



Exploring the Flow-Performance Relation in Colombian Open-End Investment Funds

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* This paper has grandly benefited from being part of the working group of the NBFIs initiative of the International Banking Research Network (IBRN) coordinated by Linda Goldberg and Falko Fetch. The authors thank Falko Fetch, Linda Goldberg, Hernando Vargas, Andrés Murcia, Carlos Quicazán, Juan Carlos Mendoza, and Miguel Sarmiento for their insightful comments and suggestions. The opinions contained herein are the sole responsibility of the authors and do not commit Banco de la República nor its Board of Directors.

Motivation and objective

- In recent years, open-end investment funds (OEFs) have grown rapidly in Colombia and several jurisdictions worldwide, positioning these funds and their managers as systemically important within the non-bank financial sector.
- OEFs have experienced massive redemptions during episodes of market stress, such as the global financial crisis, the taper tantrum, and the COVID-19 pandemic.
 - Research has focused on analyzing fund inflows and outflows to better understand the potential threats to the financial stability they pose.
 - Several studies have assessed the flow-to-performance relation of funds in jurisdictions different to Colombia (mainly in the US and Europe), finding heterogeneous results.
- We contribute to the existing literature on mutual funds in Colombia and, notably, present the **first analysis of the flow-performance relation in Colombian OEFs, seeking to understand investors' behavior.**
 - We intend to evaluate the sensitivity of net flows (contributions minus redemptions) to past performance under different circumstances (negative past performance, low fund liquidity, periods of massive withdrawals or increasing debt market volatility).

Colombian context

- Assets managed by OEFs increased by 165,2% between 2016 and 2023, reaching COP 90,9 t in December 2023 and accounting for approximately 5% of the non-bank financial sector's assets.
- Between 2016 and early 2020, AUM exhibited a relatively constant growth rate. **However, since the COVID-19 pandemic, this positive trend changed.**
- Fixed-income funds have driven the dynamic of total AUM because they are the most representative and their investment portfolio mainly consists of CD.

Figure 1: Assets and capital flows

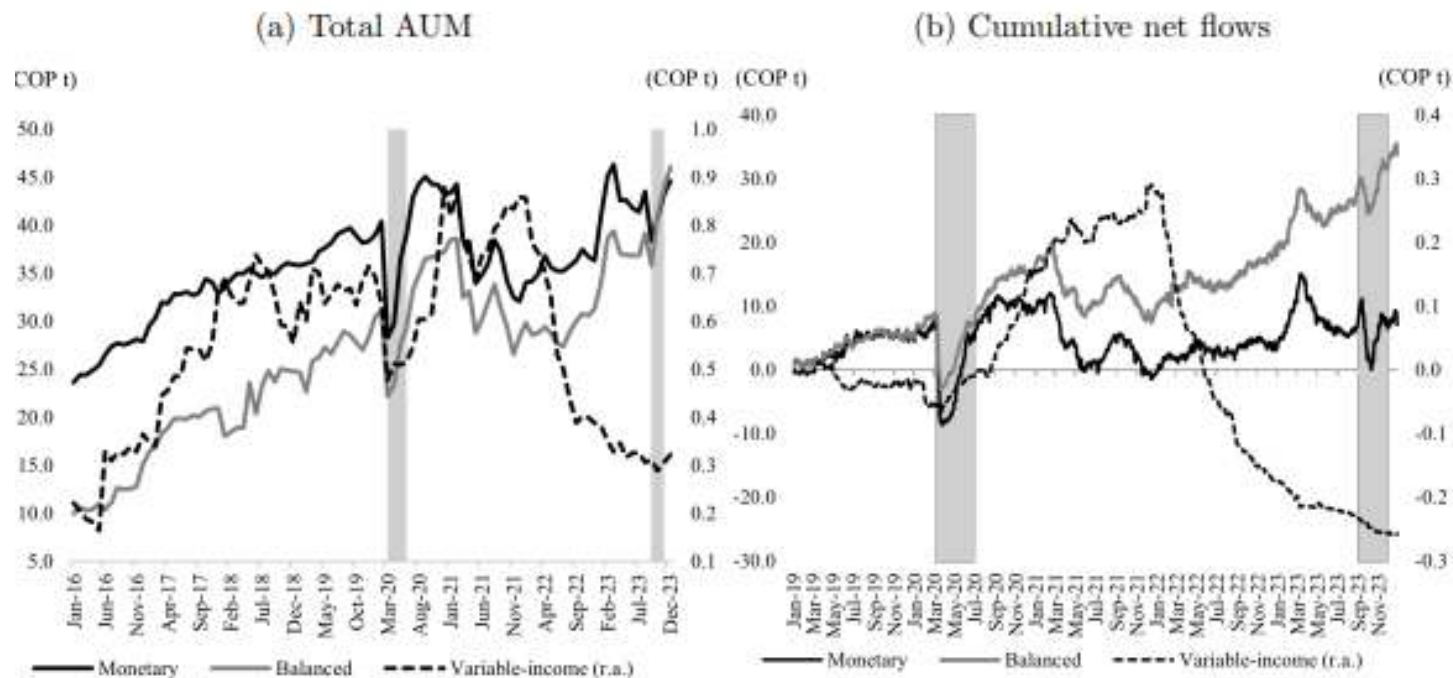
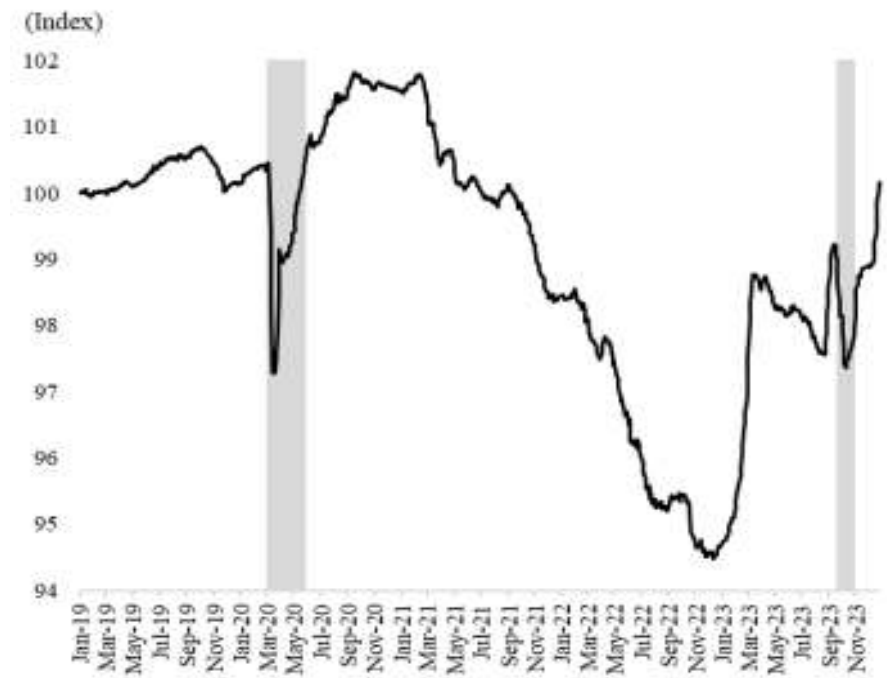


Figure 3: Price index of certificates of deposits



- **Four weekly data sources are available at the fund level:**
 - Balance sheet.
 - Portfolio holdings.
 - Liquidity risk indicators.
 - Capital flows and fund performance.
- **The final dataset merges all the sources and considers a total of 81 OEFs:** 18 money market funds, 54 balanced funds, and 9 variable-income funds. Our analysis period spans from January 2018 to December 2023.
- **The key variables in our empirical analysis are fund flows and performance.** We define the former as the total weekly net flow (contributions minus redemptions) over the total AUM. The latter is simply the monthly raw return recorded each week.
- **We employ an additional dataset provided by the Financial Superintendence of Colombia, that contains information on relevant class-type investors by fund.** This source comes from an extraordinary request made by the financial supervisor to OEFs in 2024.

- We divide OEF into fixed-income (MMFs and balanced funds) and variable-income funds, considering their differences in size, main investments, returns, liquidity, among others.

VARIABLE	Fixed-income Funds				Variable-income Funds			
	Mean	p1	p50	p99	Mean	p1	p50	p99
Assets (COP t)	1.10	0.00	0.44	12.29	0.08	0.00	0.05	0.41
Cash (% Assets)	29.00	6.19	30.08	55.25	9.46	3.62	7.41	35.15
Investments (% Assets)	70.55	44.01	69.42	93.76	90.23	64.67	92.3	96.25
Certificates of Deposits (% Investments)	55.75	0.00	65.21	100	0.85	0	0	14.48
1-day Liquidity Ratio (%)	29.33	6.41	30.45	55.87	9.4	3.63	7.4	33.37
Liquidity Coverage Ratio (%)	391.52	135.9	367.17	887.48	735.5	154.32	843.73	959.83
Net Flows (COP t)	0.00	-0.28	0.00	0.30	0.00	-0.01	0.00	0.01
Daily Raw Return (%)	18.39	-64.37	4.99	357.92	198.67	-89.48	69.28	1938.41
Monthly Raw Return (%)	6.93	-29.7	4.5	66.14	27.09	-77.48	15.48	255.83
Institutional Investors (% Assets)	4.79	0.00	0.72	38.96	0.69	0.00	0.01	3.25
Real Sector Investors (% Assets)	9.63	0.00	0.58	84.61	7.83	0.00	0.73	31.85
Natural Persons Investors (% Assets)	14.44	0.00	11.78	64.18	4.91	0.00	0.16	22.87

The table depicts the summary statistics for characteristics of fixed-income and variable-income funds in our sample from January 2018 to December 2023. For the investors' participation in the assets we use data as of December 29th 2023. We report the mean (Mean), 1st percentile (P1), 50th percentile (P50), and 99th percentile (P99). Authors' calculations.

- To analyze whether macro-financial variables impact capital flows**, we employ a dataset containing information on weekly private and public debt interest rates and monetary policy interest rates.

Empirical strategy and results

- We follow several research documents that explore the flow-performance relation in jurisdictions other than Colombia (Chen et al., 2010; Goldstein et al., 2017; Ciccone et al., 2022).
- **We employ panel regression models clustering standard errors at the fund level, including fixed effects at the fund and time levels.**
 - Dummies by fund account for individual-specific unobservable effects, which may be correlated with explanatory variables.
- **We analyze separately fixed (MMFs and balanced funds) and variable-income funds.**
 - On average, the fixed-income hold much more illiquid assets and has recorded historically higher levels of redemptions under periods of stress.
- Overall, we run three different panel regression specifications:
 1. **Sensitivity of flows to different levels of past performance.**
 2. **Heterogenous effects of negative past performance.**
 3. **Impact of asset liquidity on the flow-performance relation.**

Results: Sensitivity of flows to different levels of past performance

$$Flow_{i,t} = \alpha + \beta_1 MonthlyRawReturn_{t-1} + \beta_2 MonthlyRawReturn_{t-1} \cdot I(RawReturn_{t-1} < 0) + \beta_3 I(RawReturn_{t-1} < 0) + \gamma Controls_{i,t-1} + \delta MacroFinancial_{t-1} + \epsilon_{i,t}$$

- ✓ **Some macro-financial variables are relevant when included in the flow-performance relation analysis.**
 - ✓ When liquidity in the money market is low net flows decrease in fixed-income funds, as well as when market volatility increases.
- ✓ **Positive relation between lagged monthly raw return and net flows.**
- ✓ **Lagged negative monthly returns lead to a decrease in net flows.**

VARIABLES	Fixed-income funds	
	(1)	(2)
Net flow _{t-1}	0.170*** (0.0296)	0.169*** (0.0295)
Monthly raw return _{t-1}	0.0042* (0.0025)	0.0047* (0.0027)
Monthly raw return _{t-1} · I(Raw return _{t-1} < 0)		-0.0115 (0.0128)
I(Raw return _{t-1} < 0)		-1.479** (0.569)
Fund size _{t-1}	-2.474*** (0.481)	-2.550*** (0.474)
Percentage of investments _{t-1}	0.0720** (0.0303)	0.0727** (0.0303)
Interbank-to-Monetary policy rate spread _{t-1}	-0.0825*** (0.0193)	-0.0774*** (0.0183)
12-month Private-to-Public debt rate spread _{t-1}	0.0348 (0.0548)	0.0468 (0.0520)
Volatility index _{t-1}	-0.0117*** (0.0038)	-0.0104*** (0.0039)
Observations	21,230	21,230
Adjusted R-squared	0.326	0.326
Time FE	YES	YES
Individual FE	YES	YES

Flow_{i,t} corresponds to fund *i*'s net flow in week *t* over total assets.
I(*RawReturn_{i,t-1}* < 0) equals one if the fund records a negative lagged monthly raw return and zero otherwise.

Results: Impact of asset liquidity on the flow-performance relation

$$Flow_{i,t} = \alpha + \beta_1 MonthlyRawReturn_{t-1} + \beta_2 MonthlyRawReturn_{t-1} \cdot I(IlliqFund_{i,t-1}) + \beta_3 I(IlliqFund_{i,t-1}) + \gamma Controls_{i,t-1} + \delta MacroFinancial_{t-1} + \epsilon_{i,t}$$

- ✓ **Macro-financial variables are statistically significant.**
- ✓ **Liquidity in assets is relevant for investors.**
 - ✓ A fund with high 1-day liquid assets holdings may experience higher capital net contributions when increasing returns.
 - ✓ Capital net contributions are lower in a fund whose distance between the 1-day liquidity indicator to the required minimum is lower than the 5th percentile of the historical distribution.

VARIABLES	Fixed-income funds	
	(1)	(2)
Net flow _{t-1}	0.171*** (0.0297)	0.169*** (0.0244)
Monthly raw return _{t-1}	-0.0011 (0.0016)	0.0084* (0.0050)
Monthly raw return _{t-1} · I(IlliqFund _{t-1})		-0.0099** (0.0048)
I(IlliqFund _{t-1})		-0.1319 (0.2337)
Monthly raw return _{t-1} · IlliqFund _{t-1}	0.0015** (0.0007)	
IlliqFund _{t-1}	0.572*** (0.114)	
Fund size _{t-1}	-2.398*** (0.557)	-2.805*** (0.419)
Percentage of investments _{t-1}	0.5443*** (0.1145)	0.0882*** (0.0285)
Interbank-to-Monetary policy rate spread _{t-1}	-0.0577*** (0.0166)	-0.0689* (0.0403)
12-month Private-to-Public debt rate spread _{t-1}	-0.1582** (0.0755)	-0.0998 (0.1246)
Volatility index _{t-1}	-0.0331*** (0.0043)	-0.0288** (0.0141)
Observations	21,230	21,230
Adjusted R-squared	0.368	0.327
Time FE	YES	YES
Individual FE	YES	YES

Flow_{i,t} corresponds to fund *i*'s net flow in week *t* over total assets.
IlliqFund_{i,t-1} distance between the 1-day liquidity indicator to the required minimum.
I(IlliqFund_{i,t-1}) equals one if the distance between the 1-day liquidity indicator to the required minimum is lower than the 5th percentile of the historical distribution.

Results: Flow-performance relation considering the funds' type of investors

VARIABLES	(1) Institutional	(2) Real Sector	(3) Natural Persons	(4) Institutional	(5) Real Sector	(6) Natural Persons	(7) Institutional	(8) Real Sector	(9) Natural Persons
Net flow _{<i>t-1</i>}	0.1725*** (0.0306)	0.1744*** (0.0315)	0.1746*** (0.0316)	0.1742*** (0.0310)	0.1758*** (0.0319)	0.1760*** (0.0320)	0.1723*** (0.0307)	0.1741*** (0.0316)	0.1742*** (0.0317)
Monthly raw return _{<i>t-1</i>}	0.0058* (0.0028)	0.0052* (0.0027)	0.0052* (0.0028)	-0.0007 (0.0016)	-0.0003 (0.0015)	-0.0002 (0.0015)	0.0031 (0.0024)	0.0026 (0.0024)	0.0026 (0.0024)
Monthly raw return _{<i>t-1</i>} · I(Raw return _{<i>t-1</i>} < 0)	-0.0139 (0.0127)	-0.0157 (0.0129)	-0.0157 (0.0132)						
I(Raw return _{<i>t-1</i>} < 0)	-1.6397*** (0.5477)	-1.5841*** (0.5433)	-1.6127*** (0.5560)						
Monthly raw return _{<i>t-1</i>} · IlliqFund _{<i>t-1</i>}				0.0016** (0.0007)	0.0015* (0.0007)	0.0015* (0.0008)			
IlliqFund _{<i>t-1</i>}				0.5785*** (0.1280)	0.4891*** (0.1034)	0.4860*** (0.1056)			
Monthly raw return _{<i>t-1</i>} · VolPeriod							0.0036 (0.0046)	0.0040 (0.0046)	0.0043 (0.0047)
VolPeriod							-0.8028** (0.3049)	-0.4246 (0.3343)	-0.3852 (0.3459)
Fund size _{<i>t-1</i>}	-2.3394*** (0.4705)	-2.4048*** (0.5002)	-2.3943*** (0.5018)	-2.2183*** (0.5870)	-2.3055*** (0.5952)	-2.3029*** (0.5985)	-2.5666*** (0.5658)	-2.5892*** (0.5791)	-2.5903*** (0.5820)
Percentage of investments _{<i>t-1</i>}	0.0813** (0.0365)	0.0534** (0.0230)	0.0578** (0.0238)	0.5569*** (0.1277)	0.4559*** (0.0953)	0.4573*** (0.0974)	0.0938** (0.0425)	0.0564** (0.0249)	0.0606** (0.0255)
Interbank rate-to-Monetary policy rate spread _{<i>t-1</i>}	-0.0752*** (0.0199)	-0.0733*** (0.0233)	-0.0701*** (0.0242)	-0.0508*** (0.0186)	-0.0406** (0.0200)	-0.0367* (0.0207)	-0.0715*** (0.0183)	-0.0575*** (0.0195)	-0.0531** (0.0201)
12-month Private debt-to-Public debt rates spread _{<i>t-1</i>}	0.0425 (0.0556)	0.0154 (0.0625)	0.0032 (0.0640)	-0.1297 (0.0810)	-0.1523 (0.0963)	-0.1689* (0.0993)	-0.0350 (0.0843)	-0.0854 (0.1010)	-0.1072 (0.1041)
Volatility index _{<i>t-1</i>}	-0.0100** (0.0043)	-0.0109** (0.0051)	-0.0106* (0.0053)	-0.0325*** (0.0046)	-0.0278*** (0.0047)	-0.0278*** (0.0048)	-0.0214*** (0.0046)	-0.0216*** (0.0059)	-0.0216*** (0.0061)
Observations	18,469	15,546	14,926	18,469	15,546	14,926	18,469	15,546	14,926
Adjusted R-squared	0.3676	0.3991	0.4022	0.4068	0.4235	0.4259	0.3680	0.3990	0.4021
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Individual FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Authors' calculations. The table depicts the effect of periods of crisis and high volatility in debt markets on the flow-performance relation from January 2018 to December 2023. Standard errors are clustered at the fund level. *, **, and ***, indicate significance at the 10%, 5%, and 1% respectively.

Main findings

- ✓ **Macro-financial variables play a significant role in influencing investing decisions.**
 - Low liquidity in the money market, increasing public debt market volatility, and the devaluation of certificates of deposits increase outflows in funds highly exposed to fixed-income securities.
- ✓ **Statistically significant flow-performance relation in fixed-income funds (greater outflows under negative returns).**
 - Shares can be redeemed quickly. Under negative performance, investors may prefer to withdraw their capital to invest in another instrument, seeking profitability.
- ✓ **The effect of illiquidity on the sensitivity of capital flows is statistically significant in fixed-income funds.**
 - Investors in fixed-income funds holding fewer liquid assets may know the redemption by others will impose liquidation costs, reducing returns for those who remain in the fund.
- ✓ **Institutional investors exhibit greater sensitivity (in magnitude) to market conditions than other types of investors.**
 - Given the active monitoring of institutional investors, they are more likely to withdraw their capital in response to changes in fund characteristics, such as liquidity and returns, as well as macroeconomic conditions.
- ✓ **This paper may inform future evaluations to determine measures that OEFs can take to alleviate the amplification of redemptions.**