Background

- Previously well-established consensus in International Macroeconomics: Mundell-Fleming
  - Expenditure switching at the center: When US raises $R^*$, USD appreciates
    - Foreign exports & US imports go up
    - Foreign economies expand

- In recent decades the consensus has begun to shift.
  - Some events Asian Crisis, Taper Tantrum (2013)
  - Recent literature (Financial linkages + muted expenditure switching channel)
International consequences of a US monetary policy tightening?

- First, look at impact on the US
  - Generally looks like responses reported elsewhere.
  - Show, in addition, that US imports contract fairly sharply after a monetary tightening.

- Then, look at impact on rest of the world.
  - A US contraction appears to lead to a contraction in the rest of the world, especially emerging markets.

- Investigate various frictions that have been proposed to address the above observations.
VAR Analysis

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

- 8 variables in $Y_t$:
  - GDP, PCE, Exports, Imports, trade-weighted nominal exchange rate, $S&P$ 500,
  - Excess Bond Premium (EBP), from Gilchrist-Zakrajsek
    - Excess of what businesses pay to borrow (adjusted for default risk) over US government.
  - $R^*$ (sum of 2-year US Treasury bond rate and EBP), default-free short term rate for business
    - Shortest maturity subject to being away from 0 during ZLB periods (13-20 basis points in Covid, a bit higher post-GFC).
    - EBP spread as marginal value of liquidity of Treasury securities (Devereux-Engle-Wu 2023)

- Quantity and Price Variables are in Log-Levels.
Response to Contractionary US Shock
Key US Results

• Generally, results in line with what others get.
  • $R^*$ rises,
  • US currency appreciates,
  • S&P 500 goes down,
  • Price level goes down.

• Imports go down a lot more than GDP in percent terms.
  • M-F expenditure switching???
Our VAR for the $i^{th}$ non-US economy is

$$Y_{i,t} = A_1 Y_{i,t-1} + A_2 Y_{i,t-2} + C \varepsilon_{mp} + \varepsilon_{i,t},$$  \hspace{1cm} (1)$$

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

- Impose that coefficients for each country are the same and no interaction between countries.
  - **AE** (advanced economies): $N = 8$ - Australia, Canada, UK, Germany, Japan, Korea, Switzerland, and Sweden
  - **EME** (emerging market economies): $N = 15$ - Brazil, Chile, Colombia, Dominican Republic, Hungary, Indonesia, Mexico, Peru, Philippines, Poland, Russia, Serbia, South Africa, Turkey.
Advanced Economies

- GDP and investment (sort of) go down. Not consistent with rosy M-F scenario.
- Substantial interest rate cut.
- No significant impact on foreign reserves, \( \frac{FX_t - FX_{t-1}}{GDP_t - 3} \).
Emerging Market Economies
Facts

• When US raises rates:
  • US import demand declines
  • Rest of world contracts

• Substantial ER depreciations followed by reversion

• Larger output fall in EMEs relative to AEs
  • Large drop in exports

• EMEs seem to resort to FX intervention more, in response to US tightening
We build a small open economy model
  • US is exogenous, source of 'shocks'

Estimate the model: Match the facts

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

Financial Frictions matter: Amplifies import demand shock
Small Open Economy Model

- Homogenous Domestic Good
- Intermediate Good Producers
  - Household Labor
  - Capital
- Exporters
- Final Consumption
- Foreign Buyers
- Foreign Good
- Homogenous Foreign Good
1. Interest Rate Parity Friction

- Households not inclined to shift their portfolios
  - Non-pecuniary reasons, habits
  - Regulation, capital controls

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

- When $R^*$ rises, 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.

- We amplify this portfolio effect:
  - Introduce “flight to safety” “low risk appetite”: Target portfolio moves with $R^*$ (non-pecuniary motive)
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.
  - This effect can be very large.
4. Dominant Currency Paradigm

- Export prices sticky in dollars (Gopinath, et al).
- Muted expenditure switching: Exports respond sluggishly to depreciation
Model Estimation

- Match IRFs for AEs & EMEs (Christiano et al 2011, 2016)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Peru</th>
<th>EME</th>
<th>AE</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma$</td>
<td>Portfolio Adjustment</td>
<td>2.70</td>
<td>1.84</td>
<td>4.68</td>
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<td>$\gamma_R$</td>
<td>Portfolio Demand Shifter</td>
<td>0.91</td>
<td>28.42</td>
<td>27.90</td>
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<td>$\kappa$</td>
<td>Investment Adjustment</td>
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<td>$\theta_{R^*}$</td>
<td>FX Intervention Coefficient</td>
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<td>$\rho^{FX}$</td>
<td>FX Intervention Persistence</td>
<td>0.71</td>
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<td>$\eta_c$</td>
<td>Consumption Elasticity of Substitution</td>
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<td>$\eta_e$</td>
<td>Export elasticity of Substitution</td>
<td>1.49</td>
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<td>1.40</td>
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<td>$\nu_i$</td>
<td>Investment Elasticity of Substitution</td>
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<td>$\eta_f$</td>
<td>Price Elasticity of Exports</td>
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<td>5.17</td>
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<td>$\gamma_f$</td>
<td>Export Demand Shifter</td>
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<td>5.71</td>
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<td>$\theta^x$</td>
<td>Export Calvo Stickiness</td>
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<td>$1 - \omega_c$</td>
<td>Home Bias, Consumption</td>
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<td>0.54</td>
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<td>$\gamma_I$</td>
<td>Home Bias, Investment</td>
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<td>$1 - \phi$</td>
<td>Credit Dollarization</td>
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<td>$\hat{Y}$</td>
<td>Steady State Deposit Dollarization</td>
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<td>$\frac{F^*}{4\times GDP}$</td>
<td>Steady State Reserves/GDP</td>
<td>0.30</td>
<td>0.15</td>
<td>0.05</td>
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</tbody>
</table>
Advanced Economy Fit

Nominal Exchange Rate

MP Rate

CPI

Domestic GDP

Investment

Exports

Imports
EME Fit

Nominal Exchange Rate

CPI

MP Rate

Domestic GDP

Reserves

Investment

Exports

Imports

0 10 20 30 40

0 5 10

0 10 20 30 40

-1

-0.5

-10

0 10 20 30 40

-5

-10

0 10 20 30 40

-6

-10

0 10 20 30 40

-10

-5
Results

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

- AE output decline modest: High home bias
  - AE with low home bias: larger decline

- EME: FX Interventions not effective against US MP Shocks
  - The reduction in US imports that goes with the tightening acts as real shock on the SOE.
  - Effective against pure $R^*$ shocks and UIP Shocks
  - Role of Dollar debt & sticky export prices

- Peru: FX Intervention official policy (Castillo and Medina 2021), large reserves, large interventions
  - Intervention Effectiveness
  - Intervention Effectiveness: Pure $R^*$ Shock
Decomposition

- US Monetary shock has 3 effects
  - Pure interest rate ($R^*$)
  - GDP & Import demand decline ($Y^f$)
  - Inflation & expenditure switching ($P^f$)
- GDP decline (both EME & AE) is mostly due to $Y^f$
- Trade and financial frictions
  - Trade shock is more severe with financial frictions (through investment)
EME - Decomposition

- **Exchange Rate**

- **Reserves**

- **Imports**

- **Exports**

- **GDP**

- **Consumption**

- **Inflation**

- **Dollarization**

- **UIP Deviation**
EME - Role of Financial Frictions

- Reserve
- Imports
- Exports
- Investment
- GDP
- Consumption
- Inflation
- Dollarization
- UIP Deviation

Graphs showing the impact of financial frictions on various economic indicators.
Conclusion

• US MP Shocks $\rightarrow$ US Slowdown $\rightarrow$ US Import demand declines

• Results suggest US demand decline could be the main transmission mechanism
  • The impact of the decline in imports shaped by financial frictions.

• Results may shed light on the puzzle, “Why has the recent US monetary tightening not launched a big recession in the EMEs, like it normally does?”
  • Answer: this time is unusual, US economy and US imports didn’t contract like they normally do.
UIP Spread

The graph shows the UIP Spread (% APR) over time. The X-axis represents time, while the Y-axis represents the UIP Spread (%). The lines indicate different categories: EME, AE, and Pers. The graph illustrates the movement and comparison of these categories over the specified period.
Advanced Economy with Low Home Bias
EME Effectiveness of Interventions

\[ R^* \] Benchmark \quad No Intervention

\[ R \]

\[ \Delta \% \]

\[ \text{Exchange Rate} \]

\[ \text{Reserves} \]

\[ \text{Imports} \]

\[ \text{Exports} \]

\[ \text{Investment} \]

\[ \text{GDP} \]

\[ \text{Consumption} \]

\[ \text{Inflation} \]

\[ \text{Dollarization} \]

\[ \text{UIP Deviation} \]
EME Effectiveness of Interventions: Pure $R^*$ Shock
EME Effectiveness of Interventions: UIP Shock

- Portfolio USD Target
- Reserves
- Investment
- Inflation
- R
- Imports
- GDP
- Dollarization
- Exchange Rate
- Exports
- Consumption
- UIP Deviation
Peru: Effectiveness of FX Interventions

- **R**
- **Reserves**
- **Imports**
- **Exports**
- **Investment**
- **GDP**
- **Consumption**
- **Inflation**
- **Dollarization**
- **UIP Deviation**

The diagrams illustrate the impact of FX interventions on various economic indicators over time.
Peru: Effectiveness of FX Interventions: Pure $R^*$ Shock
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, \(ED_1, ..., ED_4\).
  - Compute first principle component, \(\tilde{x}\), of \(ED_1, ..., ED_4\).
    - Loosely, \(\tilde{x}\) is the time series that best captures the variation in \(ED_1, ..., ED_4\).
- 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...
  - Residual is \(\varepsilon^m_t\), the estimate of pure monetary policy shock (higher \(\varepsilon^m_t\) means tighter policy).
- Interpret correlation of \(\tilde{x}_t\) with information at time \(t\) as reflecting error in private sector’s expectation of how the Fed reacts to publicly available news.
  - They want to remove the latter, so \(\varepsilon^m_t\) is a ‘pure’ monetary policy shock.