Asset Purchase Programs and the Exchange Rate

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Disclaimer: The views expressed in this paper are those of the author and do not necessarily represent those of the European Stability Mechanism.

Motivation

- Since the GFC, APPs became a part of the policy toolkit in AEs
- Pandemic highlighted a critical distinction: APPs for **monetary policy** vs. **financial stability**
  - **Before 2020:** Only AEs, Zero Lower Bound (ZLB) problem, depreciation of the exchange rate
  - **2020-2021:** Both AEs and EMs, above the ZLB, appreciation of the exchange rate

Research Questions

- What is the impact of COVID-era APPs on exchange rates (XRs)?
  - Focus on EMs & provide a comparison with AEs
- Does the response of exchange rates to APPs differ between AEs & EMs?
  - If so, what drives these differences?

This paper

- **Event set:** construct a comprehensive event set for APP announcements
- **Evidence:** conduct an event-study to study the effect of APPs on the XR

  $\Rightarrow$ APPs appreciate the XR in EMs, & robust to controlling confounding factors including Fed Swap lines
- **Mechanism:**
  - APPs appreciate the XR in EMs through a reduction in sovereign credit risk

    $\Rightarrow$ "Sovereign credit risk channel" of APPs in EMs

Outline

1. Event set
2. Event study analysis
   - Baseline results
   - Controlling for confounders
3. What drives the differences in the exchange rate response?
4. Empirical Evidence
   - Q1: How do APSs affect sovereign credit risk & convenience yields?
   - Q2: What is the overall effect of APSs on the risk-free rate?
5. Conclusion

Outline

Event set

- **Countries:** **23 EMs** and **7 AEs**
  - Implemented APPs in the COVID-19 period.
- March 2020 - August 2021, daily frequency.
- Sample 98 announcements: EMs (60) and AEs (38) ▸ Figure
- Simultaneous policy announcements ▸ Details
- **Data source:** Collected from central bank websites.
  Fratto et al. (2021) and Rebucci et al. (2022).

▸ Summary Statistics (Table) ▸ Summary Statistics (Figure)

Outline

Event study analysis

APS measurement in the spirit of Rogers, Scotti, and Wright (2018) Go

- Asset prices respond only to unexpected changes Kuttner (2001)
  - Focus on the "surprise" component of asset purchase announcements
  - Short window around the APP announcement → causal effect
- APSs captured by the residuals ($\widehat{\epsilon_{i,t}}$) from:

$$\Delta i_{i,t}^{LT} = \alpha \Delta i_{i,t}^{ST} + \epsilon_{i,t}$$

- Δ: 2-day change around the APP announcement
- Δi_t^{LT}: change in the 10-year government bond yield in basis points
- Δi_t^{ST}: change in the ST government bond yield in basis points
- Intuition: jumps in LT rates beyond ST rates via expectations channel
- Strategy: Δi_t^{ST}: proxy for monetary policy surprises Zettelmeyer (2004)
- Outcome: $\widehat{\epsilon_{i,t}}$: additional movements in LT rates in excess of Δi_t^{ST}

Baseline Results

Asset purchase surprises appreciate local currency

$$\Delta e_{i,t} = \beta \widehat{\epsilon_{i,t}} + u_{i,t}$$

	EMs		AEs	
	Gov. & Private	**Gov. only**	**Gov. & Private**	**Gov. only**
β	**0.016***** (0.002)	**0.011***** (0.004)	**0.055***** (0.012)	**0.055***** (0.021)
Observations	50	44	28	19
R-squared	0.177	0.083	0.413	0.391

Table 1: Bootstrapped standard errors are shown in parentheses.

Controlling for confounding factors

$$\Delta i^{LT}_{\mathbf{EM},t} = \alpha \Delta i^{ST}_{\mathbf{EM},t} + \beta D_t F^{Fed}_{\mathbf{EM},t} + \gamma \Delta \bar{i}^{AE,ST}_t + \delta F^{\mathbf{EM}}_t + \epsilon_{\mathbf{EM},t}$$

$$\Delta i^{LT}_{\mathbf{AE},t} = \alpha \Delta i^{ST}_{\mathbf{AE},t} + \beta D_t F^{Fed}_{\mathbf{AE},t} + \delta F^{\mathbf{AE}}_t + \epsilon_{\mathbf{AE},t}$$

1. **Actions of the Fed** $(F^{Fed}_{i,t})$ ▸ DollarIndex
   - multidimensionality of Fed policy actions with factor analysis Swanson (2021)
   - **four** factors: (i) FFR, (ii) FG, (iii) LSAP, (iv) **SWAP factor**
2. **Actions of other major AE central banks** $(\Delta \bar{i}^{AE,ST}_t)$
   - the average of the change in ST interest rates in other major AEs
3. **Other actions taken by the country itself** (F^i_t) ▸ Simultaneous
   - sum of the total number of simultaneous policy announcements

Appreciation remains for EMs, but disappears for AEs

$$\Delta e_{i,t} = \beta^{\phi} \widehat{\epsilon_{i,t}} + u_{i,t}$$

	EMs		AEs		
	Gov. & Private	**Gov. only**	**Gov. & Private**	**Gov. only**	**Gov. only†**
β^{ϕ} (4-factor)	**0.023***** (0.003)	**0.017***** (0.004)	**0.041** (0.037)	**0.109***** (0.038)	**0.063** (0.039)
N	50	44	28	19	18
R^2	0.279	0.156	0.038	0.138	0.078

- †: Excluding the announcement by the ECB
  - **Credit risk heterogeneity** in the Eurozone
  - E.g. Eligibility of Greek government debt securities for the PEPP

Outline

Mechanism

Through the lens of LR-UIP deviations

- LR-UIP holds if $\beta = 1$:

$$s_{t+k} - s_t = \alpha + \beta(i_{t,k} - i^*_{t,k}) + \epsilon_{t,t+k}$$

- LR-UIP is (not) rejected for EMs (AEs)
  Meredith & Chinn (1998), Lustig et al. (2019), Rebucci, Toraman, and Valente (2025)
- In EMs, APP transmission differs from AEs De Leo et al. (2025), Mimir & Sunel (2025)
- Set-up a no-arbitrage asset pricing framework where LR-UIP deviations are driven by ▸ Go
  - convenience yields Jiang et al. (2022)
  - sovereign credit risk Du and Schreger (2018)
- **Claim:** The ↓ in LT bond yields in EMs is due to ↓ default risk and ↑ bond scarcity, that risk-free rates do not necessarily ↓

Outline

Asset purchases decrease CDS spreads in EMs

Evidence of a "sovereign credit risk channel" of APPs in EMs

- Sovereign credit risk by CDS spreads
  - *CDS* : Sovereign credit default swap (CDS) spread Augustin et al. (2020)

$$\Delta CDS_{i,t} = \beta_1 \widehat{\epsilon_{i,t}} + u_{i,t}$$

	5-year					
	CDS		CIP		Pure CIP	
	EMs	AEs	EMs	AEs	EMs	AEs
β_1	0.435***	0.064*	0.529***	0.134	0.024	0.057
	(0.057)	(0.036)	(0.116)	(0.116)	(0.137)	(0.111)
N	53	36	45	36	45	36
R^2	0.323	0.084	0.155	0.047	0.000	0.007

No evidence for a convenience yield channel of COVID-APPs in AEs

- Relative convenience yields by CIP deviations Jiang et al. (2021)
  - **Intuition:** Investors earn different CYs from US treasuries → CIP fails
  - $CIP_{i,n,t} = y^{Govt}_{i,n,t} - \rho_{i,n,t} - y^{Govt}_{USD,n,t}$ Du and Schreger (2016), Du et al. (2018)

$$\Delta CIP_{i,t} = \beta_2 \widehat{\epsilon_{i,t}} + u_{i,t}$$

	5-year					
	CDS		CIP		Pure CIP	
	EMs	AEs	EMs	AEs	EMs	AEs
β_2	0.435***	0.064*	0.529***	0.134	0.024	0.057
	(0.057)	(0.036)	(0.116)	(0.116)	(0.137)	(0.111)
N	53	36	45	36	45	36
R^2	0.323	0.084	0.155	0.047	0.000	0.007

Accounting for credit risk matters for EMs

- Both convenience yields & credit risk matters → **Pure CIP**
  Gourinchas & Dao (2025)
  - $CIP^{pure}_{i,n,t} = \left(y^{Govt}_{i,n,t} - CDS_{i,n,t}\right) - \rho_{i,n,t} - y^{Govt}_{USD,n,t}$

$$\Delta CIP^{pure}_{i,t} = \beta_3 \widehat{\epsilon_{i,t}} + u_{i,t}$$

5-year

	CDS		CIP		**Pure CIP**	
	EMs	AEs	EMs	AEs	**EMs**	**AEs**
β_3	0.435***	0.064*	0.529***	0.134	0.024	0.057
	(0.057)	(0.036)	(0.116)	(0.116)	(0.137)	(0.111)
N	53	36	45	36	45	36
R^2	0.323	0.084	0.155	0.047	0.000	0.007

Q2: What is the overall effect of APSs on the LT risk-free rate?

Long-term risk-free rate does not necessarily decrease in EMs

$$\Delta y_{i,t}^{10y,rf} = \beta_1 \widehat{\epsilon_{i,t}} + \beta_2 EM_i * \widehat{\epsilon_{i,t}} + u_{i,t}$$

where

- $\Delta y_{EM,t}^{10y,rf} = \Delta y_{EM,t}^{10y} - \Delta CDS_{EM,t}^{5y} + \Delta PCIP_{EM,t}^{5y}$
- $\Delta y_{AE,t}^{10y,rf} = \Delta y_{AE,t}^{10y} - \Delta CDS_{AE,t}^{5y} + \Delta CIP_{AE,t}^{5y}$

	Gov. & Private	**Gov. only**
β_1	0.858***	0.843***
	(0.226)	(0.284)
β_2	-0.816***	-0.846**
	(0.265)	(0.359)
N	67	52

Outline

Conclusion

- Construct an event set covering 98 APPs
- Provide a comparison of APPs between AEs and EMs
  - EM appreciation is robust to accounting for control variables
- Explanation through the lens of LR-UIP deviations:
  - Evidence of a "sovereign credit risk channel" of APPs in EMs
- Policy implication:
  - EMs can use APPs to stabilize exchange rates
- Future research:
  - Comparing QE & FXI in EMs, and QE & SWAP lines in AEs

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Thank you!

Summary Statistics for the Event Dates

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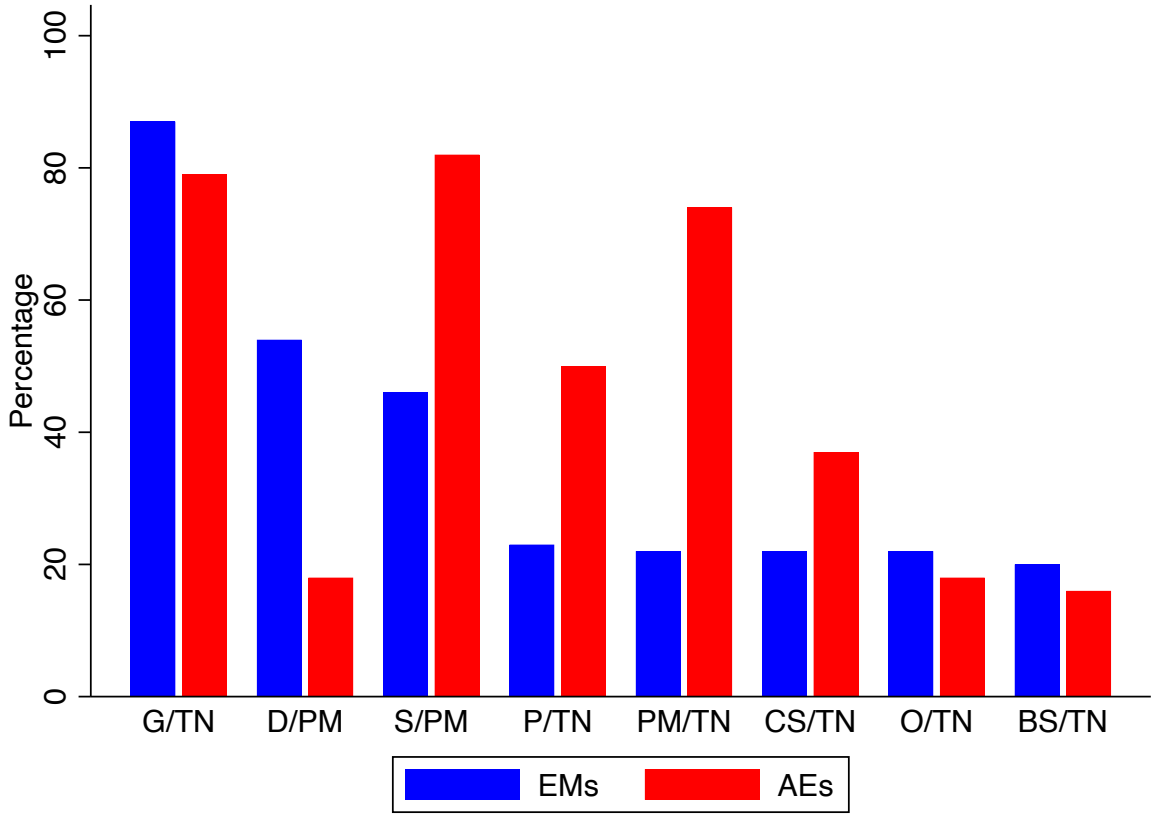

Figure 1: Relevant ratios for comparing the characteristics of the APP announcements and the accompanying events. Note: "O" stands for the other events, defined as the summation of FXI, Repo operations, and FX Swaps. The ratios for a specific group of countries, i.e., EMs or AEs, do not necessarily add up to 1, as there can be multiple accompanying events at a specific date.

Summary Statistics for the Event Dates

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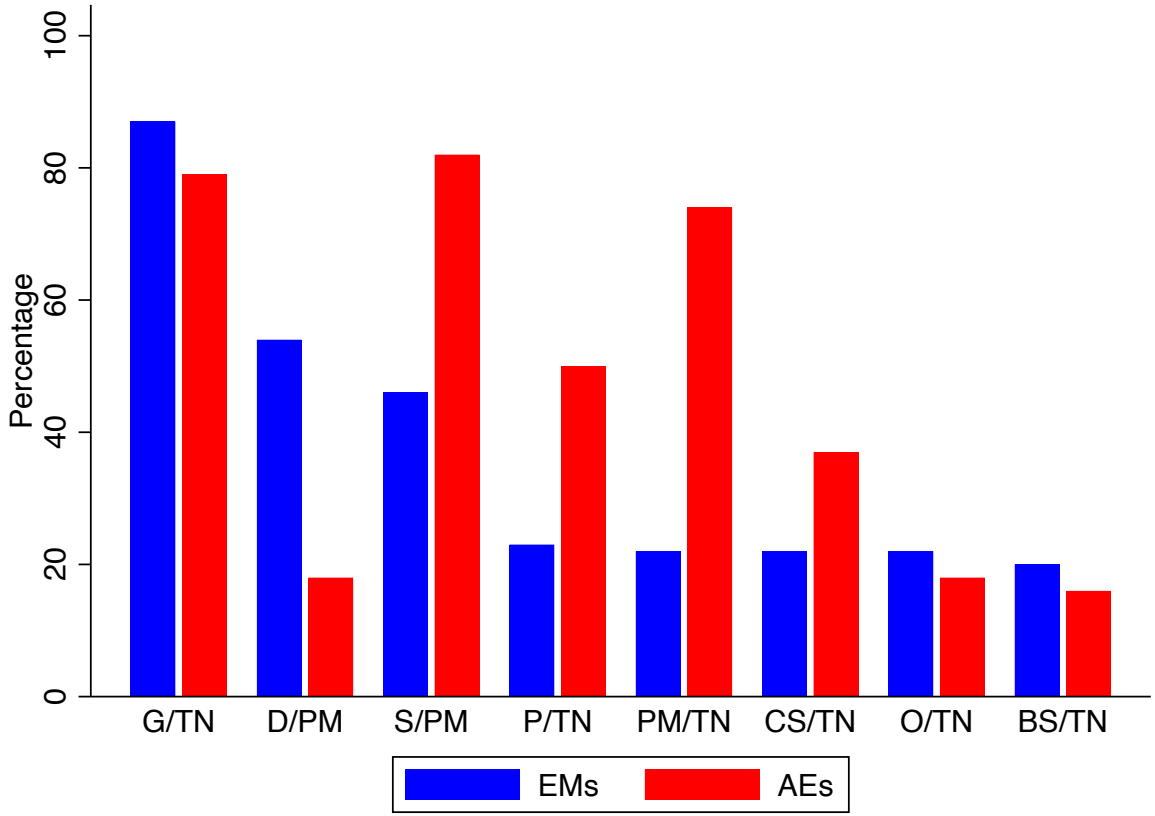

Figure 2: Relevant ratios for comparing the characteristics of the APP announcements and the accompanying events. Note: "O" stands for the other events, defined as the summation of FXI, Repo operations, and FX Swaps. The ratios for a specific group of countries, i.e., EMs or AEs, do not necessarily add up to 1, as there can be multiple accompanying events at a specific date.

Summary Statistics

Figure

	EMs	AEs
Total Number of Events (TN)	60	38
Policy Meeting (PM)	13	28
Decrease in Rate (D)	7	5
Same Rate (S)	6	23
Amount Announced	49	34
Government Purchase (G)	52	30
Private Purchase (P)	14	19
Corporate Sector Measures (CS)	13	14
Banking Sector Measures (BS)	12	6
Foreign Exchange Intervention (FXI)	1	0
Repo Operation	8	3
FX Swap	4	4

Table 2: The summary statistics for the APP announcements and the accompanying events for EMs and AEs.

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APP announcement dates

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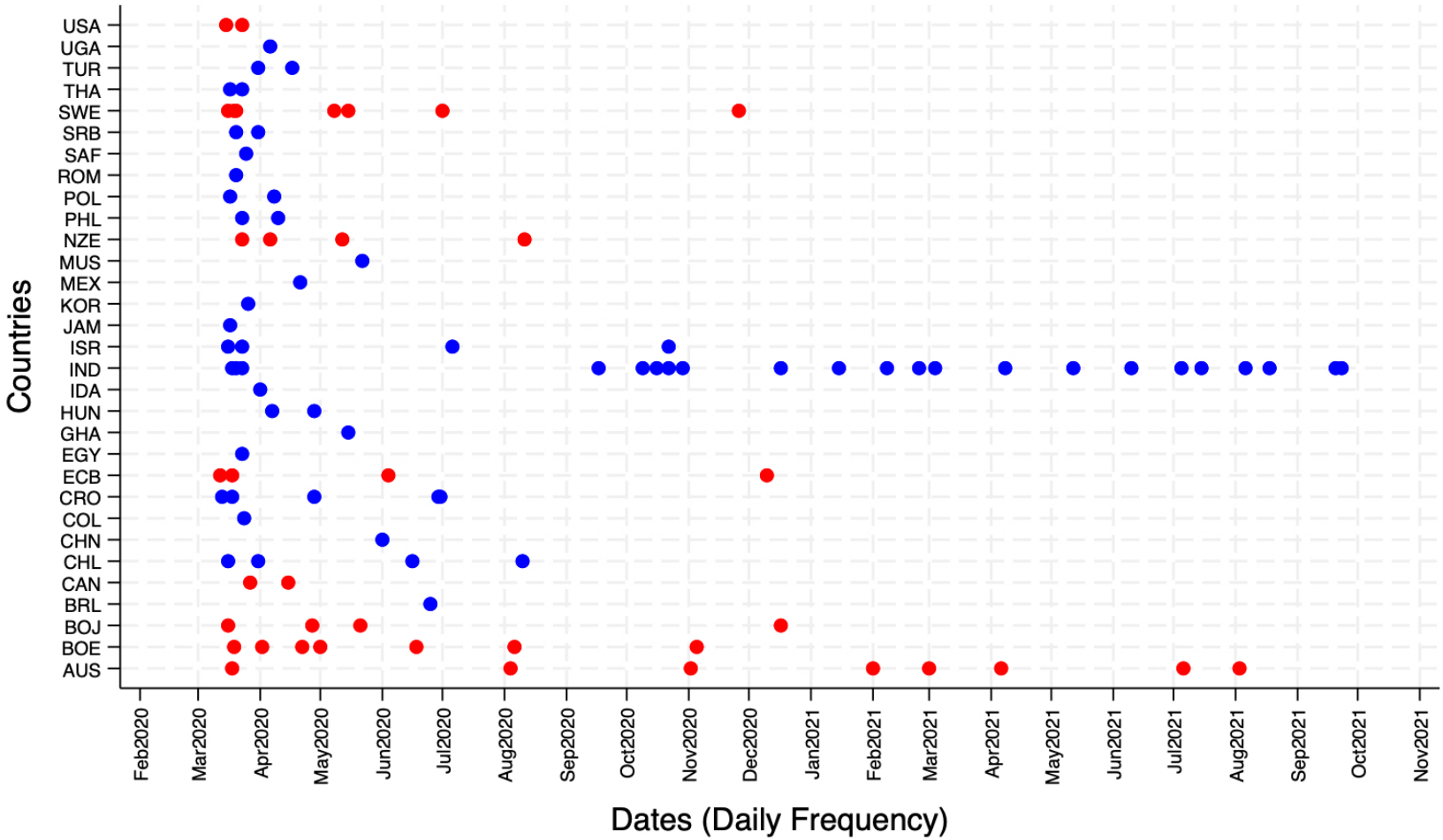

Figure 3: Note: Blue represents EMs, and red represents AEs.

Rogers, Scotti, and Wright (2018) methodology

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- **Target surprise:**
  - change in yield on the current- or next-month federal funds futures contracts
- **Forward guidance surprise:** Residual from a regression where
  - the change in the yield for the fourth Eurodollar futures contract is regressed on the target surprise
- **Asset purchase surprise:** Residual from a regression where
  - the change in the 10-year Treasury futures is regressed onto the target and forward guidance surprises

Simultaneous policy announcements

- Foreign exchange intervention (FXI)
- Introduction/extension/expansion of a FX Swaps
- Introduction/extension/expansion Repo operations
- Introduction/extension/expansion of a measure targeting the banking sector or corporate sector
- Policy rate announcement

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Asset Purchase Programs and Dollar Indices

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Challenge: Depreciation of the Dollar is followed by the Fed's APP announcement

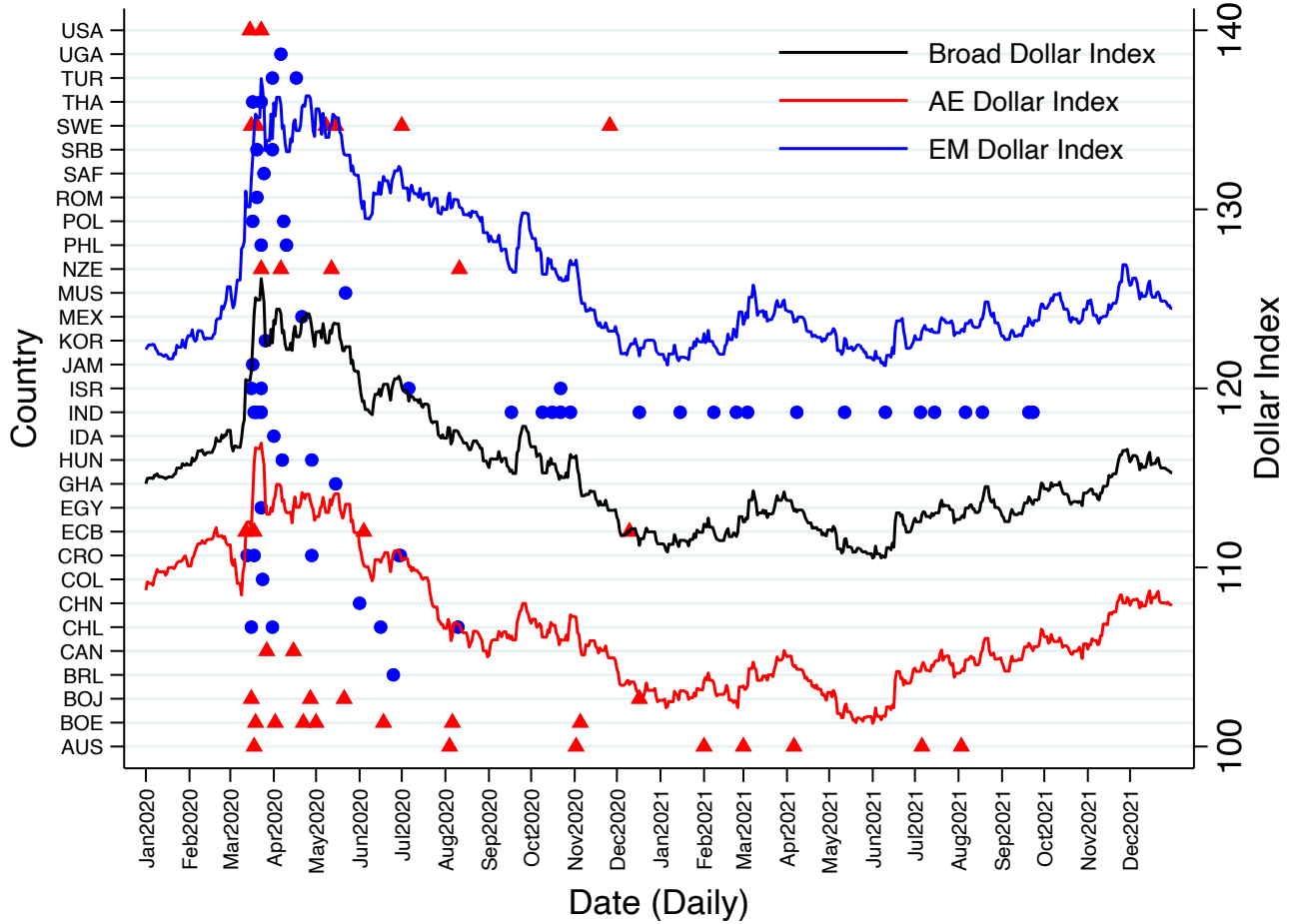

Figure 4: Asset purchase program announcements and Dollar Indices. Note: an increase in the dollar index represents an appreciation of the U.S. dollar.

Robustness Analysis

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- Post-GFC analysis for selected AEs using the same methodology
  - Using both daily and intraday data (Rogers et al., 2014)
- Different classifications for countries
  - Exchange rate regime (Ilzetzki et al., 2022)
  - Foreign investor share in total government debt (Arslanalp & Tsuda, 2014)
  - Commodity dependence (UNCTAD 2021 report)
  - Access to Fed SWAP lines
- All monetary policy announcements (Both MP & APP announcements)
- Controlling for forward guidance in AEs

Exchange rate determination equation

Multi-period bonds

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$$s_t = n\mathbb{E}_t \sum_{\tau=0}^{\infty} \left(y_{t+\tau}^{\$(n)} - y_{t+\tau}^{*(n)} \right) + \mathbb{E}_t \sum_{\tau=0}^{\infty} \left(\lambda_{t+\tau}^{\$,*} - \lambda_{t+\tau}^{*,*} \right) - \mathbb{E}_t \sum_{\tau=0}^{\infty} rp_{t+\tau}^{*} + \mathbb{E}_t \sum_{\tau=0}^{\infty} cp_{t+\tau}^{*}$$
$$+\mathbb{E}_t \sum_{\tau=0}^{\infty} \left(tp_{t+\tau}^{*,*} - tp_{t+\tau}^{\$,\$} \right) + \mathbb{E}_t \sum_{\tau=0}^{\infty} \left[\left(\lambda_{t+\tau}^{*,*} - \lambda_{t+\tau}^{*,*(n)} \right) - \left(\lambda_{t+\tau}^{\$,\$} - \lambda_{t+\tau}^{\$,\$(n)} \right) \right] + \bar{s}_t$$

- $rp_t^* = -\operatorname{cov}_t \left(m_{t+1}^*, \Delta s_{t+1} \right)$, $cp_t^* = -\operatorname{cov}_t \left(m_{t+1}^*, L_{t+1}^{*,*} \right)$
- $tp_t^{*,*} = -\operatorname{cov}_t \left(m_{t+1}^*, hy_{n,t+1}^* \right)$, $tp_t^{\$,\$} = -\operatorname{cov}_t \left(m_{t+1}^{\$}, hy_{n,t+1}^{\$} \right)$
- $hy_{n,t+1}$ is the difference between the holding period return of an n period bond for a single period and the return to a single period bond.
- LR-UIP deviations can be driven by: (i) relative convenience yields (CY), (ii) FX risk, (iii) credit risk (CR), (iv) relative term premium, (v) relative term structure of convenience yields