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Bond funds' risk-taking and monetary policy

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Motivation



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We ask whether bond funds' search for yield, means they lower the credit quality of their portfolios...

...And whether this is explained by monetary policy.

Risk score rule:

BBB- = 10

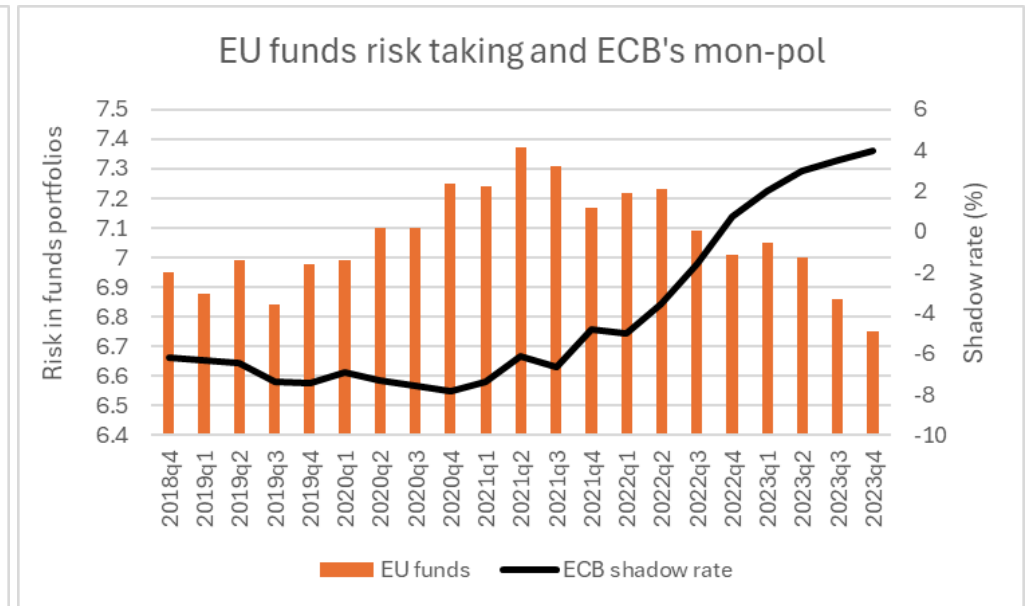
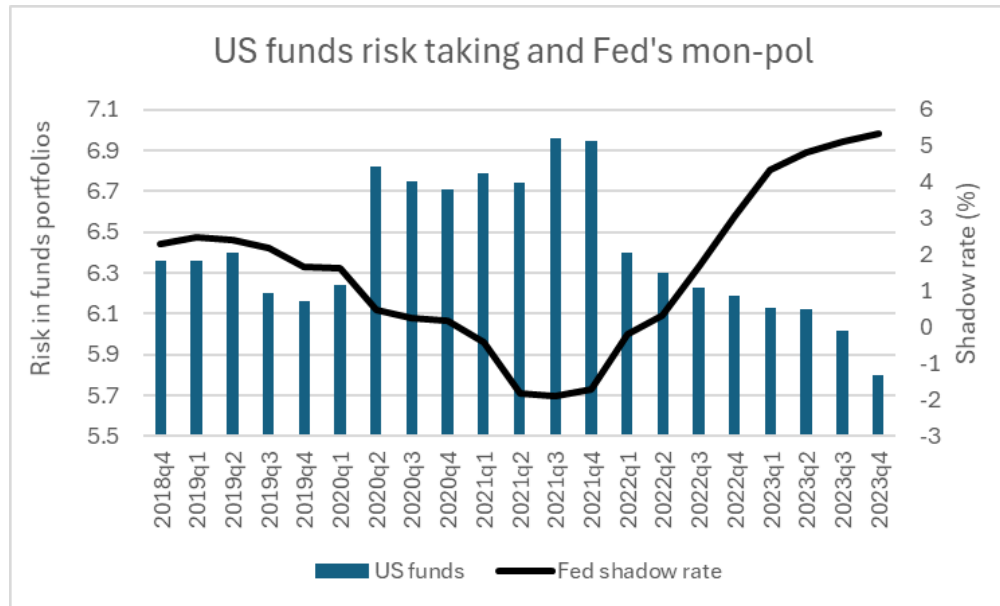
BBB = 9

BBB+ = 8

A- = 7

A = 6

A+ = 5



Research focus



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■ Research questions:

- *Does monetary policy affect the risk-taking behaviour of bond funds?*
- *Are the effects of mon-pol easing on investors' risk-taking asymmetric across different policy tools?*
- *How do the risk-taking effects of the Fed compare to those of the ECB?*

■ Key findings

- Yes, monetary policy significantly affects bond fund risk taking, especially through unconventional measures like asset purchases.
- Fed's policies have a stronger impact:
 - **Monetary easing (2020-2022) lowered the median rating of bonds held by investment funds by about 0.5-1 notch, in their median-tenor portfolios, and up to 1.5 to 2 notches for longer bonds (>10 years).**
- ECB effects are more muted and concentrated in longer duration holdings
 - **Monetary easing (2020-2022) lowered the median rating of bonds held by investment funds by 0.15-0.2 notch and up to 0.25-0.3 notches for longer bonds (>10 year).**

Data set



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Period examined: **2018:Q4 to 2023:Q3**

We gauge risk-taking decisions by using microdata:

(a) Security-level data, comprising over **>684,000 securities** (source: LSEG Workspace)

- Market & book values, maturities & tenors, currencies, credit ratings, parent company etc.

(b) Fund-level data (source: LSEG Lipper)

- Portfolios of all **US bond funds (~5,000)**; **EU bond funds (~2,500)** with aggregate fund value of more than 250 mn.
- Over **45 million fund-security observations**, from which we construct our dependent and other (fund- or security-level) explanatory variables.

Related literature

Our paper relates to several strands in the extant literature:

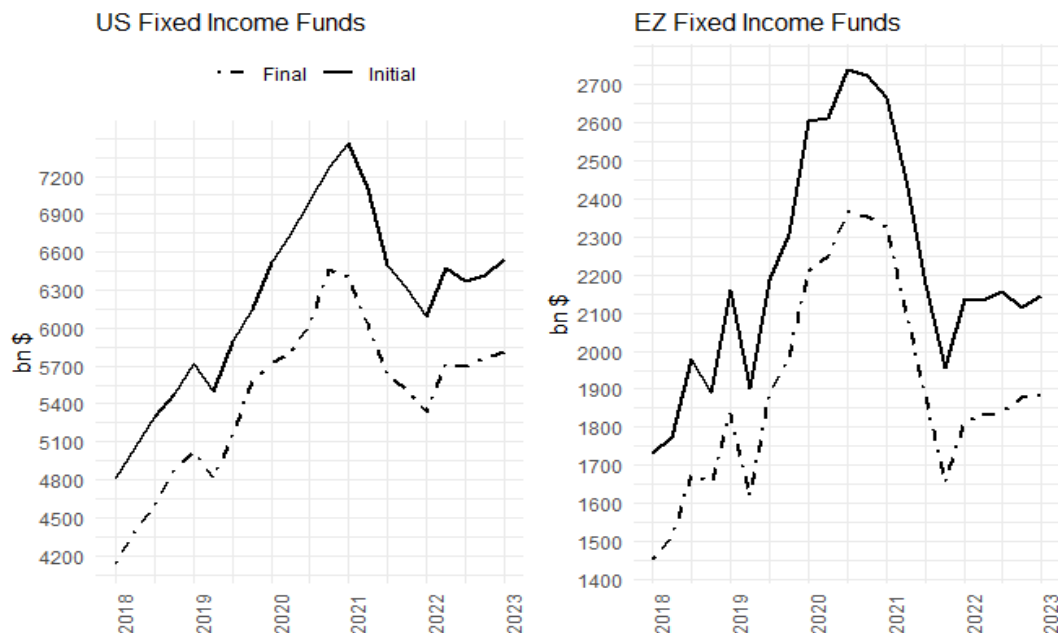
- **Demand-based asset pricing** (Kojien & Yogo 2019, Kojien *et al.* 2021, Albertazzi *et al.* 2021)
- **Risk-taking channel** (e.g. Gambacorta 2009, Bauer *et al.* 2015, Giuzio *et al.* 2021, Miranda-Agrippino and Ricco 2023)
- **Financial market effects of monetary policy** (e.g. Bauer *et al.* 2015, Albertazzi *et al.* 2021, Alpanda and Kabaca 2019, Hau and Lai 2016)
- **Portfolio allocation** (Choi and Kromlund 2018, Kaufmann 2023, Nenova 2025, Delikouras *et al.* 2025).

The data set

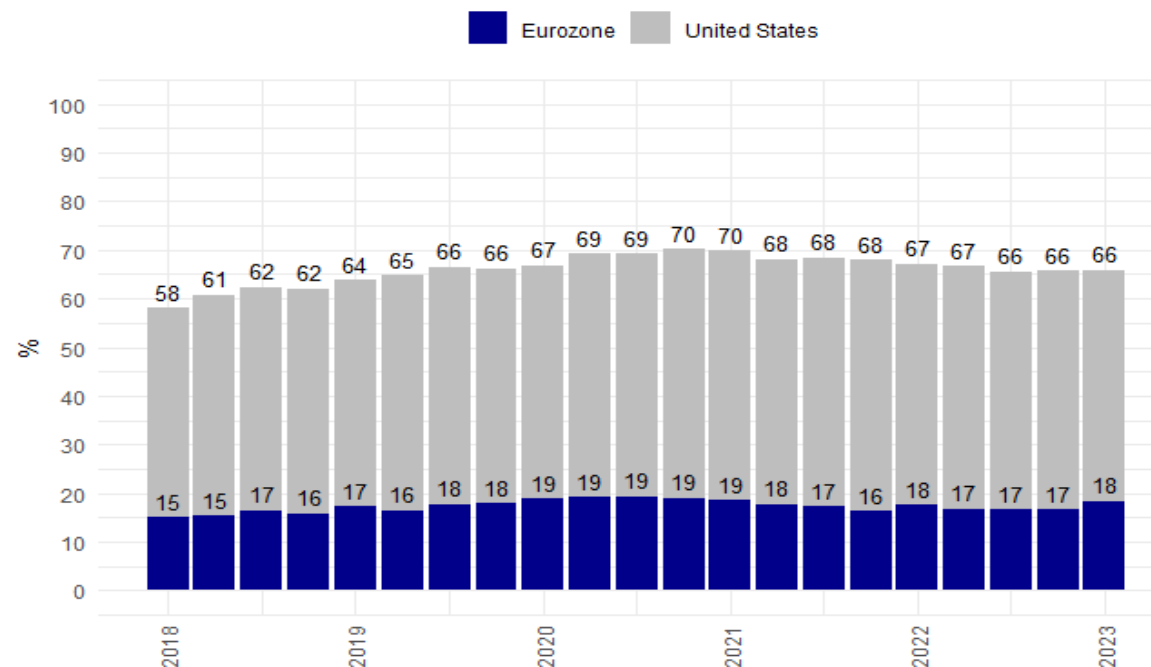


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Funds sample before and after filters:



Coverage (vs. global market):



- For US bond funds from about \$7.5 trn (peak value) we capture \$6.5 trn;
- For EU bond funds from about \$2.8 trn (at peak) we capture \$2.3 trn.
- The sample we have collected represents 60 to 65% of the international market for bond funds.

Bond fund j's portfolio

We can illustrate the fund j's portfolio based on the book value of the securities incorporated in it:

$$FBV_t = \sum_{i=1}^I BV_{i,t}$$

Where:

FBV_t : book value of the fund, at time t ;

$BV_{i,t}$: book value of security $i \in \{1, 2, \dots, I\}$ at time t .

Then, we calculate the weight (ω_t^i) of each security in the hypothesized fund's portfolio as follows:

$$\omega_t^i = \frac{BV_{i,t}}{FBV_t}$$

This gives the proportional contribution of security i to the total book value of the fund at time t .

Securities risk profile



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We assign risk scores (c_t^i) to the securities portfolio based on their credit ratings (best rating among Fitch, Moody's, S&P):

Rating	Risk Score	Rating	Risk Score
AAA	1	CCC+	17
AA+	2	CCC	18
AA	3	CCC-	19
AA-	4	CC	20
A+	5	C	21
A	6	DDD	22
A-	7	SD	23
BBB+	8	RD	24
BBB	9	DD	25
BBB-	10	D	26
BB+	11	R	27
BB	12	NR	28
BB-	13		
B+	14		
B	15		
B-	16		

Risk taking measure

To quantify the overall risk of fund j 's bond portfolio at time t , we compute the **weighted average risk score** of the bond portfolio for each fund using the individual security weights and their respective risk scores:

$$Wc_{jt} = \sum_{i=1}^I \omega_{jt}^i \times c_t^i$$

Where:

Wc_t : the risk score of the fund j portfolio, at time t .

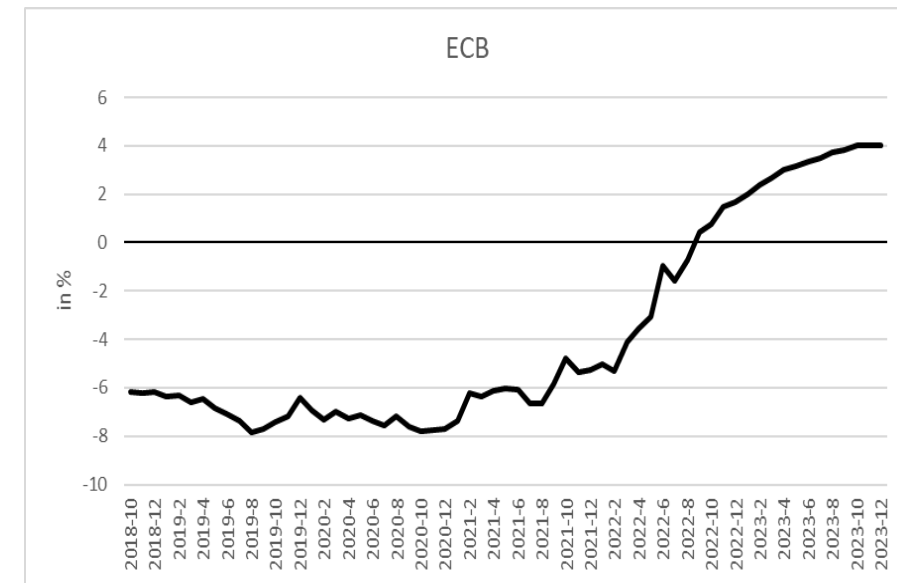
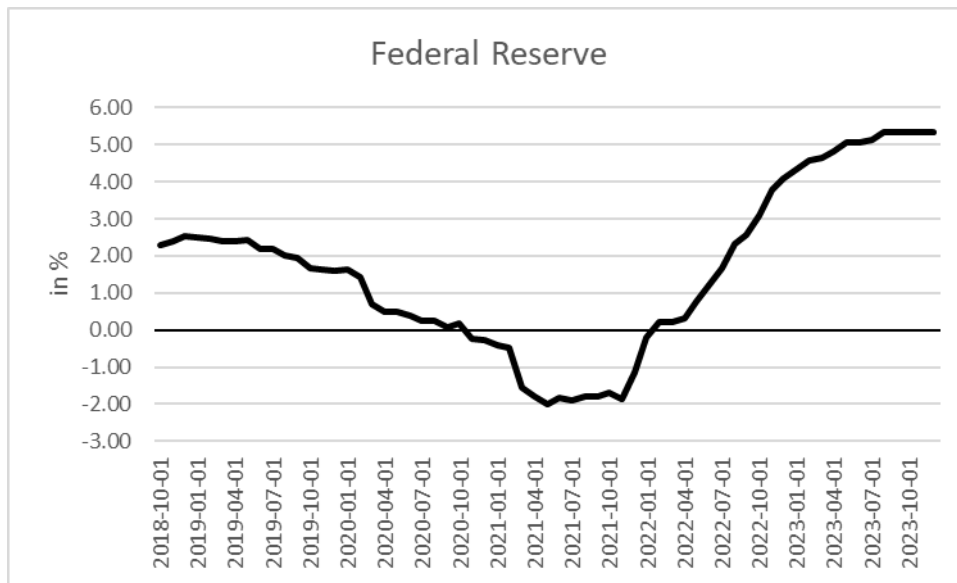
ω_{jt}^i : the weight of each security i ($i \in \{1, 2, \dots, I\}$), at time t in the portfolio of fund j .

c_{jt}^i : the risk score of security i , at time t .

This metric captures the fund's exposure to credit risk based on its composition and the quality of its holdings.

Monetary policy variables

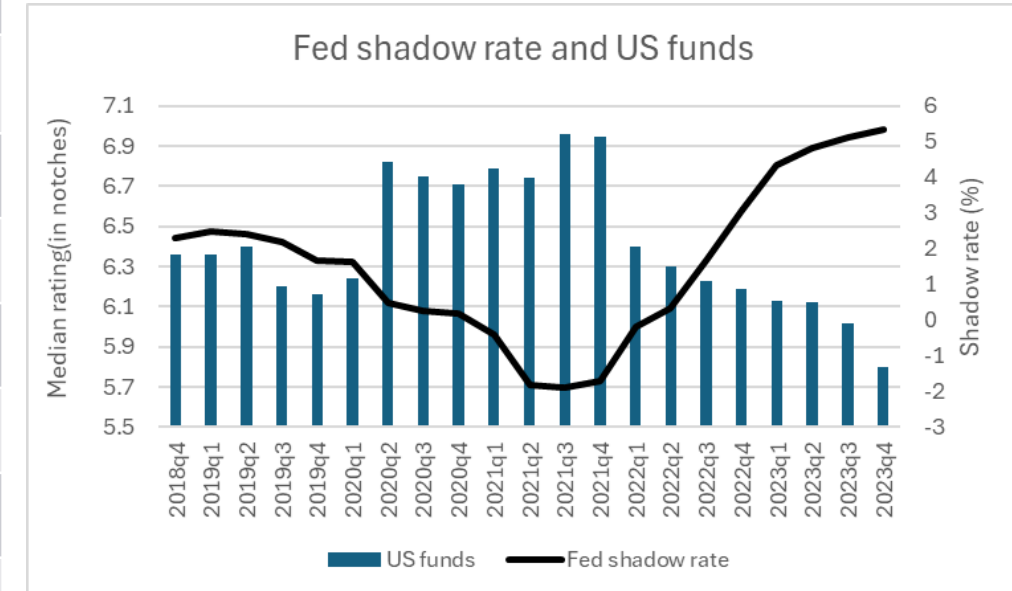
- We measure monetary policy by using shadow rates provided by Wu and Xia (2016).
 - Shadow rates reflect both interest-rate and unconventional monetary policies (as they are not constrained at zero).
- We also employ [pure monetary-policy shocks](#) (Jaročinski and Karadi 2020) initially as explanatories and then as instrumental variables.



First findings (a) Fed

Dependent variable: Weighted average risk score

JK MP shock	0.002 (0.341)			
JK MP shock*Maturity	-0.205*** (0.029)			
Sh.FFR		-0.229*** (0.021)		
Sh.FFR*Maturity		-0.018*** (0.002)		
EFFR			-0.119*** (0.020)	
EFFR*Maturity			-0.008*** (0.001)	
(Sh.FFR-EFFR)				-0.025 (0.030)
(Sh.FFR-EFFR)*Maturity				-0.018*** (0.002)
2wFE	Yes	Yes	Yes	Yes
Fund controls	Yes	Yes	Yes	Yes
Security controls	Yes	Yes	Yes	Yes
Clustered s.e.	Fund	Fund	Fund	Fund
Adj. R ²	0.283	0.285	0.285	0.286



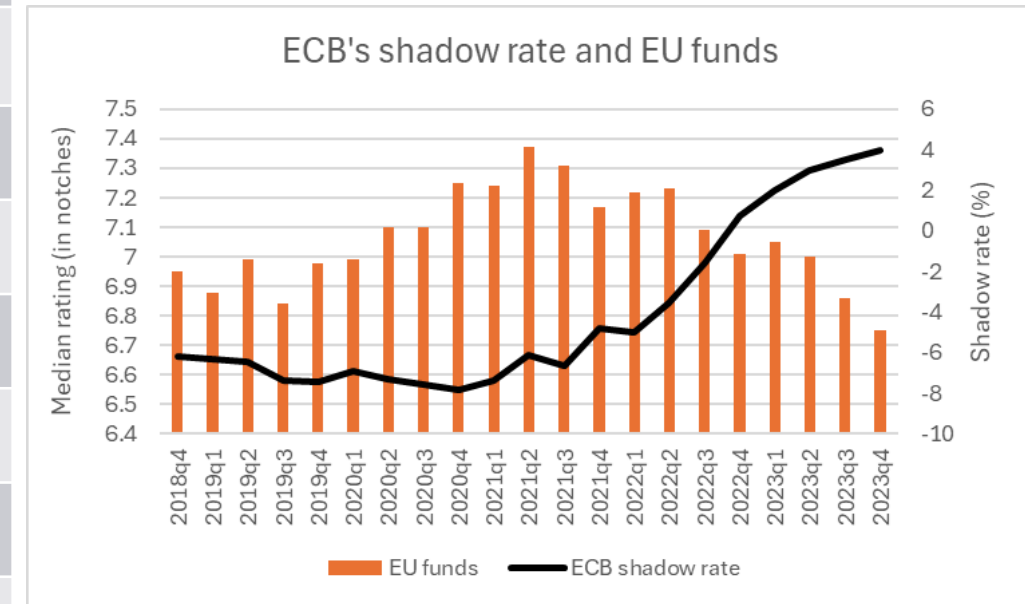
First findings (b) ECB



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Dependent variable: Weighted average risk score

JK MP shock	1.474*** (0.258)			
JK MP shock*Maturity	-0.088*** (0.019)			
Sh.DFR		-0.111*** (0.017)		
Sh.DFR*Maturity		-0.004*** (7.44x10 ⁻⁴)		
DFR			-2.663*** (0.381)	
DFR*Maturity			-0.009*** (0.002)	
(Sh.DFR-DFR)				-0.083*** (0.018)
(Sh.DFR-DFR)*Maturity				-0.006*** (0.001)
2wFE	Yes	Yes	Yes	Yes
Fund controls	Yes	Yes	Yes	Yes
Security controls	Yes	Yes	Yes	Yes
Clustered s.e.	Fund	Fund	Fund	Fund
Adj. R ²	0.258	0.285	0.285	0.285



IV setup



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IV equation—first stage:

$$\mathbf{MP}(\mathbf{Z})_t = \alpha_j + T_t + \beta_1 \cdot \mathbf{Z}_t + \beta_2 \cdot \mathbf{Z}_t \times \mathbf{Maturity}_{j,t} + \beta_3 \cdot \mathbf{Maturity}_{j,t} + \Gamma \cdot \mathbf{X} + e_{j,t}^2 \quad (\text{IV.1})$$

IV equation-second stage:

$$w_{j,t}^c = \alpha_j + T_t + \beta_1 \cdot \widetilde{\mathbf{MP}(\mathbf{Z})}_t + \beta_2 \cdot \widetilde{\mathbf{MP}(\mathbf{Z})}_t \times \mathbf{Maturity}_{j,t} + \beta_3 \cdot \mathbf{Maturity}_{j,t} + \Gamma \cdot \mathbf{X} + u_{j,t}^2 \quad (\text{IV.2})$$

$\mathbf{MP}_t$: the variables capturing **monetary policy effects**; we use: ECB's and Fed's shadow rates (SDFR & SFFR), EFFR & DFR, Jarocinski and Karadi MP and CBI shocks.

$\mathbf{X}$: vector of **controls**; weights per asset types (gvt bonds and corp bonds as %NAV), funds' returns, cash (%NAV) and median tenor.

$\mathbf{Z}$: **instrumental variables**; MP shocks and internal instruments.

ε, u : error terms

α_j, T_t : Fund and Time FEs.

Main findings (a) Fed (second stage)

Dependent variable: Weighted average risk score

	Overall mon-policy	Interest rates	Unconv. Mon-pol
Sh.FFR	-0.228*** (0.024)		
Sh.FFR*Maturity	-0.017*** (0.003)		
EFFR		-0.208*** (0.027)	
EFFR*Maturity		-0.009*** (0.001)	
(Sh.FFR-EFFR)			-0.334*** (0.029)
(Sh.FFR-EFFR)*Maturity			-0.018*** (0.003)
Controls			
Median Tenor	Yes	Yes	Yes
Cash	Yes	Yes	Yes
Govt	Yes	Yes	Yes
Corp-Fin	Yes	Yes	Yes
Corp-NonFin	Yes	Yes	Yes
Fund return	Yes	Yes	Yes
Fund return _{t-1}	Yes	Yes	Yes
Setup characteristics			
Fund FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster s.e.	Fund	Fund	Fund
Adj. R ²	0.078	0.078	0.076

We find that Fed's easing lowered the median rating of bond funds' portfolios:

- For every 100 bps lower rate (shadow) the median rating in the portfolio was downgraded by 0.23 of a notch; plus 0.1 of a notch for portfolios >10 year.
- I.e. a negative 5 p.p. shadow rate, explains a median credit quality **1.2 notches lower** than at zero; for longer portfolios **~2 notches lower**.

Effect of mon-pol on funds' risk-taking:

$$\widehat{\beta}_1 \cdot SFFR_t + \widehat{\beta}_2 \cdot SFFR_t \cdot Maturity_{jt}$$

$$= -0.228 * (-5) - 0.017 * (-5) * 10 = 1.94$$

Robustness (panel AB-GMM)

Fed			
	Overall mon-policy	Interest rates	Unconv. Mon-pol
MedianRisk _{t-1}	0.528*** (0.031)	0.544*** (0.031)	0.537*** (0.029)
SFFR	-0.014*** (0.005)		
SFFR*Maturity	-0.008*** (0.001)		
EFFR		-0.011* (0.007)	
EFFR*Maturity		-0.002** (0.001)	
(SFFR-EFFR)			0.008 (0.022)
(SFFR-EFFR)*Maturity			-0.010*** (0.002)
Controls			
Median Tenor	Yes	Yes	Yes
Cash	Yes	Yes	Yes
Govt	Yes	Yes	Yes
Corp-Fin	Yes	Yes	Yes
Corp-NonFin	Yes	Yes	Yes
Fund return	Yes	Yes	Yes
Fund return _{t-1}	Yes	Yes	Yes
Setup characteristics			
IV	AB	AB	AB
Cluster s.e.	Fund	Fund	Fund

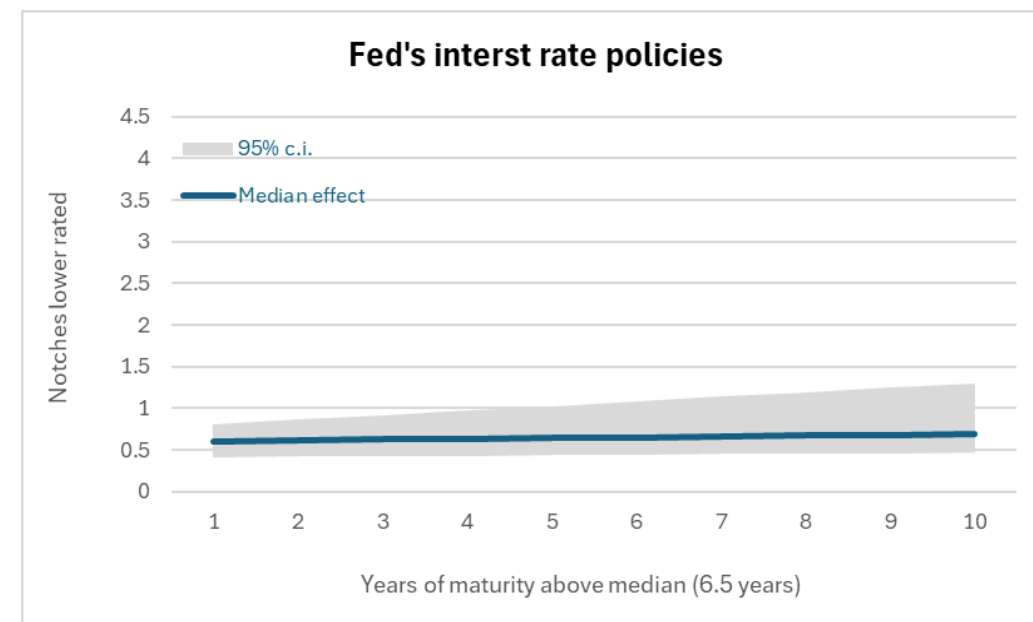
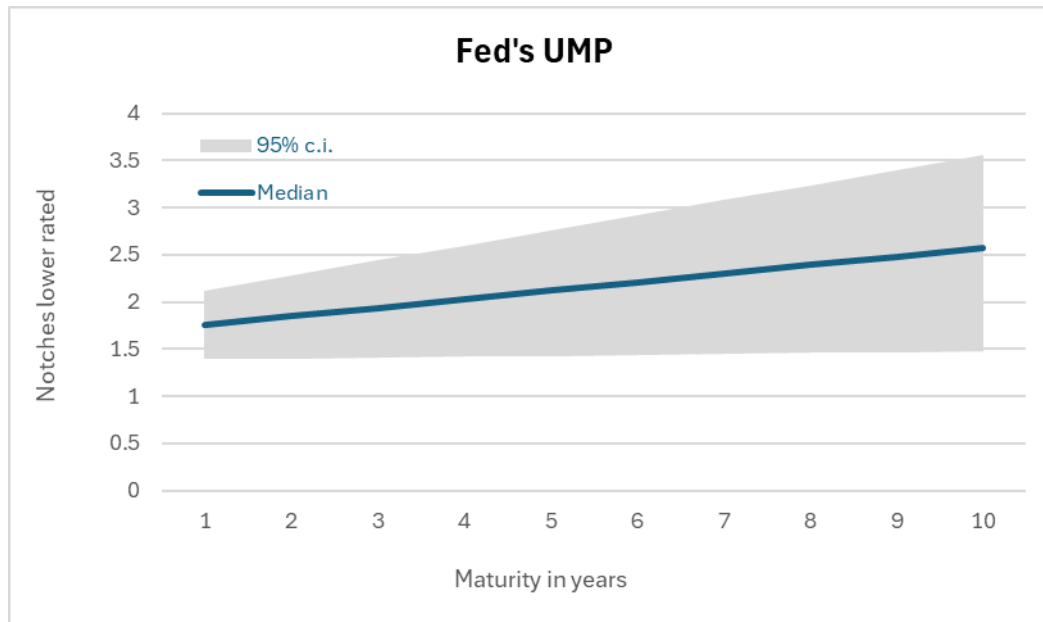
Dynamic GMM gives a somewhat more muted result:

- A -5% shadow rate corresponds to **1 notch decline in the median rating** of a portfolio of 10-year bonds.

Long-run GMM effect of mon-pol on funds' risk-taking:

$$\begin{aligned}
 & \frac{\widehat{\beta}_1 \cdot SFFR_t + \widehat{\beta}_2 \cdot SFFR_t \cdot Maturity_{jt}}{1 - \hat{\rho}} = \\
 & = \frac{-0.014 \cdot (-5) - 0.008 \cdot (-5) \cdot 10}{1 - 0.528} = \\
 & = 0.99
 \end{aligned}$$

Asymmetries across policy tools



- Fed's UMPs have a larger impact in the credit quality of bond funds' portfolios than interest-rate policies.
- Effects more pronounced for longer positions' credit quality.

Main findings (b) ECB (second stage)

Dependent variable: Weighted average risk score			
	Overall mon-policy	Interest rates	Unconv. Mon-pol
Sh.DFR	-0.002 (0.011)		
Sh.DFR*Maturity	-0.004*** (7.8x10 ⁻⁴)		
DFR		-6.194*** (0.654)	
DFR*Maturity		-0.008*** (0.002)	
(Sh.DFR-EDFR)			0.014 (0.018)
(Sh.DFR-EDFR)*Maturity			-0.006*** (0.001)
Controls			
Median Tenor	Yes	Yes	Yes
Cash	Yes	Yes	Yes
Govt	Yes	Yes	Yes
Corp-Fin	Yes	Yes	Yes
Corp-NonFin	Yes	Yes	Yes
Fund return	Yes	Yes	Yes
Fund return _{t-1}	Yes	Yes	Yes
Setup characteristics			
Fund FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster s.e.	Fund	Fund	Fund
Adj. R ²	0.078	0.078	0.076

We find that ECB's policies have a much more muted (than the Fed's) effect on the median rating of bond funds' portfolios:

- For every 100 bps lower rate (shadow) the median rating in the portfolio was downgraded by 0.04 and for each year larger than the median tenor, an additional 0.04 of a notch is deducted.
- Thus, a (hypothetical) negative 5 p.p. shadow rate, explains a credit quality **0.2 notches lower** than if rates are at the ZLB, for a portfolio of 10-year bond holdings.

Robustness (panel AB-GMM)

Fed			
	Overall mon-policy	Interest rates	Unconv. Mon-pol
MedianRisk _{t-1}	0.538*** (0.031)	0.557*** (0.030)	0.536*** (0.030)
Sh.DFR	-0.007* (0.004)		
Sh.DFR*Maturity	-0.001** (4.2x10 ⁻⁴)		
DFR		-0.019** (0.008)	
DFR*Maturity		2.23x10 ⁻⁴ (7.73x10 ⁻⁴)	
(Sh.DFR-DFR)			-0.005 (0.030)
(Sh.DFR-DFR)*Maturity			-0.003*** (6.3x10 ⁻⁴)
Controls			
Median Tenor	Yes	Yes	Yes
Cash	Yes	Yes	Yes
Govt	Yes	Yes	Yes
Corp-Fin	Yes	Yes	Yes
Corp-NonFin	Yes	Yes	Yes
Fund return	Yes	Yes	Yes
Fund return _{t-1}	Yes	Yes	Yes
Setup characteristics			
IV	AB	AB	AB
Cluster s.e.	Fund	Fund	Fund

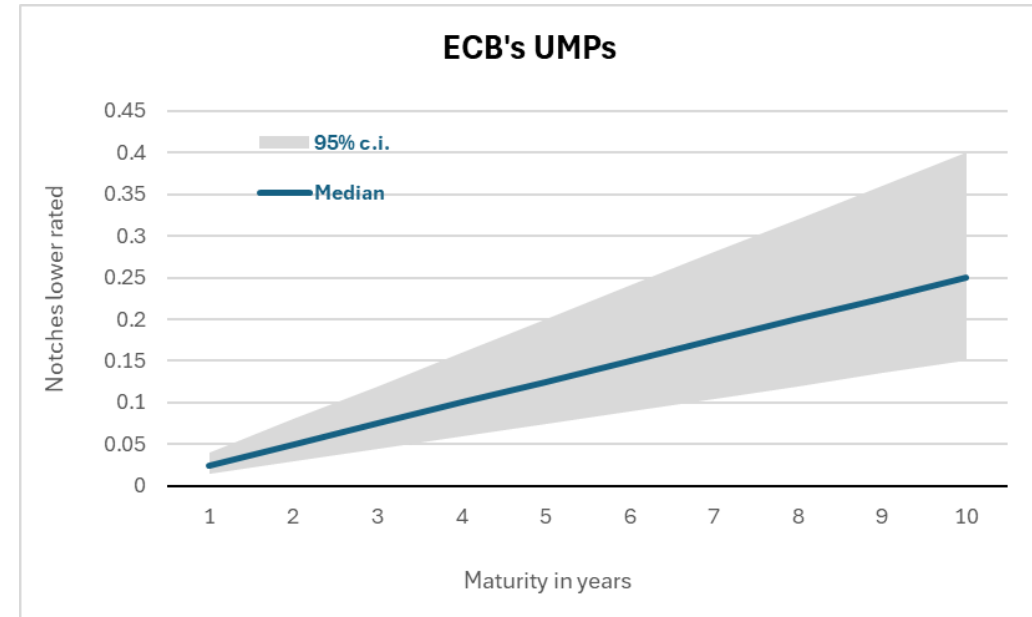
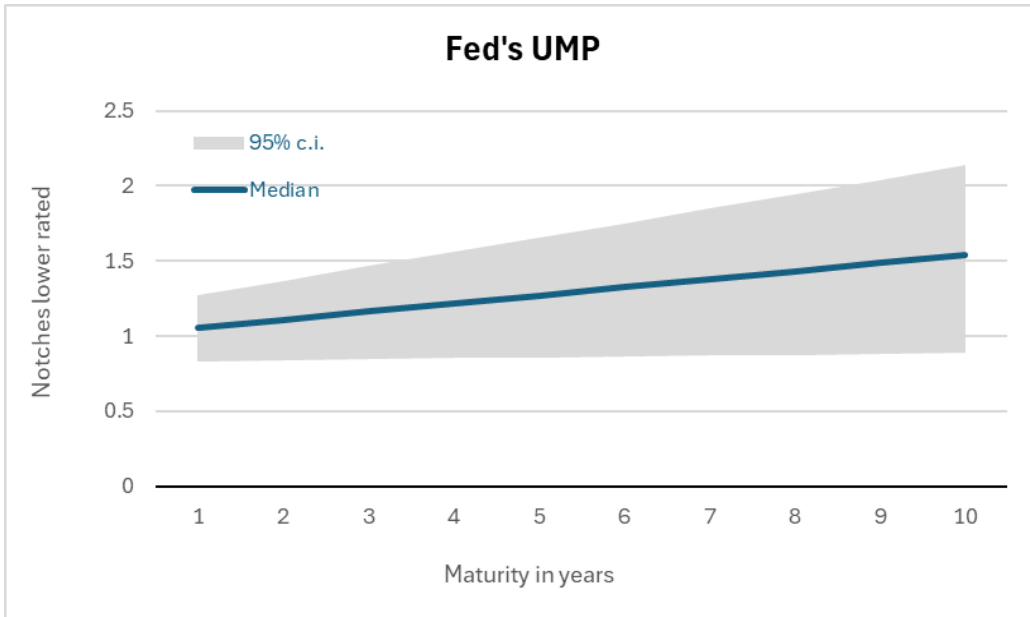
Dynamic GMM gives similar results:

A -5% shadow rate corresponds to 0.18 of a notch decline in the median rating of a portfolio of 10-year bonds.

Fed vs. ECB



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- Fed's asset purchases (and other UMPs) led to a reduction of the median rating by 1-1.5 notches (depending on the maturity of the bond).
- ECB's UMPs work mainly at the longer-end reducing the median rating by up to 0.2 of a notch (for long-term holdings).

Heterogeneities-Fed



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	Domicile		Size			Strategy		Leveraged		Institutional	
	US	European	Q(20%)	Q(20)<S<Q(80)	Q(80%)	Active	Passive	Yes	No	Yes	No
SFFR	-0.124*** (0.017)	-0.055** (0.008)	-0.321*** (0.073)	-0.221*** (0.033)	-0.329*** (0.052)	-0.303*** (0.029)	-0.006 (0.020)	-0.492 (0.126)	-0.234*** (0.071)	-0.352*** (0.054)	-0.213*** (0.029)
SFFR*Tenor	-0.018*** (0.004)	0.001 (0.002)	-0.037*** (0.008)	-0.013*** (0.004)	-0.016*** (0.004)	-0.019*** (0.003)	-0.002 (0.002)	-0.013 (0.008)	-0.017*** (0.003)	-0.007** (0.003)	-0.023*** (0.004)
IV: JK MP shocks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IV: SFFR_{t-1}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Asset controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covid dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund
N	2734	2341	1587	4317	642	4322	753	486	4961	1406	3669
Obs.	46015	35821	15087	47907	18605	69453	12383	3947	77657	21710	60126
Adj. R-sq	0.079	0.122	0.083	0.069	0.122	0.077	0.296	0.108	0.077	0.149	0.065

Heterogeneities-ECB



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	Domicile		Size			Strategy		Leveraged		Institutional	
	US	European	Q(20%)	Q(20)<S<Q(80)	Q(80%)	Active	Passive	Yes	No	Yes	No
Sh.DFR	0.022 (0.017)	-0.028** (0.006)	0.048 (0.029)	-0.001 (0.023)	-0.038 (0.024)	-0.011 (0.019)	-0.005 (0.013)	0.048 (0.072)	-0.016 (0.016)	0.015 (0.029)	-0.006 (0.0019)
Sh.DFR*Tenor	-0.005*** (0.001)	4.1x10 ⁻⁴ (6.3x10 ⁻⁴)	-0.006*** (0.001)	-0.004*** (0.001)	-0.002 (0.001)	-0.004*** (0.001)	-4.52x10 ⁻⁴ (3.84x10 ⁻⁴)	-0.002* (0.001)	-0.003*** (0.001)	-0.001 (0.001)	-0.005*** (0.001)
IV: JK MP shocks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IV: SDFR _{t-1}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Asset controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covid dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E.	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund	Fund
N	2734	2341	1587	4317	642	4322	753	486	4961	1406	3669
Obs.	46015	35821	15087	47907	18605	69453	12383	3947	77657	21710	60126
Adj. R-sq	0.081	0.122	0.083	0.071	0.116	0.077	0.296	0.099	0.078	0.144	0.065

Conclusions



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We find that investment funds take more risks during monetary-policy easing and more so due to asset purchases and other UMPs.

The Fed's monetary policies are more effective (and global) than the ECB's:

- Fed's pandemic easing resulted to a reduction, of about 1.2 notches of the median rating in the bonds held by funds and by 0.4-0.8 notches more for longer positions.
- ECB's monetary policy has had much more muted effects (a reduction effect of about 0.2-0.3 of a notch).
- Fed's effects are economically significant for both US and European funds, whereas ECB's are (economically) significant only for European funds. Same for institutional and large funds.



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ANNEX

Top 10 fund companies



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Table: Top 10 Major Fund Companies by AUM in Sep. 2023

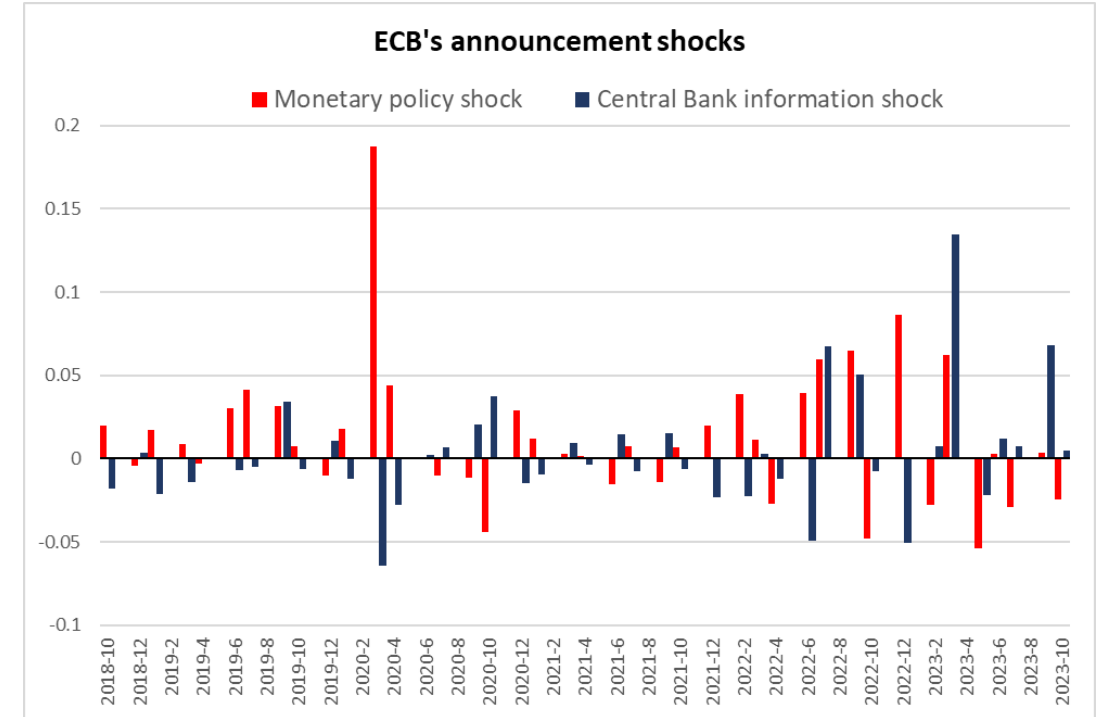
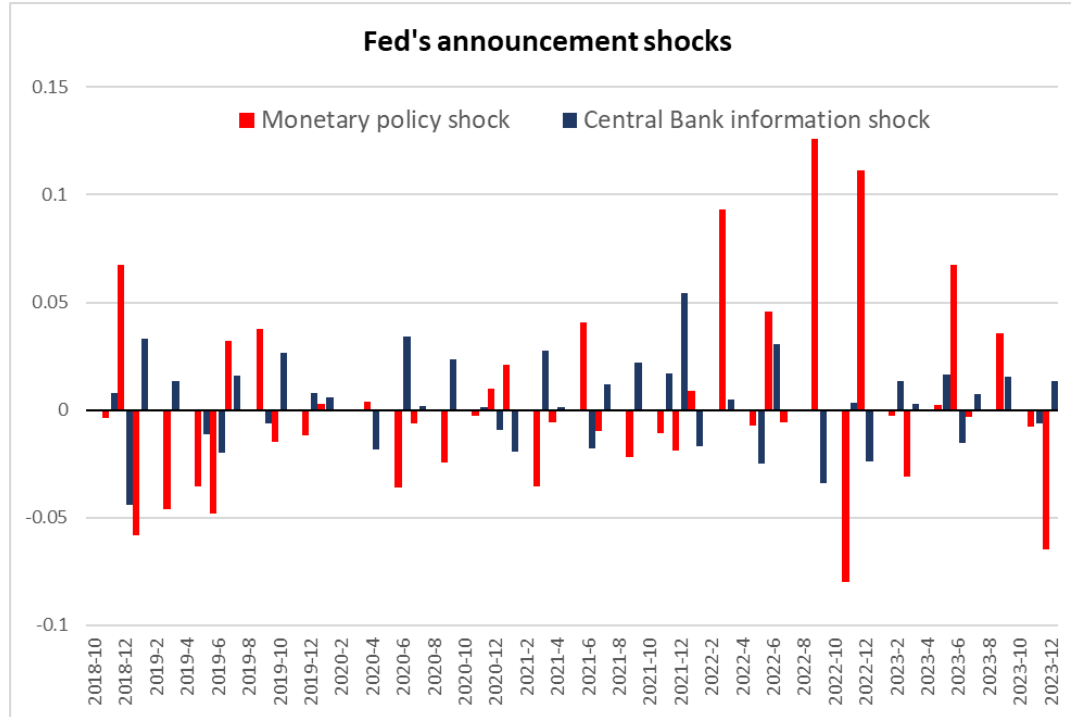
Fund Company	AUM in \$ bn	Market Share
Vanguard	1457	20
BlackRock	907	12.5
PIMCO	430	5.9
Fidelity	379	5.2
Capital Research & Mgt.	253	3.5
JP Morgan	182	2.5
State Street Global Advisors	146	2
Franklin Templeton	138	1.9
Invesco	120	1.7
Lord Abbett	106	1.5

Source: Bank of Greece Calculations.

JK monetary policy shocks



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Thank you!



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