Monetary Policy Transmission through the Exchange Rate Factor Structure

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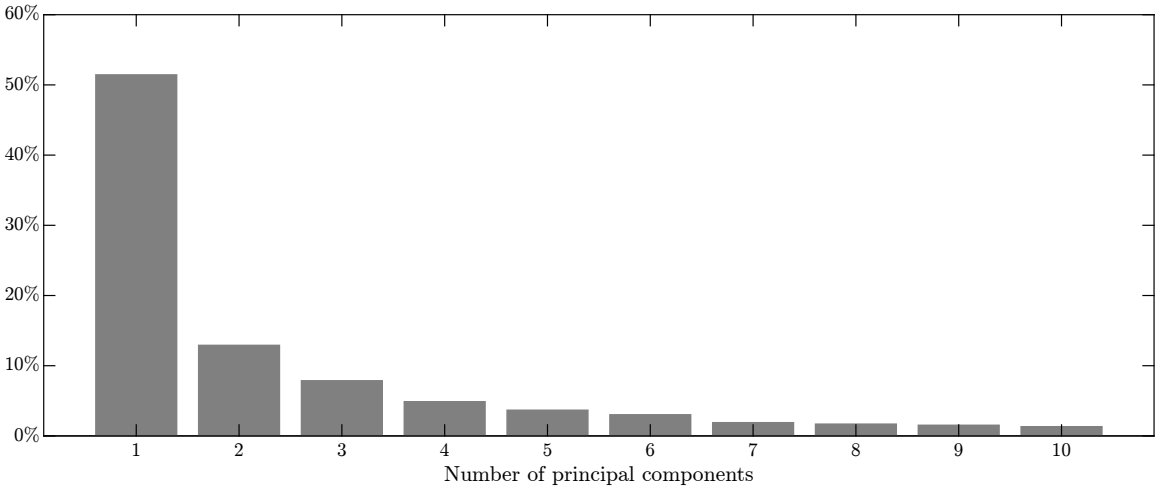
Exchange Rates Follow a Strong Factor Structure



Note: Sample covers 28 currency pairs and spans the monthly period from January 2000 to March 2024.

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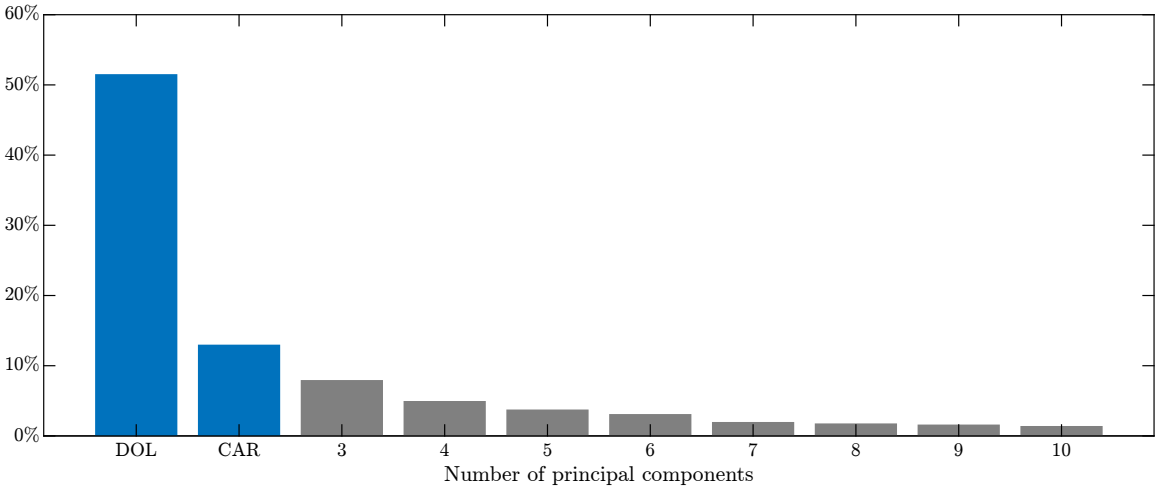

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Motivation

1. Bilateral **exchange rates follow** a **strong factor structure**:
   - **Dollar** and **carry** factor account for the bulk of the variation in FX rates (Verdelhan, 2018):

$$\Delta FX_{i,t} = \alpha + \beta_i^{DOL} Dollar_t + \beta_i^{CAR} Carry_t + \epsilon_{i,t}$$

   - Thus far, these factors were used to explain **return** and **risk** properties of **exchange rates**.
   - **This paper**: do these **factors** connect more broadly to other *macroeconomic* phenomena?

2. Can these **FX factors** explain the **international transmission** of **US monetary policy**?
   - **US monetary policy** impacts **global economy**: *asset prices*, *bank lending*, *capital flows*, etc.

⇒ Why are some **countries affected** more by **US monetary policy** than others?

⇒ Can the **exposure** to these **FX factors** explain the **cross-sectional differences**?

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   $\Rightarrow$ Why are some **countries affected** more by **US monetary policy** than others?

   $\Rightarrow$ Can the **exposure** to these **FX factors** explain the **cross-sectional differences**?

Main Result

FX factor structure explains **international transmission** of **US monetary policy** to:

1. **Global Currency Flows**
   - **Funds** **buy high-risk** and **sell low-risk** currencies after US monetary policy eases.
   - **Persistent effect: high-risk** currencies face **lasting demand** for several months.
2. **International Bank Lending**
   - Identify **globally active US banks** that **lend** in **foreign currencies** via syndicated loans.
   - **Banks** tilt **loan origination** from **low-** to **high-risk** currencies as monetary policy eases.
3. **Firm-level Outcomes**
   - **Firms** exposed to **high-risk currencies borrow** more as US monetary policy eases.
   - **High-risk currency borrowers** increase their **investment** relative to **low-risk borrowers**.

Empirical Approach

Empirical Approach

1. **Risk-based transmission of monetary policy**:
   - **Monetary policy easing** ⇒ higher willingness to take on risk (e.g., Bruno and Shin, 2015).
   - Do **quantities** (e.g., currency flows) respond heterogeneously across *i* foreign currencies?

$$\text{Quantities (flows)}_{i,t} = \alpha + \beta_i \left(\text{Monetary Policy Shock}_t\right) + \epsilon_{i,t} \qquad \forall i$$

2. **Monetary policy surprises and factor exposures**:
   - Can **dollar** and **carry betas** explain the cross-sectional heterogeneity in β_i ?

$$\text{Quantities}_{i,t} = \varphi \left(\text{MP Shock}_t \times \text{Factor Exposure}_{i,t}\right) + \gamma \text{Factor Exposure}_{i,t} + \alpha_t + \mu_i + \epsilon_{i,t}$$

   - **Factor exposure** to **systematic currency risk** from **rolling window regression**:

$$\Delta FX_{i,t} = \alpha + \beta_i^{DOL} Dollar_t + \beta_i^{CAR} Carry_t + \epsilon_{i,t}$$

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$$\Delta FX_{i,t} = \alpha + \beta_i^{DOL} Dollar_t + \beta_i^{CAR} Carry_t + \epsilon_{i,t}$$

Global Currency Flows

Data Overview

Dependent variables:

- **Global currency flows from CLS Group**: track flows by various customer groups.
  - 50% of global FX settlement;
  - G10 vs. USD from Sep 2012 to Mar 2024
  - Order flow by instrument and participants: dominated by funds and non-dealer banks (95%)
- **Syndicated loans from DealScan**: bank lending behavior across foreign currencies.
  - Global US banks (must have a US subsidiary)
  - Unit of observation is the currency
- **Compustat Global from S&P**: international firms' foreign currency borrowing.

Data Overview

Independent variables:

- **Exchange rates, forward contracts, and excess returns**: currency risk factors.
  - Spot + daily forwards (Bloomberg); CIP $\Rightarrow$ forward discount $\approx$ interest rate differential.
  - **Dollar** and **carry** (high-minus-low interest rate portfolio) factors.
- **Measures of systematic currency risk**: propagation of shocks across countries.
  - Dollar & carry **betas** (Verdelhan 2018)
  - Betas are *predetermined* and highly persistent (AR(1) ≈ 0.98); also a UMVE beta (Chernov et al. 2023) for *priced* risk.
- **US monetary policy shocks from Fed Fund futures**
  - Kuttner (2001) high-frequency **surprise** around FOMC
  - **Positive shock = easing**
  - Plausibly exogenous to flows

Monetary Policy Surprises and Global Currency Flows

$\Rightarrow$ How much do **currency flows** move in response to **changes** in **US monetary policy**?

$\Rightarrow$ Which **groups** of **market participants** are **driving** these **global currency flows**?

Monetary Policy Surprises and Global Currency Flows

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$\Rightarrow$ Which **groups** of **market participants** are **driving** these **global currency flows**?

- **Corporates**: non-financial corporations (mostly large multinationals).
- **Funds**: mutual funds, pension funds, and high-frequency trading firms.
- **Non-bank financials**: insurance companies, brokers, and clearing houses.
- **Non-dealer banks**: banks that are not market makers in a specific currency.

Monetary Policy Surprises and Global Currency Flows

⇒ How much do **currency flows** move in response to **changes** in **US monetary policy**?

⇒ Which **groups** of **market participants** are **driving** these **global currency flows**?

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- **Non-bank financials**: insurance companies, brokers, and clearing houses.
- **Non-dealer banks**: banks that are not market makers in a specific currency.

⇒ Counterparties for each of these four groups are **dealer banks**.

US Monetary Policy and Global Currency Flows

1. **How do currency flows respond to monetary policy surprises?**

$$\text{Spot Flow}_{ij,t} = a_{ij} + \beta_{ij} MPS_t + \epsilon_{ij,t}.$$

- *Spot Flow*$_{ij,t}$ is the spot flow into foreign currency i by investor group j within month t.
- *MPS*$_t$ is our monetary policy surprise measure (Bernanke and Kuttner, 2005).

Flows by Funds and Banks Respond to US Monetary Policy

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	dollar beta
USDJPY						−0.25	0.51
USDCHF						−0.10	0.98
USDEUR						−0.09	1.11
USDSEK						0.04	1.34
USDGBP						0.05	0.87
USDNOK						0.21	1.57
USDCAD						0.28	0.96
USDNZD						0.51	1.42
USDAUD						0.57	1.44

Note: Coefficients are in $mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Flows by Funds and Banks Respond to US Monetary Policy

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	dollar beta
USDJPY	8.04	35.88	14.42			−0.25	0.51
	[0.56]	[0.74]	[1.03]				
USDCHF	7.08	23.51	−10.85			−0.10	0.98
	[0.76]	[0.42]	[0.67]				
USDEUR	31.47	−580.18***	16.15*			−0.09	1.11
	[0.95]	[4.57]	[1.86]				
USDSEK	4.17**	−30.21***	−2.18			0.04	1.34
	[2.54]	[3.14]	[1.38]				
USDGBP	−72.82***	210.39***	−25.46*			0.05	0.87
	[2.90]	[3.38]	[1.76]				
USDNOK	−4.39**	−13.99***	−1.19			0.21	1.57
	[2.12]	[3.33]	[1.15]				
USDCAD	2.18	537.22***	25.06			0.28	0.96
	[0.46]	[5.67]	[1.51]				
USDNZD	−1.67	23.94	1.32			0.51	1.42
	[1.59]	[1.13]	[1.55]				
USDAUD	−0.02	190.42***	1.03			0.57	1.44
	[0.00]	[5.23]	[0.20]				

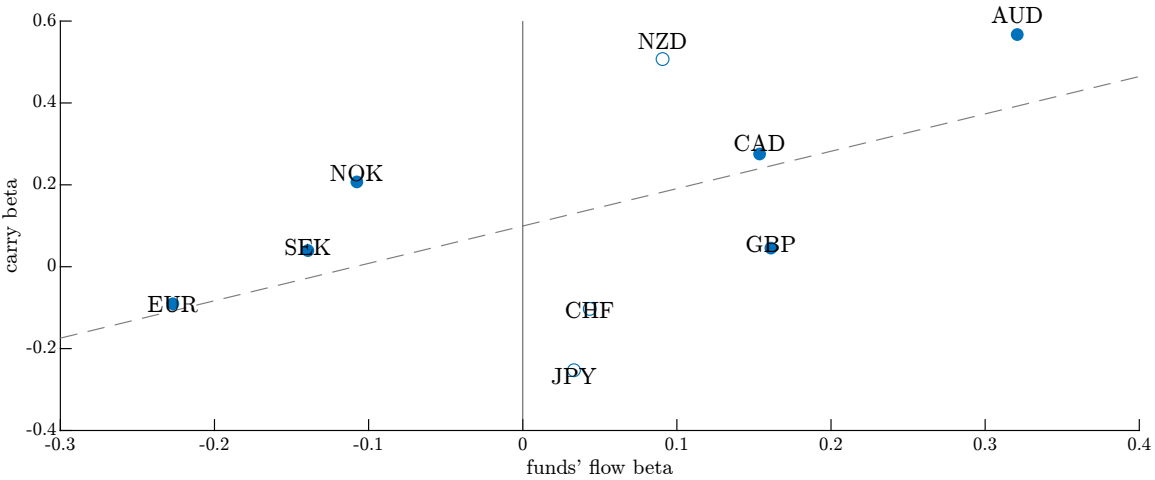
Note: Coefficients are in $mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Flows by Funds and Banks Respond to US Monetary Policy

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	dollar beta
USDJPY	8.04	35.88	14.42	−246.79***	188.45***	−0.25	0.51
	[0.56]	[0.74]	[1.03]	[4.73]	[4.25]		
USDCHF	7.08	23.51	−10.85	−15.52	−4.22	−0.10	0.98
	[0.76]	[0.42]	[0.67]	[0.57]	[0.10]		
USDEUR	31.47	−580.18***	16.15*	−62.86	595.42**	−0.09	1.11
	[0.95]	[4.57]	[1.86]	[0.40]	[2.44]		
USDSEK	4.17**	−30.21***	−2.18	20.67	7.55	0.04	1.34
	[2.54]	[3.14]	[1.38]	[1.03]	[0.51]		
USDGBP	−72.82***	210.39***	−25.46*	27.04	−139.15	0.05	0.87
	[2.90]	[3.38]	[1.76]	[0.18]	[1.29]		
USDNOK	−4.39**	−13.99***	−1.19	−47.26***	66.84***	0.21	1.57
	[2.12]	[3.33]	[1.15]	[4.60]	[6.47]		
USDCAD	2.18	537.22***	25.06	500.92	−1,065.39***	0.28	0.96
	[0.46]	[5.67]	[1.51]	[1.62]	[3.30]		
USDNZD	−1.67	23.94	1.32	−49.58**	26.00***	0.51	1.42
	[1.59]	[1.13]	[1.55]	[2.11]	[2.96]		
USDAUD	−0.02	190.42***	1.03	−213.38***	21.95	0.57	1.44
	[0.00]	[5.23]	[0.20]	[3.42]	[0.64]		

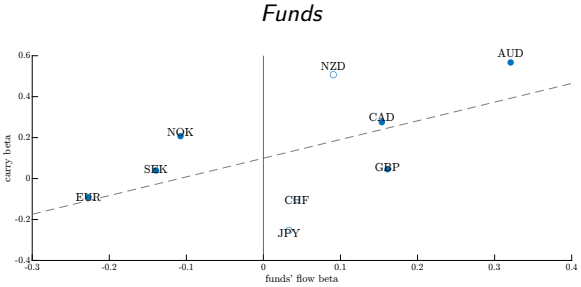
Note: Coefficients are in $mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Funds are Risk-On: Buy High-Risk and Sell Low-Risk Currencies



Note: Filled dots indicate statistical significance at the 10% confidence level. The inference is based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Funds are Risk-On: Buy High-Risk and Sell Low-Risk Currencies



⇒ Do other groups behave similarly?

- **Corporates** largely irresponsive, if anything, risk-off (i.e., sell high-risk).
- **NBFIs** do not respond to changes in US monetary policy at all.
- **Non-dealer banks** provide liquidity to other market participants.

Flows by Funds Respond to US Monetary Policy

Takeaways:

- Sort currencies by **carry beta** (safe $\rightarrow$ risky, left to right).
- After an easing, **funds sell safe and buy risky**: outflows from EUR, inflows to CAD/AUD.
- **Prices follow quantities**: high-carry currencies appreciate (FX response).

	JPY	CHF	EUR	SEK	GBP	NOK	CAD	NZD	AUD
Carry β	-0.25	-0.10	-0.09	0.04	0.05	0.21	0.28	0.51	0.57
Fund flow ($mn)	35.88	23.51	-580.18^{***}	-30.21^{***}	210.39^{***}	-13.99^{***}	537.22^{***}	23.94	190.42^{***}
FX response	-0.13	-0.15	-0.25	-0.15	0.03	0.15	-0.30	0.50	0.37

US Monetary Policy and Global Currency Flows

1. **How do currency flows respond to monetary policy surprises?**

$$\text{Spot Flow}_{ij,t} = a_{ij} + \beta_{ij} MPS_t + \epsilon_{ij,t}.$$

- $Spot\ Flow_{ij,t}$ is the spot flow into foreign currency i by investor group j within month t.
- MPS_t is our monetary policy shock measure (Bernanke and Kuttner, 2005).

2. **Do FX factor exposures explain the heterogeneity in responses?**

$$\text{Spot Flow}_{i,t} = \varphi (X_{i,t} \times MPS_t) + \beta MPS_t + \gamma X_{i,t} + \kappa \mathbf{W}_{i,t} + \mu_i + \alpha_t + \epsilon_{i,t}.$$

- Focus on **investment funds** as their **flow betas** line up with **carry betas**.
- $X_{i,t}$ is a measure of systematic currency risk (e.g., **carry** or **dollar beta**).
- μ_i and α_t are country- and time-fixed effects and $\mathbf{W}_{i,t}$ includes additional controls.

Heterogeneous Response of Funds' Spot Currency Flows

Dep. variable: Spot Flow$_{i,t}$	(1)	(2)	(3)	(4)
carry beta$_{i,t}$				
dollar beta$_{i,t}$				
MPS$_t$	0.03			
	[0.86]			
carry beta$_{i,t}$ × MPS$_t$				
dollar beta$_{i,t}$ × MPS$_t$				
Δ log bid-ask spread$_{i,t}$				
Δ log $S_{i,t}$				
Overall R^2 in %	18.76			
Avg. #Time periods	139			
#Currencies	9			
Currency FE	yes			
Time series FE	no			

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from September 2012 to March 2024.

Heterogeneous Response of Funds' Spot Currency Flows

Dep. variable: Spot Flow$_{i,t}$	(1)	(2)	(3)	(4)
carry beta$_{i,t}$		0.02		
		[0.39]		
dollar beta$_{i,t}$			0.13	
			[0.70]	
MPS$_t$	0.03	0.01	−0.04	
	[0.86]	[0.26]	[0.43]	
carry beta$_{i,t}$ × MPS$_t$		0.09***		
		[2.75]		
dollar beta$_{i,t}$ × MPS$_t$			0.08	
			[1.13]	
Δ log bid-ask spread$_{i,t}$		−0.03	−0.03	
		[1.34]	[1.57]	
Δ log $S_{i,t}$		−0.01	−0.02	
		[0.37]	[0.52]	
Overall R^2 in %	18.76	19.46	19.25	
Avg. #Time periods	139	138	138	
#Currencies	9	9	9	
Currency FE	yes	yes	yes	
Time series FE	no	no	no	

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from September 2012 to March 2024.

Heterogeneous Response of Funds' Spot Currency Flows

Dep. variable: Spot Flow$_{i,t}$	(1)	(2)	(3)	(4)
carry beta$_{i,t}$		0.02		−0.15
		[0.39]		[1.00]
dollar beta$_{i,t}$			0.13	0.20
			[0.70]	[0.95]
MPS$_t$	0.03	0.01	−0.04	
	[0.86]	[0.26]	[0.43]	
carry beta$_{i,t}$ × MPS$_t$		0.09***		0.17***
		[2.75]		[4.21]
dollar beta$_{i,t}$ × MPS$_t$			0.08	−0.36***
			[1.13]	[3.68]
Δ log bid-ask spread$_{i,t}$		−0.03	−0.03	0.03
		[1.34]	[1.57]	[0.91]
Δ log $S_{i,t}$		−0.01	−0.02	−0.02
		[0.37]	[0.52]	[0.46]
Overall R^2 in %	18.76	19.46	19.25	31.85
Avg. #Time periods	139	138	138	138
#Currencies	9	9	9	9
Currency FE	yes	yes	yes	yes
Time series FE	no	no	no	yes

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from September 2012 to March 2024.

Heterogeneous Response of Funds' Spot Currency Flows

- **What does the dollar capture?**
  - Confounds *risk* (priced, like carry) and *gravity* (trade distance to the US; Lustig-Richmond 2020).
  - Carry orthogonalization it (Frisch-Waugh-Lovell): Post-GFC, corr(dollar, carry) up $\sim$70%. Controlling for carry strips out the risk content; the *residual* dollar beta is pure distance.
  - Distance reduces flows: exactly as gravity predicts for trade (speculative: -0.36 is a gravity effect)
- **It's the *priced* risk that matters (Chernov et al. 2023).**
  - UMVE beta: pure *priced* currency risk
  - Interaction coefficient of $\sim$0.08 close to carry's $+0.17$.
  - The risk-on tilt is driven by priced, not unpriced, risk.
- **Robustness:** the carry-vs-gravity split holds up.
  - correlation(dollar, carry) rises $\sim$70% from pre- to post-GFC.
  - Residual dollar beta (orthogonal to carry) lines up with gravity/distance variables.
  - Rank-based betas $\Rightarrow$ results come from the cross-sectional *ordering*, not multicollinearity.

International Bank Lending

US Monetary Policy and International Bank Lending

So far: focus on how **banks'** **customers** trade around **monetary policy surprises**.

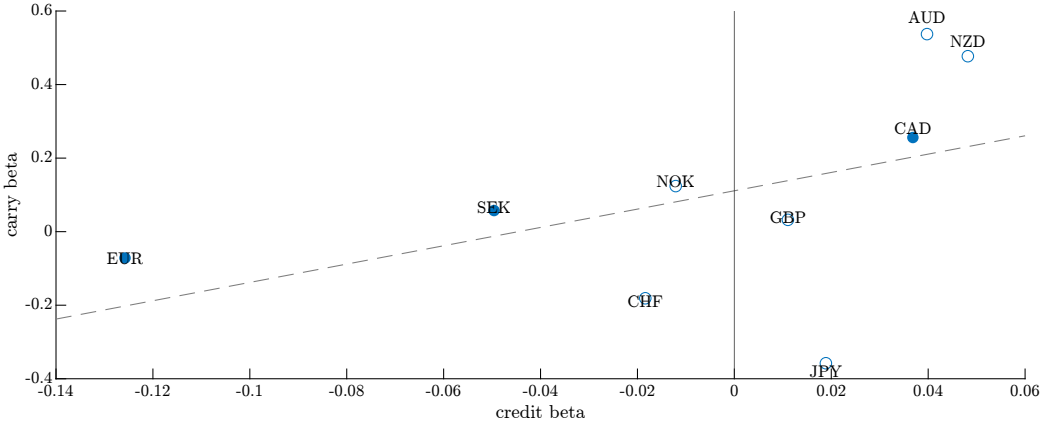
Now: study the **risk-taking behavior** of **banks** in **foreign currency lending**.

$$\log Loan_{i,t} = \varphi\,(X_{i,t} \times MPS_t) + \beta MPS_t + \gamma X_{i,t} + \mu_i + \alpha_t + \psi \Delta \log S_{i,t} + \epsilon_{i,t}$$

- $\log Loan_{i,t}$ is the log loan amount from **global banks** headquartered in the US to firms domiciled abroad in foreign currency i during month t.
- $X_{i,t}$ is a measure of systematic currency risk (e.g., **carry** or **dollar beta**).
- μ_i and α_t are currency- and time-fixed effects and $S_{i,t}$ is the dollar exchange rate.

Global Banks are Risk-On in Foreign Currency Lending

$$\log \text{Loan}_{i,t} = \beta_i \text{MPS}_t + \gamma_i \Delta \log S_{i,t} + a_i + \varepsilon_{i,t}$$



Heterogeneous Response of Banks' Foreign Currency Lending

Dep. variable: log $Loan_{i,t}$	(1)	(2)	(3)	(4)
carry $beta_{i,t}$				
dollar $beta_{i,t}$				
MPS_t	0.03			
	[0.52]			
carry $beta_{i,t} \times MPS_t$				
dollar $beta_{i,t} \times MPS_t$				
$\Delta \log S_{i,t}$	−0.08			
	[0.71]			
Overall R^2 in %	57.95			
Avg. #Time periods	291			
#Currencies	9			
Currency FE	yes			
Time series FE	no			

Note: The independent variables are measured in units of standard deviations. Inference is based on double clustered standard errors (by currencies and time). The sample spans from January 2000 to March 2024.

Heterogeneous Response of Banks' Foreign Currency Lending

Dep. variable: log $Loan_{i,t}$	(1)	(2)	(3)	(4)
carry $beta_{i,t}$		−0.33		
		[1.22]		
dollar $beta_{i,t}$			0.41	
			[0.99]	
MPS_t	0.03	0.04	0.40***	
	[0.52]	[0.96]	[3.62]	
carry $beta_{i,t} \times MPS_t$		0.11*		
		[1.81]		
dollar $beta_{i,t} \times MPS_t$			−0.38**	
			[2.04]	
$\Delta \log S_{i,t}$	−0.08	−0.08	−0.09	
	[0.71]	[0.75]	[0.76]	
Overall R^2 in %	57.95	58.02	58.02	
Avg. #Time periods	291	291	291	
#Currencies	9	9	9	
Currency FE	yes	yes	yes	
Time series FE	no	no	no	

Note: The independent variables are measured in units of standard deviations. Inference is based on double clustered standard errors (by currencies and time). The sample spans from January 2000 to March 2024.

Heterogeneous Response of Banks' Foreign Currency Lending

Dep. variable: log $Loan_{i,t}$	(1)	(2)	(3)	(4)
carry $beta_{i,t}$		−0.33		−1.37
		[1.22]		[1.44]
dollar $beta_{i,t}$			0.41	0.84
			[0.99]	[1.24]
MPS_t	0.03	0.04	0.40***	
	[0.52]	[0.96]	[3.62]	
carry $beta_{i,t} \times MPS_t$		0.11*		0.17***
		[1.81]		[3.01]
dollar $beta_{i,t} \times MPS_t$			−0.38**	−0.68**
			[2.04]	[2.14]
$\Delta \log S_{i,t}$	−0.08	−0.08	−0.09	−0.07
	[0.71]	[0.75]	[0.76]	[0.43]
Overall R^2 in %	57.95	58.02	58.02	63.21
Avg. #Time periods	291	291	291	291
#Currencies	9	9	9	9
Currency FE	yes	yes	yes	yes
Time series FE	no	no	no	yes

Note: The independent variables are measured in units of standard deviations. Inference is based on double clustered standard errors (by currencies and time). The sample spans from January 2000 to March 2024.

Firm-level Outcomes

US Monetary Policy and Firm-level Outcomes

So far: focus on **heterogeneous response** of **foreign currency lending** by **US banks** to changes in **US monetary policy** conditional on measures of currency risk.

Now: study the **real economic effects** of these **loan supply shocks** on the cross-section of **international firms** borrowing from globally active **US banks**.

Goal: show that **firms exposed** to **low-** vs **high-risk currencies** are affected differently.

$$\log Loan_{j,i,c,t} = \varphi \left(X_{i,t} \times MPS_t\right) + \beta MPS_t + \gamma X_{i,t} + \psi \log \mu_j + \alpha_{c,t} + S_{i,t} + \kappa \mathbf{W}_{j,i,t} + \epsilon_{j,i,c,t}$$

- $Loan_{j,i,c,t}$ is the total cumulative dollar amount that firm j in country c has borrowed from US banks in currency i via syndicated loans in a given quarter t.
- $X_{i,t}$ is assigned to firm j based on their reporting currency i.
- μ_j and $\alpha_{c,t}$ are firm- and country-quarter-fixed effects controlling for global factors.

Firms Exposed to Riskier Currencies Borrow more when Fed Eases

Dep. variable: log $Loan_{j,i,c,t}$	(1)	(2)	(3)	(4)	(5)	(6)
carry $beta_{i,t}$	−0.05*		0.01			
	[1.78]		[0.47]			
dollar $beta_{i,t}$		−0.12***	−0.12***			
		[3.31]	[3.20]			
carry $beta_{i,t} \times MPS_t$	0.05***		0.05***			
	[3.33]		[2.93]			
dollar $beta_{i,t} \times MPS_t$		−0.11***	−0.09***			
		[3.54]	[3.88]			
log $S_{i,t}$	−0.21	−0.26*	−0.27*			
	[1.32]	[1.68]	[1.68]			
Overall R^2 in %	4.32	4.36	4.37			
Avg. #Time periods	95	95	95			
#Firms	1115	1115	1115			
Controls	yes	yes	yes			
Firm FE	yes	yes	yes			
Time series FE	yes	yes	yes			
Country × quarter FE	no	no	no			

Note: The independent variables are measured in units of standard deviations. Inference is based on double clustered standard errors (by firms and time). The sample spans from January 2000 to March 2024.

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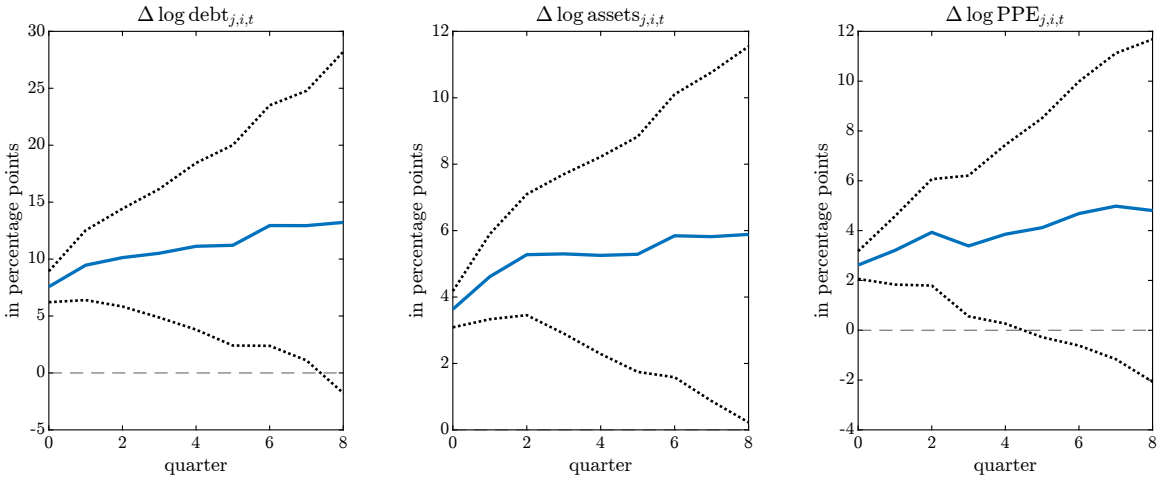
Dep. variable: log $Loan_{j,i,c,t}$	(1)	(2)	(3)	(4)	(5)	(6)
carry $beta_{i,t}$	−0.05*		0.01	−0.13***		−0.08***
	[1.78]		[0.47]	[6.71]		[13.92]
dollar $beta_{i,t}$		−0.12***	−0.12***		−0.23***	−0.20***
		[3.31]	[3.20]		[3.92]	[3.66]
carry $beta_{i,t} \times MPS_t$	0.05***		0.05***	0.20**		0.18**
	[3.33]		[2.93]	[2.31]		[2.28]
dollar $beta_{i,t} \times MPS_t$		−0.11***	−0.09***		0.04	0.06*
		[3.54]	[3.88]		[1.15]	[1.71]
log $S_{i,t}$	−0.21	−0.26*	−0.27*	−0.39***	−0.47***	−0.50***
	[1.32]	[1.68]	[1.68]	[3.81]	[2.91]	[2.95]
Overall R^2 in %	4.32	4.36	4.37	3.84	3.84	3.86
Avg. #Time periods	95	95	95	95	95	95
#Firms	1115	1115	1115	1115	1115	1115
Controls	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Time series FE	yes	yes	yes	no	no	no
Country × quarter FE	no	no	no	yes	yes	yes

Note: The independent variables are measured in units of standard deviations. Inference is based on double clustered standard errors (by firms and time). The sample spans from January 2000 to March 2024.

Borrowing Firms Increase Leverage, Assets, and Investment



Note: This figure plots cumulative impulse responses of firm-level variables. The dotted lines mark the 90% confidence bands based on Newey and West (1987) standard errors. The sample spans from January 2000 to March 2024.

Conclusion

⇒ **FX factor structure** explains **international transmission** of **US monetary policy**

1. Following an unexpected **easing** of **US monetary policy**
   - ⇒ **Funds buy high-risk** and **sell low-risk** currencies.
   - ⇒ **Banks lend more** in **high-** vs **low-risk** currencies.
   - ⇒ **Firms** exposed to **high-risk** currencies **invest** more.

2. Measures of **systematic currency risk** (i.e., **dollar** and **carry betas**) successfully explain the **cross-sectional differences** in how **quantities respond** to US monetary policy.

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Thank you

Appendix

Related Literature

International Asset Pricing

Interest parity deviations: e.g. Lustig and Verdelhan (2007), Lustig, Roussanov, and Verdelhan (2011), Verdelhan (2018), Liu, Maurer, Vedolin, and Zhang (2022), Nucera, Sarno, and Zinna (2023)

Monetary policy impact: e.g. Eichenbaum and Evans (1995), Stavrakeva and Tang (2015), Schmitt-Grohé and Uribe (2018), Savor and Wilson (2014), Mueller, Tahbaz-Salehi, and Vedolin (2017), Ai and Bansal (2018), Antolin-Diaz, Cenedese, Han, and Sarno (2023), Roussanov and Wang (2023)

⇒ **This paper**: shows that the currency factor structure has implications for global currency flows.

Monetary Policy Transmission

Real economic effects: e.g. Ottonello and Winberry (2020), Bräuning and Ivashina (2020a,b), Zhang (2021), Correa, Paligorova, Sapriza, and Zlate (2021)

Global financial cycle: e.g. Rey (2013), Miranda-Agrippino and Rey (2020), Borio and Zhu (2012), Bruno and Shin (2015, 2017), Adrian, Estrella, and Shin (2019), Bauer, Bernanke, and Milstein (2023)

⇒ **This paper**: connects exchange rate factor structure to real effects of monetary policy transmission.

Data Overview

Dependent variables:

1. **Global currency flows from CLS Group**: track flows by various customer groups.
2. **Syndicated loans from DealScan**: bank lending behavior across foreign currencies.
3. **Compustat Global from S&P**: international firms' foreign currency borrowing.

Independent variables:

1. **Exchange rates, forward contracts, and excess returns**: currency risk factors.
2. **Measures of systematic currency risk**: propagation of shocks across countries.
3. **US monetary policy shocks from Fed Fund futures**: capture surprise component.

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Exchange Rates, Forward Contracts, and Excess Returns

⇒ **Exchange rates:**

- Spot mid, bid, and ask quotes from Bloomberg.
- All exchange rates are defined as foreign currency units per US dollar.

⇒ **Forward rates:**

- Forward rates are from Bloomberg for various maturities (1, 3, and 12 month) and are also defined as foreign currency units per US dollar (e.g., 1.51 AUD per USD).

⇒ **Excess returns:**

For each currency i, we define the currency excess return as:

$$RX_{i,t}(m) = \log F_{i,t-m,t} - \log S_{i,t} = (\log F_{i,t-m} - \log S_{i,t-m}) - \Delta \log S_{i,t}$$

- $F_{i,t-m,t}$ is the price of a forward contract m periods ago maturing at date t.
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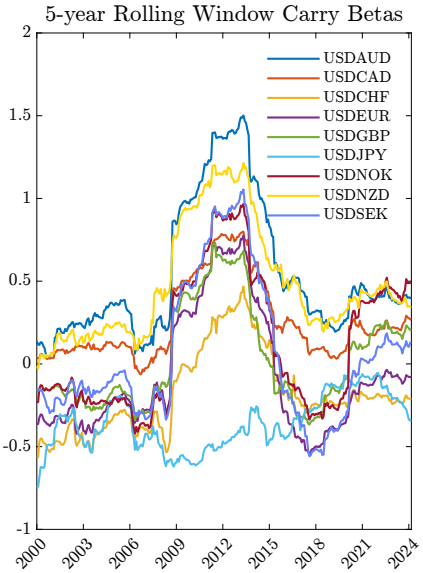
Systematic Currency Risk

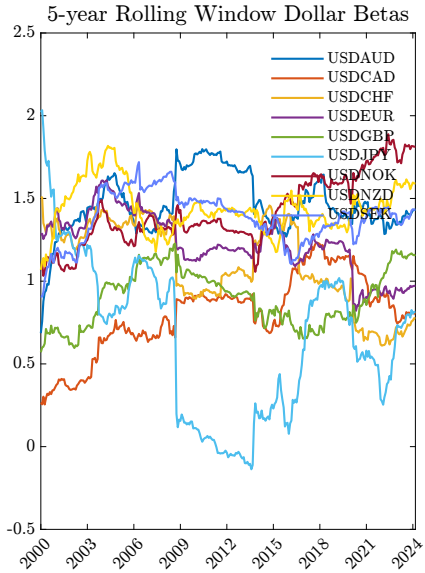
Measures of **systematic currency risk**:

$\Rightarrow$ Follow Verdelhan (2018) and estimate **FX factor model** using **rolling window**:

$$\Delta FX_{i,t} = \alpha + \beta_i^{DOL} Dollar_t + \epsilon_{i,t}$$
$$\Delta FX_{i,t} = \alpha + \beta_i^{CAR} Carry_t + \epsilon_{i,t}$$

$\Rightarrow$ **Dollar betas** β_i^{DOL} and **carry betas** β_i^{CAR} capture the **factor exposures**.





Note: This figure plots carry and dollar betas across G10 currency pairs that are based on 60-month rolling window regressions of currency excess returns on the carry and dollar factor, respectively.

Go back

Monetary Policy Surprises

- Follow Bernanke and Kuttner (2005) to measure the **monetary policy surprise** (MPS) on day t from changes in **Fed Fund futures** prices around FOMC announcements.
- **Positive values** correspond to an **easing surprise**.

We **time-aggregate** surprises as "Simple" and "Weighted" sums:

		Monthly		Quarterly	
	High-frequency	Simple sum	Weighted sum	Simple sum	Weighted sum
Mean	1.23	1.25	0.85	2.53	1.31
Median	0.00	0.00	0.00	0.00	0.00
Std.	8.42	9.17	7.90	11.95	9.03
Min.	−24.89	−24.89	−24.89	−29.19	−23.50
Max.	74.06	83.24	72.43	66.55	51.47
#Obs	200	196	196	97	97

Note: The sample spans from 1 January 2000 to 29 March 2024. All shocks are in basis points (bps).

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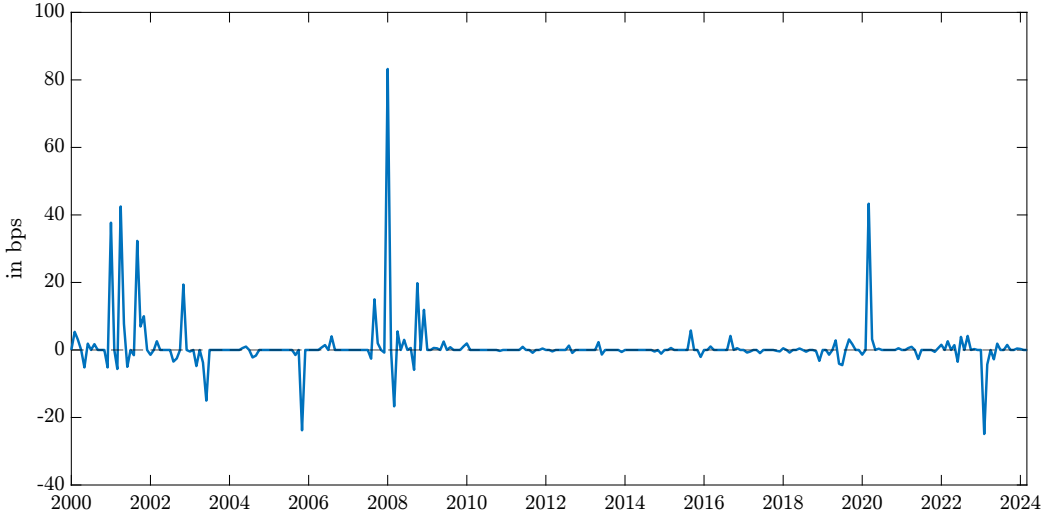
Monetary Policy Surprises using Fed Fund Futures

Go back



Monetary Policy Surprises and Systematic Currency Risk

Dep. variable: **dollar betas**	**USDAUD**	**USDCAD**	**USDCHF**	**USDEUR**	**USDGBP**	**USDJPY**	**USDNOK**	**USDNZD**	**USDSEK**
Intercept (α)	0.060	0.044	−0.032	−0.010	0.070	−0.053	0.072	0.053	0.085
	[0.966]	[0.811]	[0.638]	[0.192]	[1.445]	[0.745]	[1.188]	[0.811]	[1.324]
MPS_t	−0.099	−0.131	0.230*	0.238	0.039	0.156	−0.081	−0.017	0.158*
	[0.990]	[1.417]	[1.656]	[1.400]	[0.511]	[1.537]	[0.810]	[0.208]	[1.716]
$\bar{R}^2$ in %	0.64	1.39	4.98	5.36	−0.19	2.10	0.31	−0.32	2.15
#Obs	290	290	290	290	290	290	290	290	290
Dep. variable: **carry betas**	**USDAUD**	**USDCAD**	**USDCHF**	**USDEUR**	**USDGBP**	**USDJPY**	**USDNOK**	**USDNZD**	**USDSEK**
Intercept (α)	0.002	0.006	0.026	0.012	0.017	0.050	0.026	0.021	0.007
	[0.029]	[0.102]	[0.398]	[0.147]	[0.225]	[0.700]	[0.395]	[0.304]	[0.091]
MPS_t	−0.166	−0.190	−0.099	−0.153*	−0.194*	0.012	−0.231	−0.153**	−0.155
	[1.518]	[1.564]	[1.629]	[1.923]	[1.839]	[0.385]	[1.385]	[2.355]	[1.629]
$\bar{R}^2$ in %	2.43	3.28	0.64	2.02	3.46	−0.33	5.03	2.00	2.08
#Obs	290	290	290	290	290	290	290	290	290

Note: This table reports results from *monthly* regressions of the form $\Delta y_{i,t} = \mu_i + \beta MPS_t + \epsilon_{i,t}$, where the dependent variable is the first-difference in either the dollar or the carry beta, respectively. MPS_t is our monetary policy shock in basis points that we extract from Fed Fund futures rate changes following Kuttner (2001). Both dependent and independent variables are measured in units of standard deviations. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987) correcting for heteroskedasticity and serial correlation. Asterisks *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels. The sample covers the period from January 2000 to March 2024. Go back

Example: USDEUR flows

Player	EUR buy volume (in USD)	EUR sell volume (in USD)	Order Flow
Corporates	100,294,116	11,070,887	89,223,229
Funds	48,540,172	717,368,707	(668,828,535)
Non-bank financials	57,996,743	149,442,298	(91,445,555)
Non-dealer banks	1,600,840,643	1,662,449,490	(61,608,847)
Total	1,807,671,674	2,540,331,382	(732,659,708)

Dealer banks	2,540,331,382	1,807,671,674	732,659,708

Reference Date: 01/02/2019 from 12 to 1pm GMT. USDEUR Spot = 0.88397

- **Dealers**: central position in the currency trading network.
- CLS uses network analysis to identify dealer banks in each currency pair.

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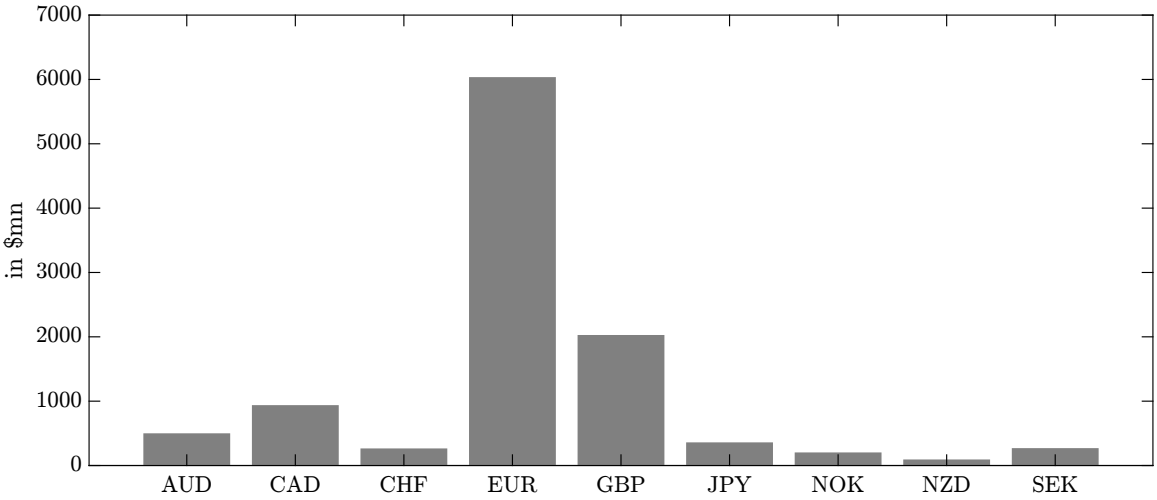
Funds and Banks Dominate Global Currency Flows

	Corporates		Funds		NBFIs		Non-dealer banks	
	Std. in $bn	Share in %	Std. in $bn	Share in %	Std. in $bn	Share in %	Std. in $bn	Share in %
USDAUD	0.42	0.36	2.65	10.98	0.46	3.18	3.97	85.49
USDCAD	0.70	0.29	15.58	10.40	1.03	1.98	31.40	87.33
USDCHF	0.57	0.90	2.41	9.06	1.45	4.17	4.27	85.87
USDEUR	3.46	2.19	11.39	13.78	1.45	3.18	14.67	80.85
USDGBP	1.23	1.00	5.82	13.02	1.56	3.56	7.96	82.42
USDJPY	0.94	0.85	4.81	8.93	0.96	3.14	6.19	87.08
USDNOK	0.12	0.45	0.58	12.75	0.10	2.94	1.55	83.86
USDNZD	0.04	0.08	1.18	7.30	0.15	3.46	1.68	89.16
USDSEK	0.18	1.18	0.97	20.78	0.12	2.78	1.64	75.26

Note: *Std.* reports the standard deviation of monthly buy minus sell volume, whereas *Share* sums up to 100% across groups and is based on the sum of buy and sell volume. The sample covers the period from September 2012 to March 2024.

Foreign Currency Lending is Concentrated in G10 Currencies



Note: Each bar shows the average monthly syndicated loan amount for the period from January 2000 to March 2024.

Monetary Policy Surprises and Global Currency Flows

⇒ How much do **currency flows** move in response to **changes** in **US monetary policy**?

⇒ Which **groups** of **market participants** are **driving** these **global currency flows**?

- **Corporates**: non-financial corporations (mostly large multinationals).
- **Funds**: mutual funds, pension funds, and high-frequency trading firms.
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Flows by Funds and Banks Respond to US Monetary Policy

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	dollar beta
USDJPY						−0.25	0.51
USDCHF						−0.10	0.98
USDEUR						−0.09	1.11
USDSEK						0.04	1.34
USDGBP						0.05	0.87
USDNOK						0.21	1.57
USDCAD						0.28	0.96
USDNZD						0.51	1.42
USDAUD						0.57	1.44

Note: Coefficients are in $mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Flows by Funds and Banks Respond to US Monetary Policy

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	dollar beta
USDJPY	8.04	35.88	14.42			−0.25	0.51
	[0.56]	[0.74]	[1.03]				
USDCHF	7.08	23.51	−10.85			−0.10	0.98
	[0.76]	[0.42]	[0.67]				
USDEUR	31.47	−580.18***	16.15*			−0.09	1.11
	[0.95]	[4.57]	[1.86]				
USDSEK	4.17**	−30.21***	−2.18			0.04	1.34
	[2.54]	[3.14]	[1.38]				
USDGBP	−72.82***	210.39***	−25.46*			0.05	0.87
	[2.90]	[3.38]	[1.76]				
USDNOK	−4.39**	−13.99***	−1.19			0.21	1.57
	[2.12]	[3.33]	[1.15]				
USDCAD	2.18	537.22***	25.06			0.28	0.96
	[0.46]	[5.67]	[1.51]				
USDNZD	−1.67	23.94	1.32			0.51	1.42
	[1.59]	[1.13]	[1.55]				
USDAUD	−0.02	190.42***	1.03			0.57	1.44
	[0.00]	[5.23]	[0.20]				

Note: Coefficients are in $mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Flows by Funds and Banks Respond to US Monetary Policy

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	dollar beta
USDJPY	8.04	35.88	14.42	−246.79***	188.45***	−0.25	0.51
	[0.56]	[0.74]	[1.03]	[4.73]	[4.25]		
USDCHF	7.08	23.51	−10.85	−15.52	−4.22	−0.10	0.98
	[0.76]	[0.42]	[0.67]	[0.57]	[0.10]		
USDEUR	31.47	−580.18***	16.15*	−62.86	595.42**	−0.09	1.11
	[0.95]	[4.57]	[1.86]	[0.40]	[2.44]		
USDSEK	4.17**	−30.21***	−2.18	20.67	7.55	0.04	1.34
	[2.54]	[3.14]	[1.38]	[1.03]	[0.51]		
USDGBP	−72.82***	210.39***	−25.46*	27.04	−139.15	0.05	0.87
	[2.90]	[3.38]	[1.76]	[0.18]	[1.29]		
USDNOK	−4.39**	−13.99***	−1.19	−47.26***	66.84***	0.21	1.57
	[2.12]	[3.33]	[1.15]	[4.60]	[6.47]		
USDCAD	2.18	537.22***	25.06	500.92	−1,065.39***	0.28	0.96
	[0.46]	[5.67]	[1.51]	[1.62]	[3.30]		
USDNZD	−1.67	23.94	1.32	−49.58**	26.00***	0.51	1.42
	[1.59]	[1.13]	[1.55]	[2.11]	[2.96]		
USDAUD	−0.02	190.42***	1.03	−213.38***	21.95	0.57	1.44
	[0.00]	[5.23]	[0.20]	[3.42]	[0.64]		

Note: Coefficients are in $mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to March 2024.

Robustness and Additional Analyses

1. **Persistent effect of monetary policy**: investment funds' currency flows into high-risk currencies persist over several months. ▸ Details
2. **Economic sources of currency risk**: country-level risk characteristics. ▸ Table
3. **Expansionary and contractionary monetary policy**: expansions dominate. ▸ Figure
4. **Alternative story**: other central banks react systematically to US shocks. ▸ Table
5. **Other measures of monetary policy shocks**: target rate surprises dominate. ▸ Table
6. **European monetary policy shocks**: do not matter for euro-based currency flows. ▸ Table

Persistent Effect of Monetary Policy on Funds' Currency Flows

Are the effects of monetary policy on currency flows long-lasting or rather short-lived?

1. **Funds' forward currency flows:**

$$\text{Forward Flow}_{i,t,t+m} = \mu_i + \alpha_t + \gamma X_{i,t} + \beta MPS_t + \varphi (X_{i,t} \times MPS_t) + \kappa \mathbf{W}_{i,t} + \epsilon_{i,t,}$$

   - Replace **spot flow** with **forward flow** at maturities 1, 3, and 12 months.
   - MPS_t is our monetary policy shock following Bernanke and Kuttner (2005).

2. **Local projections (Jordà, 2005) of funds' spot currency flows:**

$$\text{Spot Flow}^{\$}_{i,t,t} = \alpha_t + \sum_{h=0}^{12} \beta_h MPS_{t-h} + \epsilon^{\$}_{i,t,t}$$

   - $\$$ot currency pairs into certain profitable trend or carry trades.
   - $\text{Spot Flow}^{\$}_{i,t,t}$ is the spot currency flow within group i observed in month t ahead of MPS_t.

Persistent Effect of Monetary Policy on Funds' Currency Flows

Are the effects of monetary policy on currency flows long-lasting or rather short-lived?

1. **Funds' forward currency flows:**

$$\text{Forward Flow}_{i,t+m} = \mu_i + \alpha_t + \gamma X_{i,t} + \beta MPS_t + \varphi\,(X_{i,t} \times MPS_t) + \kappa \mathbf{W}_{i,t} + \epsilon_{i,t}.$$

   - Replace **spot flow** with **forward flow** at maturities 1, 3, and 12 months.
   - MPS_t is our monetary policy shock following Bernanke and Kuttner (2005).

2. **Local projections (Jordà, 2005) of funds' spot currency flows:**

$$\text{Spot Flow}^{g}_{t,t+h} = \alpha^{g}_{h} + \sum_{m=0}^{3} \beta^{g}_{h,m} MPS_{t-m} + \epsilon^{g}_{t+h},$$

   - **Sort currency pairs** into **tertile portfolios** based on **carry betas**.
   - $\text{Spot Flow}^{g}_{t,t+h}$ is the spot currency flow within group g observed h months ahead of MPS_t.

Heterogeneous Response of Funds' Forward Currency Flows

Dep. variable: Forward Flow$_{i,t}$	1M		3M		12M	
	(1)	(2)	(3)	(4)	(5)	(6)
carry beta$_{i,t}$	0.01		−0.06		−0.11	
	[0.04]		[0.78]		[1.44]	
dollar beta$_{i,t}$		−0.22		−0.19*		−0.08
		[1.15]		[1.87]		[0.72]
carry beta$_{i,t}$ × MPS$_t$	0.03*		0.00		−0.07***	
	[1.94]		[0.34]		[5.01]	
dollar beta$_{i,t}$ × MPS$_t$		0.10*		0.02		−0.15***
		[1.75]		[0.38]		[6.25]
Δ log bid-ask spread$_{i,t}$	0.01	0.00	0.01	0.01	−0.01	0.01
	[0.20]	[0.06]	[0.71]	[0.59]	[0.25]	[0.17]
Δ log $S_{i,t}$	−0.03	−0.04	−0.02	−0.02	−0.02	−0.02
	[1.43]	[1.58]	[0.76]	[0.91]	[0.95]	[0.64]
Overall R^2 in %	61.08	62.20	62.82	63.58	32.39	32.11
Avg. #Time periods	138	138	138	138	138	138
#Currencies	9	9	9	9	9	9
Currency FE	yes	yes	yes	yes	yes	yes
Time series FE	yes	yes	yes	yes	yes	yes

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from September 2012 to March 2024.

Persistent Effect of Monetary Policy on Funds' Currency Flows

Are the effects of monetary policy on currency flows long-lasting or rather short-lived?

1. **Funds' forward currency flows:**

$$\text{Forward Flow}_{i,t+m} = \mu_i + \alpha_t + \gamma X_{i,t} + \beta MPS_t + \varphi(X_{i,t} \times MPS_t) + \kappa \mathbf{W}_{i,t} + \epsilon_{i,t}.$$

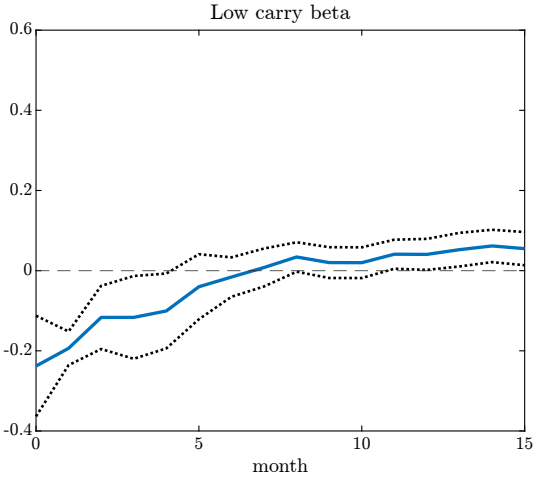
   - Replace **spot flow** with **forward flow** at maturities 1, 3, and 12 months.
   - MPS_t is our monetary policy shock following Bernanke and Kuttner (2005).

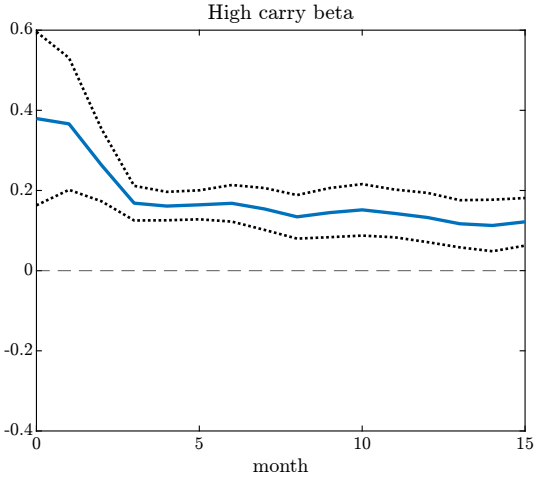
2. **Local projections (Jordà, 2005) of funds' spot currency flows:**

$$\text{Spot Flow}^g_{t,t+h} = \alpha^g_h + \sum_{m=0}^{3} \beta^g_{h,m} MPS_{t-m} + \epsilon^g_{t+h},$$

   - **Sort currency pairs** into **tertile portfolios** based on **carry betas**.
   - $\text{Spot Flow}^g_{t,t+h}$ is the spot currency flow within group g observed h months ahead of MPS_t.

Lasting Effect of Monetary Policy on Funds' Spot Currency Flows





Note: This figure plots cumulative impulse responses of flows to MP surprises. The dotted lines mark the 90% confidence bands using Newey and West (1987) standard errors. The sample spans from September 2012 to March 2024.

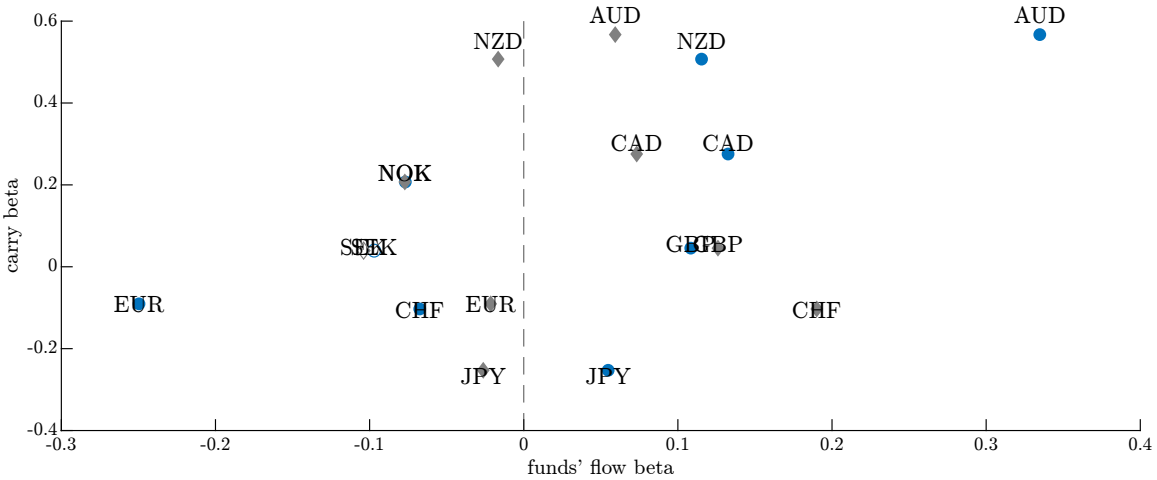
Go back

Currency Flows of Funds and a Horse Race of Currency Risks

Dep. variable: Spot Flow$_{i,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MPS$_t$	0.01	0.01	0.04	0.10**	−0.03	0.09**	0.12***	−0.03
	[0.26]	[1.01]	[1.11]	[2.07]	[0.46]	[2.06]	[2.83]	[1.17]
carry beta$_{i,t}$ × MPS$_t$	0.09***							
	[2.75]							
IMB beta$_{i,t}$ × MPS$_t$		−0.01						
		[0.51]						
downside beta$_{i,t}$ × MPS$_t$			0.01					
			[0.71]					
$f_{i,t} - s_{i,t}$ × MPS$_t$				0.09**				
				[2.01]				
centrality$_{i,t}$ × MPS$_t$					−0.08			
					[1.40]			
term premium$_{i,t}$ × MPS$_t$						0.09		
						[1.60]		
size$_{i,t}$ × MPS$_t$							−0.14***	
							[12.90]	
import ratio$_{i,t}$ × MPS$_t$								0.07***
								[4.52]
Overall R^2 in %	19.46	34.52	19.18	19.22	19.73	19.34	21.69	33.57
Avg. #Time periods	138	94	138	138	138	138	135	99
#Currencies	9	9	9	9	9	9	8	9
Currency FE	yes	yes	yes	yes	yes	yes	yes	yes

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from September 2012 to March 2024. Go back

US Monetary Policy Easing (Dots) and Tightening (Diamonds)



Note: Filled dots and diamonds indicate statistical significance at the 10% confidence level. The inference is based on robust standard errors (Newey and West, 1987). The sample spans from September 2012 to March 2024.

Go back

Predicting Foreign Policy Rates with Fed Fund Rates

Dep. variable: Δ Foreign Policy Rate$_{i,t}$	(1)	(2)	(3)	(4)	(5)
Δ FFR$_{t-1}$	0.23**	0.23**	0.24		
	[2.02]	[2.31]	[0.60]		
carry beta$_{i,t}$		−0.10***		−0.13**	
		[3.62]		[1.98]	
dollar beta$_{i,t}$			0.02		0.01
			[0.22]		[0.10]
carry beta$_{i,t}$ × Δ FFR$_{t-1}$		0.11**		0.07	
		[2.25]		[0.78]	
dollar beta$_{i,t}$ × Δ FFR$_{t-1}$			−0.01		0.03
			[0.02]		[0.08]
Overall R^2 in %	5.43	7.30	5.44	43.95	43.31
Avg. #Time periods	293	293	293	293	293
#Currencies	9	9	9	9	9
Currency FE	yes	yes	yes	yes	yes
Time series FE	no	no	no	yes	yes

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from January 2000 to March 2024. Go back

Fund Flows and a Horse Race of Monetary Policy Surprises

	Kuttner (2001)	Kearns, Schrimpf, and Xia, 2022			Jarociński and Karadi (2020)		Bauer and Swanson (2023)	
		Target	Path	Long-rate	MP	CBI	NS	ORT
carry beta$_{i,t}$	0.00	0.01	0.01	0.01	0.00	0.01	0.02	0.01
	[0.08]	[0.17]	[0.24]	[0.19]	[0.05]	[0.20]	[0.37]	[0.22]
dollar beta$_{i,t}$	0.12	0.10	0.10	0.11	0.11	0.11	0.11	0.10
	[0.65]	[0.60]	[0.61]	[0.64]	[0.66]	[0.65]	[0.65]	[0.61]
MPS$_t$	0.24**	−0.02	0.05*	−0.03	0.04	−0.01	0.03*	0.02
	[2.45]	[0.82]	[1.80]	[0.85]	[1.15]	[1.01]	[1.85]	[0.77]
carry beta$_{i,t}$ × MPS$_t$	0.14***	0.08**	−0.03*	−0.02	0.01	0.02	0.05	0.01**
	[3.79]	[2.29]	[1.77]	[0.58]	[0.64]	[0.59]	[1.34]	[2.46]
dollar beta$_{i,t}$ × MPS$_t$	−0.26***	0.03***	0.05	0.04	0.03	0.04	0.02	0.03
	[2.67]	[4.38]	[1.42]	[1.02]	[1.16]	[1.15]	[0.49]	[1.33]
Overall R^2 in %	20.08	20.62	20.36	20.21	20.27	20.12	20.61	20.51
Avg. #Time periods	138	137	137	137	137	137	136	129
#Currencies	9	9	9	9	9	9	9	9
Currency FE	yes	yes	yes	yes	yes	yes	yes	yes

Note: Both dependent and independent variables are standardized. Inference is based on double clustered standard errors (by currencies and time). The sample covers the period from September 2012 to March 2024. Go back

Bank Loans and a Horse Race of Monetary Policy Surprises

	Kuttner (2001)	Kearns, Schrimpf, and Xia, 2022			Jarociński and Karadi (2020)		Bauer and Swanson (2023)	
		Target	Path	Long-rate	MP	CBI	NS	ORT
carry beta$_{i,t}$	−0.37	−0.32	−0.33	−0.29	−0.37	−0.40	−0.36	−0.34
	[1.19]	[1.09]	[1.10]	[0.98]	[1.20]	[1.29]	[1.14]	[1.16]
dollar beta$_{i,t}$	0.46	0.23	0.23	0.22	0.46	0.47	0.46	0.51
	[1.07]	[1.05]	[0.99]	[0.90]	[1.11]	[1.14]	[1.12]	[1.26]
MPS$_t$	0.49**	0.18	−0.22	−0.10	0.23	0.25	0.33	−0.32
	[2.04]	[0.66]	[0.42]	[0.16]	[1.03]	[1.07]	[0.87]	[0.65]
carry beta$_{i,t}$ × MPS$_t$	0.13**	0.09	0.22*	−0.22*	0.23**	−0.10	0.11	0.30***
	[2.48]	[1.17]	[1.73]	[1.76]	[2.31]	[0.77]	[1.14]	[2.77]
dollar beta$_{i,t}$ × MPS$_t$	−0.46*	−0.03	0.21	0.07	−0.25	−0.49*	−0.46	0.34
	[1.87]	[0.07]	[0.39]	[0.12]	[0.74]	[1.67]	[1.05]	[0.67]
Overall R^2 in %	58.12	57.75	57.77	57.93	58.18	58.22	58.14	58.22
Avg. #Time periods	291	257	257	261	290	290	288	281
#Currencies	9	9	9	9	9	9	9	9
Currency FE	yes	yes	yes	yes	yes	yes	yes	yes

Note: The independent variables are measured in units of standard deviations. Inference is based on double clustered standard errors (by currencies and time). The sample spans from January 2000 to March 2024. Go back

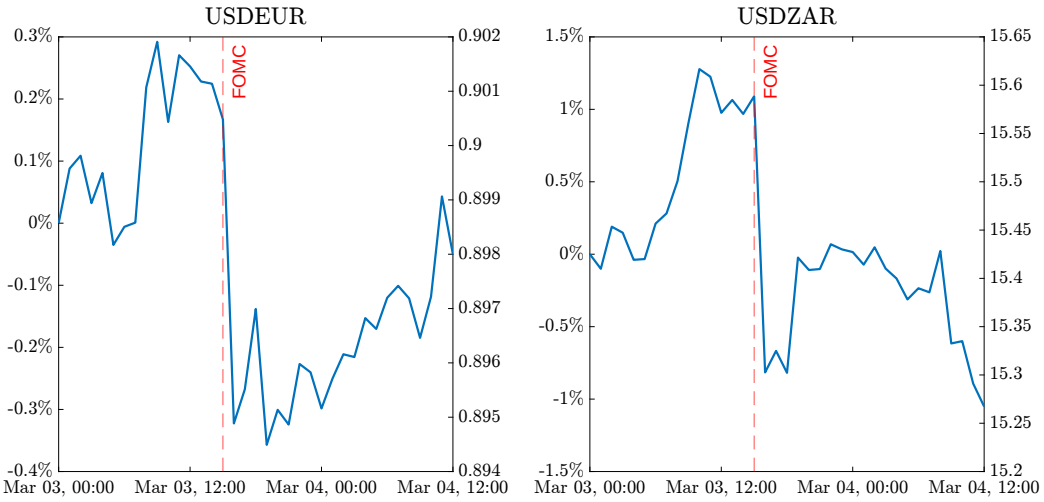
Flow Betas for Euro Currency Pairs

	Corporates	Funds	NBFIs	Non-dealer banks	Dealer banks	carry beta	euro beta
EURCHF	−0.22***	−0.12	−0.17*	−0.07	0.19*	−0.17	0.64
	[4.14]	[0.78]	[1.89]	[1.09]	[1.78]		
EURJPY	0.08	0.18	0.05	−0.22*	0.11*	−0.02	1.18
	[1.09]	[1.34]	[1.06]	[1.86]	[1.69]		
EURDKK	0.04	0.06	0.14	−0.16***	0.09*	0.00	0.01
	[0.23]	[0.89]	[1.52]	[2.79]	[1.81]		
EURGBP	−0.09	0.12	−0.07	−0.15*	0.11	0.11	0.99
	[1.01]	[1.63]	[0.85]	[1.84]	[1.38]		
EURSEK	−0.03	−0.07	0.01	0.12	−0.06	0.16	0.59
	[0.42]	[0.98]	[0.07]	[1.19]	[0.66]		
EURUSD	−0.10	−0.15	0.09	−0.04	0.16*	0.19	1.23
	[0.90]	[1.30]	[1.20]	[0.74]	[1.79]		
EURNOK	0.06	−0.07	0.04	0.03	0.02	0.34	1.14
	[0.71]	[1.12]	[0.71]	[0.40]	[0.35]		
EURCAD	−0.04	−0.21	0.15**	0.12*	0.02	0.46	1.49
	[0.82]	[0.94]	[2.33]	[1.91]	[0.12]		
EURAUD	0.02	−0.02	−0.12*	0.17	−0.14	0.68	1.74
	[0.23]	[0.21]	[1.93]	[1.37]	[0.93]		

Note: Coefficients are in €mn. The numbers inside the brackets are the corresponding test statistics based on robust standard errors (Newey and West, 1987). The sample covers the period from September 2012 to October 2023.

Go back

US Monetary Policy and Exchange Rates



Note: On 3 March 2020 at 15:00 GMT the Fed cut interest rates unexpectedly by 50 bps.

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