International Capital Flow Pressures and Global Factors

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*The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of New York, Federal Reserve System, or Danmarks Nationalbank

Motivation

- Large and important current literatures: on the global factor, drivers of international capital flows including risk sentiment, international portfolio puzzles, safe haven currencies and excess returns, and country foreign asset positions.

- Empirical and theoretical literatures often assume specific exchange rate regimes. However, international capital flow pressures are met by (time varying) balances of exchange rate adjustment and official policy responses (FX intervention, policy rate changes).

- Without accounting for these incipient pressures, some analytical results are subject to attenuation bias if relying (eg) mainly on exchange rates (or capital flow quantities), missing time series and cross-sectional differences in how global and local factors play out.

Main Contributions

- New measure of international capital flow pressures, a revamped Exchange Market Pressure (*EMP*) index. Relies on balance of payments equilibrium, international portfolio demands, and valuation changes on portfolio wealth.
- *EMP* implemented for 41 countries, monthly 2000-2020 vis-a-vis reference currencies (dollars or euros). Adds up observed currency movements with incipient pressures absorbed by quantities of FX interventions (with country-time specific effectiveness) and monetary policy rate changes.
- On average, international capital flow pressures are reflected in exchange rate variation to a greater degree in periods of heightened risk sentiment, with more of a mix of tools outside of these periods.
- Currencies characterized as safe havens change, differing episodically if based on *EMP* versus only currency movements.
- Safe haven countries have larger gross foreign assets, economic size, and financial liquidity. Smaller contribution of macroeconomic conditions, without differentiating across non-safe haven countries in extreme risk periods.

Related Literature: Partial List, with Apologies!

- Exchange Market Pressure indices and Balance of Payments Crises: Girton and Roper 1977, Eichengreen Rose and Wyplosz 1994, Kaminsky and Reinhart 1999, Forbes 2002, Aizenman Lee and Shushko 2012, Aizenman Chinn and Ito 2016; Patnaik Felman and Shah 2017.
- Gross and Net Foreign Asset Measurement: Gourinchas Rey 2014, Benetrix Lane Shambaugh 2015, Lane Milesi-Ferretti 2018, Camanho Hau Rey 2018.
- Portfolios Home bias: Coeurdacier and Rey 2012; Maggiori Neiman and Schreger 2020
- Models of Portfolio Choice: Henderson and Rogoff 1982, Branson and Henderson 1985, Kouri 1981, broad more recent literature, eg Bacchetta, Davenport and van Wincoop 2021, Caballero Farhi Gourinchas 2016, Gabiax Maggiori 2015.
- Portfolio adjustments using disaggregated data: Koijen and Yogo 2020; Jiang Richmond and Zhang 2021, Faia Salomao Veghazy 2022.
- Global financial cycle and global liquidity flows: Rey 2015,.. large set of contributors here!... Avdjiev Gambacorta Goldberg Schiaffi 2020
- Global risk sentiment: Forbes and Warnock 2021; Chari, Dilts Stedman and Forbes 2022; Bekaert Engstrom Xu 2021.
- Safe Havens: Brunnermeier Nagel and Pederson 2008, Ranaldo and Soederlind 2010, Habib and Stracca 2021, Fatuam and Yamamoto 2014

EMP Building Blocks

The Balance of Payments identity anchors *EMP* Construction:

$$FXI_t = NX_t + \left(i^*_{t-1}A_{t-1} - i_{t-1}\frac{L_{t-1}}{e_{t-1}} + i^*_{t-1}R_{t-1}\right) + \left(\frac{1}{e_t}IL_t - IA_t\right)$$

Desired Portfolios of International Assets:

$$\tilde{A}_t e_t = W_t \cdot [1 - \alpha(uip_t, l^*_t, s_t)] \qquad \frac{\tilde{L_t}}{e_t} = W^*_t \cdot [1 - \alpha^*(-uip_t, l_t, s_t)]$$

where $uip_t = i_t - i^*_t - \frac{E(e_{t+1}) - e_t}{e_t}$

Home and Foreign wealth in period t evolve, including from exchange rates:

$$W_t = (1 + \dot{p}_t + \dot{g}_t) D_{t-1} + e_{t-1}A_{t-1}(1 + \dot{p_t}^* + \dot{e}_t + i^*_{t-1}) - L_{t-1}(1 + \dot{p}_t + i_{t-1})$$

$$W^*_t = \left(1 + \dot{p_t}^* + \dot{g^*_t}\right) D^*_{t-1} + \frac{L_{t-1}}{e_{t-1}}(1 + \dot{p}_t - \dot{e}_t + i_{t-1}) - A_{t-1}(1 + \dot{p_t}^* + i^*_{t-1})$$

Gross foreign asset and liability flows between period $t-1$ and t reflect gaps between desired and current holdings:

$$IA_t = \tilde{A}_t - \bar{A}_t \qquad IL_t = \tilde{L_t} - \bar{L_t}$$

The Derived Exchange Market Pressure *EMP* Index I

$$\text{EMP}_t \equiv \frac{de_t}{e_{t-1}} + di_t \frac{\pi_i}{\pi_e} - \frac{dFXI_t}{\pi_e}$$

where π_i and π_e are defined as:

$$\pi_e = \left[dNX_{e,t} + \frac{L_t}{e_t}\epsilon_e^L - A_t\epsilon_e^A \right] > 0 \qquad \pi_i = \left[\frac{L_t}{e_t}\epsilon_i^L - A_t\epsilon_i^A \right] > 0$$

and the elasticities are defined as:

$$\epsilon_e^A \approx -\left[\frac{\alpha'_{uip}}{1-\alpha} + \alpha \right] < 0 \qquad \epsilon_e^L \approx \left[\frac{\alpha^{*\prime}_{uip}}{1-\alpha^*} + \alpha^* \right] > 0$$

$$\epsilon_i^A = -\frac{\alpha'_{uip}}{1-\alpha} < 0 \qquad \epsilon_i^L = \frac{\alpha^{*\prime}_{uip}}{1-\alpha^*} > 0$$

The Derived Exchange Market Pressure *EMP* Index I

$$
\begin{aligned}
EMP_t \equiv & \frac{de_t}{e_{t-1}} + di_t \frac{\pi_i}{\pi_e} - \frac{dFXI_t}{\pi_e} = ds \frac{1}{\pi_e} \left[\frac{L_t}{e_t} \frac{\alpha_s^{*'}}{1-\alpha^*} - A_t \frac{\alpha_s'}{1-\alpha} \right] + di_t^* \frac{\pi_i}{\pi_e} \\
& + \left(\frac{dp_t}{p_{t-1}} - \frac{dp_t^*}{p_{t-1}^*} \right) \frac{1}{\pi_e} \left[\frac{L_{t-1}}{e_{t-1}} \alpha^* + \frac{e_{t-1}}{e_t} A_{t-1} \alpha \right] \\
& + \frac{dg_t}{g_{t-1}} \frac{1}{\pi_e} \left[(1-\alpha) \frac{D_{t-1}}{e_t} \right] - \frac{dg_t^*}{g_{t-1}^*} \frac{1}{\pi_e} \left[(1-\alpha^*) D_{t-1}^* \right] \\
& + dl \frac{1}{\pi_e} \left[\frac{L_t}{e_t} \frac{\alpha_l^{*'}}{1-\alpha^*} \right] - dl^* \frac{1}{\pi_e} \left[A_t \frac{\alpha_l'}{1-\alpha} \right]
\end{aligned}
$$

Observations about the *EMP*

- Equivalence factors presenting FXI in currency units are country and time specific:
  - For any quantity gap in the BOP (international capital flow pressure), what percentage change in the exchange rate is needed to close that gap?
  - When the BOP is highly sensitive to exchange rate changes, less exchange rate adjustment is needed to close BOP dollar (or euro) gaps. Conversely, a gap met by *FXI* changes offsets less currency depreciation.

- The equivalence factor is larger when:
  - Gross international positions are small
  - Optimal portfolio shares respond little to exchange rate movements
  - Wealth effects at home and abroad from exchange rates are small

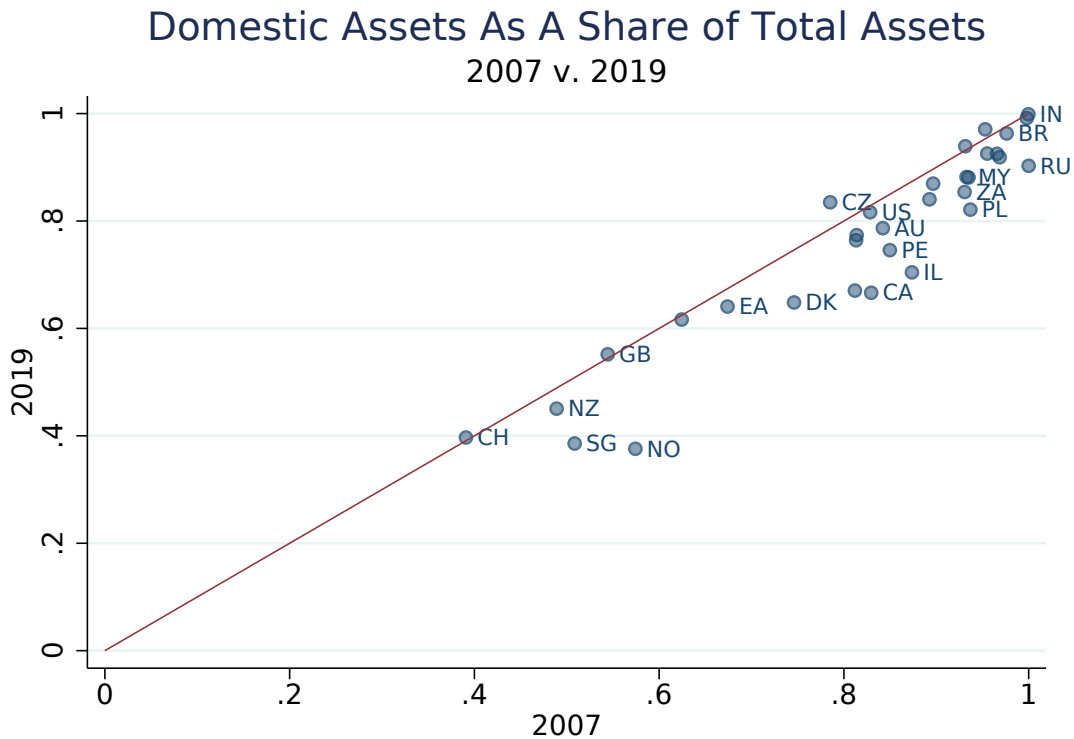
- The terms within the *EMP* are arranged so that assumed endogenous responses are within the *EMP*, and drivers - corresponding to global and local factors - also embed testable hypotheses.

EMP Implementation

41 countries, monthly data, 2000-2021. AEs and EMs by data availability.

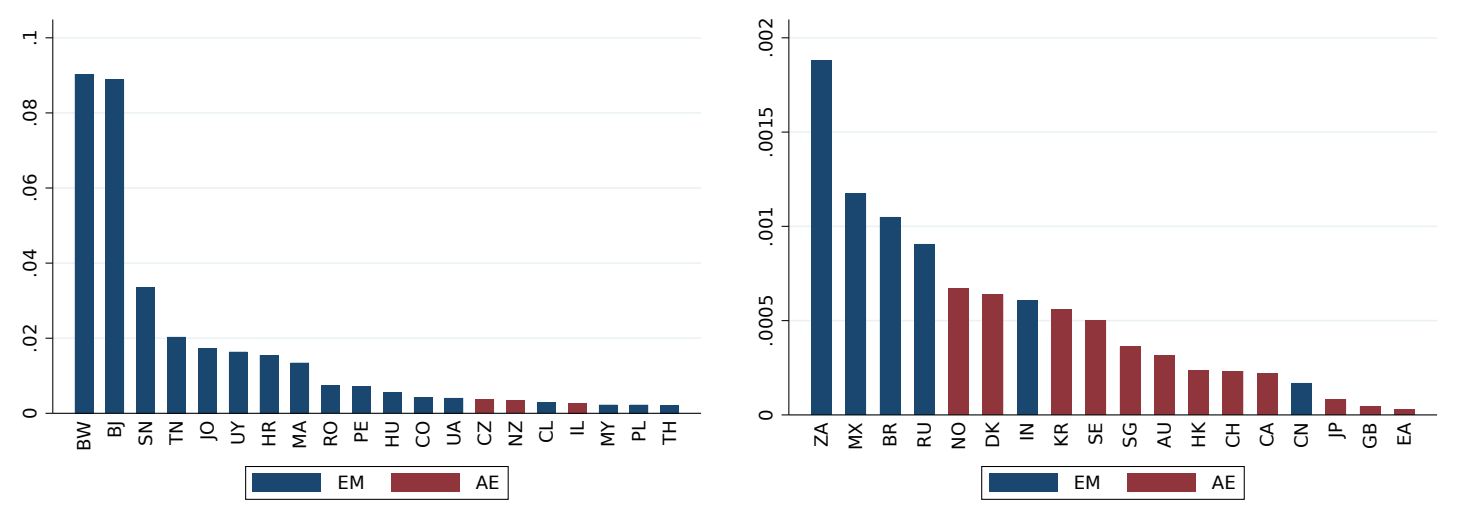
- Given focus on monthly frequency, assume $dNX_{e,t} = 0$
- Application assumes a reference currency of either dollars or euros
- Follow Coeurdacier and Rey (2012) and broader literature on methods to compute home bias α. Extend prior series, using available data on domestic and foreign holdings of stocks, bonds and bank loans.
- Measure α^* as share of rest of world holdings outside of country. Implied $(1 - \alpha^*)$ very small.
- Follow the literature by assuming low portfolio share sensitivity to currency depreciation or *uip*:
  - Hau and Rey 2004 2006, Curcuru Thomas Warnock Wongswan 2014;
  - More recent literature on substantial heterogeneity but still very small quantitative effects: Koijen, Richmond and Yogo 2020, Koijen and Yogo 2020, Jiang Richmond and Zhang 2021, Faia Salomao Veghazy 2022.
  - Our application does not embed investor-type differences or time variation.
- Careful construction of *FXI* monthly series

Home Bias by Country is fairly persistent



- Based on data on equity markets, sovereign and corporate bonds, and bank assets, we compute measures of home bias per Coeurdacier and Rey (2012). 2019 home bias is less than 2007, but persistent.

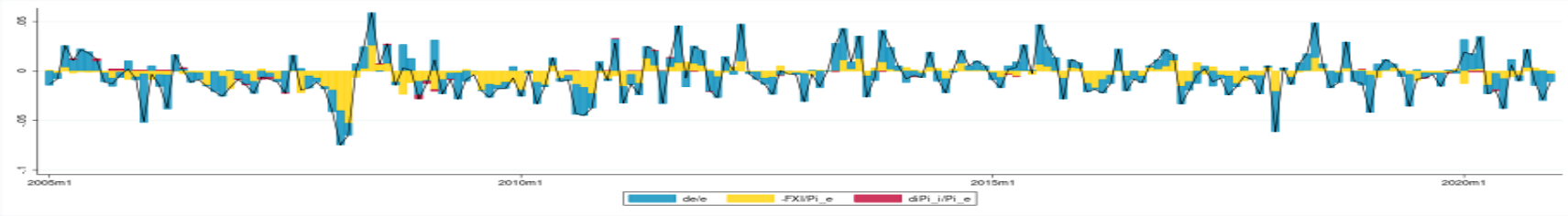
Implied *FXI* equivalencies, comparing $1/\pi_e$ across countries: 2019



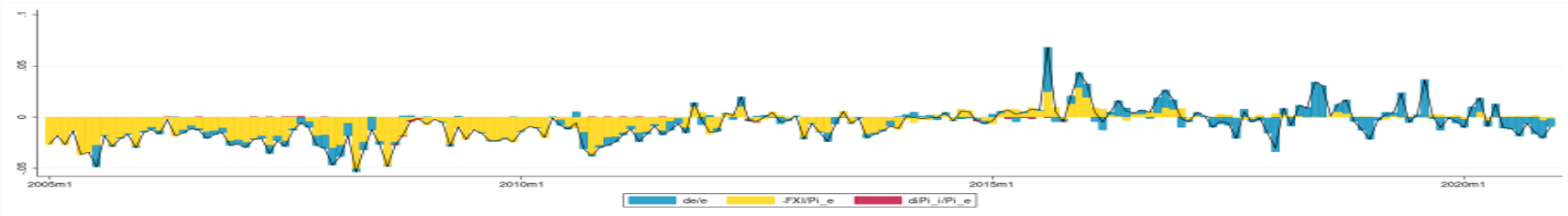
- Country-specific and time-varying parameter used to convert a FXI consisting of 1 Bil dollars or euros sold into exchange rate depreciation equivalents
- Lower values for AEs (right panel) reflect much larger foreign asset positions and open capital markets, less home bias
- Over broader time frame, the values of $1/\pi_e$ tend to decrease
- More sensitive portfolio responses to uip would lower the amount of currency depreciation avoided by *FXI* country plots sensitivity analysis

Contributions of Individual Components to the *EMP* – Select Countries

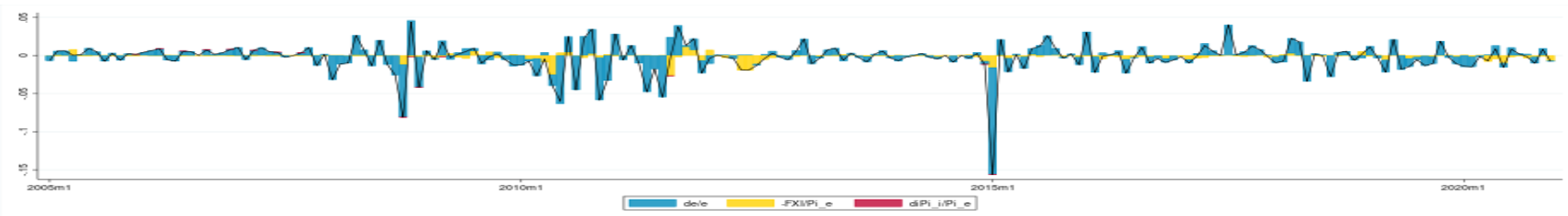
(a) Colombia



(b) Thailand



(c) China



(d) Switzerland

Currency Depreciation Shares of *EMP*'s: by country-time-stress regime

	Rank correlations by de/e share	Share of countries by de/e share of total EMP variance		
		< 10 percent	$[10; 90]$ percent	> 90 percent
Normal periods	-	19	37	44
High stress periods	0.91	10	49	41
GFC	0.71	12	32	56
Pandemic	0.73	17	27	56

- Define high stress periods by 90th percentile observations of monthly VIX
- Exchange rates contribution to *EMP*: over 90 percent for 44 percent of obs.
- Contributions from exchange rates rise in high stress periods, as many countries focus less on offsetting international capital flow pressures
- Spearman rank correlations of countries by de/e share of total EMP variance show lowest correlation between country rankings in normal periods and high stress months like in GFC and Pandemic.

A Global Risk Response (GRR) Index

Exchange market pressures on currencies change with risk sentiment s_t.
Compute correlations looking back over (5 years of) monthly observations.

$$GRR_t^j = -corr_{t-x,t}(EMP_t^j, s_t) > 0$$

where s_t is a measure of global risk sentiment, the VIX

- All but a handful of countries, including AEs, consistently have a $GRR < 0$
- Safe Havens: Statistically significant $GRR > 0$ over the entire sample period
  - United States, Denmark, Switzerland, Japan, Hong Kong ⏩ GRR Plots
- Using the EMP instead of exclusively exchange rates changes the relative rankings of countries considerably with $\rho = 0.770$ ⏩ EMP v. de/e Rank
- Robustness: VSTOXX, Bekaert Engstrom Xu Risk Aversion, Chari Dilts Stedman Lundblad RORO

GRR in Normal Times v. High Stress

Conduct difference in means and difference-in-difference tests to *GRR*

- Risk sensitivities are lower outside of high stress events
- So-called safe havens main oppositely signed GRR from all others
- Post-GFC safe haven sensitivities to risk are higher in normal times; other country risk sensitivities have not declined.

Pre-GFC

	All	Safe Haven	Excl. Safe Haven
GRR – All Periods	-0.09***	0.11***	-0.11***
GRR – Excluding P90	-0.03***	0.09***	-0.05***
Difference	-0.06***	0.01	-0.07***

Post-GFC

	All	Safe Haven	Excl. Safe Haven
GRR – All Periods	-0.08***	0.10***	-0.11***
GRR – Excluding P90	-0.03***	0.12***	-0.05***
Difference	-0.05***	-0.02*	-0.05***

What characteristics are associated with Risk Sensitivity of the *EMP*?

Following Brunnermeier et al. (2008) and Habib and Stracca (2012), define (counterfactual) excess return for country j:

$$z_t^{j,e} \equiv i_{t-1}^j - i_{t-1}^* - \frac{e_t^j - e_{t-1}^j}{e_{t-1}^j} \tag{1}$$

We define relative to its reference currency. And second version replaces observed depreciation with the *EMP*

$$z_t^{j,EMP} \equiv i_{t-1}^j - i_{t-1}^* - EMP_t^j \tag{2}$$

Set up time series panel regressions, 41 countries 2000m1-2020m12

$$z_t^{j,EMP} = \alpha_s ds_t + \beta \Omega_t^j * ds_t + \gamma \Omega_t^j + + \delta di_t^* + \zeta^j + \varepsilon_t^j \tag{3}$$

Per Habib and Stracca (2012), Ω_t^j captures characteristics of:

i) low risk, ii) large liquid financial markets; iii) open global capital markets.

Key Findings: Safe Haven Specifications

Regressions Performed, with Rationales

- $z_t^{j,e}$ versus $z_t^{j,EMP}$: Does using the *EMP* provide different insights?
- Separating safe havens from non-safe havens: Do specific characteristics differentially impact risk response?
- Separating normal *VIX* months from high stress months: When do markets care abput characteristics?

Key Results

- On average, higher VIX reduces expected returns (due to international capital outflow pressures manifested in depreciation or increase in *EMP*)
  table
- Key characteristics providing "insulation" or safe-haven status are PubDebt/GDP, Share of World GDP and large gross asset/liability positions
  table
- These characteristics do not distinguish non-safe haven sensitivity in high stress months table

Concluding Remarks

- Proposed new measure on international capital flow pressures in form of Exchange Market Pressure Index. A super exchange rate interpretation.
- Analytics address some attenuation bias for studies only relying on currency movements, already shown to be useful in understanding risk sensitivities, safe haven currencies, normal versus stress periods, and potential effectiveness of *FXI*.
- Key parameters of international portfolio shares and sensitivities. Future research could refine construction of each.
- Are wealth effects from exchange rates really so large, and optimal portfolio responses really so small?
- Planned work to focus more specifically on: regions, safe haven currencies, and high stress periods.
- Monitoring tool, with more immediacy than capital flows but less immediacy than exclusive use of exchange rates.

Thank you!

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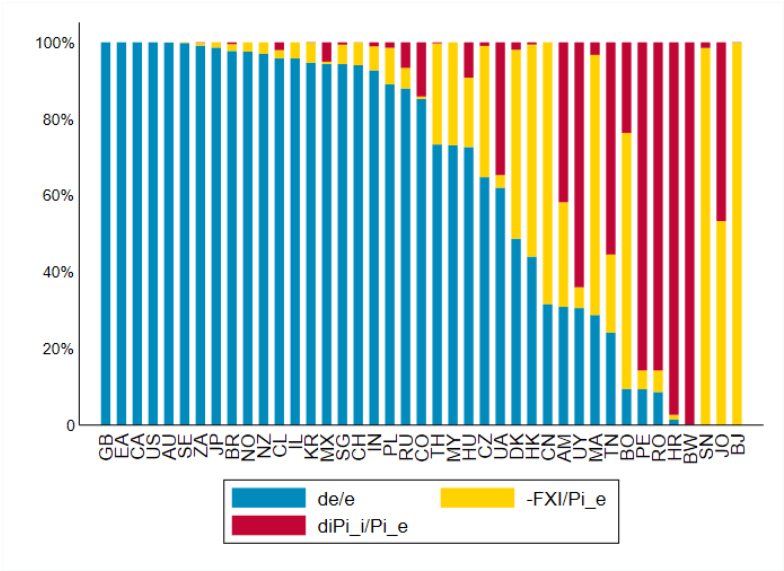
Appendix

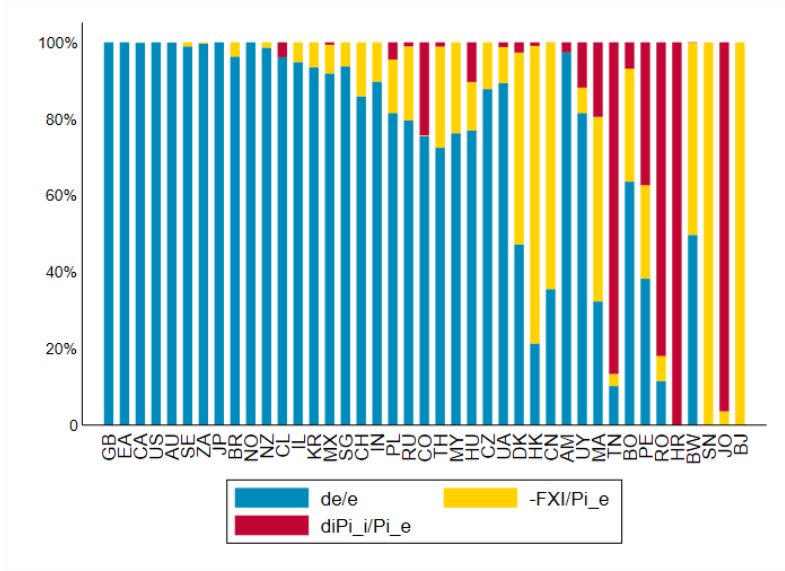
Earlier Exchange Market Pressure Indices in the Literature

Study	*EMP* Definitiona	Weighting Scheme	Exchange Rate Definition
*GirRob:1977	$\frac{de}{e} + \frac{dR}{M0}$	Equal	Nominal bilateral against US dollars
*EichRoseWyp:1994c and *Forbes:2002	$w_e \frac{de}{e} + w_i d(i - i^*) - w_R \frac{(dR - dR^*)}{M1}$	Precision	Nominal bilateral against DM/US dollars
*Weymark:1995	$\frac{de}{e} + w_R \frac{dR}{M}$	Model based price and interest elasticities	Nominal bilateral against US dollars
*SachsTornellVelasco:1996	$w_e \frac{de}{e} - w_R \frac{(dR - dR^*)}{R}$	Precision	Nominal bilateral against US dollars
*KamRein:1999	$w_e \frac{de}{e} + w_R \frac{dR}{R}$	Precision	Real effective
*AizLeeSush:2012d	$w_e \frac{de}{e} + w_i d(i - i^*) - w_R \frac{(dR - dR^*)}{R}$	Equal and Precision	Nominal bilateral against US dollars
*AizenmanChinnIto:2016	$w_e \frac{de}{e} + w_i d(i - i^*) - w_R \frac{(dR - dR^*)}{R}$	Precision	Nominal bilateral against reference currency
*PatnaikFelmanShah:2017	$\frac{de}{e} - w_R dR$	Exchange rate elasticity to US dollars $1bn of interventions	Nominal bilateral against US dollars

EMP Components: Normal Times v. High Stress Periods



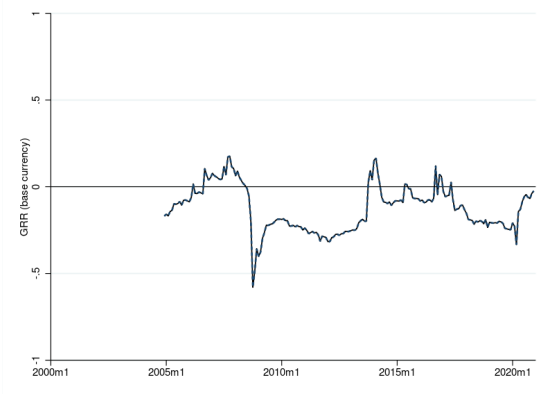
(e) Normal Periods



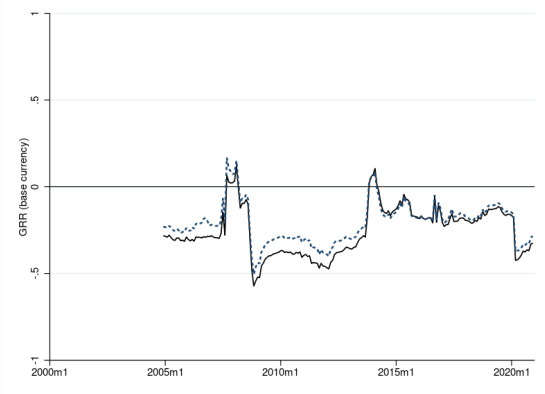
(f) High Stress Periods

- Many countries prefer to allow exchange rate adjustments rather than use costly interventions during periods of high stress in financial markets

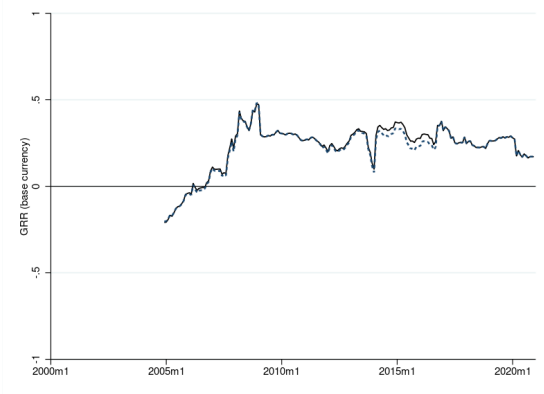
GRR Comparison – Examples



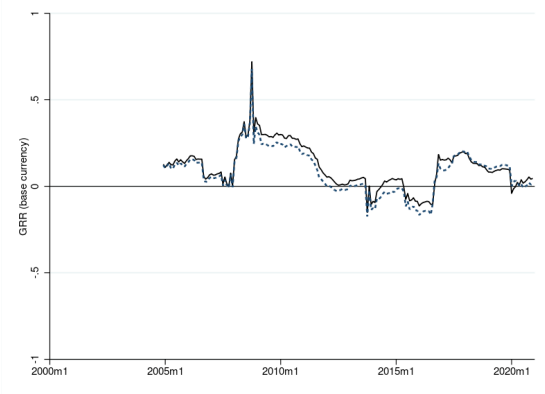
(g) Australia



(h) Brazil



(i) Japan

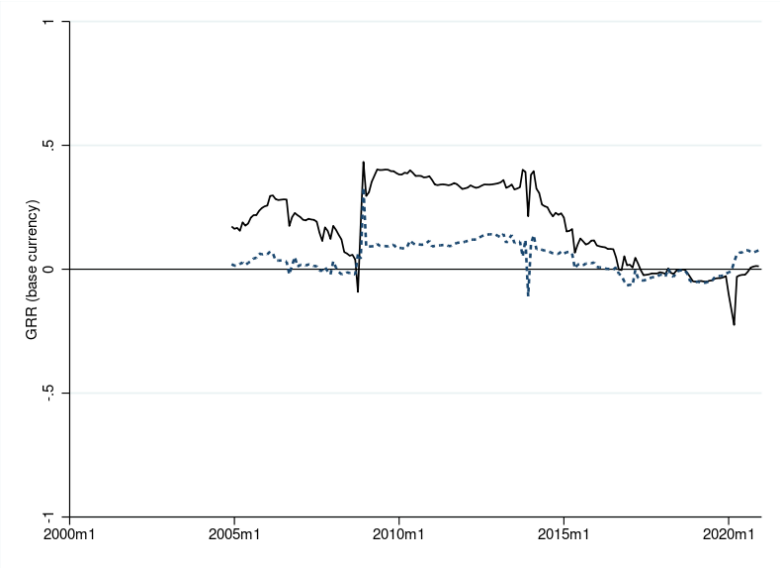


(j) Switzerland

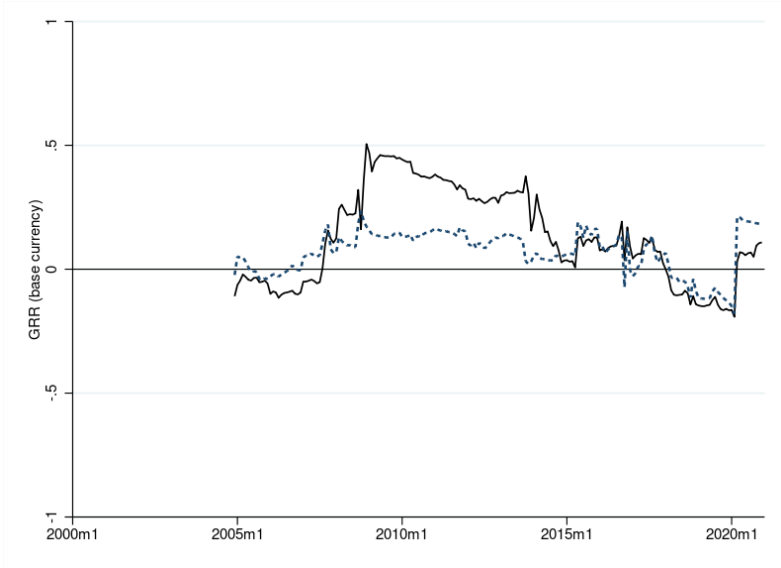
- The solid line displays *GRR* computed using the EMP. Dashed line using realized exchange rate depreciation.

GRR Definition

GRR Comparison – Small AEs Examples



(k) Denmark



(l) Hong Kong

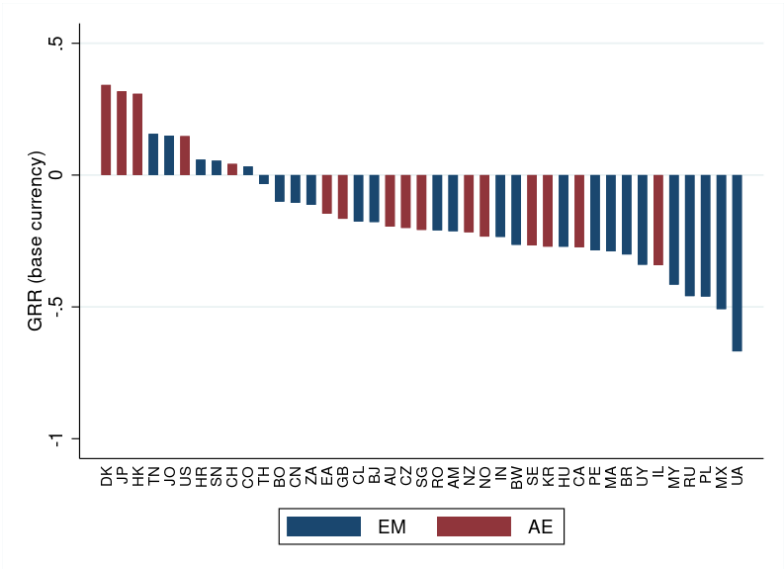
- *EMP* index illuminates the periodic safe haven characteristics of some smaller advanced economies

⏩ GRR Definition

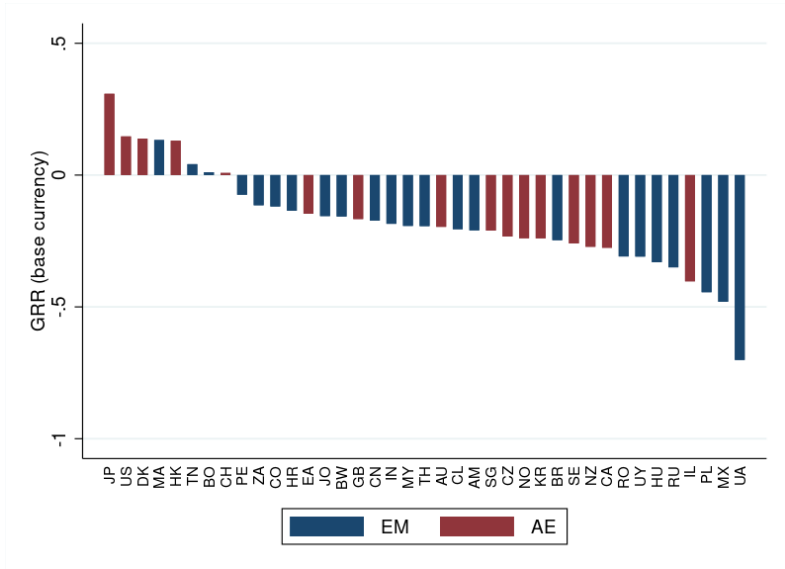
Full Sample

	All	Safe Haven	Excl. Safe Haven
GRR – All Periods	-0.11***	0.15***	-0.14***
GRR – Excluding P90	-0.02***	0.15***	-0.04***
Difference	-0.09***	-0.003	-0.10***

GRR by Country in June 2013: EMP v. de/e



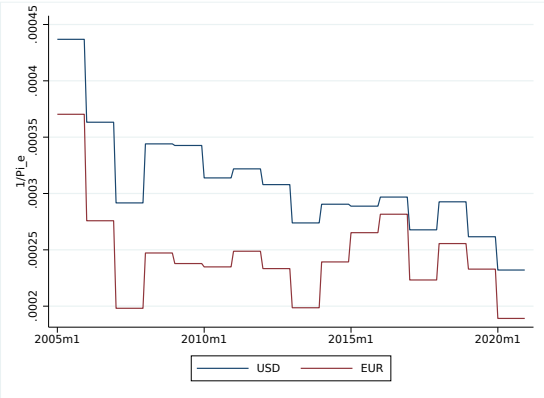
(m) EMP



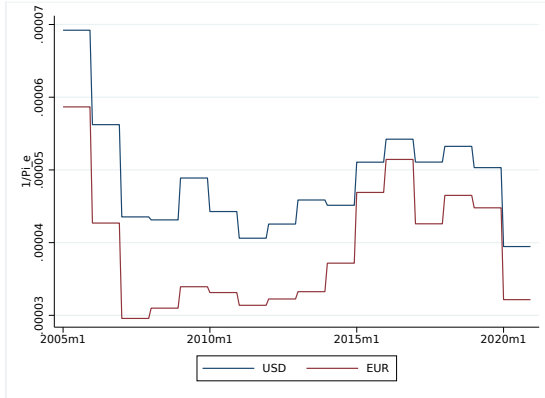
(n) de/e

▶▶ GRR Definition

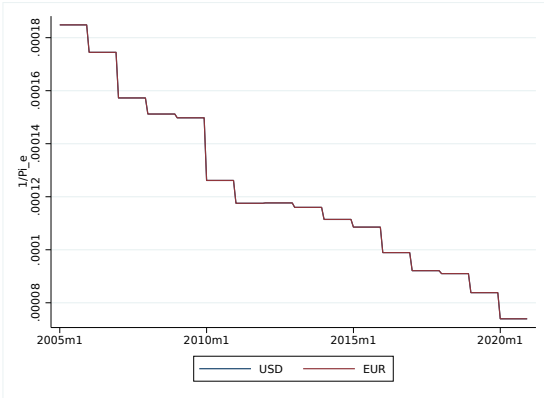
$\frac{1}{Pi_e}$ Comparison of Baselines using U.S. Dollar vs Euro Reference Currency



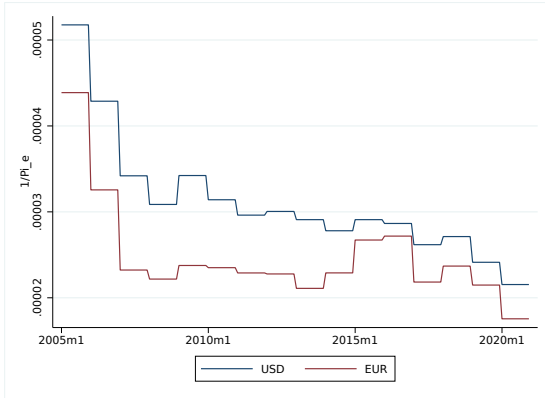
(o) Switzerland



(p) United Kingdom



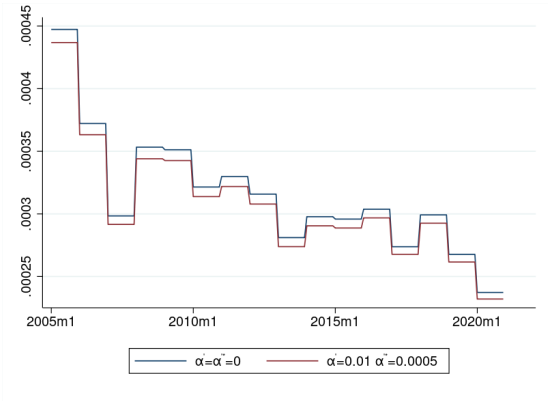
(q) Japan



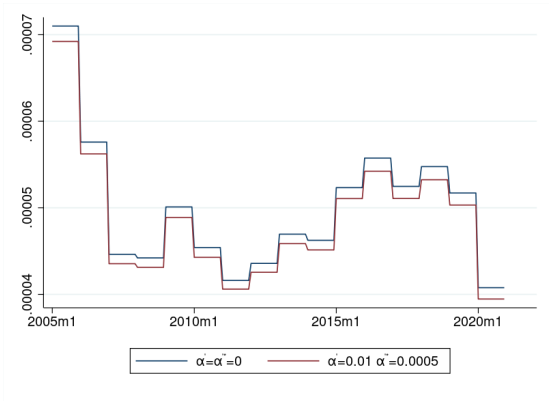
(r) United States

▶▶ FXI equivalencies

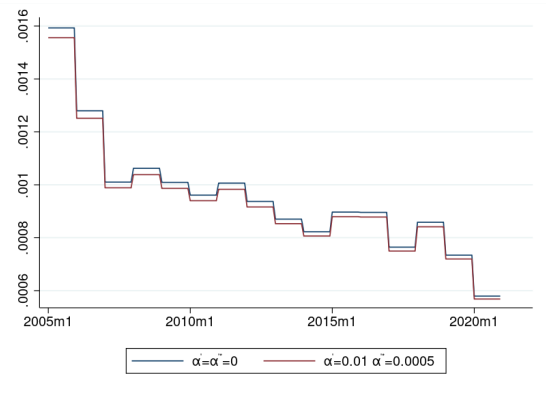
Time series comparison of $\frac{1}{Pi_e}$ values



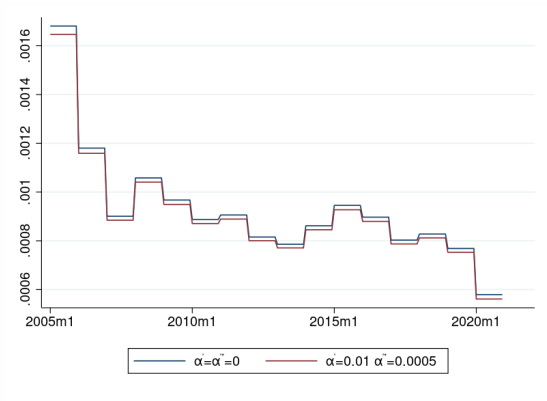
(s) Switzerland



(t) United Kingdom

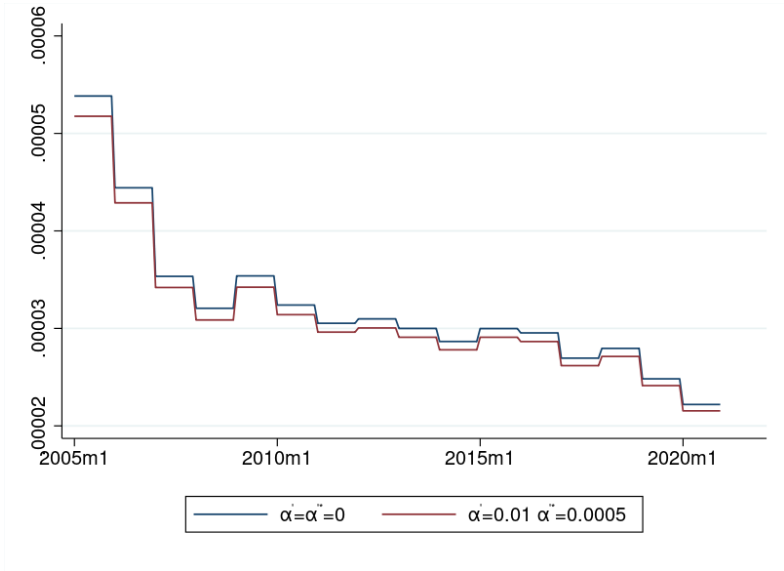


(u) Denmark

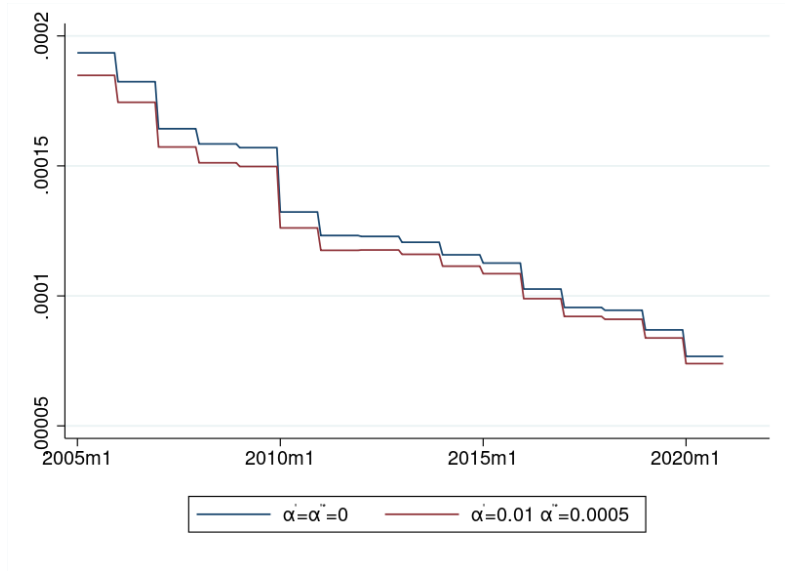


(v) Norway

conclusions



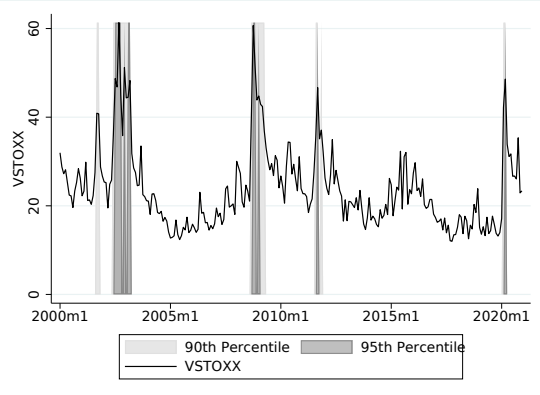
(w) United States



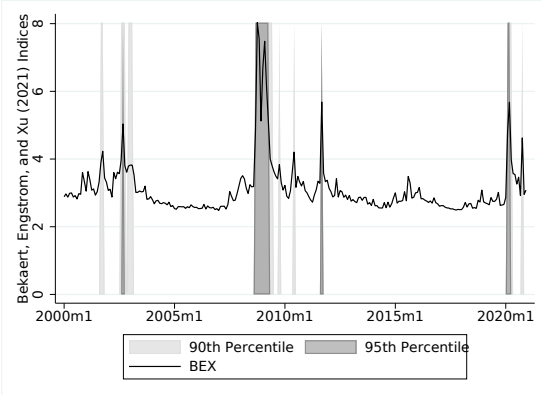
(x) Japan

conclusion

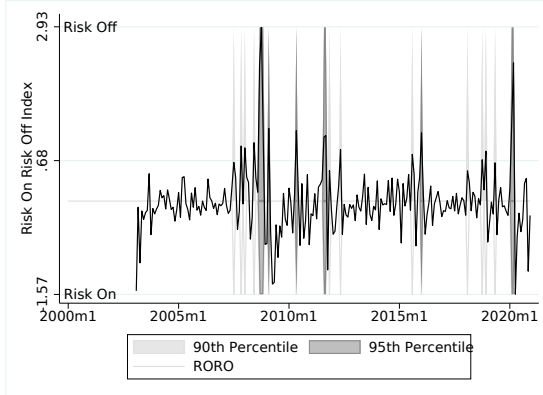
Alternative Risk Measures I



(y) VSTOXX



(z) BEX



() RORO

Figure: **High Risk Periods As Defined By Alternative Risk Measures**

Alternative Risk Measures II

Table: **High Stress Dates Using BEX**

		90th Percentile	95th Percentile
Event Time	Event Name	BEX	
2001	9/11 Attacks	9/2001-10/2001	
2002–2003		8/2002-10/2002;12/2002-2/2003	9/2002
2008–2009	Great Financial Crisis	9/2008-6/2009; 10/2009	9/2008-4/2009
2010	Euro Area Crisis	6/2010	
2011	US Debt Ceiling & European Crisis	9/2011	9/2011
2020–2021	COVID-19	2/2020-4/2020; 10/2020	2/2020-3/2020

Alternative Risk Measures III

Table: **High Stress Dates Using VSTOXX**

		90th Percentile	95th Percentile
Event Time	Event Name	VSTOXX	
2001	9/11 Attacks	9/2001-10/2001	
2002–2003		6/2002-3/2003	7/2002-10/2002; 12/2002; 2/2003-3/2003
2008–2009	Great Financial Crisis	9/2008-4/2009	10/2008-11/2008; 1/2009
2011	US Debt Ceiling & European Crisis	8/2011-9/2011; 11/2011	9/2011
2020–2021	COVID-19	2/2020-3/2020	3/2020

Alternative Risk Measures IV

Table: **High Stress Dates Using RORO**

		90th Percentile	95th Percentile
Event Time	Event Name	RORO	
2007		7/2007 ; 11/2007	
2008–2009	Great Financial Crisis	1/2008; 6/2008; 9/2008-11/2008; 2/2009	9/2008-11/2008; 2/2009
2010	Euro Area Crisis	5/2010	5/2010
2011	US Debt Ceiling & European Crisis	8/201-9/2011; 11/2011	8/201-9/2011
2012		5/2012	
2015		8/2015	
2016		1/2016	1/2016
2018		2/2018; 10/2018; 12/2018	
2019		5/2019	
2020–2021	COVID-19	2/2020-3/2020	2/2020-3/2020

Results – Baseline

	$z^e * 1000$				
	I	II	III	IV	V
$dVIX$	-1.167***	-1.429***	-1.851***	-1.539***	-1.768**
$dVIX * NFA/GDP_{t-1}$		0.102			-0.304
$dVIX * Infl_{t-1}$		-7.417			-5.614
$dVIX * PubDebt/GDP_{t-1}$		0.008*			0.006*
$dVIX * ShareofWorldGDP_{t-1}$			6.212*		5.493
$dVIX * StockmarketCap/GDP_{t-1}$			0.000		0.001
$dVIX * Dom.Credit/GDP_{t-1}$			0.006		-0.000
$dVIX * (GFA + GFL)/GDP_{t-1}$				0.086	0.109
$dVIX * ChinnIto_{t-1}$				0.202	0.089
Constant	30.245***	14.648*	45.548***	85.670***	52.928**
Adj. R2	0.022	0.136	0.033	0.063	0.159
No.Obs	10024	9011	9104	9121	8857
	$z^{EMP} * 1000$				
$dVIX$	-1.275***	-1.543***	-2.058***	-1.651***	-1.922***
$dVIX * NFA/GDP_{t-1}$		0.144			-0.288
$dVIX * Infl_{t-1}$		-8.506			-6.524
$dVIX * PubDebt/GDP_{t-1}$		0.008*			0.006*
$dVIX * ShareofWorldGDP_{t-1}$			6.878*		6.121*
$dVIX * StockmarketCap/GDP_{t-1}$			0.000		0.001
$dVIX * Dom.Credit/GDP_{t-1}$			0.006		0.001
$dVIX * (GFA + GFL)/GDP_{t-1}$				0.101*	0.113
$dVIX * ChinnIto_{t-1}$				0.145	0.008
Constant	29.844***	20.033***	47.278***	77.159***	58.505***
Adj. R2	0.025	0.097	0.036	0.052	0.117
No.Obs	9830	8871	8920	8963	8717

findings

Results – By Safe Haven Status

	$z^{EMP} * 1000$ – Safe Havens				
	I	II	III	IV	V
$dVIX$	0.441	0.304	2.285	0.804	1.217
$dVIX * NFA/GDP_{t-1}$		-0.153			0.696
$dVIX * Infl_{t-1}$		11.404			18.538
$dVIX * PubDebt/GDP_{t-1}$		0.002			0.001
$dVIX * ShareofWorldGDP_{t-1}$			3.979*		6.016*
$dVIX * StockmarketCap/GDP_{t-1}$			-0.000		-0.004
$dVIX * Dom.Credit/GDP_{t-1}$			-0.012		-0.010
$dVIX * (GFA + GFL)/GDP_{t-1}$				-0.063	0.123
$dVIX * ChinnIto_{t-1}$				0.000	0.000
Constant	-0.486***	-6.109	3.420	5.454	-27.717
Adj. R2	0.016	0.038	0.030	0.025	0.046
No.Obs	1230	1216	1230	1230	1216

	$z^{EMP} * 1000$ – Non-Safe Havens				
	I	II	III	IV	V
$dVIX$	-1.558***	-2.080***	-1.668***	-1.446***	-1.487
$dVIX * NFA/GDP_{t-1}$		-0.208			-0.262
$dVIX * Infl_{t-1}$		-4.590			-6.485
$dVIX * PubDebt/GDP_{t-1}$		0.012			0.010
$dVIX * ShareofWorldGDP_{t-1}$			2.264		2.161
$dVIX * StockmarketCap/GDP_{t-1}$			-0.002		-0.003
$dVIX * Dom.Credit/GDP_{t-1}$			0.002		-0.002
$dVIX * (GFA + GFL)/GDP_{t-1}$				0.068	0.087
$dVIX * ChinnIto_{t-1}$				-0.443	-0.322
Constant	34.154***	24.067**	53.794***	79.007***	58.507***
Adj. R2	0.034	0.111	0.042	0.061	0.129
No.Obs	8600	7655	7690	7733	7501

findings

Results – Excluding High Stress

	$z^{EMP} * 1000$ – Safe Havens				
	I	II	III	IV	V
$dVIX$	0.722	0.335	3.371	1.217*	2.267
$dVIX * NFA/GDP_{t-1}$		-0.069			0.107
$dVIX * Infl_{t-1}$		1.998			3.302
$dVIX * PubDebt/GDP_{t-1}$		0.005			0.006*
$dVIX * ShareofWorldGDP_{t-1}$			5.150*		4.595*
$dVIX * StockmarketCap/GDP_{t-1}$			-0.000		-0.002
$dVIX * Dom.Credit/GDP_{t-1}$			-0.017		-0.017
$dVIX * (GFA + GFL)/GDP_{t-1}$				-0.082	0.168
$dVIX * ChinnIto_{t-1}$				0.000	0.000
Constant	-0.528**	-5.604	4.300	6.919**	-33.493
Adj. R2	0.011	0.030	0.023	0.022	0.038
No.Obs	1109	1095	1109	1109	1095

	$z^{EMP} * 1000$ – Non-Safe Havens				
	I	II	III	IV	V
$dVIX$	-2.101***	-3.169***	-2.028***	-1.808*	-1.544
$dVIX * NFA/GDP_{t-1}$		-0.305			-0.544
$dVIX * Infl_{t-1}$		-2.754			-6.516
$dVIX * PubDebt/GDP_{t-1}$		0.021*			0.012
$dVIX * ShareofWorldGDP_{t-1}$			-4.053		-6.274
$dVIX * StockmarketCap/GDP_{t-1}$			-0.008		-0.010*
$dVIX * Dom.Credit/GDP_{t-1}$			0.006		-0.001
$dVIX * (GFA + GFL)/GDP_{t-1}$				0.131	0.299**
$dVIX * ChinnIto_{t-1}$				-0.886	-1.125
Constant	33.403***	22.179**	52.628***	79.283***	57.034***
Adj. R2	0.029	0.114	0.038	0.059	0.136
No.Obs	7777	6919	6964	6996	6790

findings

Results – High Stress Only

	$z^{EMP} * 1000$ – Safe Havens				
	I	II	III	IV	V
$dVIX$	0.373	0.388	1.883	0.593	-0.609
$dVIX * NFA/GDP_{t-1}$		-0.167			1.477
$dVIX * Infl_{t-1}$		13.921			30.853
$dVIX * PubDebt/GDP_{t-1}$		-0.000			0.000
$dVIX * ShareofWorldGDP_{t-1}$			3.176		9.447*
$dVIX * StockmarketCap/GDP_{t-1}$			-0.000		-0.007
$dVIX * Dom.Credit/GDP_{t-1}$			-0.010		-0.003
$dVIX * (GFA + GFL)/GDP_{t-1}$				-0.037	0.258*
$dVIX * ChinnIto_{t-1}$				0.000	0.000
Constant	1.818	1.346	1.483	1.696	0.715
Adj. R2	0.032	0.032	0.043	0.032	0.066
No.Obs	121	121	121	121	121

	$z^{EMP} * 1000$ – Non-Safe Havens				
	I	II	III	IV	V
$dVIX$	-1.216***	-1.260*	-1.507***	-1.105**	-1.059
$dVIX * NFA/GDP_{t-1}$		-0.023			-0.095
$dVIX * Infl_{t-1}$		-6.134			-7.683
$dVIX * PubDebt/GDP_{t-1}$		0.004			0.004
$dVIX * ShareofWorldGDP_{t-1}$			4.382		5.713
$dVIX * StockmarketCap/GDP_{t-1}$			0.001		0.001
$dVIX * Dom.Credit/GDP_{t-1}$			0.001		-0.003
$dVIX * (GFA + GFL)/GDP_{t-1}$				0.059	0.032
$dVIX * ChinnIto_{t-1}$				-0.401	-0.144
Constant	40.042***	42.956***	43.795***	42.985***	44.015***
Adj. R2	0.092	0.095	0.092	0.093	0.091
No.Obs	823	736	726	737	711

findings