The International Monetary Transmission Mechanism

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Background

- Earlier consensus in International Macroeconomics: Mundell-Fleming
  - Expenditure switching at the center: when US raises R^*, USD appreciates
  - Production predicted to 'switch' from US to foreign economies, via expansion of US imports and contraction of US exports.

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  - Some events: Asian Crisis, Taper Tantrum (2013)
  - Recent influential work:
    - ⋆ emphasizes centrality of financial linkages (Miranda-Aggripino and Rey RESTUD20)
    - ⋆ expenditure switching channel muted (Gopinath, et al AER2020).

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- We take another look at the international impact of US monetary tightening.

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- Interpretation of the IRFs
  - fit small open economy (SOE) models to the IRFs.
  - Do counterfactuals on SOEs to see what factors account most for foreign responses.

VAR Analysis

- Monthly data, 2006-2019
  - ▶ Data availability & 2000s different regime for EMEs
  - ▶ US Monetary policy shocks: Bauer & Swanson (2023) ▶ Details
  - ▶ Bayesian estimation: Minnesota priors.

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- 8 variables in Y_t:
  - GDP, PCE, Exports, Imports, trade-weighted nominal exchange rate, $S\&P$ 500,
  - Excess Bond Premium (EBP), from Gilchrist-Zakrajsek
    - ⋆ Measures marginal value of liquidity of Treasury securities (Devereux-Engle-Wu 2023)
  - R^* (sum of 2-year US Treasury bond rate and EBP), default-free short term rate for business

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- Quantity and Price Variables are in Log-Levels.

US Response to Contractionary US Monetary Shock
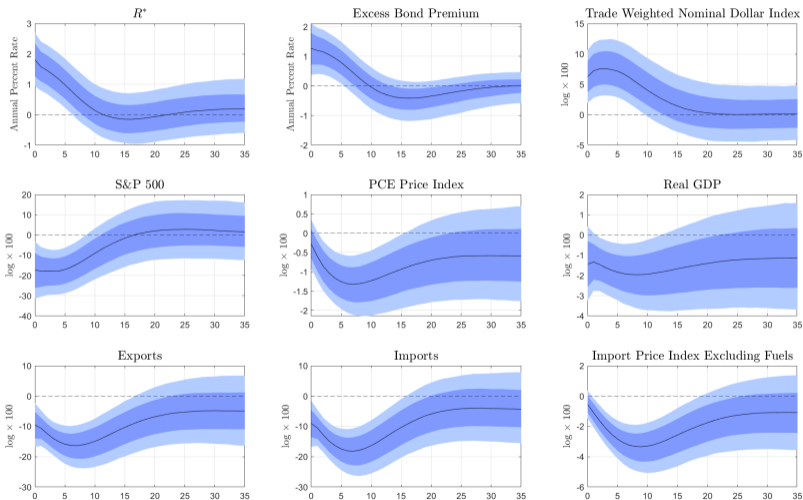
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- US imports **go down a lot** more than GDP in percent terms.
    - Fall in import price index suggests that decline is due to fall in demand from US (due to fall in GDP).

# International Impact of US Monetary Tightening

- Our VAR for the ith non-US economy is

$$Y_{i,t} = A_1 Y_{i,t-1} + A_2 Y_{i,t-2} + C\varepsilon_t^{mp} + \varepsilon_{i,t}, \tag{1}$$

$$Y_{i,t} = \left[\begin{array}{c} \tilde{Y}_t \\ Y_t^i \end{array} \right],$$

and $\tilde{Y}_t$ are US variables that affect other economies: $\tilde{Y}_t \sim 3 \times 1$ vector of log GDP^{US}, R^*, PCE^{US}

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- Impose that coefficients for each country are the same and no interaction between countries.
  - *AE* (advanced economies): $N = 10$ - Australia, Canada, UK, Germany, Israel, Japan, Korea, Norway, Switzerland, and Sweden.
  - *EME* (emerging market economies): $N = 14$ - Brazil, Chile, Colombia, Hungary, India, Indonesia, Mexico, Peru, Philippines, Poland, Russia, South Africa, Thailand, Turkey.

Advanced Economies
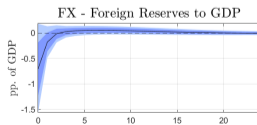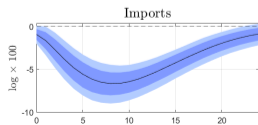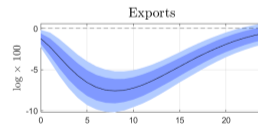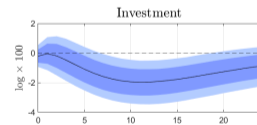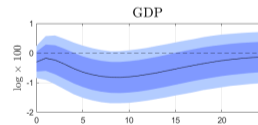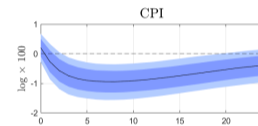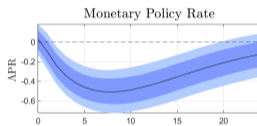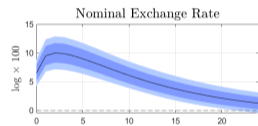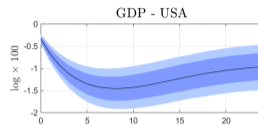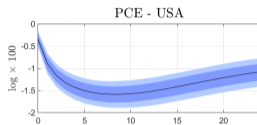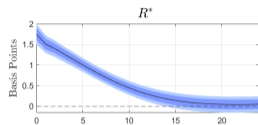
Emerging Market Economies
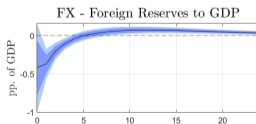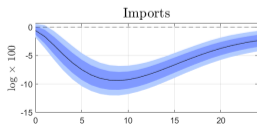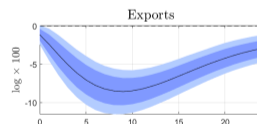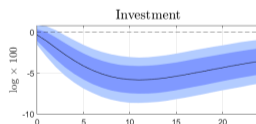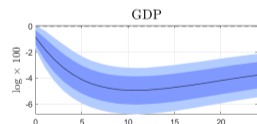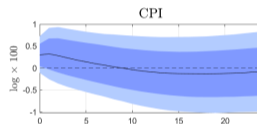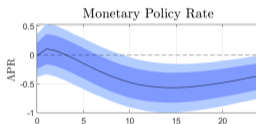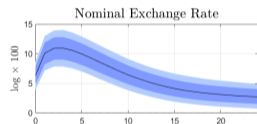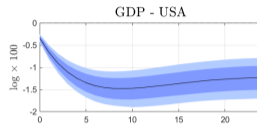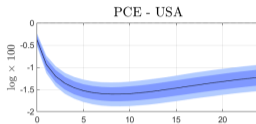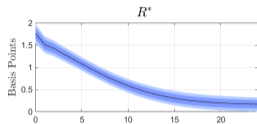
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- Contractions in Foreign Economies
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    - **Large drop in exports in EMEs and AEs**

- EMEs seem to resort to FX intervention more, in response to US tightening

Small Open Economy Model

- We build a small open economy model
  - US is exogenous, source of monetary tightening shock

- Estimate the model: Match Estimated Impulse Responses

- Results suggest import demand channel is the main channel through which US MP shocks transmit to RoW

- Financial Frictions matter:
  - they amplify the trade shock triggered by monetary contraction.

Small Open Economy Model
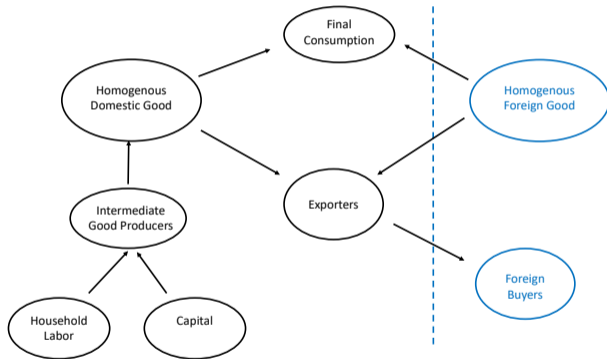
1. Portfolio Effect Due to Presence of Capital (No other frictions)

- With a *pure R^** rise (i.e., excluding impact on US imports & prices), households in the SOE reallocate their portfolios towards the US.
    - ▶ People pull back on investment inside the SOE.
    - ▶ This portfolio effect, in a 'reasonably parameterized' version of the model, overwhelms the expenditure switching force in the M-F model and produces a recession in the SOE.

2. Interest Rate Parity Friction

- Households not inclined to shift their portfolios
    - Non-pecuniary reasons, habits
    - Regulation, capital controls
    - Introduce "flight to safety" "low risk appetite": Target portfolio moves with R^* (non-pecuniary motive)

    -
- Gabaix-Maggiori, Itskhoki-Mukhin, Eichenbaum-Johannsen-Rebelo and others.
    - Accounts for the interest rate premium in countries.
    - Allows FX Interventions to influence the ER

3. Balance Sheet Channel

- Drop in EMEs (esp investment) seems quite substantial.

- Introduce a balance sheet channel following costly state verification model, BGG.
  - Funding for investment requires dollars and local currency.

- When EME currency depreciates, then entrepreneurs suffer capital losses and they borrow less.
  - The effect on investment can be very large.
  - Rise in interest rate spread and loan non-performance.
  - Substantial drop in net worth (market capitalization).

4. Dominant Currency Paradigm

- Export prices sticky in dollars (Gopinath, et al AER2020).

- Muted expenditure switching: Exports respond sluggishly to depreciation

Model Estimation

- Match IRFs for AEs & EMEs (Christiano et al 2005, 2010, 2016)

Table 1: Estimated Model Parameters

Variable	Description	Peru	EME	AE
γ	Portfolio Adjustment	2.70	1.84	4.68
γ_R	Portfolio Demand Shifter	0.91	28.42	27.90
κ	Investment Adjustment	3.14	6.92	3.03
θ_{R*}	FX Intervention Coefficient	0.36	0.34	0.00
ρ^{FX}	FX Intervention Persistence	0.71	0.89	0.00
η_c	Consumption Elasticity of Substitution	1.43	1.16	0.78
η_x	Export elasticity of Substitution	1.49	1.82	1.40
ν_i	Investment Elasticity of Substitution	1.20	0.81	0.25
η^f	Price Elasticity of Exports	2.04	5.17	2.62
γ_f	Export Demand Shifter	2.67	5.71	4.50
θ^x	Export Calvo Stickiness	0.79	0.89	0.82
$1 - \omega_c$	Home Bias, Consumption	0.53	0.54	0.93
γ_I	Home Bias, Investment	0.29	0.29	0.49
γ_x	Home Bias, Exports	0.42	0.41	0.61
γ_f	Export Demand Shifter	2.67	5.71	4.50
ρ_R	MP Persistence	0.86	0.95	0.89
$1 - \phi$	Credit Dollarization	0.50	0.56	0.01
$\tilde{\Upsilon}$	Steady State Deposit Dollarization	0.40	0.40	0.05
$\frac{F^*}{4 \times GDP}$	Steady State Reserves/GDP	0.30	0.15	0.05

Advanced Economy Fit
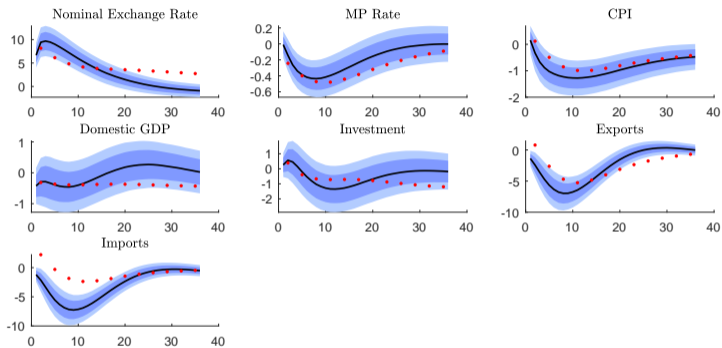
EME Fit
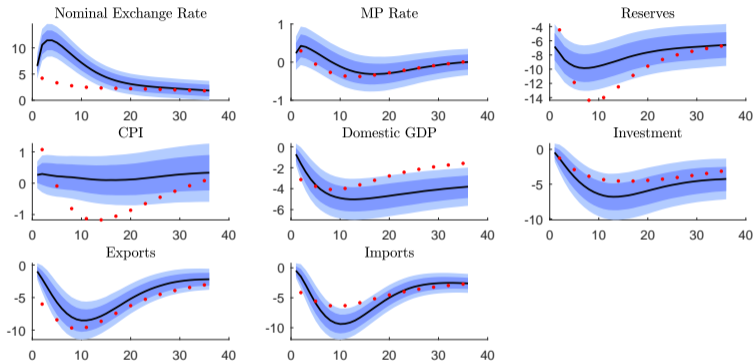
Results

- Large ER depreciation
  - 'So' large that expected appreciation makes dollar asset returns lower in LCU
  - High $R^* \longrightarrow$ High $R_t - R_t^* \frac{S_{t+1}}{S_t}$ ▸ UIP Spreads
  - Flight to safety.

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  - AE with low home bias: larger decline ▸ Detail

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- AE output decline modest: High home bias
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- EME: FX Interventions not effective against US MP Shocks ▸ Detail
  - The reduction in US imports that goes with the tightening acts as real shock on the SOE.
  - Effective against pure R^* shocks ▸ Detail and UIP Shocks ▸ Detail
  - Role of Dollar debt & sticky-in-dollar export prices ▸ Detail
- Peru: FX Intervention official policy (Castillo and Medina 2021), large reserves, large interventions
  - ▸ Fit ▸ Invervention Effectiveness ▸ Invervention Effectiveness: Pure R* Shock

Decomposition

- US Monetary shock has 3 effects
    - Pure interest rate (R^*)
    - GDP & Import demand decline (Y^f)
    - Inflation & expenditure switching (P^f)

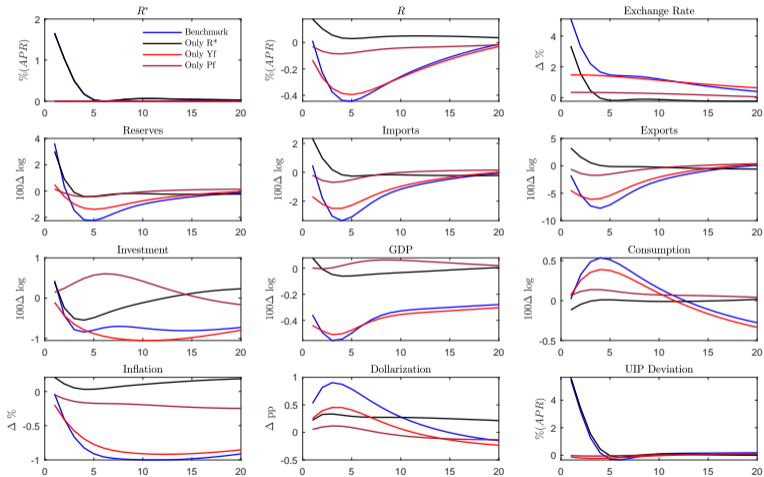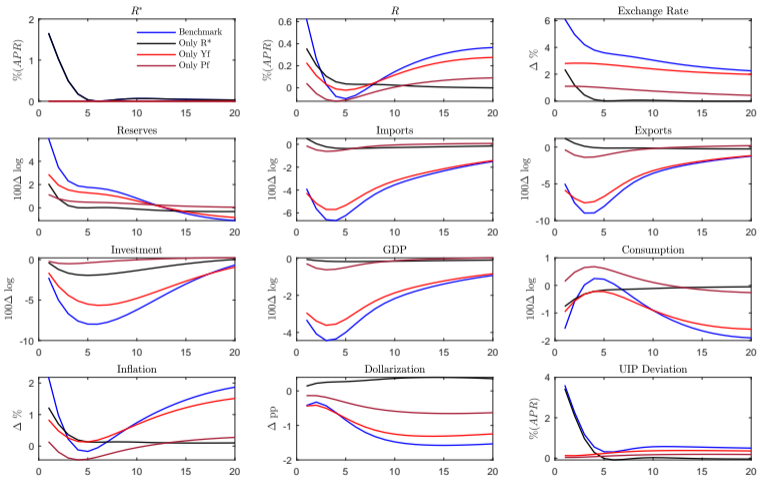# Decomposition

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- GDP decline (both EME & AE) is mostly due to decline in Y^f

- Trade and financial frictions
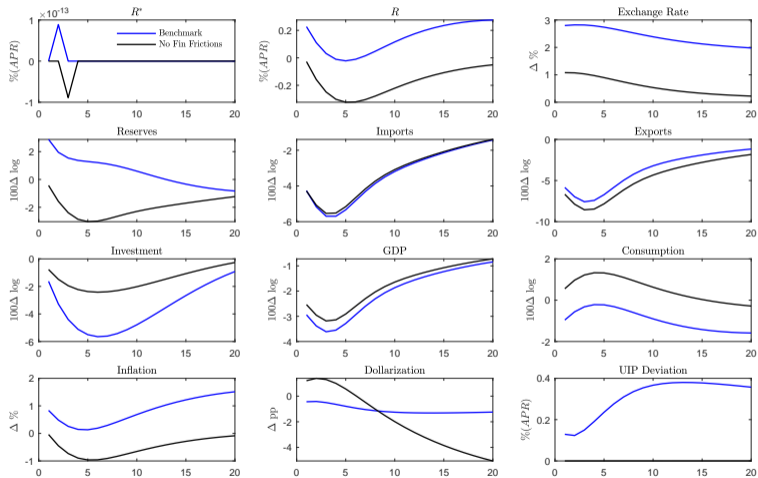   - Trade shock is more severe with financial frictions (through investment)

# Advanced Economies - Decomposition

EME - Decomposition

# EME - Role of Financial Frictions in Trade Channel

Conclusion

- US MP Shocks $\longrightarrow$ US Slowdown $\longrightarrow$ US Import demand decline

- US MP Shocks $\longrightarrow$ Foreign Economies
  - ▶ Depreciation of Foreign Currency relative to dollar
  - ▶ Decline in GDP^{AE} and bigger decline in GDP^{EME}
  - ▶ Substantial decline in AE and EME *exports*.
    - ⋆ Intuitively: hard to square with exchange rate depreciation.

- Counterfactual analysis suggests:
  - ▶ US MP Shocks $\longrightarrow$ drop in US Import demand (trade channel) $\longrightarrow$ drop in foreign GDP.
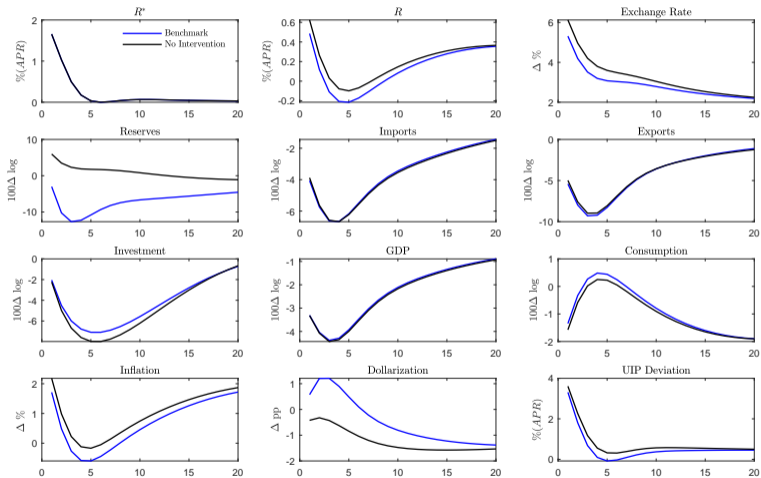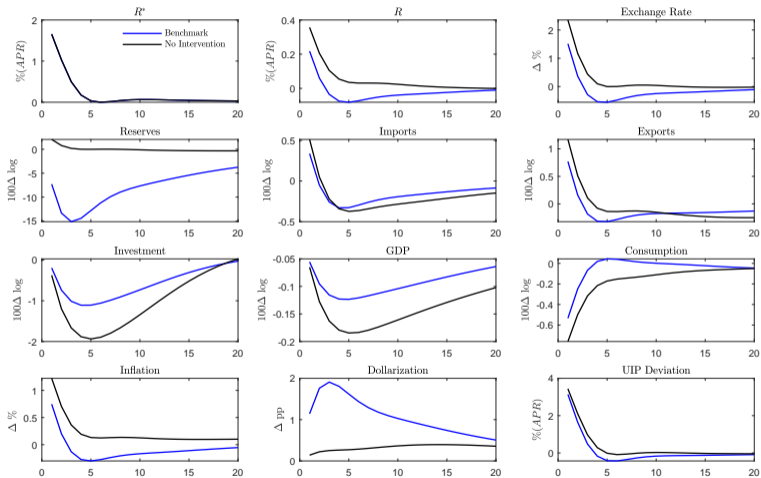 - ▶ Financial frictions matter in trade channel.

UIP Spread
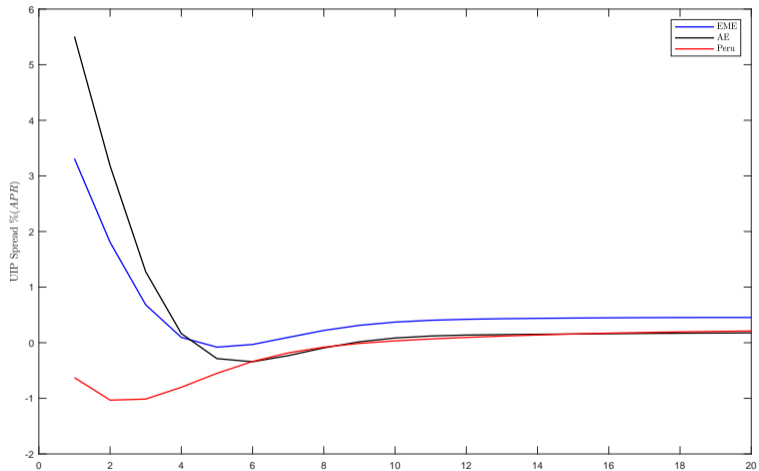
Advanced Economy with Low Home Bias
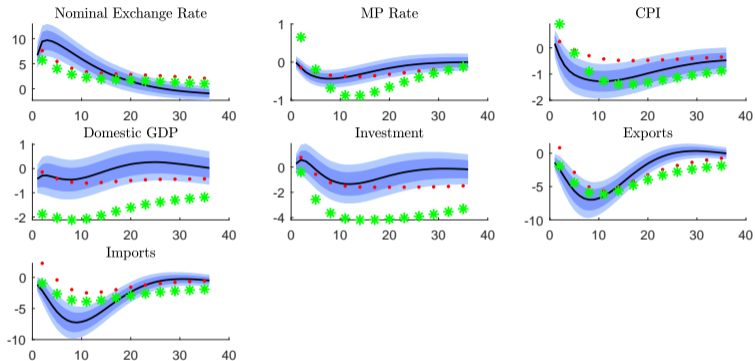
EME Effectiveness of Interventions
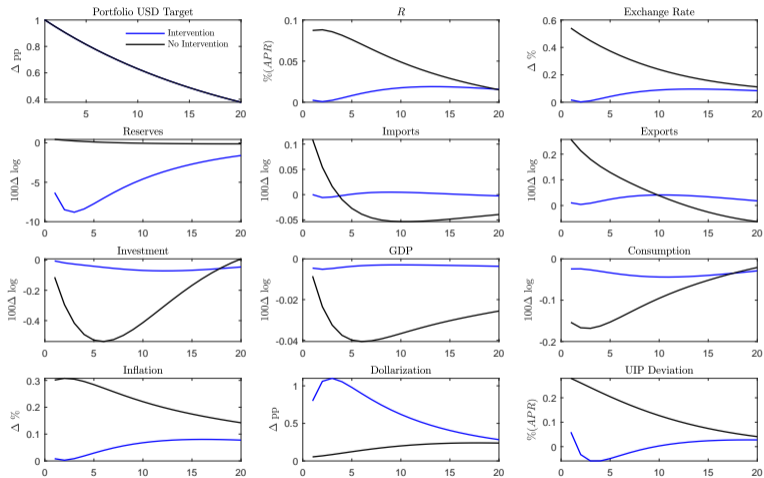
EME Effectiveness of Interventions: Pure R^* Shock

Peru Fit
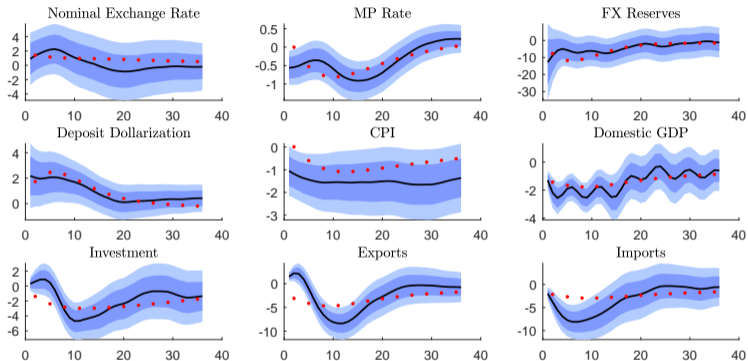
Peru: Effectiveness of FX Interventions
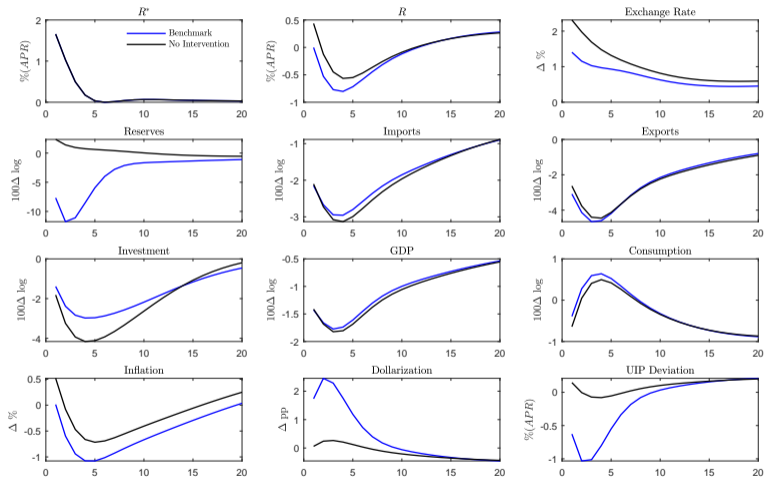
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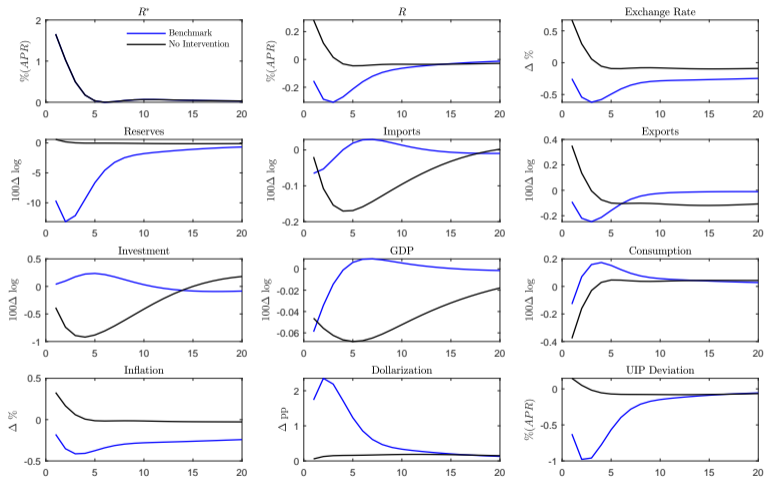
EME: Role of Dollar Debt & Dollar Invoicing
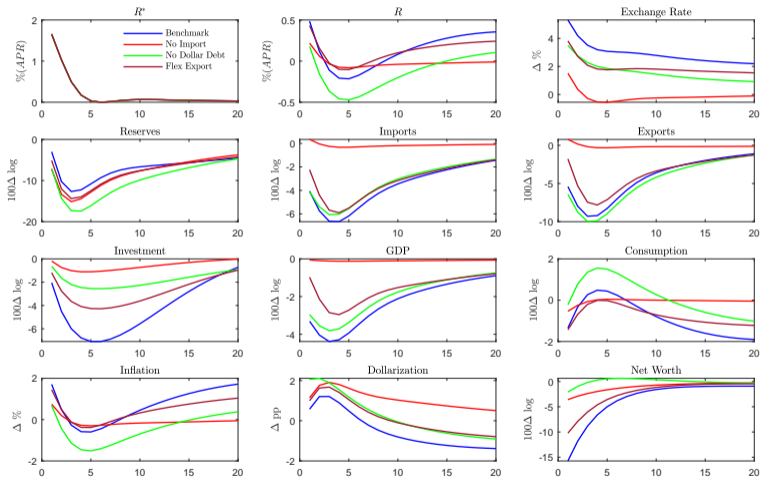
Bauer and Swanson (2023) Index of Monetary Policy Shocks

- High frequency identification:
  - Based on FOMC meetings that occur 8 times a year (on average in the middle of the month).
  - Compute changes (10 minutes before FOMC announcement to 20 minutes after) on four Eurodollar futures rates, $ED1, ..., ED4$.
  - Compute first principle component, $\tilde{x}$, of $ED1, ..., ED4$.
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  - surprise in most recent release of nonfarm payrolls prior to FOMC meeting, relative to median expectation for that release.

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- Regress $\tilde{x}_t$ on data *publicly known* at t:
  - surprise in most recent release of nonfarm payrolls prior to FOMC meeting, relative to median expectation for that release.
  - employment growth, commodity price...

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  - They want to remove the latter, so ε_t^m is a 'pure' monetary policy shock. ▶ back