Uncertainty and Cross-border Banking flows

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- Banking flows are the most volatile component of capital flows, so they might be particularly vulnerable to uncertainty

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- What are the effect of higher uncertainty in a local economy on cross-border lending (bank loans) and borrowing (bank deposits)
- Is there any portfolio reallocation of global banks in response to higher uncertainty? In other words, does foreign lending behave differently from domestic lending? (in progress)

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- Bilateral data structure of the BIS Locational Banking Statistics allows for cleaner identification of the uncertainty effect from other compounding factors
- Find robust evidence on the role of uncertainty as a pull and push factor of cross-border banking flows
- Find suggestive evidence on the portfolio re-balancing of global banks in response to higher uncertainty: relative "flight-to-safety" mechanism

Overview of the BIS LBS

- Banks record their positions on an unconsolidated basis
- Information about the currency composition of banks balance sheets and the geographical breakdown of their counterparties
- BIS LBS provides the exchange-rate adjusted flows in cross-border bank claims and liabilities: account for the valuation effect

Overview of the BIS LBS

- Banks record their positions on an unconsolidated basis
- Information about the currency composition of banks balance sheets and the geographical breakdown of their counterparties
- BIS LBS provides the exchange-rate adjusted flows in cross-border bank claims and liabilities: account for the valuation effect
- Residency (not nationality) principle consistent with the BOP statistics (BPM6)
- Internationally active banks located in 46 reporting countries against counterparties (capturing 93 percent of all cross-border interbank business)
- These banks also account for the bulk of the domestic banking system

Comparison with other statistics

Table 1. Data availability on cross-border flows in the BIS International Banking Statistics

	Nationality of lending bank	Residence of borrowers	Currency composition
Consolidated banking statistics	Yes	Yes	No
Locational banking statistics			
by residence	No	Yes	Yes
by nationality	Yes	No	Yes
stage 1 data	Yes	Yes	Yes

Note: This table is reproduced from Table 1 in Avdjiev and Elod Takáts (2014). In addition to exchange rate fluctuations, the quarterly flows in the locational datasets are corrected for breaks in the reporting population. The BIS consolidated banking statistics group claims according to the nationality of banks (i.e., according to the location of banks' headquarters), netting out inter-office positions. The BIS locational banking statistics define creditors and debtors according to their residence, consistently with national accounts and balance of payments principles. The Stage 1 enhanced data are the first consistent data set to provide all three dimensions at the same time, but the construction of comprehensive time series data is still in progress.

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- Drop observations with the size of cross-border position less than \$5 million
- Dependent variables in the upper and lower one percentile of the distribution are excluded from the sample
- BIS LBS only reports the exchange rate-adjusted flows: reconstruct the stock of the cross-border claims $L_{i,j,t}$ and liabilities $B_{i,j,t}$ by adding the exchange rate-adjusted flows to the initial stock
- Left with 25 reporting and 50 counterpart countries

Countries in the final sample (*: EMDEs)

- Source countries: Australia, Austria, Belgium, Brazil*, Canada, Chile*, Denmark, Finland, France, Germany, Greece, India*, Indonesia*, Italy, Japan, Korea, Mexico*, Netherlands, Portugal, South Africa*, Spain, Sweden, Taiwan, United Kingdom, United States

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- Recipient countries: Argentina*, Australia, Austria, Belgium, Brazil*, Bulgaria*, Canada, Chile*, China*, Colombia*, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary*, India*, Indonesia*, Israel, Italy, Japan, Korea, Latvia*, Lithuania*, Malaysia*, Mexico*, Netherlands, New Zealand, Norway, Pakistan*, Peru*, Philippines*, Poland*, Portugal, Romania*, Russia*, Slovak Republic, Slovenia, South Africa*, Spain, Sweden, Taiwan, Thailand*, Turkey*, Ukraine*, United Kingdom, United States, Venezuela*

Measures of uncertainty

- Following Bloom (2009), use stock market volatility as a baseline measure of uncertainty
- Distinction between risk and uncertainty is not clear: VIX is used as a measure of global risk aversion (Milesi-Ferretti and Tille, 2011; Forbes and Warnock, 2012; Bruno and Shin, 2015; Rey, 2015)
- Compute quarterly realized volatility using daily stock prices p_t: $RV_t = 100 \times 252/T_i \sum_{t=1}^{T_i} r_{i,s}^2$, where $r_{i,s}^2$ are daily returns and T_i is the number of trading days in a given quarter

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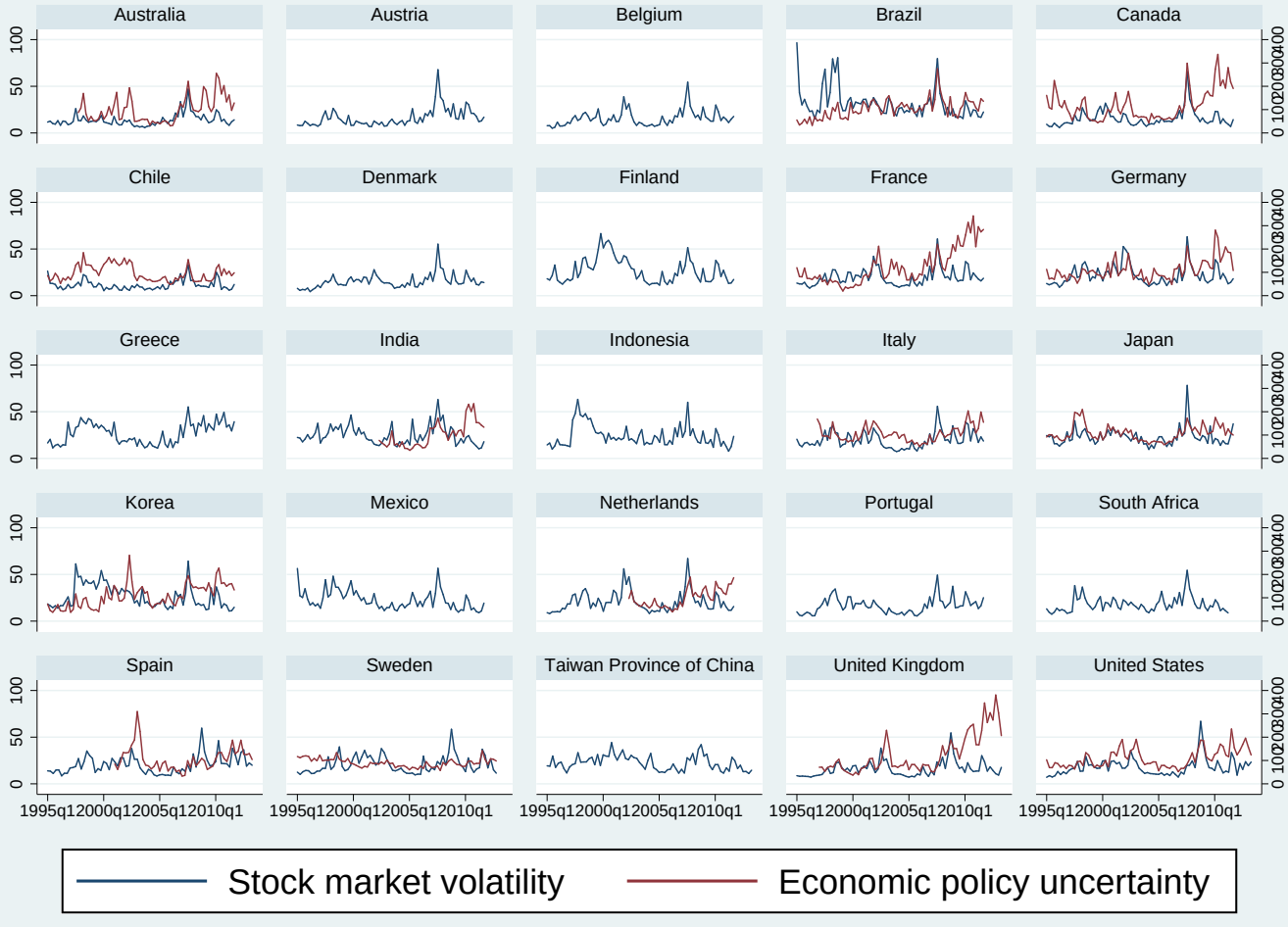
- Economic policy uncertainty by Baker et al. (2016) as a robustness check: capture uncertainty from a different dimension
- EPU index: newspaper coverage frequency of the words related to uncertainty and economic policy ("uncertainty", "central bank", "trade policy", ...)

Measures of uncertainty



Macroeconomic controls

- LBS data structure allows us to control for time-variant unobserved factors in counterparty countries (external and idiosyncratic macroeconomic shocks)
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- Many counterparty countries are emerging economies: not necessarily have all the control variables
- Only need to control for macroeconomic variables in source (reporting) countries
- Control for real GDP growth, stock market growth, the inflation rate, the short-term policy rate, nominal exchange rate growth, private credit growth, the external debt to GDP ratio, and bilateral trade flows

Summary about cross-border banking

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- Strong positive movements between assets and liabilities at the aggregate level
- Interesting heterogeneity at the bilateral level

The size of cross-border banking to GDP

Table 2. Total cross-border claims and liabilities as a share of GDP

	Total cross-border claims as a share of GDP	Total cross-border liabilities as a share of GDP
Australia	65.20	165.13
Austria	382.88	227.47
Belgium	571.81	441.18
Brazil	5.97	12.36
Canada	88.99	66.26
Chile	12.39	21.65
Denmark	197.52	229.40
Finland	502.87	595.53
France	337.02	327.53
Germany	289.92	130.79
Greece	199.62	133.61
India	6.03	18.08
Indonesia	7.53	7.34
Italy	101.95	127.21
Japan	162.92	72.29
Korea	31.03	71.46
Mexico	5.44	7.32
Netherlands	524.19	469.70
Portugal	224.71	184.77
South Africa	52.65	37.30
Spain	135.20	171.35
Sweden	278.91	169.49
Taiwan	155.67	62.37
United Kingdom	643.95	379.29
United States	63.55	49.65

Note: Total cross-border claims and liabilities as a share of the domestic GDP in 2010Q4 under locational banking statistics with the residency principle.

Summary statistics

Table 3. Summary statistics

Variable	Obs.	Mean	Median	Standard deviation
Growth of cross-border claims from a country *i* to a country *j*	30,608	3.136	1.225	40.751
Growth of cross-border liabilities of a country *i* from a country *j*	29,889	2.998	1.359	50.930
Stock market volatility	30,608	19.943	17.211	10.238
Economic policy uncertainty	24,901	105.921	97.412	44.417
Real GDP growth	30,608	0.600	0.645	1.059
Growth of stock market	30,608	1.254	2.214	9.826
Inflation rate	30,608	0.609	0.573	0.626
Policy rate	30,608	3.666	3.370	2.653
Growth of nominal exchange rate with respect to USD	30,608	-0.127	0.000	4.243
Growth of private credit	19,605	1.506	1.372	2.143
External debt to GDP ratio	17,973	80.704	74.052	53.674
Growth of bilateral exports from a country *i* to a country *j*	30,608	1.644	2.277	20.434
Growth of bilateral imports of a country *i* from a country *j*	30,608	1.993	2.242	21.967

Note: Growth rates are calculated quarter-over-quarter. All variables are in percentage points.

Illustration of data

- Aggregate cross-border claims and liabilities: U.S.

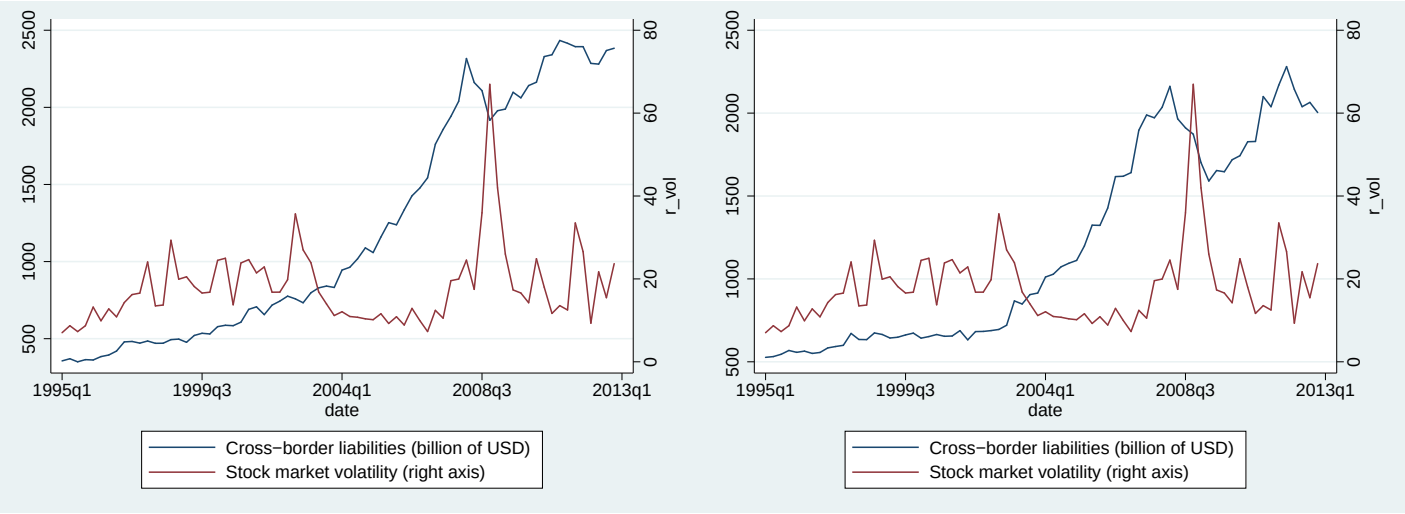

Illustration of data

- Aggregate cross-border claims and liabilities: Germany

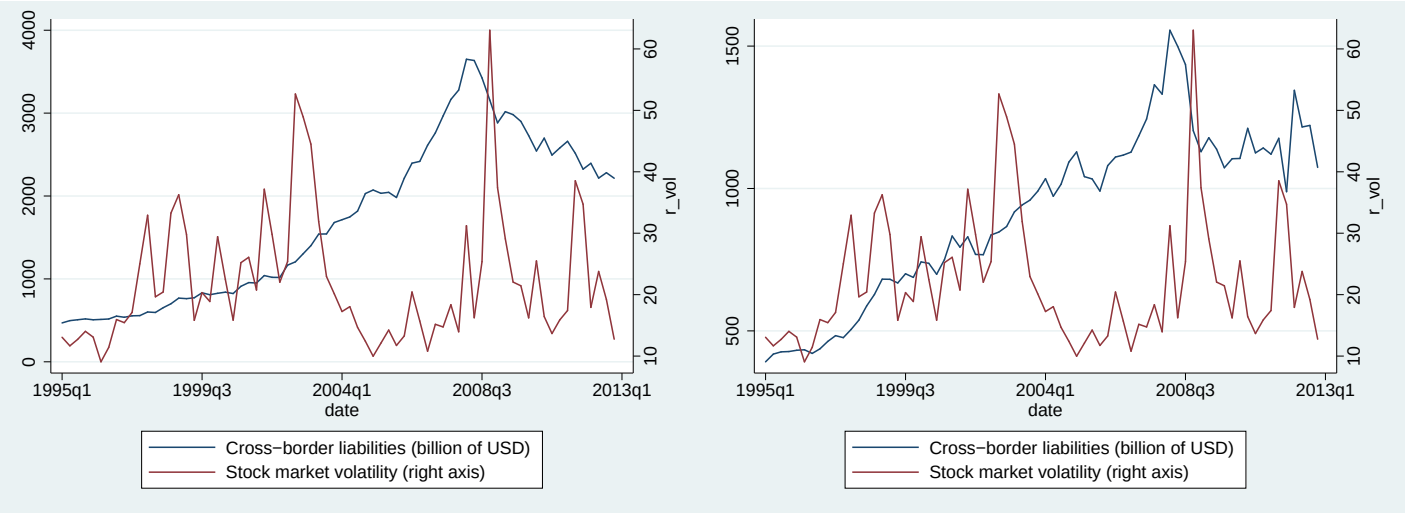

Illustration of data

- Aggregate cross-border claims and liabilities: Brazil

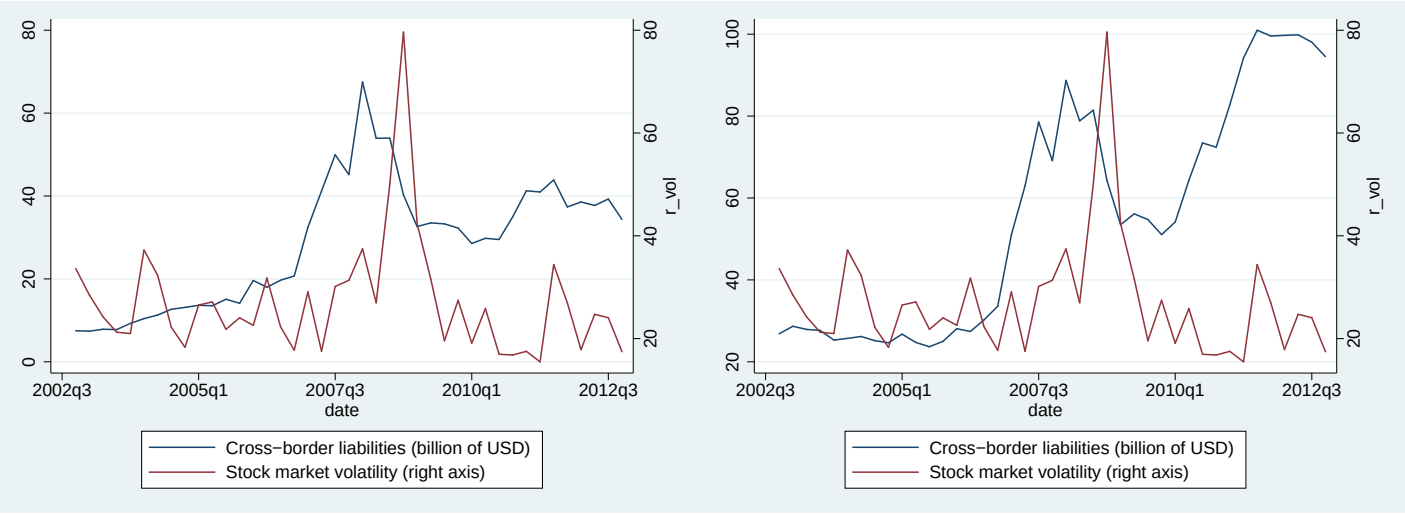

Illustration of data

- Bilateral cross-border claims and liabilities: U.S. and Germany

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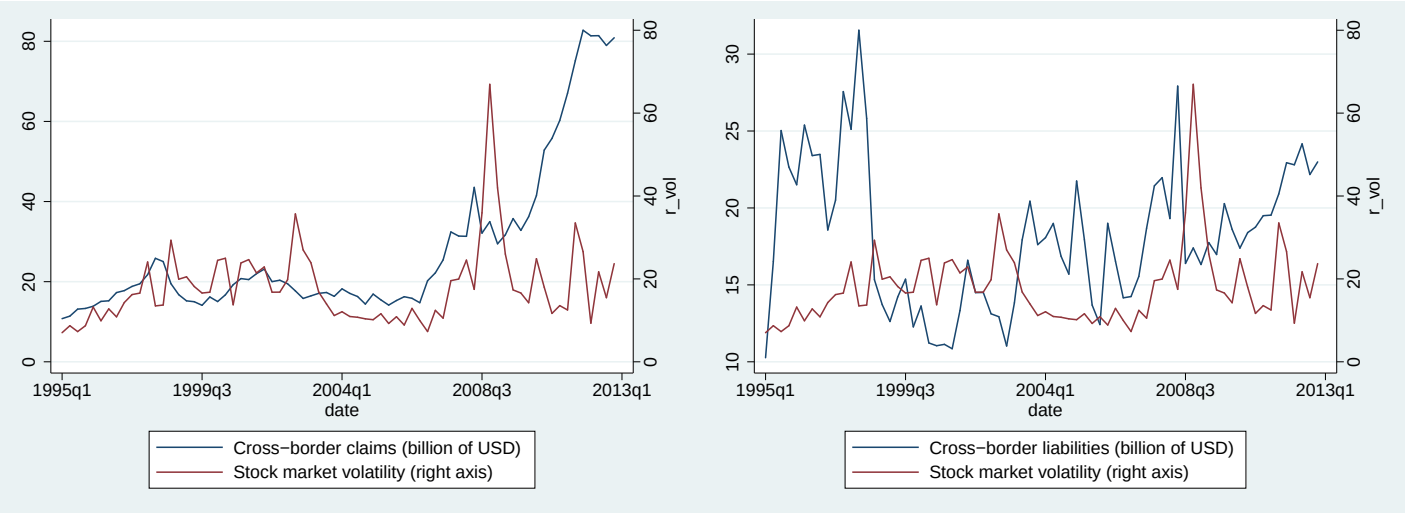

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- Multiple counterparty countries are linked to multiple source countries
- Fixed effects to control for various factors affecting loan demand (for claims) and deposit supply (for liabilities)

Cross-border claims

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$$\Delta L_{i,j,t} = \alpha_{j,t} + \beta X_{i,t-1} + \gamma UNC_{i,t-1} + \epsilon_{i,j,t}, \tag{1}$$

where i and j indicate the reporting (source) and counterparty (recipient) countries, and t denotes time.

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$\Delta L_{i,j,t}$ denotes the quarterly growth in cross-border claims of banks in a country i in a country j; $X_{i,t}$ is the set of macroeconomic controls; $\alpha_{j,t}$ are recipient country-time fixed effects, included to control for any macroeconomic shocks affecting recipient countries

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- Heteroskedasticity-robust standard errors are clustered at the reporting and counterparty country-pair levels

Cross-border liabilities

- Utilize a dyadic structure of the LBS data to disentangle uncertainty in a reporting country (demand factor) from credit supply conditions in a counterpart country

$$\Delta B_{i,j,t} = \alpha_{j,t} + \beta X_{i,t-1} + \gamma UNC_{i,t-1} + \epsilon_{i,j,t}, \tag{2}$$

where i and j indicate the reporting (source) and counterparty (recipient) countries, and t denotes time.

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Baseline finding

- Consistent with the previous literature, an increase in cross-border bank lending is associated with higher GDP growth, higher short-term policy rate (Correa et al., 2017), domestic currency appreciation (Bruno and Shin, 2015), and lower external debt to GDP in a local country

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- Uncertainty as not only push factor of capital outflows (less cross-border loans), but a pull factor of capital inflows (less cross-border deposits)

Baseline finding

Table 4. Baseline analysis

	Growth of claims (outflows)			Growth of liabilities (inflows)		
Explanatory variables	(I)	(II)	(III)	(IV)	(V)	(VI)
Uncertainty	-1.670**	-2.845**	-2.716**	-2.369**	-2.734**	-2.302*
	(0.824)	(1.150)	(1.211)	(0.957)	(1.328)	(1.289)
Real GDP growth	0.852***	0.782**	0.391	0.856**	0.207	-0.598
	(0.290)	(0.402)	(0.422)	(0.393)	(0.629)	(0.604)
Stock market growth	0.002	-0.067*	-0.062	-0.017	0.063	0.029
	(0.031)	(0.039)	(0.040)	(0.041)	(0.070)	(0.065)
CPI inflation	-0.349	-1.331	-0.995	0.782	0.587	0.477
	(0.508)	(0.879)	(0.922)	(0.615)	(1.270)	(1.017)
Policy rate	0.557***	0.718***	0.669***	0.147	0.244	0.062
	(0.107)	(0.136)	(0.133)	(0.114)	(0.166)	(0.150)
Nominal exchange rate growth	-0.094	-0.123	-0.153*	0.003	-0.093	-0.217**
	(0.078)	(0.088)	(0.089)	(0.110)	(0.138)	(0.109)
Private credit growth		0.109	0.029		0.035	0.035
		(0.183)	(0.194)		(0.211)	(0.200)
External debt to GDP			-0.022***			-0.018***
			(0.004)			(0.006)
Counterparty-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	30,608	17,462	16,431	29,889	16,725	14,784
R-squared	0.13	0.14	0.15	0.14	0.15	0.16

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims in column (I) to (III) and the growth rate of exchange rate-adjusted cross-border liabilities in column (IV) to (VI). All independent variables are lagged by one period. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Link to previous studies

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- Gauvin et al. (2014): Spillover of U.S. and euro-zone uncertainty on portfolio flows into EMEs using EPFR data

Link to previous studies

Table 5. Link to the previous studies focusing on emerging market economies

	Reporter: emerging market economies only			Counterparty: emerging market economies only		
Explanatory variables	(I)	(II)	(III)	(IV)	(V)	(VI)
Uncertainty	-8.126*	-14.287*	-16.928**	-2.177*	-3.695**	-4.016**
	(4.114)	(7.727)	(7.821)	(1.223)	(1.792)	(1.797)
Real GDP growth	1.588	-1.234	-1.381	1.512***	1.667***	1.073*
	(1.241)	(1.666)	(1.745)	(0.448)	(0.550)	(0.561)
Stock market growth	0.296**	0.138	0.097	-0.028	-0.137**	-0.126**
	(0.114)	(0.472)	(0.491)	(0.043)	(0.053)	(0.053)
CPI inflation	1.046	-2.872	0.711	-1.462*	-3.397***	-2.517**
	(1.257)	(2.309)	(3.019)	(0.764)	(1.246)	(1.253)
Policy rate	0.726**	1.429**	1.648**	0.920***	1.371***	1.188***
	(0.327)	(0.626)	(0.698)	(0.215)	(0.310)	(0.304)
Nominal exchange rate growth	0.273	0.101)	0.189	0.095	0.148)	0.133
	(0.194)	(0.287	(0.293)	(0.113)	(0.133)	(0.122)
Private credit growth		0.687	0.753		0.297	0.132
		(0.651)	(0.794)		(0.273)	(0.278)
External debt to GDP			0.054			-0.029***
			(0.128)			(0.007)
Obs	2,671	1,400	1,358	13,685	7,694	7,249
R-squared	0.37	0.41	0.42	0.15	0.17	0.18

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims. All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporting-counterparty country levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

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- The extreme event of the GFC drive the result?: winsorize stock market volatility during the GFC
- Structural changes after the GFC?: Split the sample before and after the GFC
- The important role of European banks in the global banking system (Cetorelli and Goldberg, 2011; Shin, 2012; Ivashina et al., 2015): split the sample between euro and non-euro economies

Alternative measure of uncertainty

Table 6. Robustness check: Alternative measure of uncertainty

	Growth of claims (outflows)				Growth of liabilities (inflows)			
	Economic policy uncertainty		Idiosyncratic stock market volatility		Economic policy uncertainty		Idiosyncratic stock market volatility	
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Uncertainty	-1.923**	-3.574***	-0.069*	-0.125**	-2.621**	-2.832*	-0.100**	-0.106*
	(0.930)	(1.239)	(0.039)	(0.055)	(1.207)	(1.681)	(0.047)	(0.064)
Real GDP growth	1.446***	0.920**	0.853***	0.446	0.888*	-0.052	0.859**	-0.67
	(0.380)	(0.430)	(0.290)	(0.430)	(0.468)	(0.705)	(0.393)	(0.604)
Stock market growth	0.049	-0.056	0.002	-0.065*	0.035	0.080	-0.018	0.027
	(0.037)	(0.042)	(0.032)	(0.040)	(0.051)	(0.074)	(0.041)	(0.065)
CPI inflation	-0.492	-0.807	-0.333	-0.782	0.121	0.436	0.804	0.496
	(0.587)	(1.005)	(0.508)	(0.939)	(0.608)	(1.233)	(0.616)	(1.008)
Policy rate	0.479***	0.540***	0.543***	0.597***	0.212*	0.167	0.128	0.037
	(0.114)	(0.140)	(0.106)	(0.149)	(0.120)	(0.145)	(0.112)	(0.144)
Nominal exchange rate growth	-0.034	-0.085	-0.093	-0.123	0.123	0.027	0.004	-0.193*
	(0.084)	(0.090)	(0.078)	(0.090)	(0.116)	(0.134)	(0.110)	(0.108)
Private credit growth		-0.031		0.022		-0.060		-0.091
		(0.193)		(0.194)		(0.227)		(0.196)
External debt to GDP		-0.022***		-0.023***		-0.028***		-0.021***
		(0.005)		(0.005)		(0.007)		(0.006)
Obs	21,564	13,715	27,581	14,844	21,212	14,784	26,843	13,225
R-squared	0.15	0.17	0.13	0.15	0.17	0.16	0.14	0.16

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims in column (I) to (IV) and the growth rate of exchange rate-adjusted cross-border liabilities in column (V) to (VIII). All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level. The. U.S. is dropped in the analysis of idiosyncratic stock market volatility.

Control for the dominance of the GFC

Table 7. Robustness check: Redefining the uncertainty shock

	Growth of claims (outflows)		Growth of liabilities (inflows)	
Explanatory variables	(I)	(III)	(IV)	(VI)
Uncertainty	-1.630*	-2.598**	-2.307**	-2.106*
	(0.872)	(1.301)	(1.016)	(1.285)
Real GDP growth	0.852***	0.500	0.856**	-0.686
	(0.289)	(0.426)	(0.393)	(0.610)
Stock market growth	0.004	-0.059	-0.014	0.025
	(0.031)	(0.040)	(0.041)	(0.067)
CPI inflation	-0.353	-0.773	0.779	0.299
	(0.508)	(0.935)	(0.616)	(1.026)
Policy rate	0.555***	0.606***	0.144	0.014
	(0.107)	(0.152)	(0.115)	(0.147)
Nominal exchange rate growth	-0.094	-0.127	0.003	-0.186*
	(0.078)	(0.090)	(0.110)	(0.112)
Private credit growth		0.010		-0.042
		(0.195)		(0.207)
External debt to GDP		-0.022***		-0.016***
		(0.005)		(0.006)
Obs	30,608	16,431	29,889	14,784
R-squared	0.13	0.15	0.14	0.16

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims in column (I) to (III) and the growth rate of exchange rate-adjusted cross-border liabilities in column (IV) to (VI). All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Before and after the GFC

Table 8. Robustness check: Before and after the Global Financial Crisis

	Growth of claims (outflows)		Growth of liabilities (inflows)	
	Before the GFC (1995Q1-2007Q2)	After the GFC (2007Q3-2012Q4)	Before the GFC (1995Q1-2007Q2)	After the GFC (2007Q3-2012Q4)
	(I)	(II)	(III)	(IV)
Uncertainty	-1.983**	-2.841**	-2.111**	-3.550*
	(1.026)	(1.289)	(1.052)	(1.910)
Real GDP growth	0.757*	0.909***	0.973*	0.672
	(0.453)	(0.297)	(0.550)	(0.554)
Stock market growth	0.006	0.008	-0.169***	0.106
	(0.048)	(0.033)	(0.060)	(0.065)
CPI inflation	-0.878	-0.183	0.778	0.916
	(0.843)	(0.536)	(0.986)	(0.759)
Policy rate	0.691***	0.177	0.135	0.152
	(0.143)	(0.179)	(0.124)	(0.222)
Nominal exchange rate growth	-0.058	0.003	0.011	-0.003
	(0.141)	(0.079)	(0.158)	(0.142)
Obs	18,846	11,578	18,808	1,1081
R-squared	0.143	0.119	0.16	0.13

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims in column (I) to (II) and the growth rate of exchange rate-adjusted cross-border liabilities in column (III) to (IV). All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Euro vs. non-euro area

Table 9. Robustness check: Euro area vs. non-euro area countries

	Growth of claims (outflows)		Growth of liabilities (inflows)	
	Euro area	Non-euro area	Euro area	Non-euro area
	(I)	(II)	(III)	(IV)
Uncertainty	-5.136**	-2.827*	-4.167	-1.503
	(2.444)	(1.511)	(2.523)	(2.078)
Real GDP growth	0.352	0.351	0.025	-1.120
	(0.840)	(0.587)	(1.173)	(0.827)
Stock market growth	-0.186*	-0.023	0.005	0.064
	(0.104)	(0.048)	(0.161)	(0.084)
CPI inflation	1.646	-1.672	-0.294	2.051
	(1.494)	(1.190)	(2.164)	(1.611)
Policy rate		0.621***		-0.151
		(0.191)		(0.219)
Nominal exchange rate growth		0.003		-0.098
		(0.079)		(0.160)
Private credit growth	-0.247	0.225		0.029
	(0.208)	(0.312)		(0.370)
External debt to GDP	-0.013	-0.033**		-0.055***
	(0.009)	(0.014)		(0.020)
Obs	6,559	9,508	6,253	8,856
R-squared	0.32	0.22	0.32	0.23

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims in column (I) to (II) and the growth rate of exchange rate-adjusted cross-border liabilities in column (III) to (IV). All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Robustness checks

- The use of $\alpha_{j,t}$ is more flexible than controlling for any set of common time-varying regressors, but we have not controlled for any variables varying over i, j, t: control for bilateral trade flows

Robustness checks

- The use of $\alpha_{j,t}$ is more flexible than controlling for any set of common time-varying regressors, but we have not controlled for any variables varying over i, j, t: control for bilateral trade flows
- "Great Trade Collapse" and heightened global uncertainty: the role of uncertainty in explaining the pattern of international trade (Taglioni and Zavacka, 2013; Novy and Taylor, 2014)

Robustness checks

- The use of $\alpha_{j,t}$ is more flexible than controlling for any set of common time-varying regressors, but we have not controlled for any variables varying over i, j, t: control for bilateral trade flows
- "Great Trade Collapse" and heightened global uncertainty: the role of uncertainty in explaining the pattern of international trade (Taglioni and Zavacka, 2013; Novy and Taylor, 2014)
- Tight relationship between current account and financial account

Controlling for bilateral trade flows

Table 10. Robustness check: Controlling for bilateral trade flows

	Growth of claims (outflows)		Growth of liabilities (inflows)	
Explanatory variables	(I)	(III)	(IV)	(VI)
Uncertainty	-1.686**	-2.877**	-2.365**	-2.220*
	(0.827)	(1.217)	(0.959)	(1.318)
Real GDP growth	0.834***	0.464	0.837**	-0.744
	(0.290)	(0.426)	(0.393)	(0.614)
Stock market growth	0.002	-0.063	-0.017	0.020
	(0.032)	(0.040)	(0.041)	(0.067)
CPI inflation	-0.360	-0.804	0.782	0.271
	(0.508)	(0.937)	(0.615)	(1.029)
Policy rate	0.553***	0.615***	0.145	0.018
	(0.107)	(0.151)	(0.114)	(0.147)
Nominal exchange rate growth	-0.096	-0.127	0.006	-0.186*
	(0.078)	(0.090)	(0.110)	(0.112)
Private credit growth		0.010		-0.036
		(0.194)		(0.207)
External debt to GDP		-0.022***		-0.016***
		(0.005)		(0.006)
Export (import) growth	0.028	0.015	0.018	0.037
	(0.020)	(0.028)	(0.021)	(0.026)
Counterparty-time fixed effects	Yes	Yes	Yes	Yes
Obs	30,608	16,431	29,889	14,784
R-squared	0.13	0.15	0.14	0.17

Note: The dependent variables are the growth rate of exchange rate-adjusted cross-border claims in column (I) to (III) and the growth rate of exchange rate-adjusted cross-border liabilities in column (IV) to (VI). All independent variables are lagged by one period. Heteroskedasticity-robust standard errors in parentheses. Standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Portfolio reallocation mechanism

- It is well known that banks lower domestic credit in response to uncertainty shocks (Bordo et al., 2016; Raunig et al., 2016)

Portfolio reallocation mechanism

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Portfolio reallocation mechanism

- It is well known that banks lower domestic credit in response to uncertainty shocks (Bordo et al., 2016; Raunig et al., 2016)
- An interesting question is whether they reduce foreign credit more than local credit in response to higher uncertainty about the local economy
- Redefine the dependent variable to capture the share of cross-border claims to the sum of cross-border and local claims

$$s_{i,j,t} = \frac{cross-border\,claims_{i,j,t}}{cross-border\,claims_{i,t} + local\,claims_{i,t}} \times 100 \qquad (3)$$

Portfolio reallocation mechanism

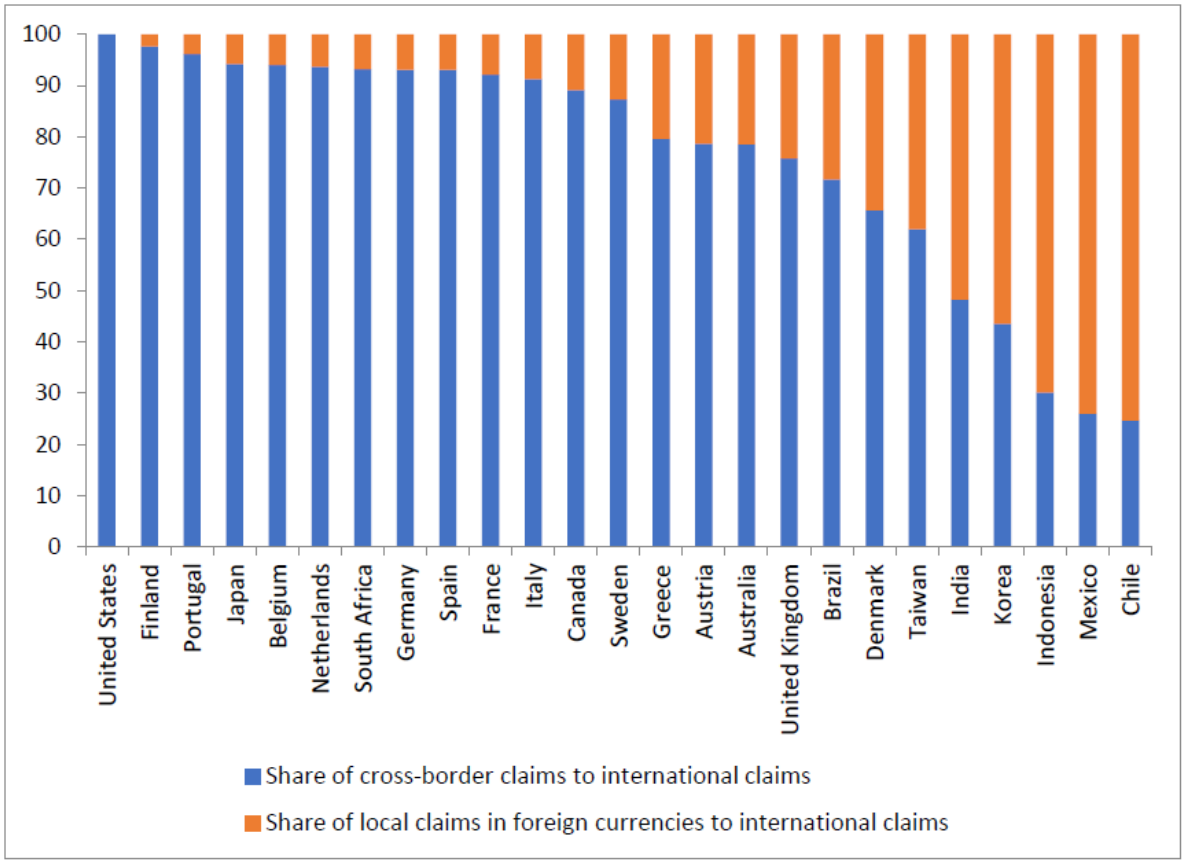
- Data constraint: LBS does not provide historical data on total domestic claims of the global banks
- Domestic claims = local claims in local currencies + local claims in foreign currencies
- We have to rely on imperfect proxies (work in progress)

Portfolio reallocation mechanism

- Data constraint: LBS does not provide historical data on total domestic claims of the global banks
- Domestic claims = local claims in local currencies + local claims in foreign currencies
- We have to rely on imperfect proxies (work in progress)
- 1) We use local claims in foreign currencies of the global banks in a reporting country instead (except for the U.S.)
- 2) We use domestic bank claims from IMF IFS line 32

Portfolio reallocation mechanism

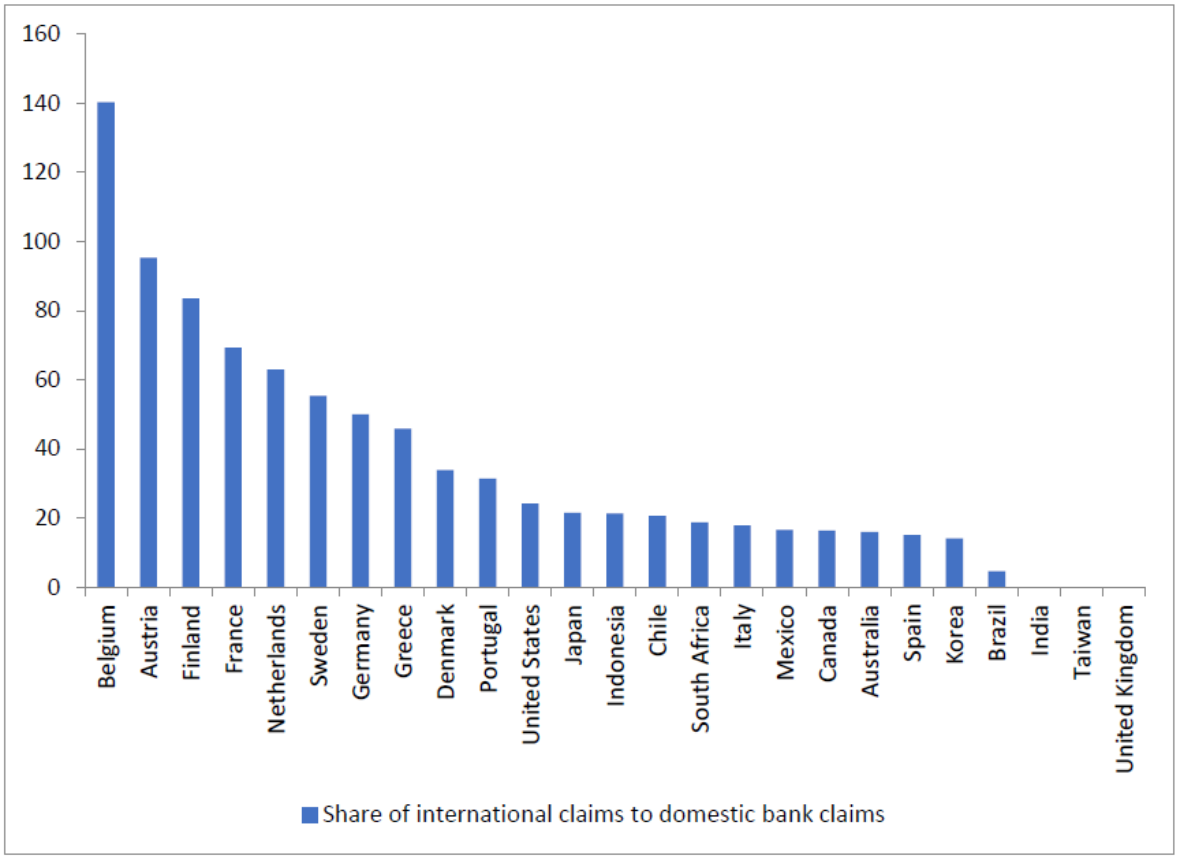
Figure 4. Share of cross-border claims to total international claims in 2010Q4



Note: The U.S. does not report local claims in foreign currencies to the BIS.

Portfolio reallocation mechanism

Figure 5. Share of international claims to domestic bank claims in 2010Q4



Note: Domestic bank claims (line 32) are taken from IMF International Financial Statistics Depository Corporations Survey. These data are not available for India, Taiwan, and the U.K. in the IMF IFS.

Portfolio reallocation mechanism

- Estimate the following equation:

$$s_{i,j,t} = \alpha_{j,t} + \beta X_{i,t-1} + \gamma UNC_{i,t-1} + \epsilon_{i,j,t}, \tag{4}$$

Portfolio reallocation mechanism

- Higher GDP growth and higher short-term policy rate in a local economy are associated with a decrease in the share of cross-border lending

Portfolio reallocation mechanism

- Higher GDP growth and higher short-term policy rate in a local economy are associated with a decrease in the share of cross-border lending
- When facing higher uncertainty in a local country, global banks reduce cross-border lending less than local lending: portfolio rebalancing toward safer borrowers

Portfolio reallocation mechanism

- Higher GDP growth and higher short-term policy rate in a local economy are associated with a decrease in the share of cross-border lending
- When facing higher uncertainty in a local country, global banks reduce cross-border lending less than local lending: portfolio rebalancing toward safer borrowers
- Results are robust to the sample split (before and after the GFC) and alternative measures of uncertainty

Portfolio reallocation mechanism

Table 12. Rebalancing between local and cross-border claims

	Share of cross-border claims		
Explanatory variables	(I)	(II)	(III)
Uncertainty	0.283*	0.465**	0.359*
	(0.166)	(0.191)	(0.185)
Real GDP growth	-0.084***	-0.060*	-0.012
	(0.020)	(0.031)	(0.025)
Stock market growth	-0.002	-0.002	-0.001
	(0.001)	(0.002)	(0.002)
CPI inflation	-0.062	-0.129**	-0.095
	(0.039)	(0.058)	(0.062)
Policy rate	-0.046**	-0.047*	-0.037
	(0.020)	(0.024)	(0.026)
Nominal exchange rate growth	-0.008**	-0.010**	-0.007
	(0.004)	(0.005)	(0.005)
Private credit growth		-0.025	0.003
		(0.019)	(0.019)
External debt to GDP			0.004***
			(0.001)
Obs	24,420	14,690	14,101
R-squared	0.51	0.49	0.50

Note: The dependent variables are the ratio of exchange rate-adjusted cross-border claims to the sum of exchange rate-adjusted cross-border claims and local claims in foreign currencies. All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level

Before and after the GFC

Table 13. Rebalancing between local and cross-border claims: Before and after the Global Financial Crisis

Explanatory variables	Share of cross-border claims			
	Before the GFC (1995Q1-2007Q2)		After the GFC (2007Q3-2012Q4)	
	(I)	(II)	(III)	(IV)
Log of uncertainty	0.237	0.268	0.447**	0.465*
	(0.199)	(0.180)	(0.182)	(0.237)
Real GDP growth	-0.093***	-0.057	-0.071***	0.007
	(0.026)	(0.047)	(0.024)	(0.025)
Stock market growth	0.005**	0.004	-0.007***	-0.004*
	(0.002)	(0.005)	(0.002)	(0.002)
CPI inflation	0.01	-0.229**	-0.122***	-0.071
	(0.065)	(0.092)	(0.045)	(0.071)
Policy rate	-0.055**	-0.028	-0.039	-0.043
	(0.022)	(0.023)	(0.029)	(0.040)
Nominal exchange rate growth	-0.025***	-0.032*	-0.001	-0.002
	(0.009)	(0.017)	(0.003)	(0.004)
Private credit growth		-0.031		0.022
		(0.024)		(0.022)
External debt to GDP		0.004*		0.004***
		(0.002)		(0.001)
Obs	13,594	5,503	10,826	8,598
R-squared	0.53	0.50	0.48	0.49

Note: The dependent variables are the ratio of exchange rate-adjusted cross-border claims to the sum of exchange rate-adjusted cross-border claims and local claims in foreign currencies. All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Instrumental variable approach

- Endogeneity problem: unobserved factors might drive uncertainty and macroeconomic conditions simultaneously
- Address this concern using an IV approach in the same spirit of Baker and Bloom (2013)

Instrumental variable approach

- Endogeneity problem: unobserved factors might drive uncertainty and macroeconomic conditions simultaneously
- Address this concern using an IV approach in the same spirit of Baker and Bloom (2013)
- Use the disaster shock data by Center for Research on the Epidemiology of Disasters (CRED) as an instrument: capture the exogenous part in stock market volatility
- Instruments are scaled by media mentions in 15-day intervals
- 2SLS approach

Instrumental variable approach

Table 14. Rebalancing between local and cross-border claims: IV approach

	Share of cross-border claims		
Explanatory variables	(I)	(II)	(III)
Log of uncertainty	1.513*	1.427*	1.735*
	(0.884)	(0.827)	(0.980)
Real GDP growth	-0.079***	-0.015	0.012
	(0.019)	(0.036)	(0.034)
Stock market growth	0.004	0.001	0.003
	(0.004)	(0.003)	(0.003)
CPI inflation	-0.061	-0.044	-0.027
	(0.037)	(0.060)	(0.069)
Policy rate	-0.071***	-0.080**	-0.081*
	(0.024)	(0.032)	(0.047)
Nominal exchange rate growth	-0.006**	-0.007*	-0.007*
	(0.003)	(0.004)	(0.004)
Private credit growth		-0.013	0.007
		(0.021)	(0.018)
External debt to GDP			0.003
			(0.002)
Cragg-Donald Wald F-statistic	207.18	321.86	256.47
Stock-Yogo weak identification test 5% critical values	16.38	16.38	16.38
Obs	24,420	14,690	14,101
R-squared	0.48	0.48	0.50

Note: The dependent variables are the ratio of exchange rate-adjusted cross-border claims to the sum of exchange rate-adjusted cross-border claims and local claims in foreign currencies. All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Safe vs. risky borrowers

- If the portfolio reallocation mechanism exists, we expect this mechanism to be weaker when lending to riskier borrowers ("flight to safety")
- Consider the inherent riskiness independent of economic conditions

Safe vs. risky borrowers

- If the portfolio reallocation mechanism exists, we expect this mechanism to be weaker when lending to riskier borrowers ("flight to safety")
- Consider the inherent riskiness independent of economic conditions
- Interact the uncertainty variable with the income-level of the counterparties

$$s_{i,j,t} = \alpha_{j,t} + \beta X_{i,t-1} + \gamma UNC_{i,t-1} + \delta EM_j UNC_{i,t-1} + \epsilon_{i,j,t}, \quad (5)$$

Safe vs. risky borrowers

Table 15. Rebalancing between local and cross-border claims: Safe vs. risky borrowers

	Share of cross-border claims		
Explanatory variables	(I)	(II)	(III)
Log of uncertainty	0.497*	0.852***	0.734**
	(0.262)	(0.322)	(0.299)
Log of uncertainty X counterparty EM dummy	-0.427*	-0.909***	-0.901***
	(0.256)	(0.345)	(0.336)
Real GDP growth	-0.089***	-0.060*	-0.012
	(0.020)	(0.031)	(0.025)
Stock market growth	-0.002	-0.002	-0.001
	(0.001)	(0.002)	(0.002)
CPI inflation	-0.054	-0.121**	-0.090
	(0.037)	(0.058)	(0.059)
Policy rate	-0.048**	-0.054**	-0.044*
	(0.020)	(0.025)	(0.026)
Nominal exchange rate growth	-0.007**	-0.010**	-0.008
	(0.003)	(0.005)	(0.005)
Private credit growth		-0.025	0.004
		(0.019)	(0.018)
External debt to GDP			0.004***
			(0.001)
Obs	24,420	14,690	14,101
R-squared	0.50	0.49	0.49

Note: The dependent variables are the ratio of exchange rate-adjusted cross-border claims to the sum of exchange rate-adjusted cross-border claims and local claims in foreign currencies. All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level

Alternative measure of domestic claims

- Use domestic bank claims by the IMF IFS
- Consistent results, but concerns about the valuation effect are present

Use alternative data

Table 16. Rebalancing between domestic and cross-border lending: Using an alternative share of cross-border claims

	Stock market volatility			Economic policy uncertainty		
	OLS	IV	OLS interaction	OLS	IV	OLS interaction
Explanatory variables	(I)	(II)	(III)	(IV)	(V)	(VI)
Log of uncertainty	3.012***	9.125***	4.979***	2.201***	2.341**	3.082***
	(0.670)	(1.833)	(1.108)	(0.604)	(1.036)	(0.909)
Log of uncertainty			-4.830***			-2.149***
X counterparty EM dummy			(1.247)			(0.808)
Real GDP growth	-0.207*	-0.248**	-0.225*	-0.675***	-0.449***	-0.675***
	(0.121)	(0.119)	(0.120)	(0.160)	(0.116)	(0.159)
Stock market growth	0.019***	0.010**	0.018***	0.016***	0.003)	0.016***
	(0.006)	(0.005)	(0.006)	(0.006)	(0.004)	(0.006)
CPI inflation	-2.975***	-2.845***	-2.953***	-3.082***	-3.067***	-3.058***
	(0.573)	(0.555)	(0.567)	(0.730)	(0.765)	(0.723)
Policy rate	-0.482***	-0.688***	-0.516***	-0.256***	-0.309***	-0.266***
	(0.112)	(0.139)	(0.120)	(0.082)	(0.096)	(0.085)
Nominal exchange rate growth	0.002*	0.003**	0.002**	0.003**	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Private credit growth	-0.085	-0.065	-0.09	-0.185***	-0.136***	-0.185***
	(0.059)	(0.058)	(0.059)	(0.048)	(0.037)	(0.048)
External debt to GDP	-0.018***	-0.023***	-0.019***	-0.016***	-0.013***	-0.016***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
Obs	17,029	17,029	17,029	14,213	14,213	14,213
R-squared	0.20	0.22	0.20	0.23	0.19	0.23

Note: The dependent variables are the ratio of exchange rate-adjusted cross-border claims of global banks to the claims of the domestic banking system. All independent variables are lagged by one period. Heteroskedasticity-robust standard errors are clustered at the reporter-counterparty levels. *** denotes 1% significant level, ** denotes 5% significance level, and * denotes 10% significance level.

Conclusion

- Contribute to the growing literature on uncertainty and international capital flows
- Higher uncertainty in a local economy reduces cross-border banking flows from/into this economy
- Global banks switch the composition of their lending toward foreign borrowers when uncertainty regarding the local economy increases
- Rebalancing behaviors are consistent with the "flight to safety" mechanism