

Burned by leverage? Flows and fragility in bond mutual funds

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- Leverage was a key amplifier in previous episodes of stress, including the 2007–08 Global Financial Crisis
- In mutual funds, leverage is restricted - but some European funds make substantial use of synthetic leverage through derivatives (ESMA, 2025)
- Financial Stability Board (2017, 2024):
 - Fund leverage can amplify financial stability risks (e.g., March 2020 turmoil, Archegos collapse, LDI crisis)
 - Adverse security price movements, margin calls and higher haircuts can force leveraged funds to sell assets procyclically
 - Leverage may increase investor outflows during stressed periods

- **Key research question:**

- Does leverage amplify investor outflows during periods of stress or poor performance?

- **Focus on:**

- Bond funds under the UCITS Directive
- Flow-performance model with leverage
- Exploiting regulatory variation in leverage limits for identification

- **Main findings:**

- Leverage increases outflows after negative relative returns and during stress periods
- Managers in leveraged funds sell assets more procyclically, in particular following net outflows

Overview

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- 2 Dataset and leverage measure
- 3 Empirical strategy and results
- 4 Conclusion

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Leverage under the UCITS Directive

- Financial leverage (borrowing) limited to 10% of NAV
- Synthetic leverage (via derivatives) limited to 100% of NAV
- Since July 2010: EU Member States may allow fund managers to choose among three regulatory limits¹
 - Commitment approach and relative VaR capture more closely the gearing effect of leverage (EFAMA, 2017)
 - Absolute VaR is a risk-based measure that does not measure leverage, allowing for higher levels of leverage

¹Commission Directive 2010/43/EU

Leverage under the UCITS Directive

"There is one big question around the management of risk, which is the risk that some UCITS using the absolute VaR approach end up with a leverage which is significantly higher than that authorised by the commitment approach."

Patrice Bergé-Vincent (2010), former Head of the Asset Management Policy Division at France's Autorité des Marchés Financiers

Dataset and leverage measure

- **Sample:** 5,227 fund share classes, from 2,032 actively-managed UCITS bond funds, between January 2007 and September 2018
- **Main time series variables:** net investor flows, fund returns, respective benchmark returns and fund holdings (Refinitiv Lipper)
- **Leverage measure:** beta above 1 and use of derivatives for non-hedging purposes to identify synthetically leveraged funds; financial leverage flag from Refinitiv Lipper
- **Regulatory leverage limits:** hand-collected from funds' prospectuses, covering 60% of full sample

Overview

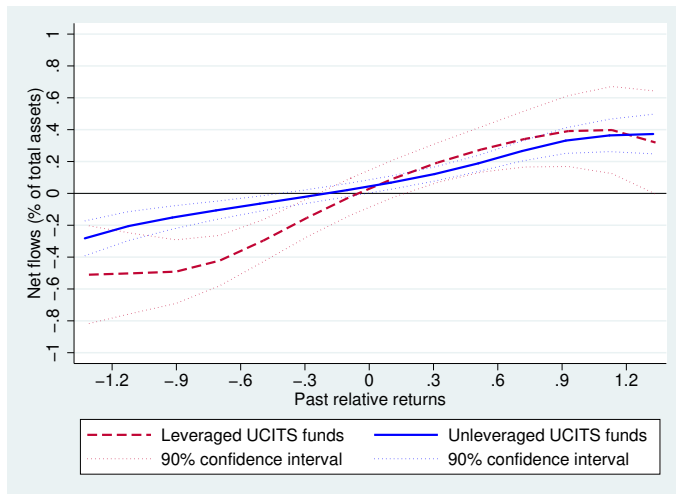
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Flow-performance with leverage

$$\text{NetFlows}_{i,t} = \beta_1 \text{Return}_{i,t-1} + \beta_2 \text{Return}_{i,t-1} * \text{Leveraged}_{i,t-1} \\ + \beta_3 \text{Leveraged}_{i,t-1} + \beta_4 \text{Controls}_{i,t-1} + \epsilon_{i,t},$$

- β_2 = impact of leverage on the flow-performance relation
- **NetFlows** $_{i,t}$ = net investors flows as percent of past assets
- **Return** $_{i,t}$ = fund return relative to its benchmark return, in percentage points
- **Controls** $_{i,t}$ include: size, age, load type, expense ratio, investor type, return volatility, cash & monthly - and share-class fixed effect
- **Model variants** include: parametric, semi-parametric and matching models

Flow-performance with leverage: semiparametric approach



This figure plots the non-parametric relationship between net flows and relative past returns for leveraged and unleveraged UCITS bond funds. The estimation uses the method developed by Robinson (1988, ECMA) and applied in Chevalier and Ellison (1997, JPE) and Goldstein et al. (2017, JFE). Source: authors' calculations based on Refinitiv Lipper.

Absolute VaR limit as proxy for leverage

- **Challenge:** fund leverage may be endogenous to investor flows
- **Idea:** regulatory absolute VaR limit as proxy for leverage
 - ① Absolute VaR funds less constrained with regards to leverage
⇒ Absolute VaR funds expected to use more leverage
 - ② Regulatory exposure limits are not expected to fluctuate much
⇒ Less correlated with cyclical investor flows
- **Methodology:** flow-performance model with regulatory absolute VaR

Absolute VaR limit as proxy for leverage

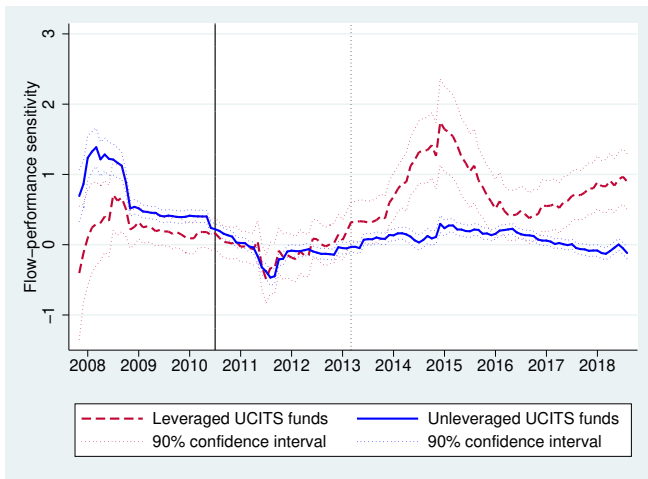
	Absolute VaR	Other UCITS funds	Difference
Leverage means:			
Leveraged	0.26	0.09	0.17***
Synthetically leveraged	0.25	0.06	0.18***
Financially leveraged	0.09	0.06	0.04***
Flow-perf. coefficients:			
Returns>0	0.02	0.03	-0.00
Returns<0	0.51	0.15	0.35***

This table shows (i) the means of leverage dummy variables and (ii) the flow-performance coefficients for the group of funds applying the absolute VaR approach, compared with the remaining UCITS funds applying alternative regulatory approaches. Source: authors' calculations based on Refinitiv Lipper. The regulatory limits are retrieved from fund prospectuses.

Regulatory change allowing higher leverage

- **Challenge:** investors self-select into leveraged funds
- **Idea:** Commission Directive in July 2010 as event allowing funds with leveraged strategies to take on more leverage
- **Methodology:** difference-in-differences approach
 - Treatment group: funds already leveraged before July 2010
 - Control group: unleveraged funds before July 2010
 - Alternative specifications:
 - Directive's transposition deadline (June 2011) as event
 - Restrict post-period to tight window around the event date to ensure investor similarity

The flow-performance relationship before and after the regulatory change



This figure plots the flow-performance sensitivities using rolling-window estimates for UCITS bond funds that were leveraged before July 2010 and those funds that were unleveraged in all periods before July 2010. The first vertical line marks the adoption of Commission Directive 2010/43/EU (July 2010), while from the second vertical line onwards (January 2013) the rolling window estimates are based on post-Directive observations only. Source: authors' calculations based on Refinitiv Lipper.

Leverage and asset manager behavior

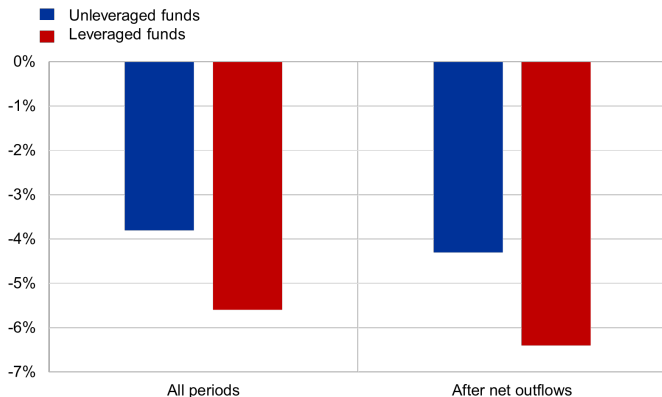
- Following adverse price movements, managers of leveraged funds are expected to sell more assets to maintain leverage targets and meet margin calls or increased haircuts
- If these sales impose additional costs on remaining investors
⇒ direct evidence that leverage can amplify the negative externality in investors' redemption decisions
- We extend Timmer's (2018, JFE) procyclical trading model by interacting lagged security price changes with fund-level leverage

Leverage and asset manager behavior: methodology

$$\text{Netbuy}_{i,s,t} = \beta_1 \Delta \text{SecPrice}_{i,s,t-1} + \beta_2 \Delta \text{SecPrice}_{i,s,t-1} * \text{Leveraged}_{i,t-1} \\ + \beta_3 \text{Leveraged}_{i,t-1} + \beta_4 \text{Controls}_{i,t-1} + \epsilon_{i,t},$$

- β_2 = impact of leverage on procyclical behavior of fund managers
- $\text{Netbuy}_{i,s,t}$ = change in the log of the nominal amount held of security s at quarter t given the fund's trades
- $\Delta \text{SecPrice}_{i,s,t}$ = change of the log price of the security
- $\text{Controls}_{i,t}$ include: fund-level controls (cash holdings, the expense ratio, load costs, log(TNA), 12-month fund return volatility) & security, fund and time-fixed effects
- **Model variants:** (i) β_2 interacted with net outflows; (ii) absolute VaR as proxy for leverage

Leverage and asset manager behavior: sale sensitivity to a 10% security price decline



This chart shows the predicted net sales following a 10% security price decline, based on the estimated coefficients from the regression model. The left side shows the procyclical behavior for the full sample, while the right side shows the procyclical behavior after net outflows. Source: authors' calculations based on Refinitiv Lipper.

Conclusion

- Loosened EU regulatory restrictions have allowed funds to make greater use of derivatives, increasing leverage for some bond funds
- Leverage through derivatives is an important factor in investors' redemption decisions after poor fund performance
- Managers in leveraged funds react more procyclically to security price changes than those in unleveraged funds (in particular after outflows)
- Findings suggest that leverage can amplify fragility in bond mutual funds

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