Ratings-Driven Demand and Systematic Price Fluctuations

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1. Endogenous Inattention and Risk Specific Price Underreation in Corporate Bonds
2. What Drives the Size and Value Factors?
3. What Do Mutual Fund Investors Really Care About?
4. Detail Bond Investors and Credit Ratings
5. Discontinued Positive Feedback Trading and the Decline of Return Predictability

- Market Microstructure
- Investor Behavior
- Market Liquidity

Mutual funds' performance, ratings and flows

1. High stock ownership by retail-owned mutual funds
2. Financial advice play a central role in driving flows and shaping financial markets
3. Morningstar ratings are the most prominent financial advice that U.S. mutual fund investors follow
4. Morningstar ratings were broadly aligned with mutual funds' past performance
5. Mutual fund flows can generate large price pressure in the underlying stocks

past performance $\rightarrow$ ratings $\rightarrow$ flows $\rightarrow$ price pressure

June 2002 Morningstar rating methodology reform

Before June 2002

- Morningstar rated all mutual funds, regardless of their style-tilts, based on their performance ranking
- Fund ratings were highly dependent on style
- Following the dot-com crash, many fund managers complained that their ratings dropped sharply and argued that ratings barely reflected contributions

After June 2002

- Morningstar began benchmarking funds against peer funds within their style
- The revised methodology removes the style-performance component from the fund ranking

Fund ratings became balanced across styles

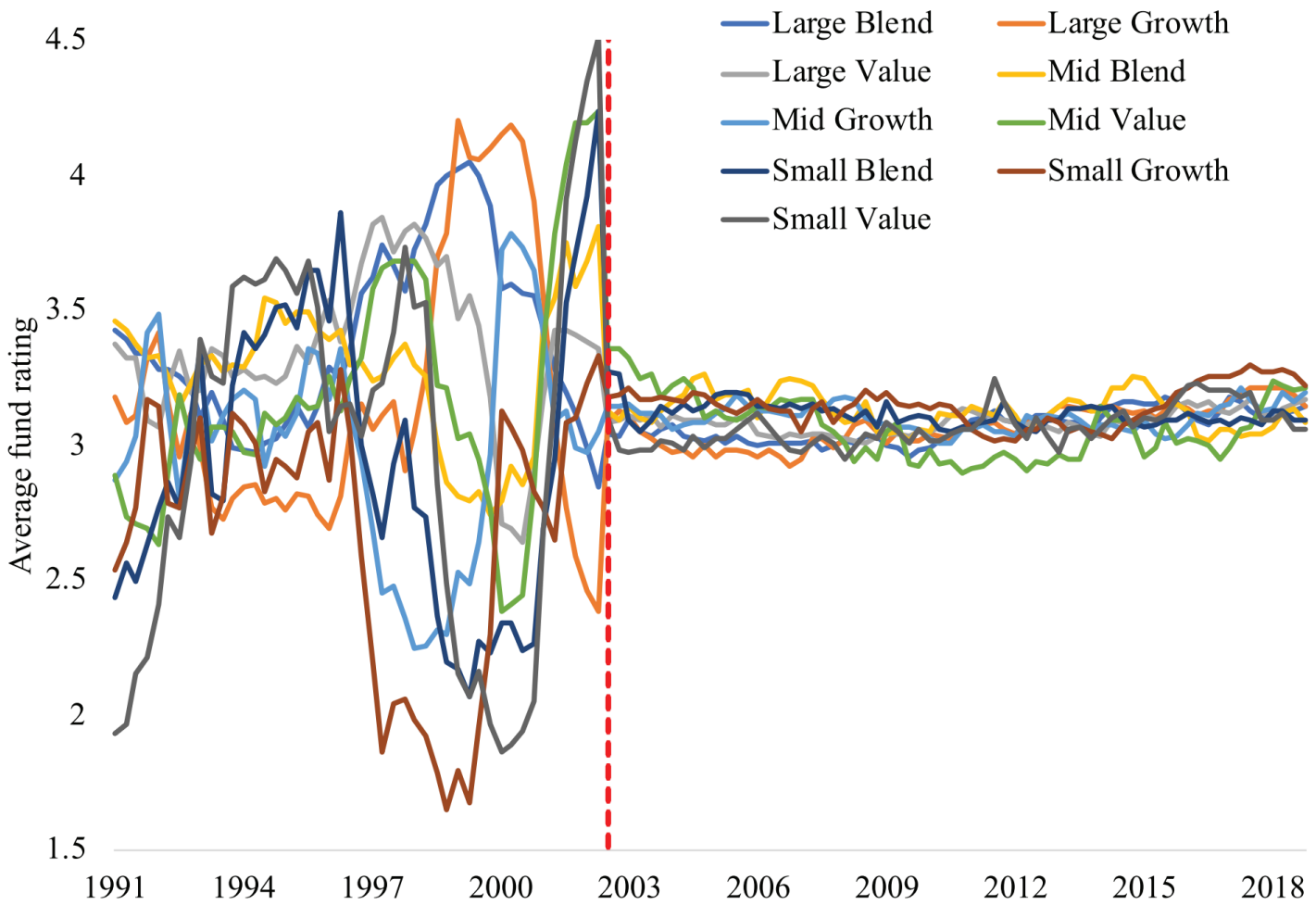


Figure 1: Morningstar fund rating by style

Variable: Mutual fund sample

- Monthly fund returns and total net assets from CRSP ($\text{Ret}_{j,t}$ and $\text{TNA}_{j,t}$ for fund j in month t)
- Quarterly fund holdings from Thomson Reuters' S12
- Ratings and style categories from Morningstar Direct

The fund flow is defined as the net flow into the fund divided by lagged TNA:

$$\text{Flow}_{j,t} = \frac{\text{TNA}_{j,t}}{\text{TNA}_{j,t-1}} - \left(1 + \text{Ret}_{j,t}\right)$$

Variable: Stock- and style-level ratings

Stock-level ratings:

$$\text{Rating}_{i,t}^{\text{stock}} = \frac{\sum_{\text{fund } j \in J} \text{SharesHeld}_{i,j,t-1} \cdot \text{Rating}_{j,t}}{\sum_{\text{fund } j \in J} \text{SharesHeld}_{i,j,t-1}}$$

$$\Delta\text{Rating}_{i,t}^{\text{stock}} = \frac{\sum_{\text{fund } j \in J} \text{SharesHeld}_{i,j,t-1} (\text{Rating}_{j,t} - \text{Rating}_{j,t-1})}{\sum_{\text{fund } j \in J} \text{SharesHeld}_{i,j,t-1}}$$

Style-level ratings:

$$\text{Rating}_{\pi,t}^{\text{style}} = \sum_{i \in \text{style } \pi} w_{i,t-1}^{\pi} \cdot \text{Rating}_{i,t}^{\text{stock}}$$

$$\Delta\text{Rating}_{\pi,t}^{\text{style}} = \sum_{i \in \text{style } \pi} w_{i,t-1}^{\pi} \cdot \Delta\text{Rating}_{i,t}^{\text{stock}}$$

$$w_{i,t-1}^{\pi} = \frac{\sum_{\text{fund } j \in \text{style } \pi} \text{Price}_{i,t-1} \cdot \text{SharesHeld}_{i,j,t-1}}{\sum_{\text{fund } j \in \text{style } \pi} \text{TNA}_{j,t-1}}$$

Exogenous?

- While the reform was prompted by the dot-com crash and therefore did not occur on a random date, its exact timing is exogenous
- Morningstar rarely changes its methodology
- The reform is arguably the most significant change to date
- Investors' rating-chasing behavior did not change around the dot-com bust or the 2002 reform
- Unrelated to the specific channel of rating-induced flows and price pressures that we are interested in

How to examine the mechanism?

1. The key elements of the mechanism exist
   - Rating-chasing behavior
   - Price impact
2. Rating-driven demand $\rightarrow$ systematic return pattern
   - Effects of rating changes on style flows and returns
   - Examine the rating-driven style momentum strategy
   - Cross-sectional dispersion in style flows and returns
3. Event study
   - Performance of styles, by predicted rating impact
   - Placebo test: Other years
   - Other factors that may have affected style returns
   - Controlling for stock characteristics

Part I: Rating-Chasing Behavior and Price Impact

1. Investors chase ratings regardless of rating methodology
2. Stock-level rating-induced price pressures
3. Return predictability in the cross-section of stock returns

Investors chase ratings regardless of rating methodology

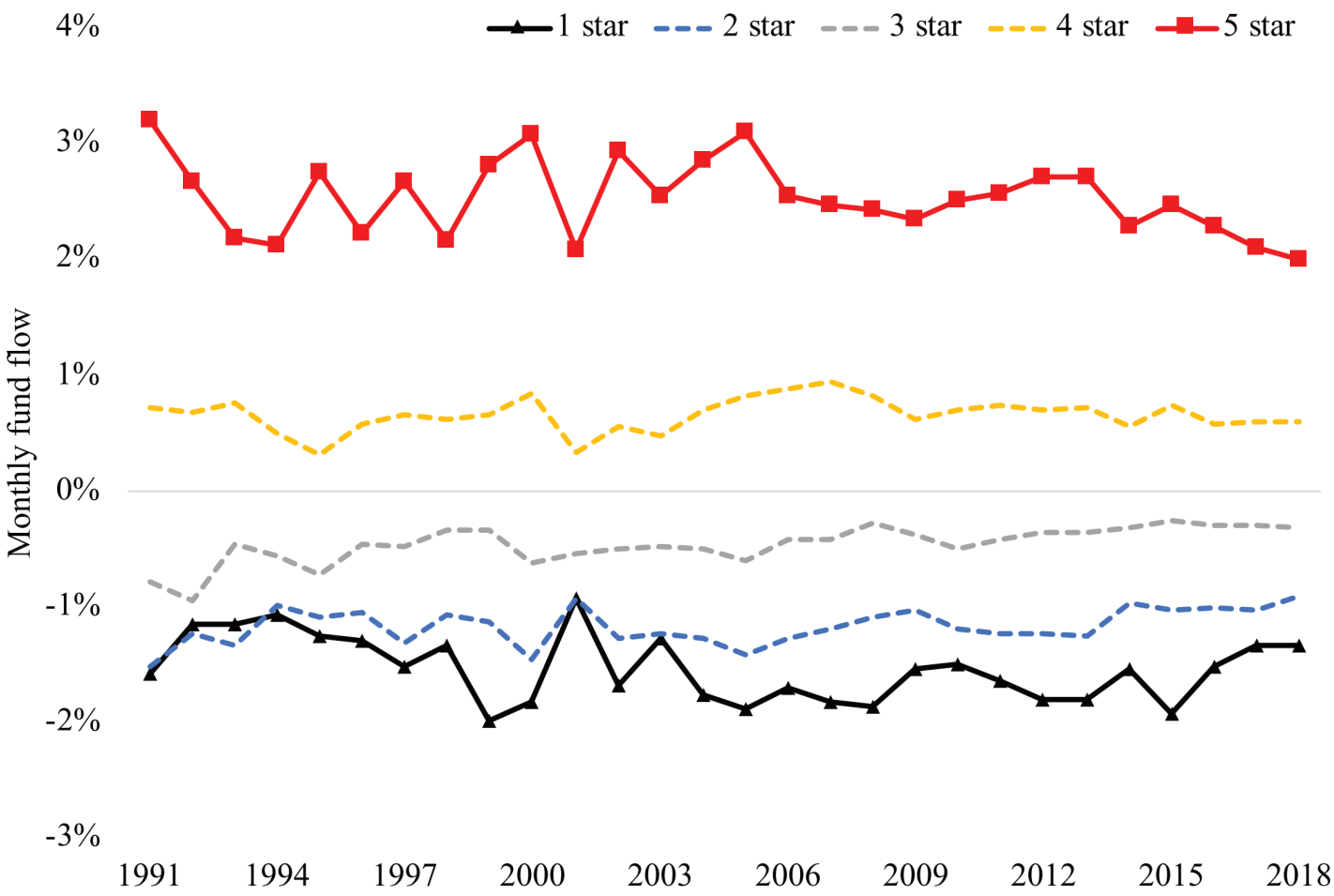


Figure 2: Average flows to mutual funds with different ratings

Investors chase ratings regardless of rating methodology

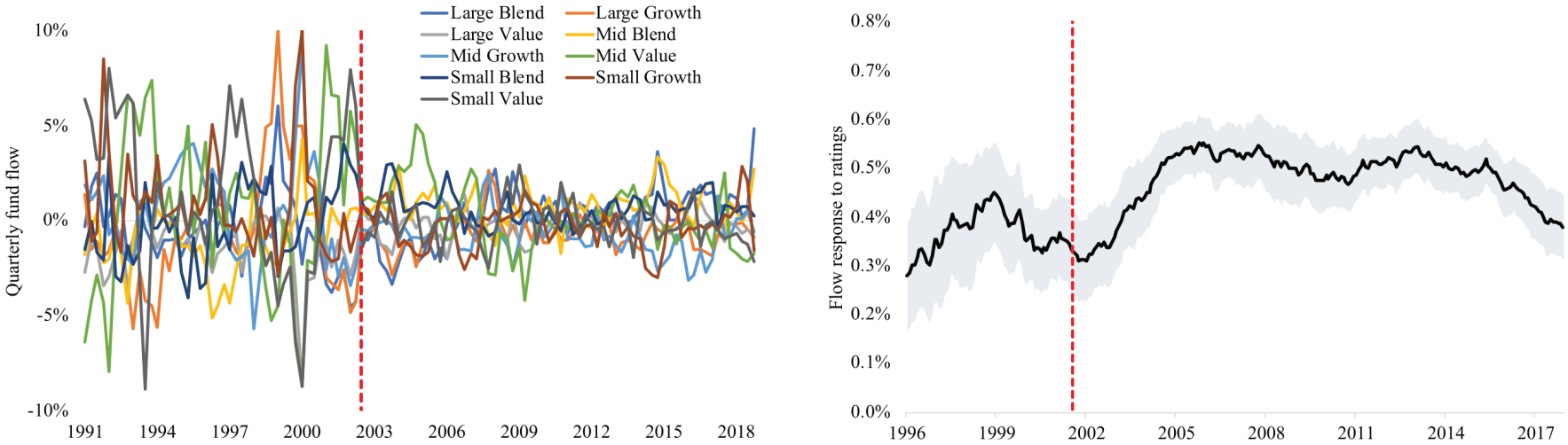
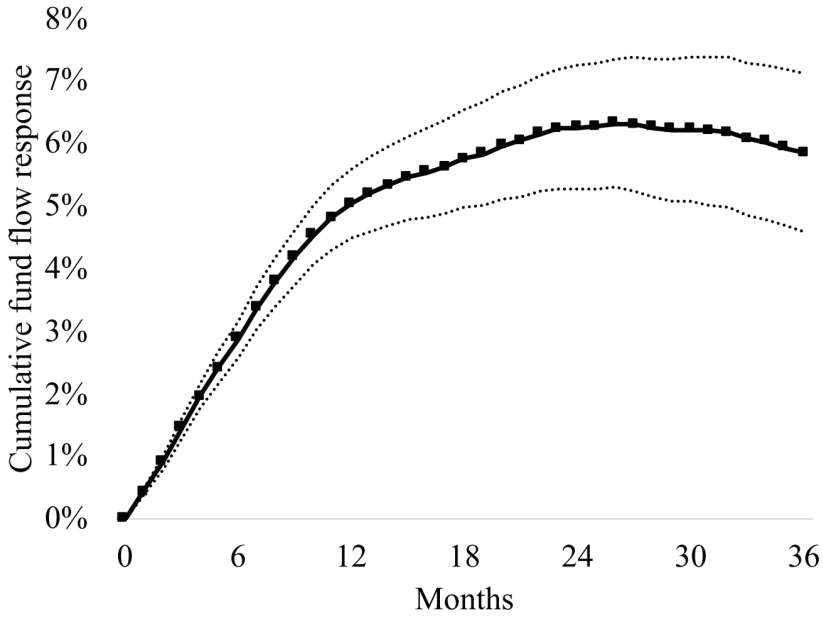


Figure 3: Relation between Morningstar ratings and fund flows

Stock-level rating-induced price pressures

1. Rating changes → Fund flows
   - $\text{Flow}_{j,t} = a + b_1 \Delta\text{Rating}_{j,t-1} + \cdots + b_{36}\Delta\text{Rating}_{j,t-36} + \gamma X_{j,t} + u_{j,t}$
   - Cumulative response coefficients: $b_1, b_1 + b_2, \cdots$
   - When controlling for past fund performance, discrete changes in ratings cause sizeable differences in flows
2. Flow-induced trading → Stock returns
   - Flow-induced trading: $\text{FIT}_{i,t} = \frac{\sum_{\text{fund } j \in J} \text{SharesHeld}_{i,j,t-1} \cdot \text{Flow}_{j,t}}{\sum_{\text{fund } j \in J} \text{SharesHeld}_{i,j,t-1}}$
   - $\text{Ret}_{i,t} = a + c_0 \cdot \text{FIT}_{i,t} + c_1 \cdot \text{FIT}_{i,t-1} + \ldots + c_{36} \cdot \text{FIT}_{i,t-36} + u_{i,t}$
   - Cumulative response: $c_0, c_0 + c_1, \cdots$
   - Immediate price pressure in the contemporaneous month and a complete reversion in the subsequent 1 to 2 years

Stock-level rating-induced price pressures



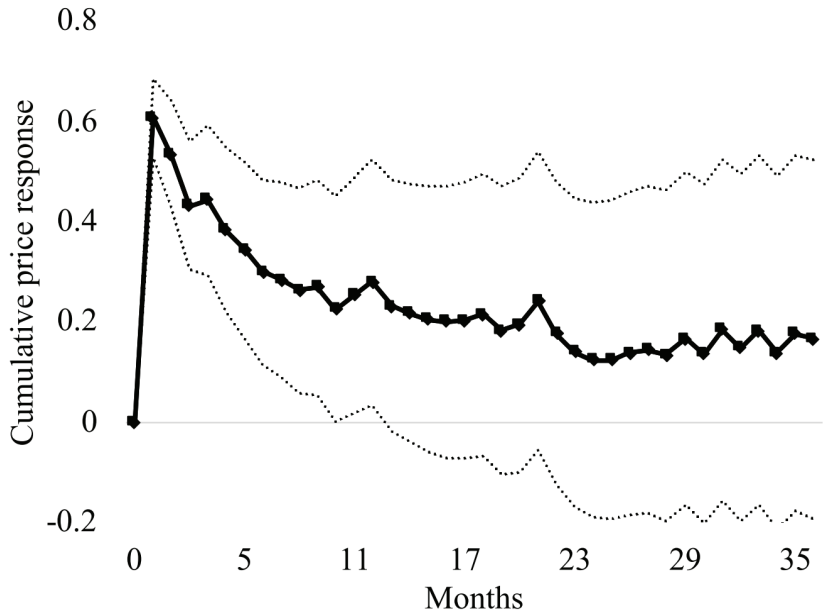


Figure 4: Rating changes, flow-induced trading and returns

Stock-level rating-induced price pressures

- Estimate the response of stock returns on the past 24 lags of stock-level rating changes
- Summarize past rating changes using $\text{ExpSum}(\Delta\text{Rating})_{i,t-1} = \sum_{k=1}^{12} \tau_k \cdot \Delta\text{Rating}_{i,t-k}$, where $\tau_k = \frac{12\cdot(1-\delta)}{1-\delta^{12}} \cdot \delta^{k-1}$ and $\delta = 0.76$

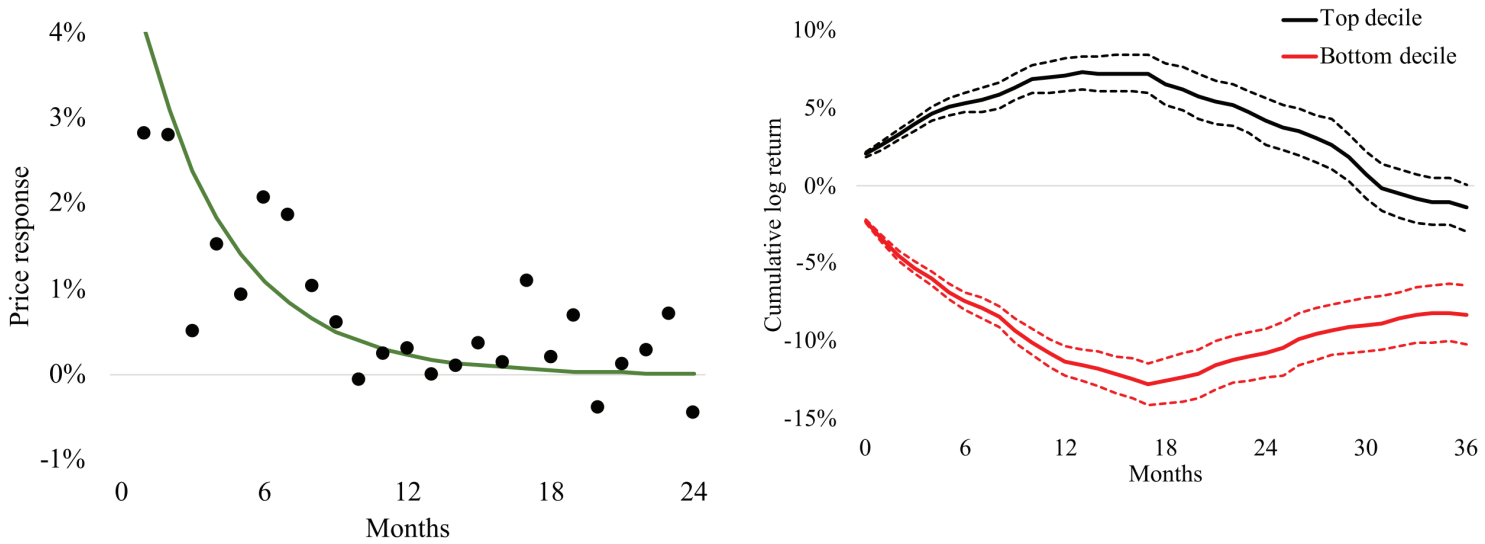


Figure 5: rating changes → stock return

Return predictability in the cross-section of stock returns

$$\text{Return}_{i,t} = d_1 \Delta\text{Rating}_{i,t-1-h\to t-1} + \gamma^s X^s_{i,t} + \gamma^f X^f_{i,t} + u_{i,t}$$

Return predictability from ratings and stock characteristics

	All stocks			Min. 3 funds		Ex. microcaps	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ExpSum(ΔRating)		0.17***		0.19***		0.26***	
		(3.99)		(4.21)		(3.59)	
ExpSum(ΔRating) ×%Held			0.16***		0.16***		0.17***
			(3.78)		(3.84)		(3.49)
Size	0.06	0.04	0.04	0.04	0.04	0.03	0.03
	(1.62)	(1.13)	(1.02)	(1.16)	(1.06)	(1.11)	(1.07)
Value	0.15**	0.14**	0.14**	0.12*	0.12*	0.06	0.07
	(2.09)	(2.21)	(2.22)	(1.92)	(1.94)	(0.86)	(0.90)
Profitability	0.11	0.11*	0.11*	0.12*	0.11*	0.09	0.09
	(1.50)	(1.74)	(1.73)	(1.79)	(1.78)	(1.28)	(1.24)
Investment	0.22***	0.21***	0.22***	0.20***	0.20***	0.14***	0.15***
	(4.62)	(4.88)	(4.94)	(4.75)	(4.80)	(3.77)	(3.84)
Momentum	0.15	0.14	0.13	0.15	0.15	0.20	0.19
	(1.07)	(0.99)	(0.94)	(1.07)	(1.03)	(1.24)	(1.22)
Reversal	0.06	0.05	0.05	0.05	0.05	0.04	0.04
	(1.36)	(1.21)	(1.24)	(1.20)	(1.24)	(1.01)	(1.08)
Fund-level controls	No	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	1,270,055	1,270,055	1,270,055	1,204,473	1,204,473	616,636	616,636
Average R^2	.030	.039	.039	.040	.040	.058	.058

Part II: Impact of Rating-Chasing Demand on Style Performance

1. Style-level rating-induced price pressures
2. Rating-driven style momentum strategy
3. Cross-sectional dispersion in style flows and returns

Style-level rating-induced price pressures

Style-level changes in Morningstar ratings:

$$\text{ExpSum}(\Delta\text{Rating})_{\pi,t-1} = \sum_{i\in\pi} w^{\pi}_{i,t-1} \cdot \text{ExpSum}(\Delta\text{Rating})_{i,t-1}$$

Rating-induced price pressures in style portfolios

	Months:	1–6	7–12	13–24	25–36
Monthly flow (%)	Before June 2002	1.14***	0.92***	0.38*	−0.25
		(0.33)	(0.28)	(0.23)	(0.19)
	After June 2002	0.09	−0.09*	−0.04	−0.02
		(0.07)	(0.05)	(0.05)	(0.05)
	Before - After	1.05***	1.01***	0.42*	−0.22
		(0.34)	(0.29)	(0.23)	(0.19)
Monthly return (%)	Before June 2002	0.76**	0.39	−0.04	−0.58***
		(0.31)	(0.35)	(0.22)	(0.22)
	After June 2002	−0.07*	−0.04	−0.05	0.04
		(0.04)	(0.06)	(0.05)	(0.04)
	Before - After	0.83***	0.43	0.02	−0.62***
		(0.32)	(0.36)	(0.23)	(0.23)

Profitability of the rating-driven style momentum strategy

- A rating-based style momentum strategy would be profitable before June 2002, but not afterward

Rating-induced style momentum strategy before and after June 2002

A. Return (demeaned)

	Bot.	2	3	4	5	6	7	8	Top	Top − Bot.
Before 2002	−0.42*	−0.45**	−0.25	0.00	−0.08	0.21	−0.06	0.49**	0.54**	0.96**
	(0.22)	(0.22)	(0.18)	(0.17)	(0.11)	(0.15)	(0.16)	(0.23)	(0.24)	(0.44)
After 2002	−0.02	0.08	−0.06	0.08	−0.07	0.04	−0.07	0.04	−0.01	0.01
	(0.08)	(0.07)	(0.08)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.09)	(0.15)

B. CAPM alpha

	Bot.	2	3	4	5	6	7	8	Top	Top − Bot.
Before 2002	−0.24	−0.29	−0.11	0.23	0.13	0.46**	0.20	0.71***	0.82***	1.06***
	(0.23)	(0.23)	(0.18)	(0.18)	(0.16)	(0.19)	(0.23)	(0.27)	(0.29)	(0.37)
After 2002	−0.01	0.09	−0.02	0.12	−0.05	0.05	−0.06	0.08	0.04	0.05
	(0.11)	(0.11)	(0.10)	(0.09)	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.15)

Cross-sectional dispersion in style flows and returns

If "ratings drive flows and then lead to price impact" is correct, we should observe a decline in the dispersion in style flows and returns after the reform

Dispersion of style ratings, flows, and returns

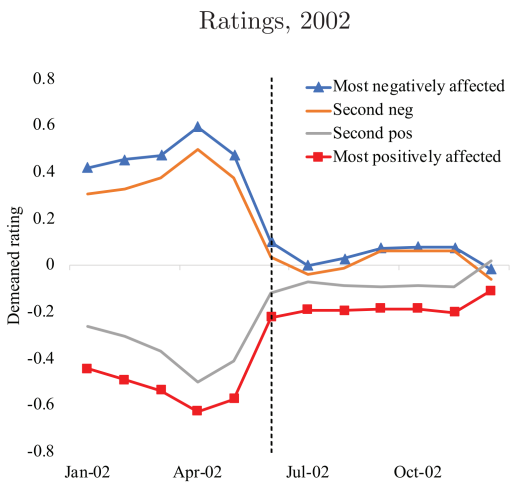
	Rating		Flow (%)		Return (%)	
Dependent variables:	Spread (1)	SD (2)	Spread (3)	SD (4)	Spread (5)	SD (6)
Full sample	−0.61***	−0.22**	−1.88***	−0.60***	−2.54***	−0.90***
	(0.22)	(0.11)	(0.23)	(0.08)	(0.68)	(0.25)
2000Q3–2004Q2	−0.53***	−0.20***	−1.74***	−0.63***	−4.45***	−1.53***
	(0.19)	(0.06)	(0.45)	(0.17)	(0.85)	(0.31)
Exclude 2000Q3–2004Q2	−0.62**	−0.22*	−1.91***	−0.59***	−2.11***	−0.76***
	(0.26)	(0.13)	(0.27)	(0.09)	(0.73)	(0.25)

Part III: Event study

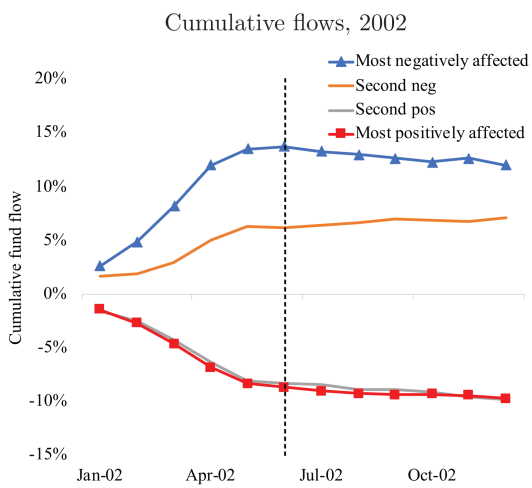
1. Performance of styles, by predicted rating impact
2. Placebo test: Other years
3. Other factors that may have affected style returns
4. Controlling for stock characteristics

Performance of styles, by predicted rating impact

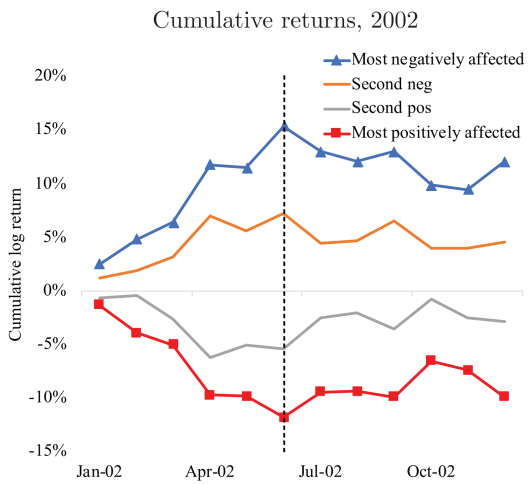
- An additional and independent test of rating-induced demand effects on style returns
- Ensure that the rating changes are primarily caused by the methodology change
- Reduces the chance that our findings are confounded by other events



Average style ratings



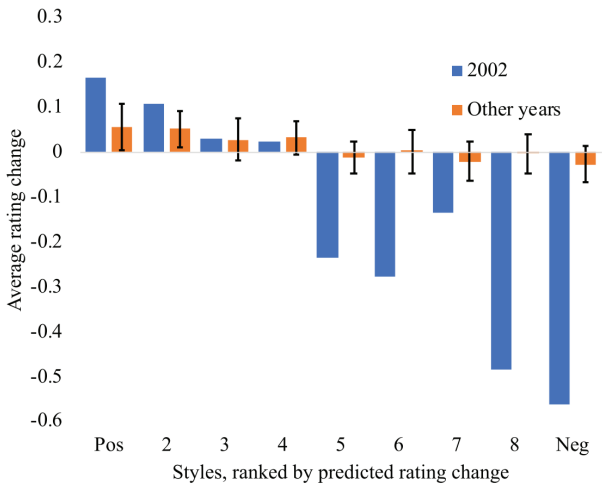
Cumulative style flows



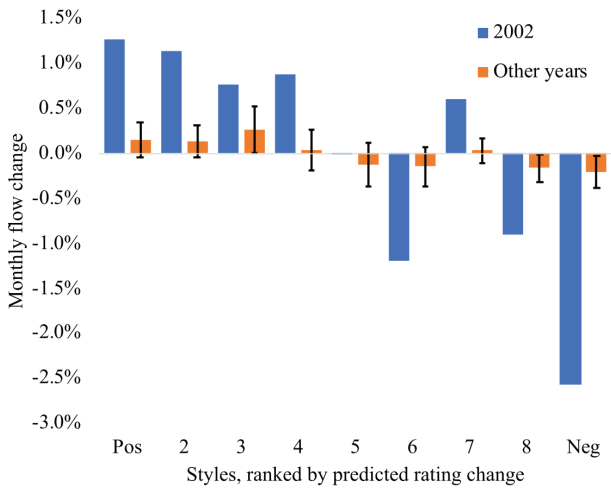
Cumulative style returns

Placebo test: Other years

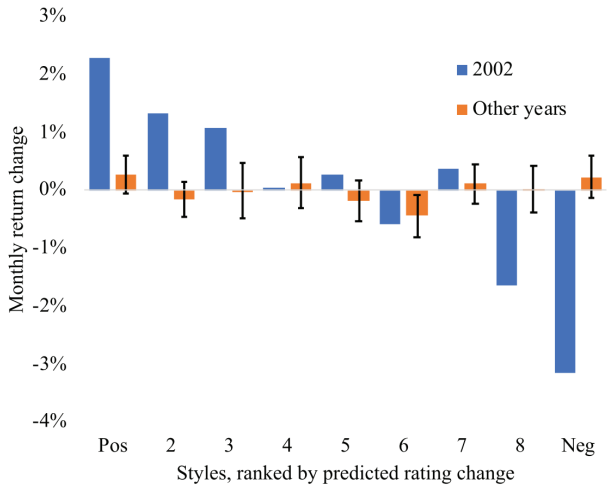
Rerunning in all years other than 2002



Ratings change: 2002 vs. placebo



Flow change: 2002 vs. placebo



Return change: 2002 vs. placebo

Other factors that may have affected style returns

- Event study methodology assumes that no other sudden style-level shocks occurred around June 2002 that could have caused the patterns
- The in-existence of such shocks is a key assumption that merits further validation

1. No discernible sudden change in fundamentals (ROA and ROE) around June 2002
2. 13F institutions traded into (out of) styles with high (low) pre-2002 ratings, before halting suddenly right after June 2002
3. A general slow rise in short interest across all styles over the window but no clear change around the event

Controlling for stock characteristics

- One might still argue that our results could be driven by sudden characteristics-related return changes that happened for other reasons
- "Predicted rating changes explain return changes" also take place at the stock level after controlling for size and book-to-market ratio characteristics
- Even after controlling for characteristics, we should still expect to see an effect

$$\text{Rating}_{i,t}^{\text{idiosyncratic}} = \text{Rating}_{i,t} - \text{Rating}_{\text{size-book/market portfolio } p,t}$$

$$\text{Ret}_{i,t}^{\text{idiosyncratic}} = \text{Ret}_{i,t} - \text{Ret}_{\text{size-book/market portfolio } p,t}$$

Controlling for stock characteristics

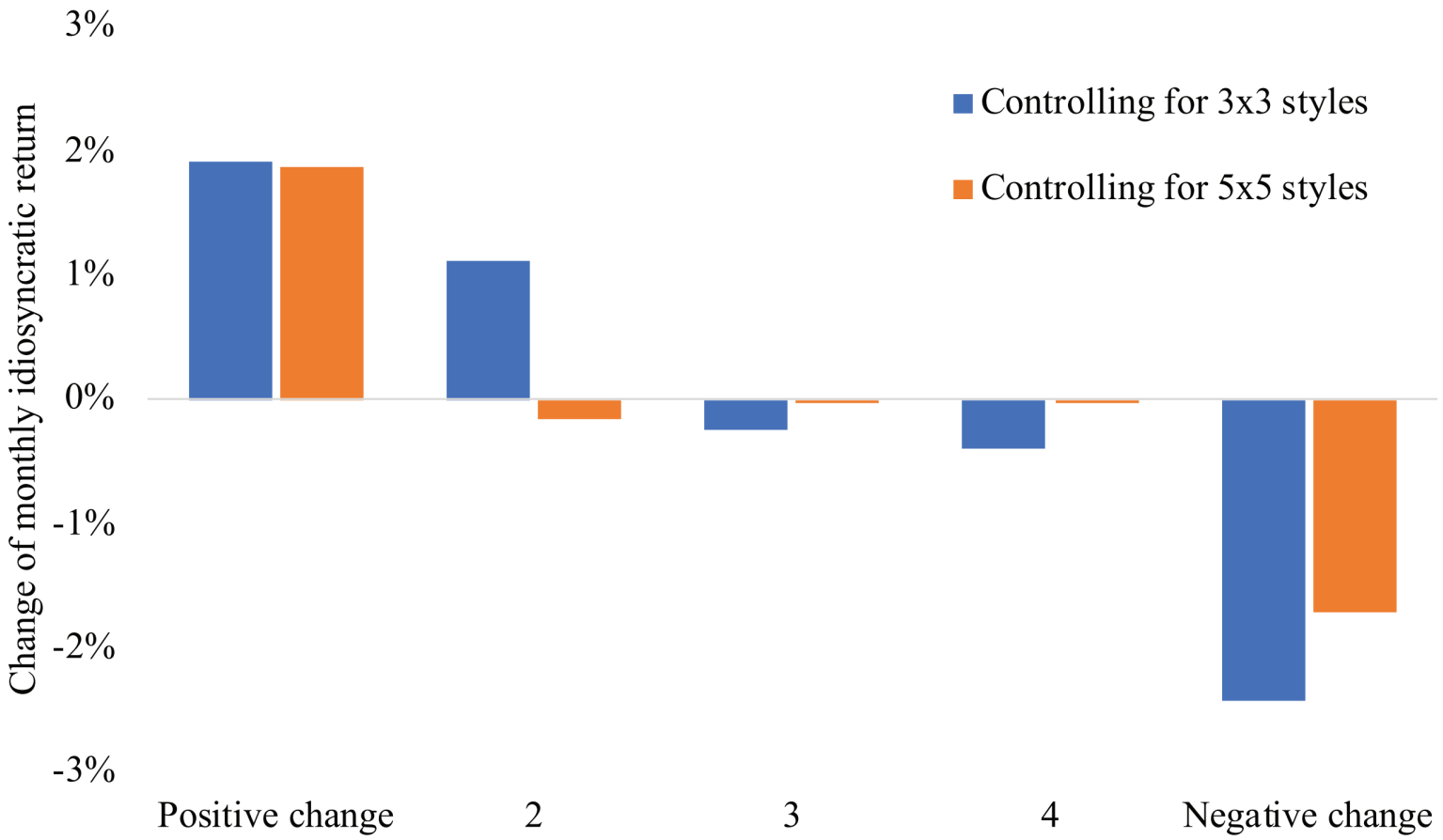


Figure 6: Stocks sorted by predicted idiosyncratic rating

Conclusion

- Morningstar rating-driven household demand for mutual funds contributes to economically significant price fluctuations at the style level
- These findings should alter the way economists interpret systematic price movements: instead of solely reflecting fundamental risks, they also may be determined by non-fundamental demand

Thoughts after reading

- Prose: the form is scattered while the spirit remains
- Completeness of the story
- More than statistical tests
- A new perspective of the story

Thanks!