Global spillovers from multi-dimensional US monetary policy

Georgios Georgiadis[1] Marek Jarocinski[1]

[1]ECB

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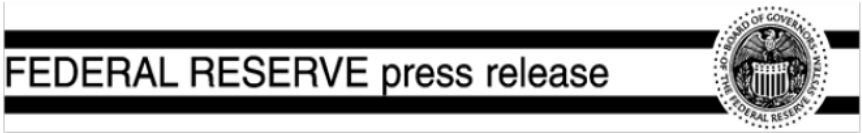
The views are those of the authors and not the ECB.

Fed toolkit multi-dimensional



FEDERAL RESERVE press release

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policy, the Committee expects inflation to return to its 2 percent objective and the labor market to remain strong. In support of these goals, the Committee decided to raise the target range for the federal funds rate to 3/4 to 1 percent and anticipates that ongoing increases in the target range will be appropriate. In addition, the Committee decided to begin reducing its holdings of Treasury securities and agency debt and agency mortgage-backed securities on June 1, as described in the Plans for Reducing the Size of the Federal Reserve's Balance Sheet that were issued in conjunction with this statement.

Motivation

Effects of Fed policies on RoW

- Lots of empirical work on Fed policy spillovers
- But little that **at the same time**
  - **(1) identifies shocks to different Fed measures within unified framework**
  - **(2) accounts for residual endogenous components in policy surprises**

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Heterogeneities across Fed measures important

- Optimal local responses may differ
  IMF (2020)
- Fed may resort to different measures more frequently in future
  Reis et al. (2016)

Research questions

Effects of Fed policy on RoW

- across measures in Fed toolkit?
- in terms of transmission channels?
- regarding EME monetary policy trade-offs?

Findings

Fed spillovers to RoW: Consequential, but not for all Fed measures

- Large for FG and LSAPs, small for changes in current policy rate (given FG)
- Both FG and LSAPs entail trade-offs for EME central banks

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Residual endogenous components in policy surprises: CBI effects crucial for FG

- Overall FG surprises entail implausible IRF estimates
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Transmission channels: Risk

- Risk-on/off drives asset prices, spreads, capital flows and exchange rates
- LSAPs: limited role for term premia, despite international portfolio re-balancing

Existing literature

Spillovers from Fed policy

- Georgiadis (2016), Dedola et al. (2017), Iacoviello and Navarro (2019), Miranda-Agrippino and Rey (2020b), Dees and Galesi (2021)

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- Bräuning and Sheremirov (2019), Degasperi et al. (2020), Camara (2021), Pinchetti and Szczepaniak (forthcoming), Hoek et al. (2022), Gai and Tong (2022), Jarociński (2022)

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Spillovers from 'pure' multi-dimensional Fed policies

- Miranda-Agrippino and Nenova (2022): Apply **uni-dimensional** Jarociński and Karadi (2020) CBI effect cleansing to **multi-dimensional** Swanson (2021) shocks
- This paper: Use Jarociński (forthcoming) **multi-dimensional** shock identification **with built-in** CBI effect cleansing

High-frequency identification of Fed policy shocks

Industry standard: Interest-rate surprise in narrow windows around FOMC meetings

- Assume (i) FIRE & (ii) window sufficiently tight to rule out non-policy shocks
  Kuttner (2001); Cochrane and Piazzesi (2002)
- Extension to unconventional policies: FG and LSAP
  Gürkaynak et al. (2005a,b); Swanson (2021)

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Residual endogenous policy surprise components

- When FIRE is relaxed: CBI effects (or Fed-response-to-news effects, non-Fisherian effects)
  Campbell et al. (2012); Nakamura and Steinsson (2018); Cieslak and Schrimpf (2019); Miranda-Agrippino and Ricco (2021); Uribe (2022); Bauer and Swanson (2023b)
- Cleansing: Exploit asset-price co-movement, additional public/private information
  Jarociński and Karadi (2020); Miranda-Agrippino and Ricco (2021); Bauer and Swanson (2023a)
- Jarociński (forthcoming): New cleansing with multi-dimensional Fed policy shocks

Jarociński (forthcoming)'s high-frequency identification approach

Motivation

- Asset-prices surprises highly non-Gaussian (i.e. fat tails, leptocurtic)

▸ Example

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Setup

- Postulate $\boldsymbol{y}_m = \boldsymbol{C}\boldsymbol{u}_m$, $u_{j,m} \overset{i.i.d.}{\sim} \mathcal{T}(\nu)$, $\boldsymbol{y}_m$ observed surprises, $\boldsymbol{u}_m$ structural shocks
- Estimate $\boldsymbol{C}$ and ν by maximum likelihood, then back out $\boldsymbol{u}_m$

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Specification

- m: 241 FOMC meetings between 1991m7 to 2019m6
- $\boldsymbol{y}_m$: surprises in current-month fed funds future, 2-/10-year Treasury yields, S&P500 index Time-series plots

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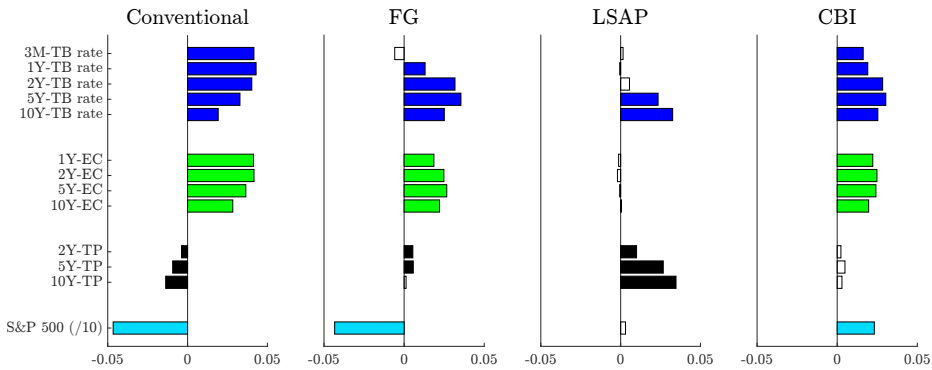
Structural labelling

- *Ex post* based on patterns in financial market effects
  Rigobon (2003)

Impact-day effects of Jarociński (forthcoming)'s shocks



Note: Each bar depicts the daily impact response of a US monetary policy shock estimated from local projections. The sample period spans 1991m7 to 2019m6. Filled bars indicate estimates that are statistically significant at the 90% confidence level. Standard errors are robust to heteroskedasticity and serial correlation. 'TB' denotes Treasury bond, 'EC' the Treasury yield curve expectations component, 'TP' the Treasury yield term premia. Filling indicates effects statistically significant at the 90% level.

▸ LSAP shock estimated only after 2008 ▸ Daily effects of other 'pure' MP shocks ▸ Daily effects of Swanson shocks

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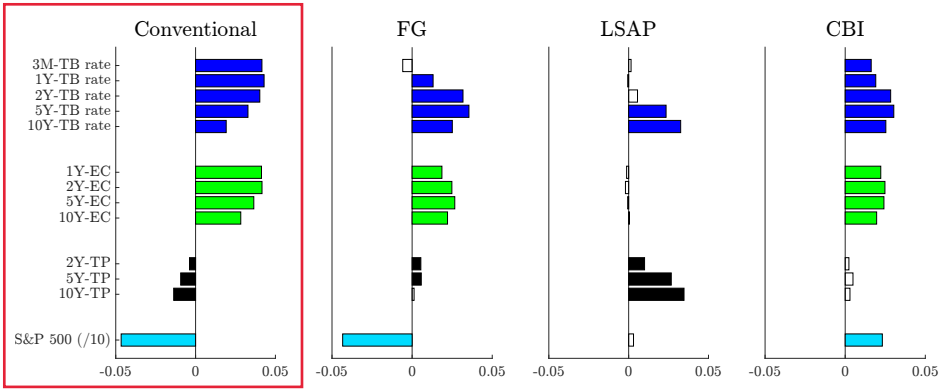

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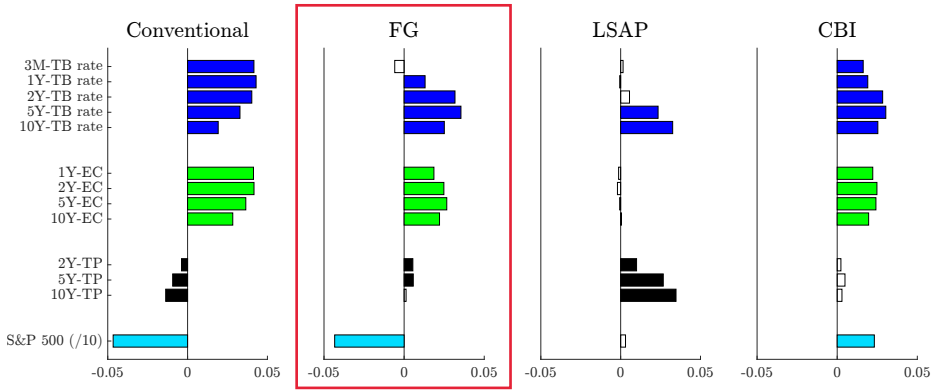

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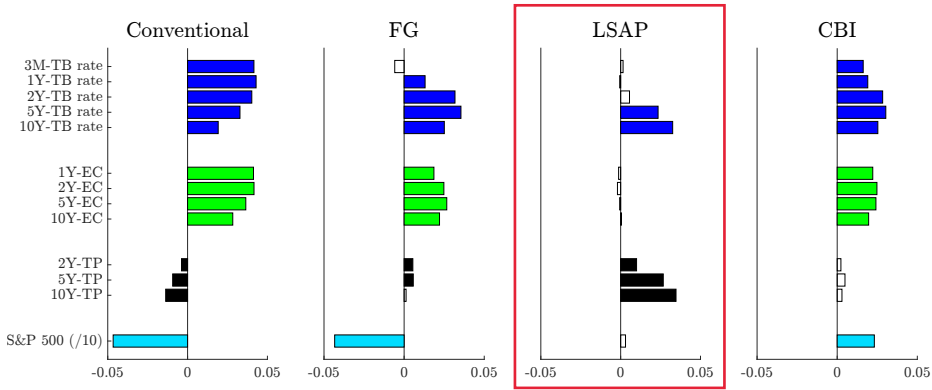

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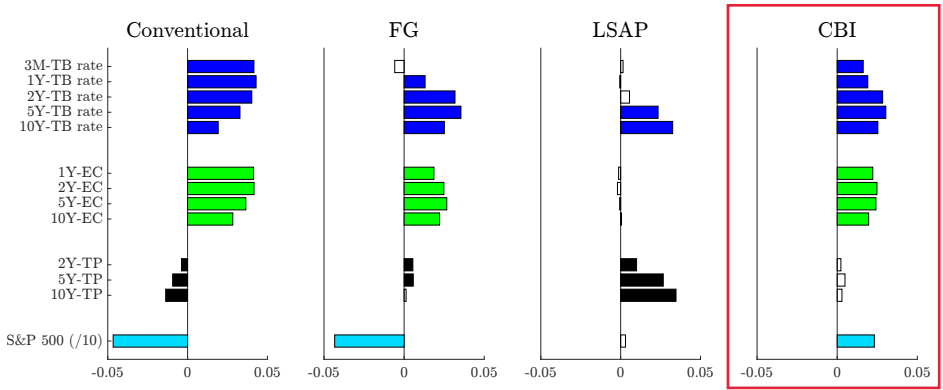

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Appealing features of Jarociński (forthcoming)'s identification

Relatively weak identifying assumptions in $\boldsymbol{y}_m = \boldsymbol{C}\boldsymbol{u}_m$, $u_{j,m} \overset{i.i.d.}{\sim} \mathcal{T}(\nu)$

- (i) N unobserved, (ii) fat-tailed, (iii) mutually independent structural shocks
- No need to impose recursiveness, sign or magnitude restrictions on $\boldsymbol{C}$
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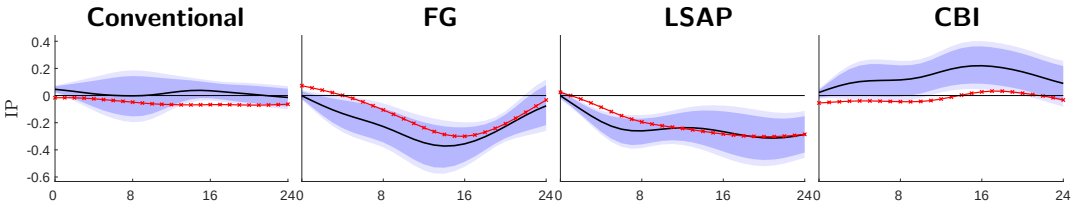
Robust to relevant variations

- N: Expand $\boldsymbol{y}_m$ (and hence $\boldsymbol{u}_m$)
- $\boldsymbol{y}_m$: Use principal components of large number of asset price surprises
- $u_{j,m} \overset{i.i.d.}{\sim} \mathcal{T}(\nu)$: Relax mutual independence, allow for common stochastic volatility

▸ Comparison to Swanson shocks

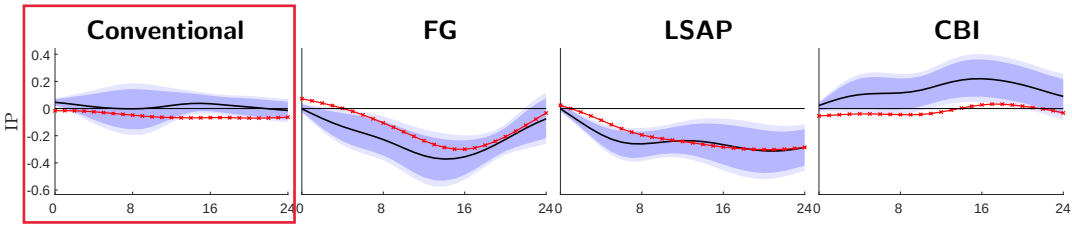
Real activity spillovers to RoW (-) and domestic effects in US (x)



Note: The black solid lines indicate the impulse responses of RoW variables to the US monetary policy shocks of Jarociński (forthcoming) estimated from SLPs of Barnichon and Brownlees (2019). The shocks are included simultaneously in the regressions. The sample period spans 1991m1 to 2019m6. Shaded areas indicate 68% and 90% confidence bands. The red cross lines represent the estimates for the corresponding US variables. Panels in a given row feature the same limits on the vertical axis.

▸ Impact day spillovers ▸ CPI effects ▸ Other real activity measures ▸ Panel LPs ▸ Global factors ▸ Oil prices

No meaningful spillovers from conventional MP shocks



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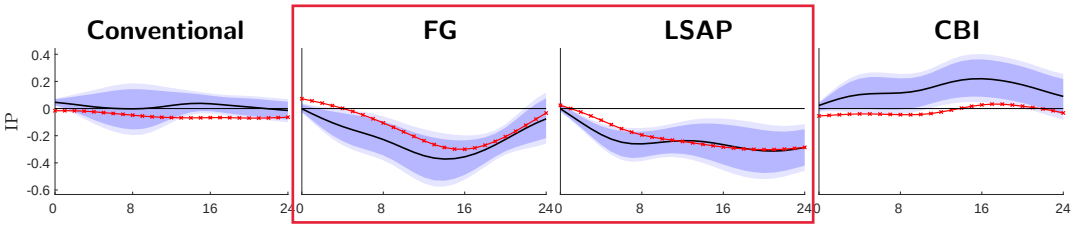
Spillovers from FG/LSAP shocks as large as domestic effects in US



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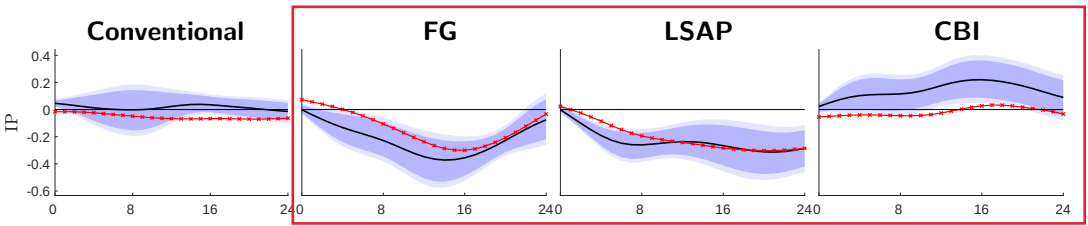
FG & LSAP shocks have opposite effects compared to CBI effects



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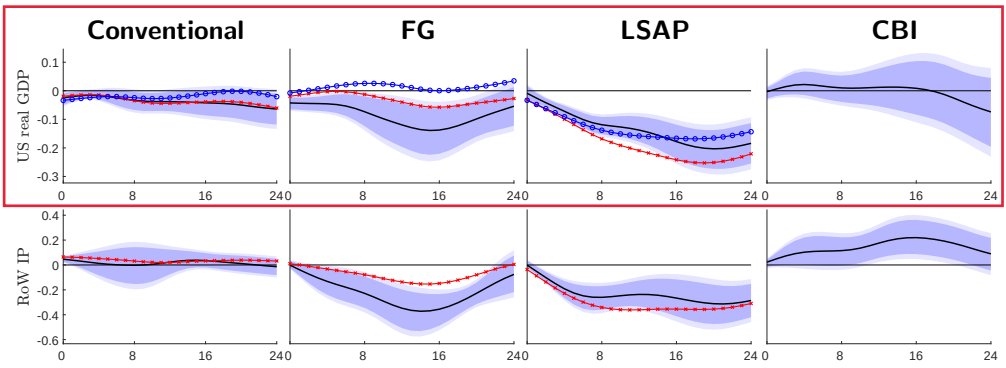
Using the shocks of Swanson (2021, x) as cleansed in Miranda-Agrippino and Nenova (2022, o)



Note: The red crossed lines indicate the responses to the conventional monetary policy, FG and LSAP shocks of Swanson (2021). The blue plus lines indicate the responses to the conventional monetary policy, FG and LSAP shocks of Swanson (2021) cleansed one a time from CBI effects based on the sign of the accompanying high-frequency stock market surprise, as done in Miranda-Agrippino and Nenova (2022).

Transmission channels

Trade channels

- Expenditure switching: Dollar appreciation increases US demand for RoW goods
- Expenditure reduction: Slowdown reduces US demand for RoW goods given exchange rate
- Effect on US imports ($= -$ RoW exports) ambiguous
- Caveats: No account for (i) intra-RoW trade, (ii) cost-push shock via disruptions in GVCs

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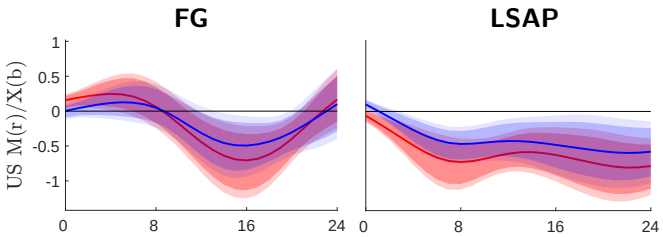
Financial channels

- Domestic and global financial accelerator mechanisms
  Bruno and Shin (2015); Akinci and Queralto (2019); Miranda-Agrippino and Rey (2020b)

  Asset prices, exchange rates, risk aversion $\longrightarrow$ net worth, collateral values, leverage
- Especially in case of LSAPs
  Alpanda and Kabaca (2020); Kolasa and Wesołowski (2020); Gourinchas et al. (2022); Greenwood et al. (2023)

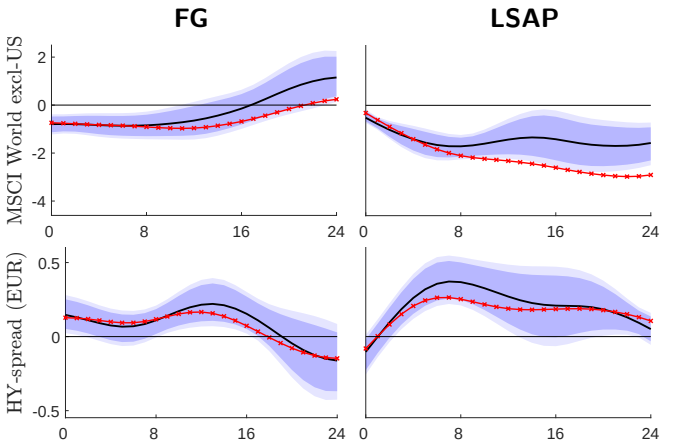
  International portfolio re-balancing $\longrightarrow$ term premia spillovers

US imports drop, but $X_{RoW,US}/Y_{RoW} \approx 0.02$ only: Trade no key channel



Note: Red (blue) lines depict impulse response of US real imports (exports).

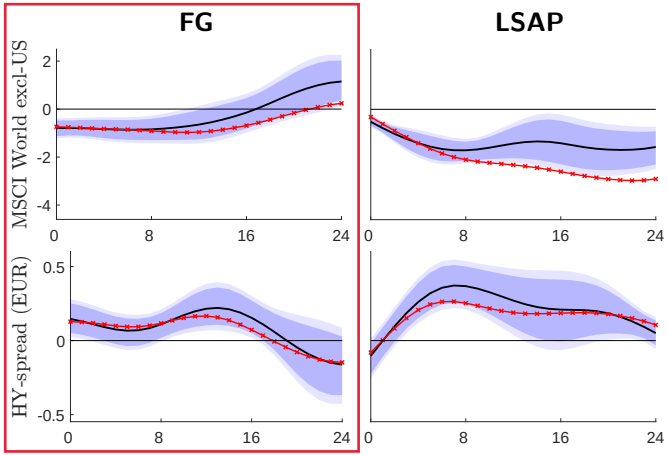
Financial channels in RoW (-) & US (x)



Note: HY-spread (EUR) is the ICE Bank of America Euro High Yield Index Option-Adjusted Spread. Red crossed lines depict effects on US variables.

▸ Bekaert et al. (2021) risk aversion

FG: Financial variables respond instantly, synchronized across US & RoW



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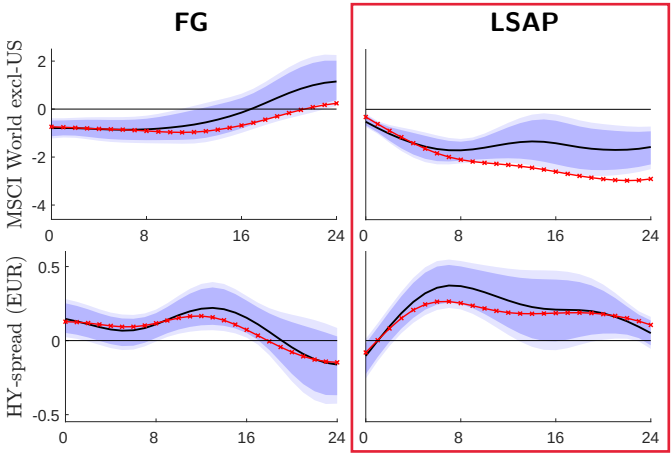
LSAPs: Financial variables respond only gradually, equally synchronized



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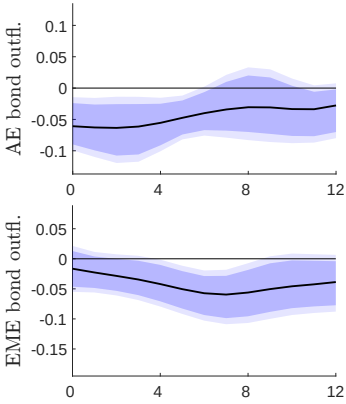
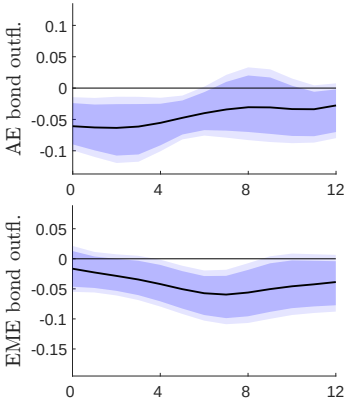
Transmission of LSAPs through portfolio re-balancing and term premia?



Note: Outflows are net purchases of foreign securities by US residents. Flows are scaled by US GDP. Bonds include private and public securities. As advocated by Bertaut and Judson (2022), flows are calculated as changes in positions adjusted by estimates of valuation effects based on the TIC-SLT survey. We combine the estimated flows data based on the methodology of Bertaut and Judson (2014) for December 2011 to December 2019 and the estimated flows data based on the methodology of Bertaut and Tryon (2007) for December 1994 to December 2010. The term premia refer to 10-year bonds and are taken from D'Amico et al. (2018, DKW) and Diebold et al. (2006, DNS). The term premium is calculated as a GDP-weighted average across Japan, Germany, Switzerland, the UK, Australia, Sweden, Canada and New Zealand. Red crossed lines depict effects on US analogues.

International portfolio re-balancing in closer substitutes of US bonds



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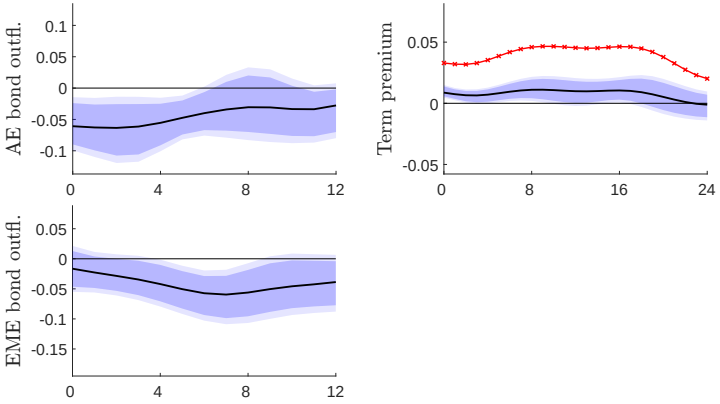
But only small term premium spillovers!



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Fed spillovers and monetary policy trade-offs in EMEs

EME complains about Fed spillovers

- 'Monetary tsunami' and calls for 'rules for the monetary game'
  Rajan (2013, 2016)

Complaints legitimate?

- Fed spillovers externality only if they elicit trade-offs for EME central banks

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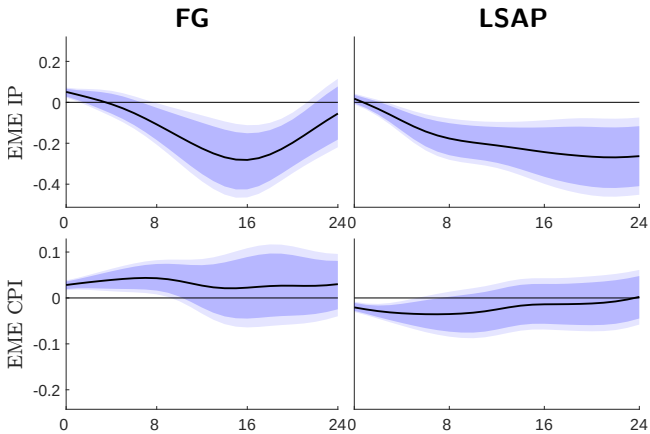
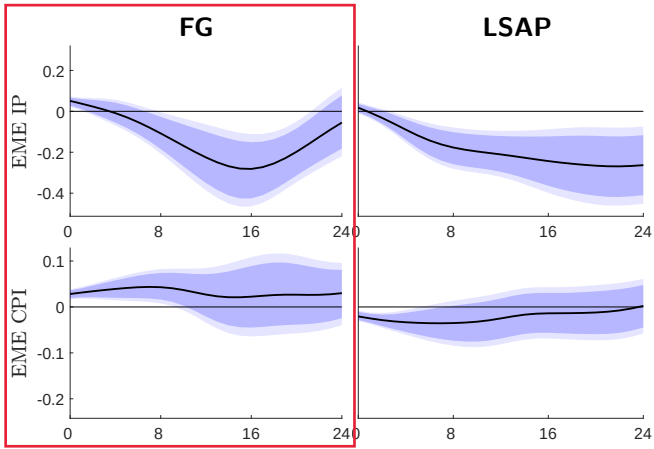
Explore trade-offs between

- output and price stabilization (≡macroeconomic stability)
- macroeconomic stability and financial stability

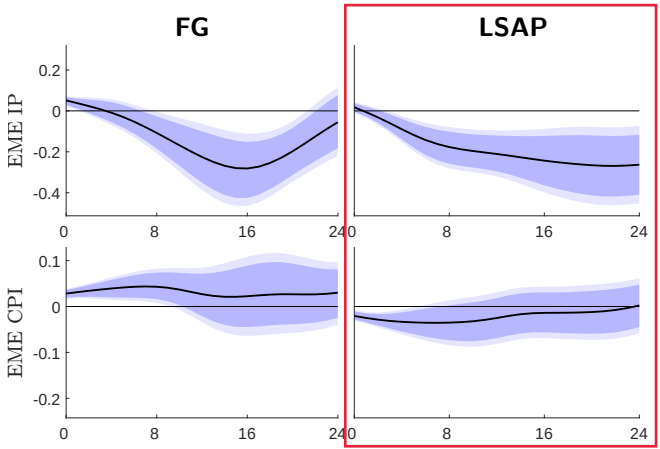
Trade-offs between output and prices



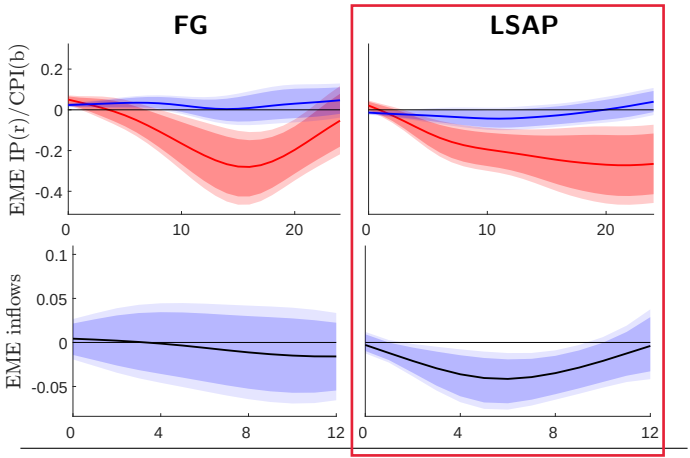
FG: Trade-off between output and prices



LSAP: No trade-off between output and prices...



...but LSAP entails trade-offs between macro and financial stability



Note: In the top panel the impulse responses for IP are depicted in red and those for consumer prices in blue. The bottom panel shows the impulse response of EME portfolio debt and equity inflows scaled by recipient-country GDP taken from the IMF Balance of Payments.

Summary

Implications of US monetary policy for the RoW

- Across dimensions of Fed toolkit?
  - $\longrightarrow$ Especially Fed FG and LSAP entail consequential spillovers
  - $\longrightarrow$ Accounting for CBI effects crucial in context of FG
- Transmission channels and foreign MP trade-offs?
  - $\longrightarrow$ (Bilateral) Trade channel not key
  - $\longrightarrow$ Risk channel at center stage

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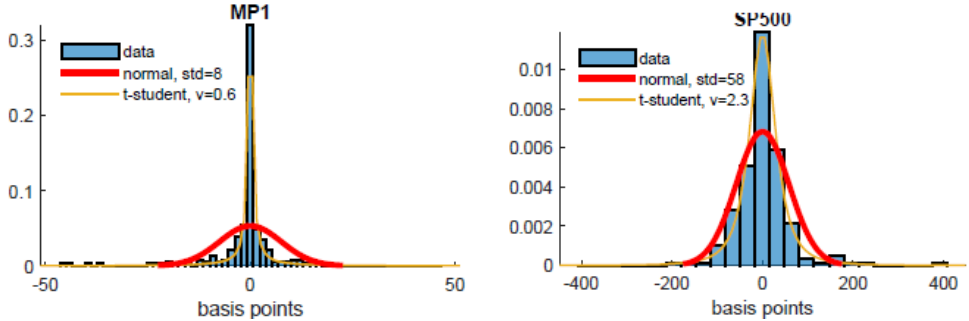
Non-Gaussian high-frequency asset-price surprises



Note: The figure displays the distribution of current-month Fed funds futures contract price and S&P 500 surprises across FOMC meetings from July 1991 to June 2019. The blue bars represent a histogram of these surprises, and the red (yellow) solid line a normal (Student-t) distribution fitted with maximum likelihood. The figure is taken from Jarociński (forthcoming).

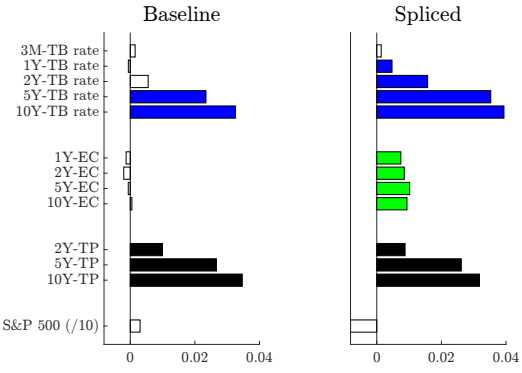
▸ Return

Time-series plots for Jarociński (forthcoming)'s MP shocks

Note: The figure shows the incidence of the monetary policy shocks of Jarociński (forthcoming) over time. Daily shocks are temporally aggregated by summing them up within a month.

▸ Return

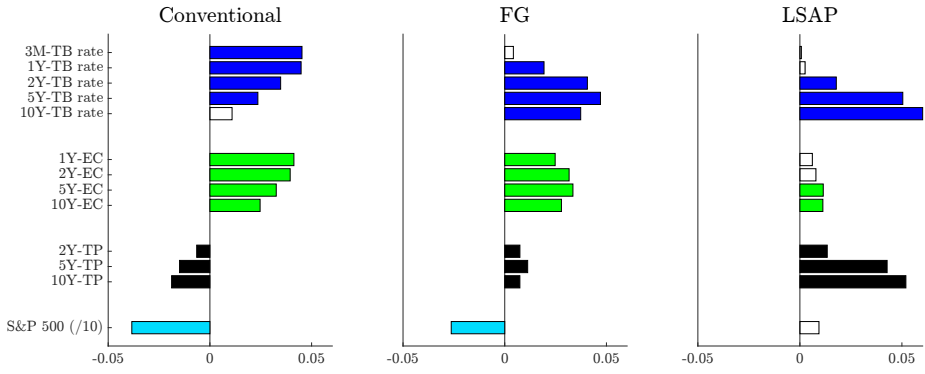
LSAP shock only estimated after 2008



Note: The left panel depicts the baseline results from fig: impact IRFs US interest rates lps main text and the right panel those from an alternative specification in which LSAP shocks are estimated only for 2008 to 2019 and set to zero prior to 2008.

▶ Return

Daily effects of shocks of Swanson (2021)



Note: The shocks are taken from Swanson (2021), and are included simultaneously in the regressions.

▸ Return

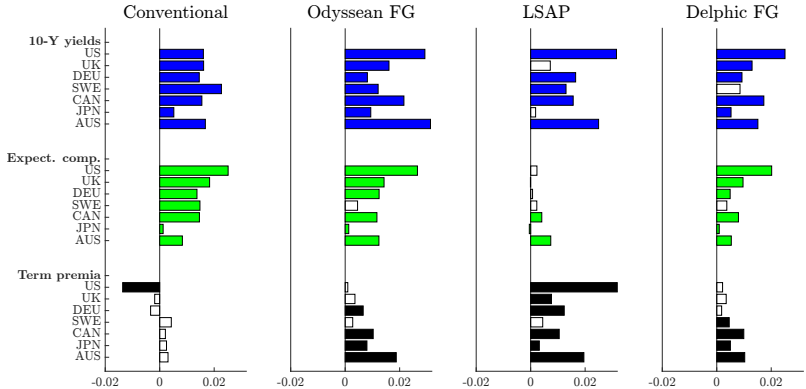
Comparison of shocks of Swanson (2021) and Jarociński (forthcoming)

	Swanson shocks on LHS			Jarocinski shocks on LHS			
(lr)2-4(lr)5-8	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CMP	FG	LSAP	CMP	FG	LSAP	CBI
Jarocinski conventional MP shock	0.79***	0.16***	0.03				
	(0.00)	(0.00)	(0.27)				
Jarocinski FG shock	0.08*	0.87***	0.01				
	(0.05)	(0.00)	(0.84)				
Jarocinski LSAP shock	-0.01	-0.21***	0.49***				
	(0.54)	(0.00)	(0.00)				
Jarocinski CBI effect	-0.02	0.47***	0.02				
	(0.38)	(0.00)	(0.60)				
Swanson conventional MP shock				1.16***	-0.09	-0.07	-0.16
				(0.00)	(0.43)	(0.19)	(0.35)
Swanson FG shock				-0.02	0.80***	0.06	0.49***
				(0.52)	(0.00)	(0.30)	(0.00)
Swanson LSAP shock				-0.02	0.45***	1.42***	0.08
				(0.61)	(0.00)	(0.00)	(0.57)
R-squared	0.91	0.91	0.70	0.90	0.71	0.70	0.26
Observations	241	241	241	241	241	241	241

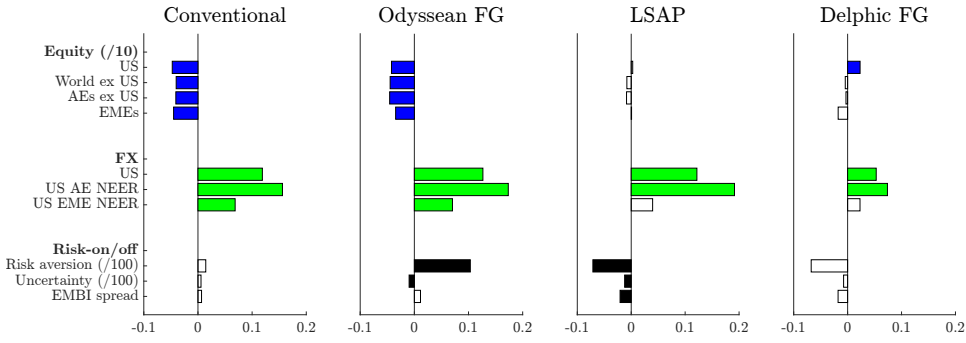
Note: The dependent variable across columns is the daily conventional, FG and LSAP shocks of Swanson (2021) in columns (1) to (3) and the conventional, Odyssean FG, LSAP and Delphic FG shocks of Jarociński (forthcoming) in columns (4) to (7), respectively. Inference is based on robust standard errors. *p*-values are reported in parentheses below the point estimates, and * (**) [***] indicates statistical significance at the 10% (5%) [1%] significance level.

▶ Return

Impact-day spillovers to RoW interest rates...



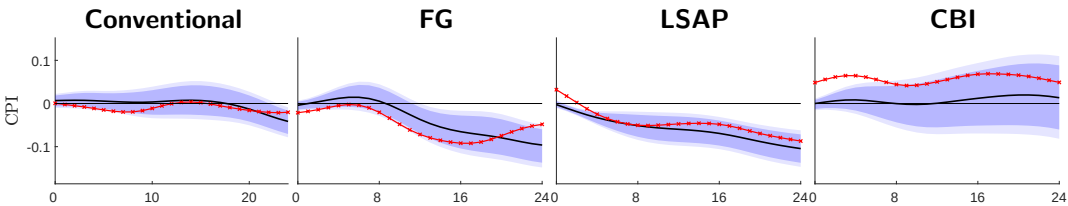
...and to equity prices, exchange rates, risk-on/off



Note: Each bar depicts the daily impact response of a US monetary policy shock estimated from the local projections. The shocks are taken from Jarociński (forthcoming), and are included simultaneously in the regressions. Filled bars indicate estimates that are statistically significant at the 90% confidence level. Standard errors are robust to heteroskedasticity and serial correlation. The sample period spans 1991m1 to 2019m6.

▸ Return

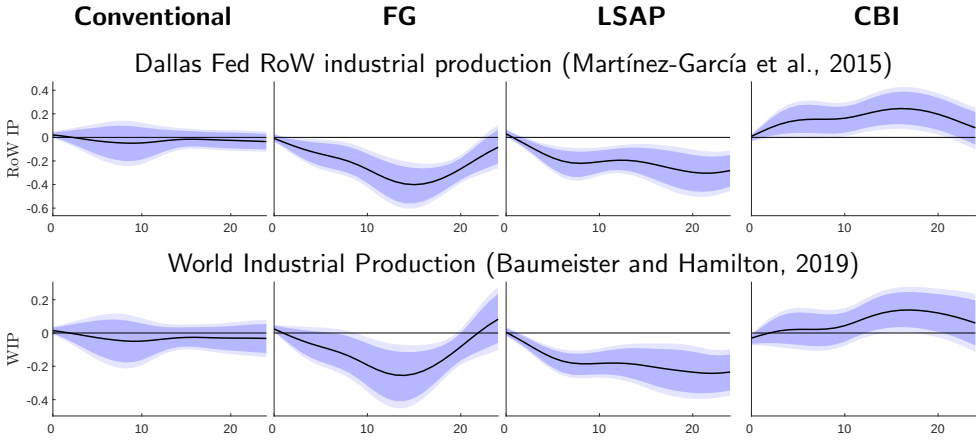
Large CPI spillovers to RoW, similar to domestic effects in US



Note: The black solid lines indicate the impulse responses of RoW variables to the US monetary policy shocks of Jarociński (forthcoming) estimated from SLPs of Barnichon and Brownlees (2019). The shocks are included simultaneously in the regressions. The sample period spans 1991m1 to 2019m6. Shaded areas indicate 68% and 90% confidence bands. The red cross lines represent the estimates for the corresponding US variables. Panels in a given row feature the same limits on the vertical axis.

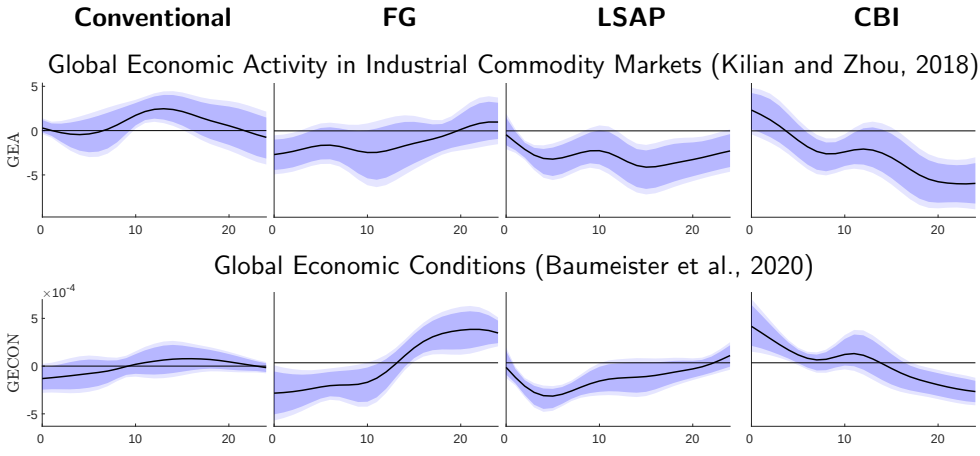
Return

US monetary policy spillovers to alternative real activity measures (I)



Note: The Dallas Fed RoW industrial production (Martínez-García et al., 2015) is an average of 40 non-US economies' industrial production indices calculated using US trade weights. The World Industrial Production index (WIP; Baumeister and Hamilton, 2019) is an extension of the OECD's index of monthly industrial production in OECD and six additional major other economies. The remaining indicators are all tied to predicting energy and/or commodity demand.

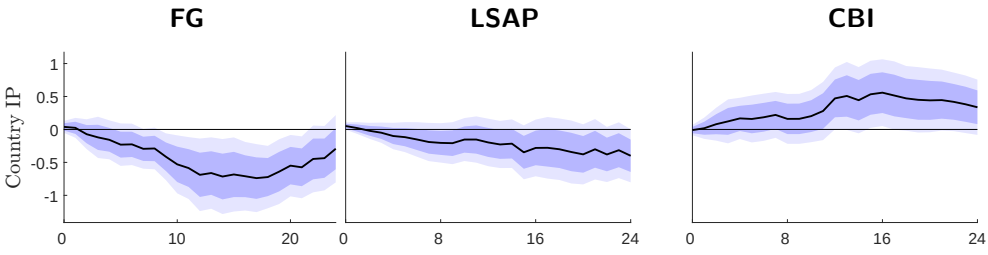
US monetary policy spillovers to alternative real activity measures (II)



Note: The Global Real Economic Activity Index in Industrial Commodity Markets (GEA; Kilian and Zhou, 2018) is derived from a panel of dollar-denominated global bulk dry cargo shipping rates and may be viewed as a proxy for the volume of shipping in global industrial commodity markets and is expressed in percent deviations from trend. Finally, the Global Economic Conditions indicator (GECON; Baumeister et al., 2020) is a combination of 16 indicators covering a broad range of variables including real economic activity, commodity prices, financial indicators, transportation, uncertainty, expectations, weather, and energy-related measures.

▸ Return

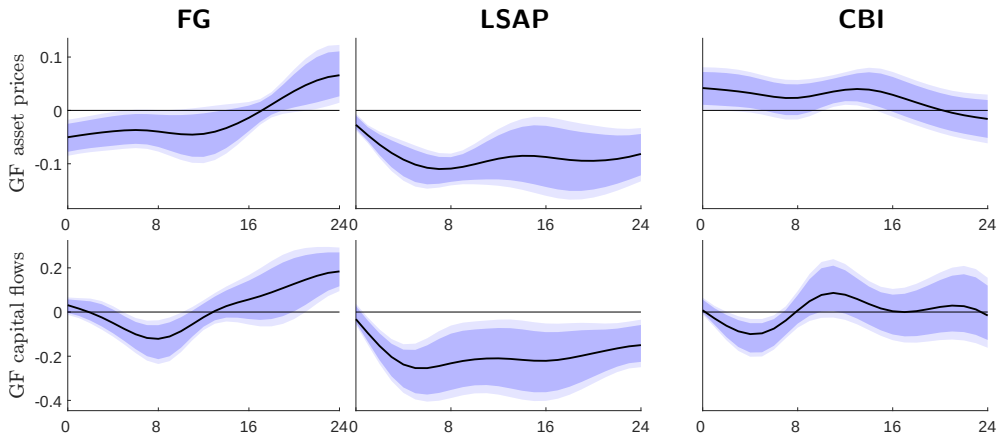
US monetary policy spillovers with panel LPs



Note: The figure presents the results for the estimates of the spillovers from US monetary policy shocks obtained from panel LPs. Shaded areas represent 90% and 68% confidence bands, based on Driscoll-Kraay robust standard errors.

▸ Return

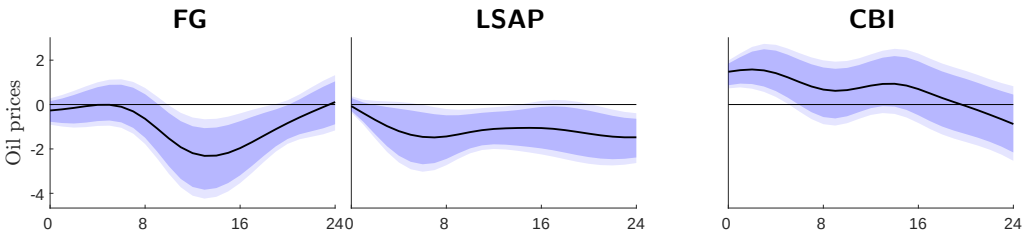
Effect of US MP on global factors



Note: The global factor ('GF') in risky asset prices were originally introduced by Miranda-Agrippino and Rey (2020b) and extended in Miranda-Agrippino et al. (2020), and the global factor in capital flows is taken from Miranda-Agrippino et al. (2020).

Return

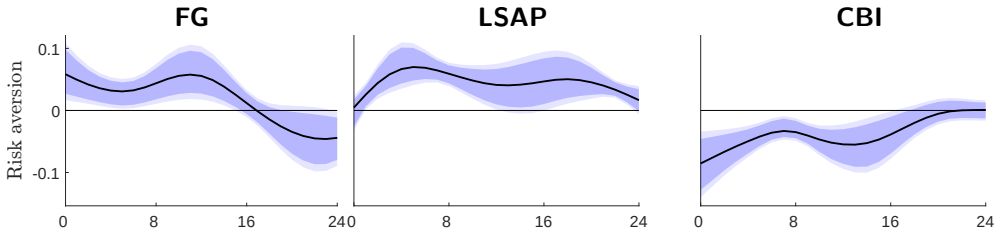
Effect of US MP on oil prices



Note: The black solid lines indicate the impulse responses of RoW variables to the US monetary policy shocks of Jarociński (forthcoming) estimated from SLPs of Barnichon and Brownlees (2019). The shocks are included simultaneously in the regressions. The sample period spans 1991m1 to 2019m6. Shaded areas indicate 68% and 90% confidence bands. The red cross lines represent the estimates for the corresponding US variables.

Return

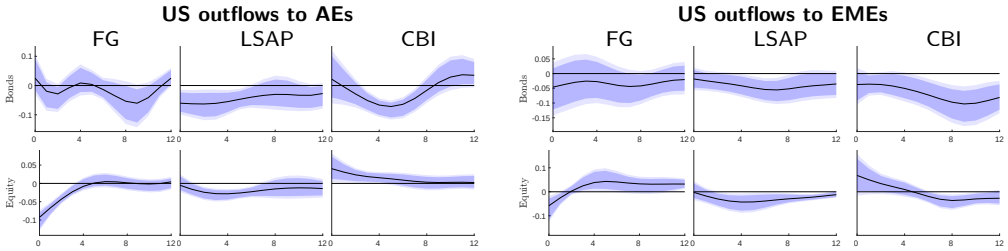
Transmission through risk channel



Note: Risk aversion is taken from Bekaert et al. (2021).

Return

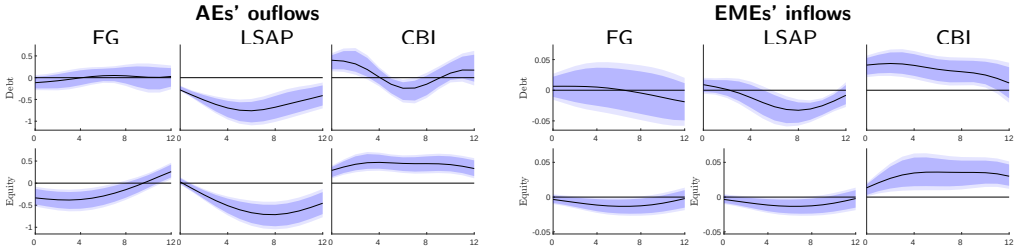
US outflows to AEs and EMEs by instrument



Note: The country classification for AEs and EMEs is taken from Miranda-Agrippino et al. (2020).

▸ Return to FG results

IMF BoP AE and EME inflows



Note: The data are taken from the IMF Balance of Payments Statistic, are interpolated from quarterly to monthly frequency, and span 1996 to 2019. We use the cross-country average of economies' ratio of outflows to recipient-country GDP.

▶ Return