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

Performance of FyF Relative to Buy-and-Hold Strategies

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

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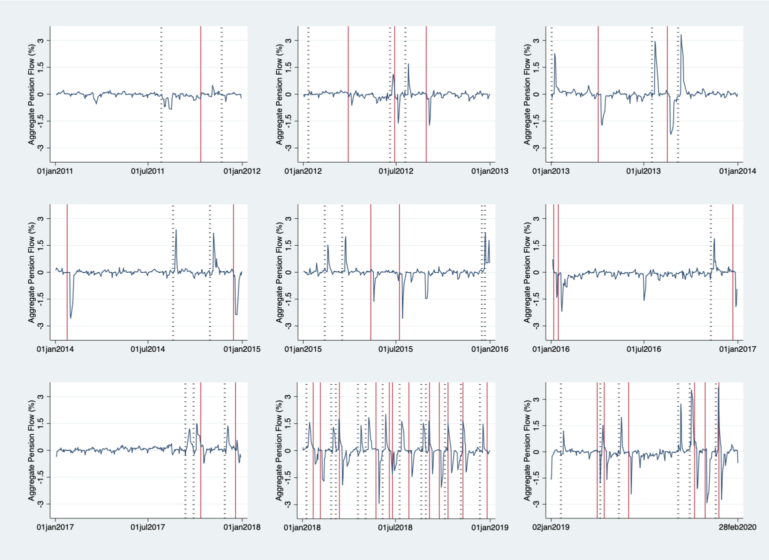
Pension Fund Reallocations from 2011 to 2020



Flow-Recommendation Relation

- We estimate the impact of FyF on pension fund flows:

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

- Flows are defined as:

$$Flow_{it} = \frac{AUM_{it}}{AUM_{it-1}} - \frac{P_{it}}{P_{it-1}}$$

- FyF Recommendations:

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

Flow-Recommendation Relation

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

Cumulative evidence

CUM [1-5]	6.54***	0.37***	-11.25***	4.20***	0.29***	-7.74***
p-value	0.00	0.00	0.00	0.00	0.00	0.00
CUM [6-10]	3.23***	0.23***	-6.37***	-0.11	0.05	1.23***
p-value	0.00	0.00	0.00	0.66	0.28	0.01

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Foreign Exchange-Recommendation Relation

- We estimate the relation between exchange rate changes and asset allocation recommendations:

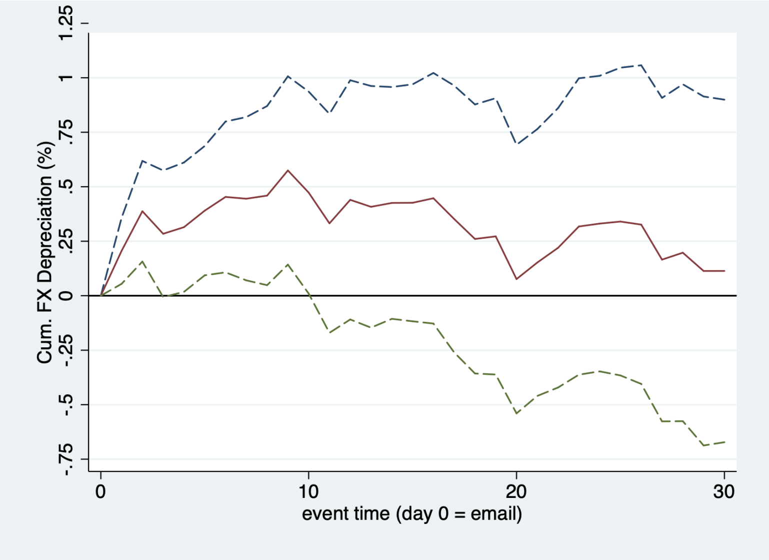
$$\Delta FX_t = \sum_{\tau=1}^{10} \beta_\tau RecDay_\tau + \sum_{j=1}^{5} \delta_j \Delta FX_{t-j} + \Gamma' X_t + \xi_t.$$

- ΔFX_t is the daily percentage change in the Chilean foreign exchange (CLP/USD).

- FyF Recommendations:

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

Exchange Rate Changes After Recommendations



Foreign Exchange Changes After Recommendations

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

Price Elasticity for Chilean Currency

- Average trade size represents 0.49% of Chilean money supply (M2) (i.e., \$27,587M x 0.0451 x 0.69 / \$175,000 M).
  - Average assets of fund A: \$27,587M
  - Average flow toward fund A: 4.45%
  - Average additional foreign currency investment in fund A: 69%
  - Average Chilean money supply (M2): \$175,000 M
- Average currency depreciation is 0.59%.
- Price elasticity is -0.83 (i.e., 0.48%/0.59%).
- The price elasticity for the Chilean currency is more negative than the price elasticity of Chilean equity securities of -0.45 (Da, Larrain, Sialm, and Tessada (2018)).

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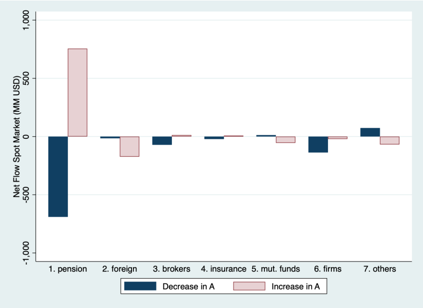
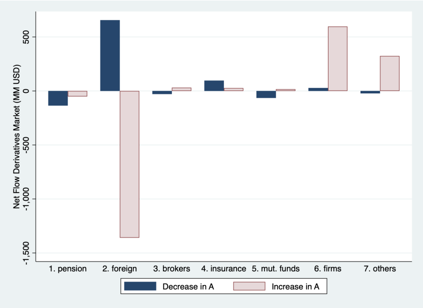
Monthly Traded Volume in Spot and Forward Markets by Bank Counterparty in Response to FyF Recommendation

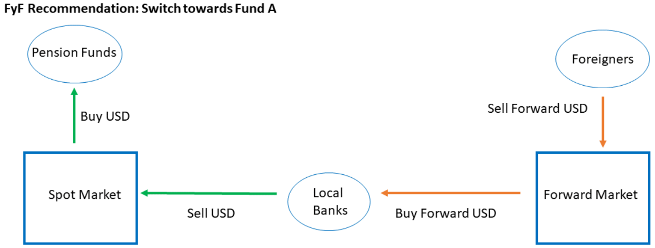
(a) Spot Market



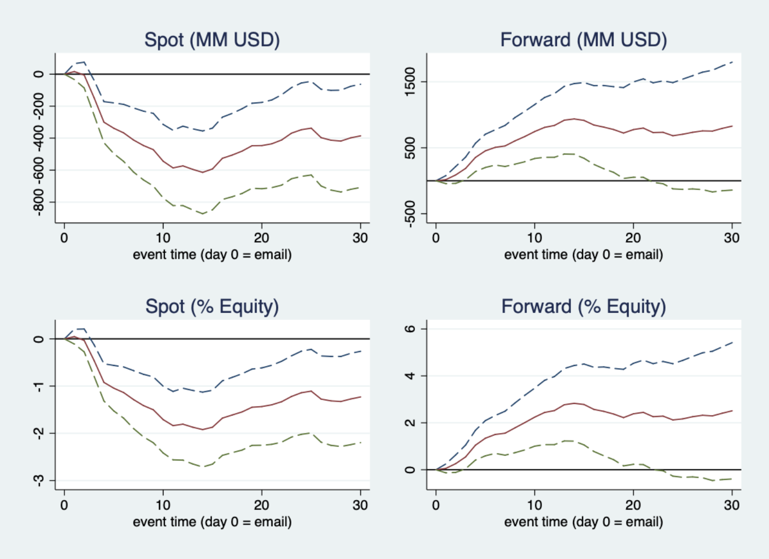
(b) Forward Market



Flows in the Spot and Forward Markets in Response to FyF Recommendations



Daily Banking Sector Imbalances after FyF Recommendations



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Covered Interest Rate Parity

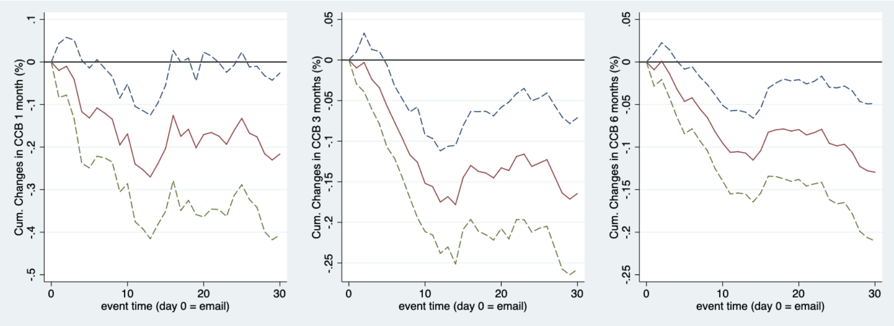
- The Covered Interest Rate Parity (CIP) is an arbitrage relation that states an investor should earn the same return if they invest in a risk-free deposit in the U.S. or if they invest in a risk-free deposit abroad and hedge the currency risk with forward contracts:

$$(1 + r_{us}) = (1 + r_{chile}) \times \frac{S}{F}$$

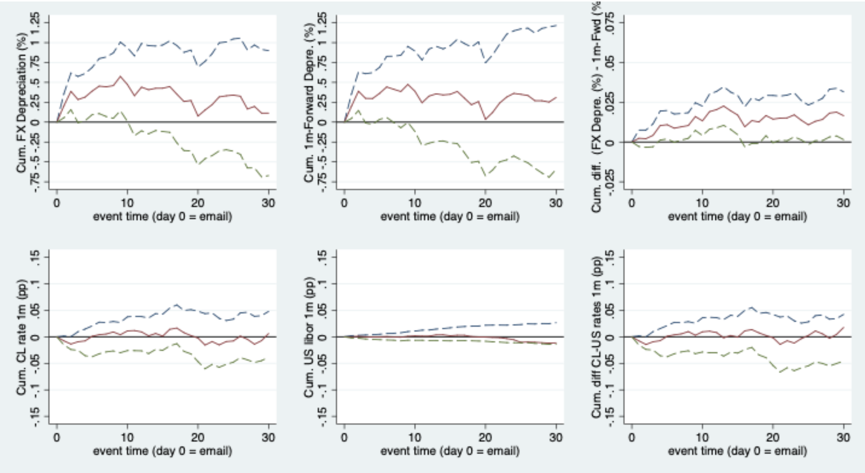
- The cross-currency basis (CCB) is measuring deviations from CIP:

$$CCB = (1 + r_{us}) - (1 + r_{chile}) \times \frac{S}{F}$$

Cross Currency Basis after FyF Recommendations



Decomposition of Cross-Currency Basis



Cross-Currency Basis with Banking Interactions

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

Conclusions

- Pension savers in Chile react strongly to market timing recommendations.
- Foreign exchange rates are very sensitive to non-fundamental fund flows.
  - We estimate a price elasticity of 0.83 for the Chilean exchange rate.
- Using bank balance sheet and trading data, we confirm that regulatory capital requirements and banks' risk bearing constraints generate deviations from covered interest rate parity.

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FyF Recommendations

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

Example of Trade Pressure

- The lagged allocations to international securities are as follows:
  - Fund A: 75% in international securities ($\lambda_{A,t-90} = 0.75$),
  - Fund E: 5% in international securities ($\lambda_{E,t-90} = 0.05$).
- FyF recommends to switch from investing 100% in Fund E to investing 50% Fund A and 50% Fund E:
  - $\Delta\omega_A^{FyF} = 0.5 - 0 = 0.5$,
  - $\Delta\omega_E^{FyF} = 0.5 - 1 = -0.5$.
- The price pressure variable is then as follows:

$$RecDay_\tau = \sum_{i=A}^{E} \lambda_{i,t-90} \Delta\omega_i^{FyF} = 0.75 \times 0.5 + 0.05 \times (-0.5) = 0.35.$$

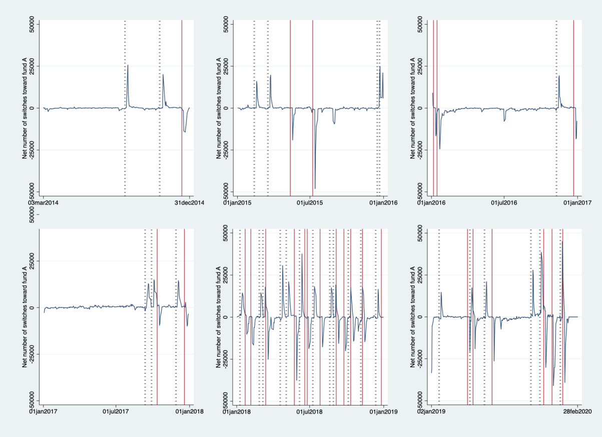
Flow-Recommendation Relation for Small AFP (Modelo)

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

Cumulative evidence

CUM [1-5]	11.05***	0.20	-14.67***	0.35***	0.01	-0.77***
p-value	0.00	0.77	0.00	0.00	0.75	0.00
CUM [6-10]	4.33***	1.22*	-6.75***	0.05	0.00	-0.33**
p-value	0.00	0.09	0.00	0.35	0.50	0.02

The FyF followers

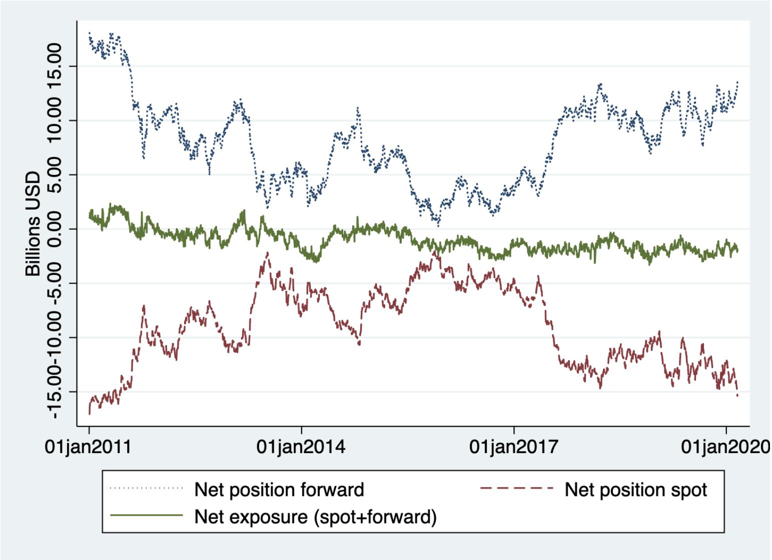


FyF consistent transfer	Number (1)	Age (years) (2)	Male (%) (3)	Amount (USD) (4)
No	4,335,830	44.9	63.5	39,508
Yes	3,591,657	40.1	70.6	22,476
p-value		0.000	0.000	0.000

Foreign Exchange Changes After Recommendations – Sample Splits

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

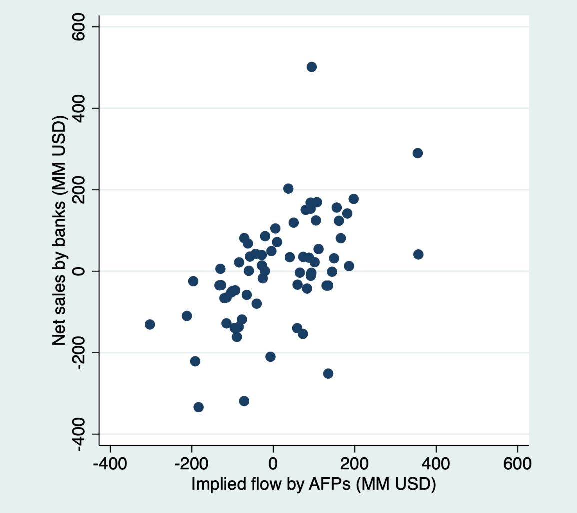
Banks' Net Position in Forward and Spot Markets



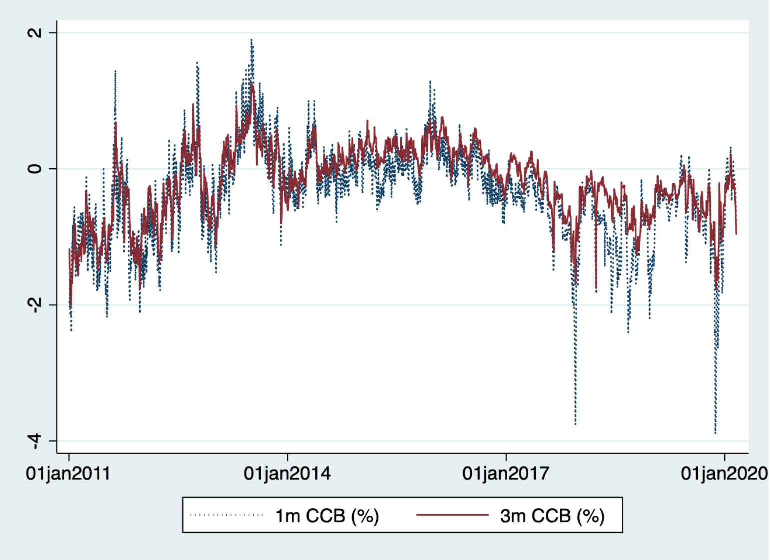
Daily Banking Imbalances and Trading Volumes

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

Daily Spot Trading by the Banking Sector and 10-Day Implied Pension Flows



Cross-Currency Basis for Chile



Cross-Currency Basis – Sample Splits

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

Decomposition of Cross-Currency Basis

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