The Global Financial Cycle Meets Global Imbalances

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Motivation

- Large, internationally active banks, at the center of global financial system (Gabaix and Maggiori 2015, Bruno and Shin 2015)

- **Global Financial Cycle** (Rey, 2013):
  Global co-movement in asset prices, gross capital flows, banks' leverage

- What are the implications for net capital flows, i.e. the current account?

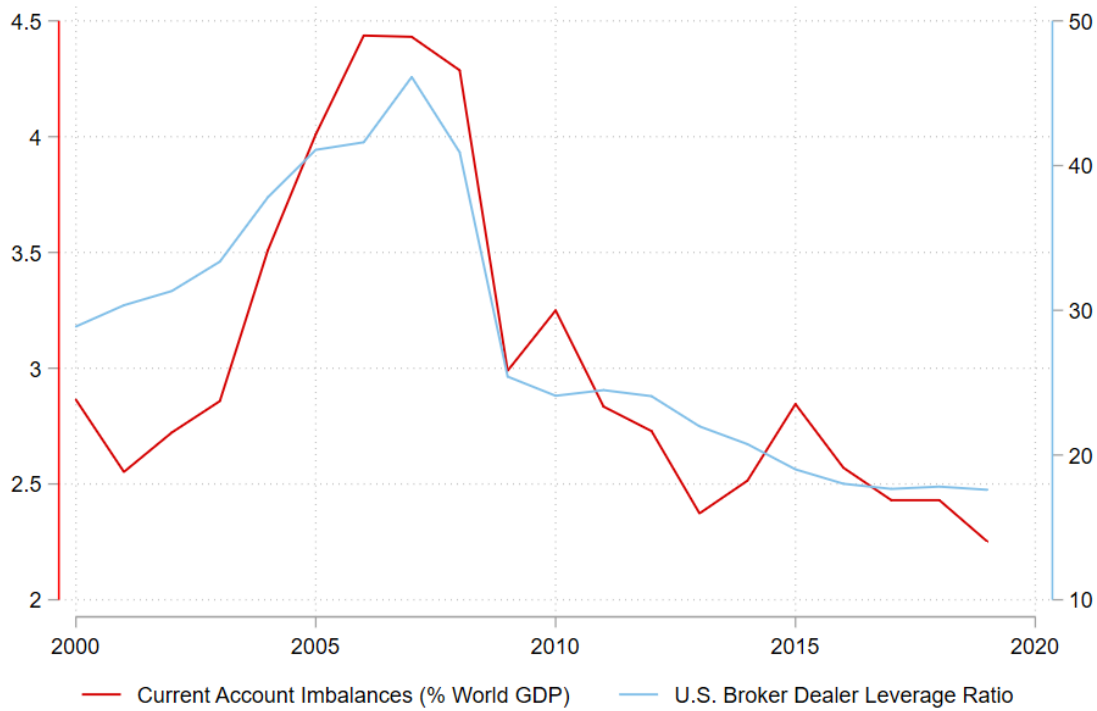
  a) **Country-level:** reflect real effects (consumption, investment)
  Current account as natural link between financial and real outcomes:

$$CA = \underbrace{O - I}_{Net\ Flows} = S - Inv$$

  b) **Global-level:** imbalances may imply systemic risks to the world economy

A First Look at Leverage and Global Imbalances

Figure: Leverage and Global Imbalances



Note. U.S. Broker-Dealer leverage (right-axis) is computed as assets over equity. Global imbalances (left-axis) are computed as the quarterly sum of the absolute value of current account balances across countries, normalized by world nominal GDP. Source: Flows of Funds, IMF BOP, author's calculations.

This Paper - Overview

Research Questions:

- Do fluctuations in the leverage of global banks affect the current account?
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- Empirical: Panel regressions using a Granular IV for global banks' leverage.

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- Theory: Tractable multi-country model with local and global banks.
- Empirical: Panel regressions using a Granular IV for global banks' leverage.

Main Contributions:

- 1) Leverage has a differentiated impact on current account balances.
- 2) The impact depends on the net external position against global banks.
- 3) Impact through investment, not savings.

Paper provides a bridge between Global Financial Cycle and Global Imbalances.

Related Literature

- **Global Financial Cycle**
  Rey (2013), Bruno and Shin (2015), Miranda-Agrippino and Rey (2015), Cerutti et al. (2019), Jeanne and Sandri (2020), Caballero and Simsek (2020)

- **Current Account Determinants and Global Imbalances**
  Razin (1993), Kraay and Ventura (2000), Aguiar and Gopinath (2007), Mendoza et al. (2009), Milesi-Ferretti and Tille (2014), Jiang et al. (2022)

- **The Role of Global Banks**
  Cetorelli and Goldberg (2012), Boissay et al. (2016), Gertler et al. (2016), Sheng (2021), Cao et al. (2021), Morelli et al. (2022)

- **Macroeconomic Effects of Capital Flows**
  Blanchard et al. (2016), Gopinath et al. (2017), Cesa-Bianchi et al. (2018), Converse et al. (2020), Davis and van Wincoop (2021)

Outline

Stylized Facts

Stylized Facts

Sources: Capital IQ - Bloomberg - BIS LBS - IMF BOP.

- **Stylized Fact #1 (Leverage):** Large global banks have a higher and more volatile leverage than other banks. Leverage List

- **Stylized Fact #2 (Counter-party):** Global banks interact mainly with other banks for their cross-border operations, through loans and deposits. Counter-party

- **Stylized Fact #3 (External positions):** There is a large dispersion of net external positions vis-a-vis global banks. The distinction between creditor and debtor countries differs from the traditional distinction between AEs and EMEs. Positions

- **Stylized Fact #4 (Gross Flows):** Gross Banking Inflows and Outflows are positively correlated. Correlations

Multi-Country Model of Global Banking

Model - Overview

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- In each country, unit continuum of Local Banks (indexed by i, j):
  - Ex-ante identical. Raise deposits from domestic Households, have access to a risky bank-specific project with return:

$$R^{i,j} = R^i + \epsilon^{i,j}$$

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- Across countries, unit continuum of Global Banks (share s^i in country i):
  - Global financial inter-mediation: Reallocate funds after $R^{i,j}$ revealed, subject to an exogenous **leverage constraint** λ.

Timeline

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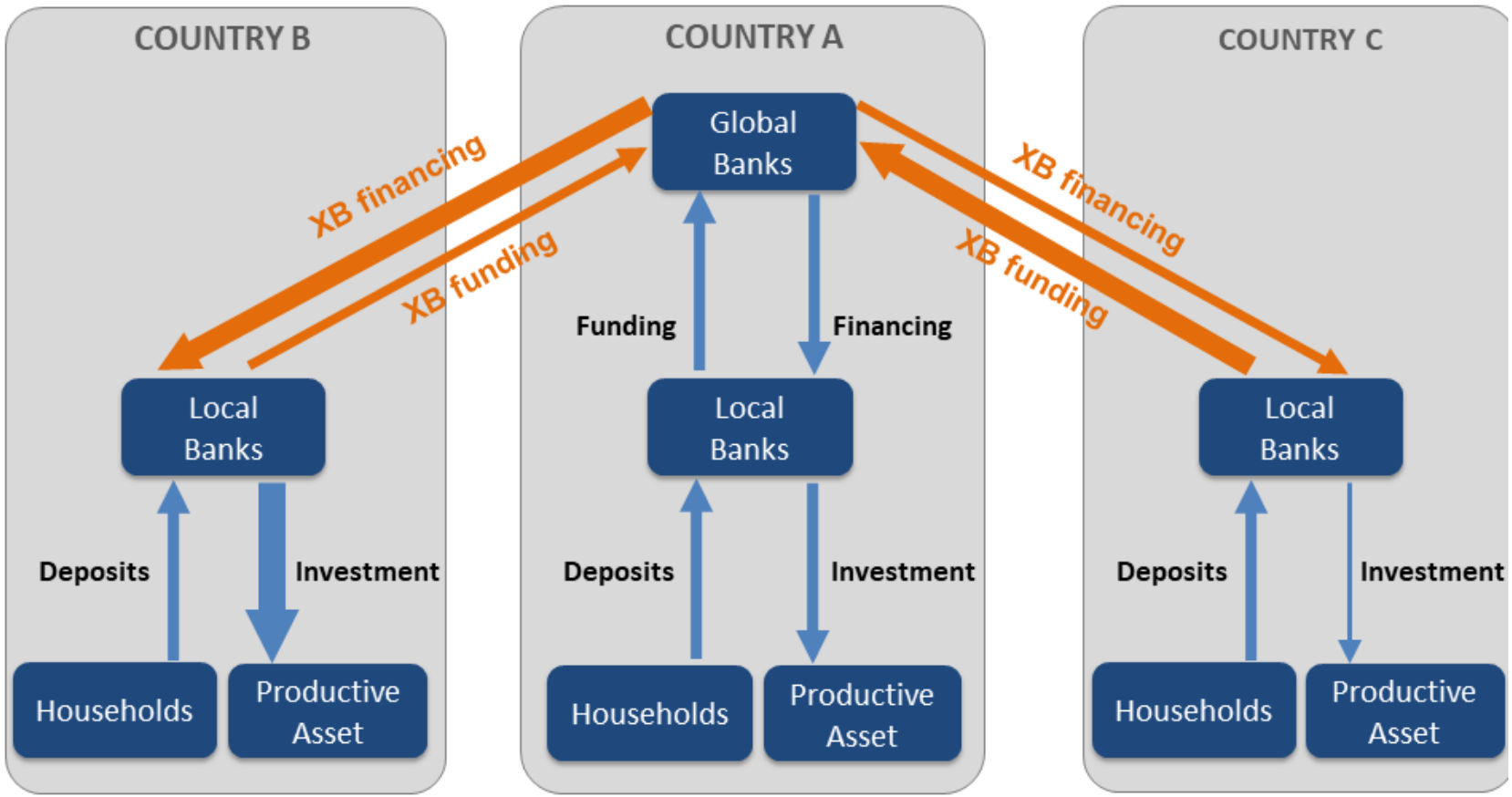
2. Period 2:
   The projects pay off and output is consumed by banks and households.

Model - Overview



Note. This chart provides a schematic representation of the model for the case where $N = 3$, $s^A = 1$, and $R^C < R^A < R^B$.

Households

Households in country i maximize:

$$\max_{d^i} U^i = u(c_1^i) + \beta\, \mathbb{E}[c_2^i]$$

Their budget constraints in period 1 and 2 are given by:

$$c_1^i + d^i = W$$
$$c_2^j = R_H^i d^i$$

Projects' Returns

The project of local bank j located in country i produces output according to:

$$y^{i,j} = \left(\underbrace{R^i + \epsilon^{i,j}}_{\equiv R^{i,j}} \right) k^{i,j}$$

where R^i and ϵ^j are independent random variables.
$R^i \in [\underline{R}; \overline{R}]$, $\epsilon^{i,j} \in [-\sigma; \sigma]$

Notation:
$G(x)$ is the global c.d.f. of projects' returns at the end of period 1
$F_i(x)$ is the c.d.f. of projects' returns at the end of period 1 in country i.

Local Banks

Retail operations. At the beginning of period 1, before uncertainty is resolved, local banks compete to raise deposits from their home households:

$$\max_{d^{i,j}} \ \mathbb{E}[\pi^{i,j}]$$

Interbank operations. At the end of period 1, after uncertainty is resolved, local banks set their interbank borrowing $d_M^{i,j}$ and lending $l_M^{i,j}$:

$$\max_{d_M^{i,j}\geq 0, l_M^{i,j}\geq 0} \pi^{i,j} = \left(\underbrace{R^i + \epsilon^{i,j}}_{\equiv R^{i,j}} \right) k^{i,j} - R_H^i d^{i,j} + R_M^l l_M^{i,j} - R_M^d d_M^{i,j}$$

subject to a balance sheet identity:

$$k^{i,j} + l_M^{i,j} = E_L + d^{i,j} + d_M^{i,j}$$

and a technological constraint:

$$k^{i,j} \leq \bar{k}$$

Global Banks

Global banks set their lending and borrowing to maximize their period 2 profits:

$$\max_{l_M^g, d_M^g} \pi^g = R_M^d l_M^g - R_M^l d_M^g$$

subject to a balance sheet identity:

$$l_M^g = E_G + d_M^g$$

and a **leverage constraint**:

$$d_M^g \leq \lambda$$

There is a spread between lending and borrowing rates if leverage is binding.

Evidence

Competitive Equilibrium

The competitive equilibrium is such that:

- (i) Global banks set l_M^g and d_M^g so as to maximize their profits subject to their balance sheet and leverage constraints, taking the interbank rates as given;
- (ii) Local banks raise $d^{i,j}$ so as to maximize their expected profits, and set $l_M^{i,j}$ and $d_M^{i,j}$ contingent on their productivity parameter, taking the interbank rates and the bank deposit rate as given;
- (iii) Households set d^i so as to maximize their utility, taking the bank deposit rate as given;
- (iv) R_M^l, R_M^d, and R_H^i clear the global wholesale market and the local retail markets for household deposits in all countries.

Equilibrium: Wholesale

Focus on symmetric equilibria: $d^{i,j} = d^i = d \; \forall i, j$

Equilibrium in the wholesale market.
The supply of funds by local bank j in country i is given by:

$$I_M^{i,j} = \begin{cases} E_L + d & \text{if } R^{i,j} \leq R_M^l \\ 0 & \text{otherwise} \end{cases}$$

The demand for funds by local bank j in country i is given by:

$$d_M^{i,j} = \begin{cases} \bar{k} - E_L - d & \text{if } R^{i,j} \geq R_M^d \\ 0 & \text{otherwise} \end{cases}$$

If $R_M^l \leq R^{i,j} \leq R_M^d$ then the local bank is inactive on wholesale market

Balance Sheets

Local Banks

High-Return

Assets	Liabilities
$\bar{k}$	E_L
	d
	$d_M^{i,j}$

Average-Return

Assets	Liabilities
$k^{i,j}$	E_L
	d

Low-Return

Assets	Liabilities
	E_L
$l_M^{i,j}$	d

Global Banks

Assets	Liabilities
l_M^g	E_G
	d_M^g

Equilibrium: Wholesale

Equilibrium in the wholesale market.

The equilibrium condition is:

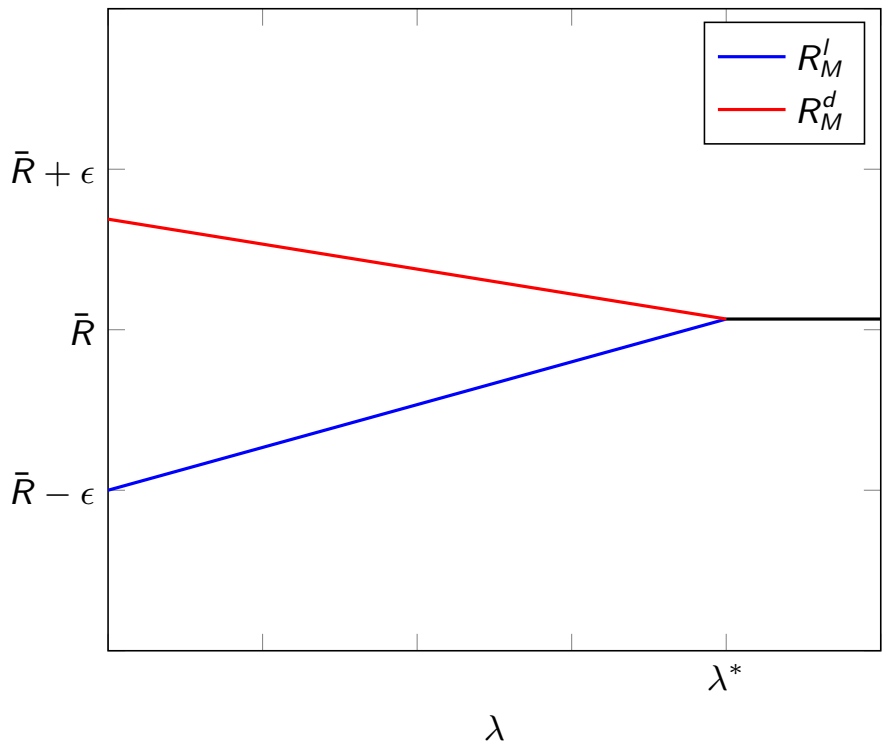
$$\underbrace{\underbrace{\int_g E_G}_{\text{Global banks' internal equity}} + \underbrace{\sum_{i=1}^{N} \int_j \left(l_M^{i,j}\right) \mathbb{I}(R^{i,j} \leq R_M^l)}_{\text{Local banks' lending}}}_{\text{Global banks' lending}} = \underbrace{\sum_{i=1}^{N} \int_j \left(d_M^{i,j}\right) \mathbb{I}(R^{i,j} \geq R_M^d)}_{\text{Local banks' borrowing}} \quad (1)$$

In a symmetric equilibrium, the equilibrium condition simplifies to:

$$E_G + N\left(E_L + d\right) G(R_M^l) = N\left(\bar{k} - E_L - d\right)\left(1 - G(R_M^d)\right) \quad (2)$$

Equilibrium: Wholesale

Figure: Inter-bank Borrowing and Lending Rates



Note. This figure shows the inter-bank borrowing (red line) and lending (blue line) rates as a function of global banks' leverage, in the special case where $R^i = \bar{R}\ \forall i$. λ^* denotes the leverage level such that the constraint of global banks does not bind. Lemma

Equilibrium: Retail

Equilibrium in the retail market for deposits.

The supply of deposits d^i is given by households' first-order condition:

$$d^i = W - \frac{1}{\beta R_H^i}$$

The marginal expected value of deposit is:

$$\mathbf{R^e} \equiv R_M^l G(R_M^l) + \mathbb{E}\left[R^{i,j} | R_M^l \leq R^{i,j} \leq R_M^d\right]\left[G(R_M^d) - G(R_M^l)\right] + R_M^d\left[1 - G(R_M^d)\right]$$

Under perfect competition, Local banks' demand for deposits is given by:

$$\mathbf{R^e} = R_H^i$$

Unique equilibrium domestic bank deposits d^* that solves the fixed-point problem:

$$d^* = W - \frac{1}{\beta \mathbf{R^e}(d^*)} \tag{3}$$

Proof Figure

Implications for Gross and Net Capital Flows

Special case: Gross Flows Respond to Leverage, not Net

Special case. $R^i = R \; \forall i$. This implies $F_i(.) = G(.)$.

The capital outflows from country i are given by:

$$O^i = \underbrace{\left(1 - s^i\right) \frac{\lambda}{N}}_{\text{from Local Banks}} + \underbrace{s^i \left(E_G + \lambda\right) \left(\frac{N-1}{N}\right)}_{\text{from Global Banks}}$$

The capital inflows to country i are given by:

$$I^i = \underbrace{\left(1 - s^i\right) \frac{E_G + \lambda}{N}}_{\text{to Local Banks}} + \underbrace{s^i \lambda \left(\frac{N-1}{N}\right)}_{\text{to Global Banks}}$$

The net capital outflows from country i, are given by:

$$N^i \equiv O^i - I^i = E_G \left[s^i - \frac{1}{N}\right]$$

General case: Gross Flows Increase in Leverage

Global economy: $O = \int_i O^i$ and $I = \int_i I^i$ are increasing in λ (**GFC**).

The gross outflows from country i are given by:

$$O^i = \underbrace{\left(1 - s^i\right) \frac{\lambda}{N} \frac{F_i(R_M^l)}{G(R_M^l)}}_{\text{from Local Banks}} + \underbrace{s^i \left(E_G + \lambda\right) \left[\frac{N\left(1 - G(R_M^d)\right) - \left(1 - F_i(R_M^d)\right)}{N\left(1 - G(R_M^d)\right)}\right]}_{\text{from Global Banks}}$$

The gross inflows to country i are given by:

$$I^i = \underbrace{\left(1 - s^i\right) \frac{E_G + \lambda}{N} \frac{1 - F_i(R_M^d)}{1 - G(R_M^d)}}_{\text{to Local Banks}} + \underbrace{s^i \lambda \left[\frac{NG(R_M^l) - F_i(R_M^l)}{NG(R_M^l)}\right]}_{\text{to Global Banks}}$$

General case: Net Flows Respond to Leverage

Proposition 1.
The net capital outflows from country i, i.e. the current account, is given by:

$$N^i \equiv O^i - I^i = \frac{\lambda\, \xi^i}{N} + \frac{E_G}{N}\left[s^i N - \frac{1 - F_i(R_M^d)}{1 - G(R_M^d)}\right] \tag{4}$$

where $\xi^i = \left[\frac{F_i(R_M^l)}{G(R_M^l)} - \frac{1-F_i(R_M^d)}{1-G(R_M^d)}\right]$ measures country net external asset on global banks.

Country-specific: N^i is decreasing in λ iff $\xi^i < 0$.

Global economy: $\int_i |N^i|$ is increasing in λ (**Global Imbalances**).

Proposition 2.
The differentiated response of the current account is driven by investment.

Evidence

Empirical Evidence

Regressions Specification

Baseline panel regressions:

$$Y_{i,t} = c_i + \beta_0^i t + \beta_1 L_t + \beta_2 L_t \; P_{i,t-1} + \beta_3 P_{i,t-1} + \alpha_1 \mathbb{X}_t + \beta_4 Y_{i,t-1} + \epsilon_{i,t} \qquad (5)$$

- $Y_{i,t}$: Current account, Net outflows, Investment, Savings (%GDP)
- L_t: Global banks' leverage
- $P_{i,t-1}$: Net external assets of residents of country i on global banks
- $\mathbb{X}_t$: World and Country real GDP growth, VIX

All specifications are estimated via OLS, include country fixed effects and country-specific linear time trend, and double-clustured standard errors by country and time.

Predictions: β_2 (+) for CA and net outflows, (-) for investment, (0) for savings.

Variables and Sources

Variables and Sources

Panel of 41 AEs and EMEs countries, quarterly data from 2000Q1-2019Q4.

- Global variables:
  - Global banks' leverage: Median leverage of 23 largest global banks. Leverage is defined as Assets/Equity (Capital IQ / Bloomberg)
  - VIX, U.S. FFR (FRED)
  - World and Country real GDP growth rates (IMF IFS)
- Country-specific variables:
  - Inflows, Outflows, Current Account (IMF BOP)
  - GDP, Investment (IMF IFS)
  - Positions vis a vis Global Banks, all sectors and banking sector (BIS)

Summary Statistics

Baseline Results

	Dependent Variable (%GDP)			
Leverage: Median Period: Full Sample	Current Account (1)	Net Outflows (2)	Investment (3)	Savings (4)
Global Banks Leverage	0.757***	1.463***	-0.820***	0.086
# Net Assets on Global Banks	[0.248]	[0.390]	[0.293]	[0.357]
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Country-specific Time Trend	Yes	Yes	Yes	Yes
Observations	2,756	2,753	2,581	2,561
R-squared	0.776	0.526	0.650	0.786
R-squared (within)	0.233	0.082	0.128	0.056

Robust standard errors in brackets
*** p< 0.01, ** p< 0.05, * p< 0.1

Full table: Full Table

Robustness checks: Leverage | First-Diff | Pre-Post 2008 | Excl. Lag | Positions | Excl. Big 5

Granular Instrumental Variable

Idea: Exploit heterogeneity in size, and remove common shocks. Factor analysis:

$$\Delta L_{jt} = \alpha_j + \Lambda F_t + \epsilon_{jt}$$

The GIV is constructed as the difference between the share-weighted and the equally-weighted idiosyncratic shocks to banks' leverage:

$$z_t = \sum_j s_j \epsilon_{jt} - \underbrace{\frac{1}{N} \epsilon_{jt}}_{=0}$$

The leverage factor is recovered by taking the cumulative sum of the GIV:

$$Z_T = \sum_{t=0}^{T} z_t$$

GIV highly correlated with Leverage, uncorrelated with VIX and RGDP growth

Correlations

Additional Results - GIV

	Dependent Variable (%GDP)			
Leverage: GIV Period: Full Sample	Current Account (1)	Net Outflows (2)	Investment (3)	Savings (4)
Global Banks Leverage	1.014**	1.939***	-1.185***	0.103
# Net Assets on Global Banks	[0.388]	[0.546]	[0.413]	[0.624]
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Country-specific Time Trend	Yes	Yes	Yes	Yes
Observations	2,396	2,394	2,252	2,241
R-squared	0.778	0.527	0.659	0.791
R-squared (within)	0.198	0.063	0.126	0.050

Robust standard errors in brackets
*** p< 0.01, ** p< 0.05, * p< 0.1

Robustness checks: Excl. Lag | Positions | Controls | Excl. Big 5

Global Leverage Meets Imbalances: Country-specific

Medium-run:
Higher net debtors experience larger **increase** in net liabilities during upside GFC.
Higher net debtors experience larger **decrease** in net liabilities during downside GFC.

To test those predictions, I run the following regressions:

$$P_{i,0708} - P_{i,0405} = \alpha_0 + \beta^B P_{i,0405} + \epsilon_i \quad (6)$$

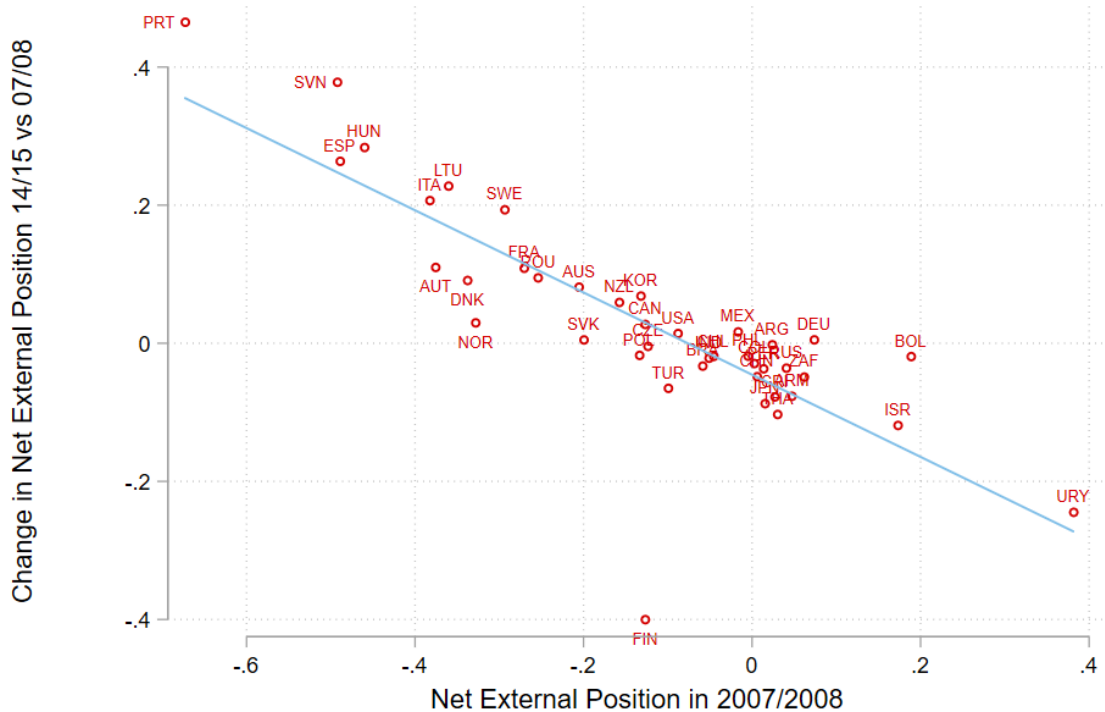
$$P_{i,1415} - P_{i,0708} = \alpha_1 + \beta^A P_{i,0708} + \epsilon_i \quad (7)$$

where $P_{i,t}$ is the net external asset positions of country i on G-banks during years t

Predictions: β_B (+), β_A (-).

Global Leverage Meets Imbalances: Country-specific

Figure: Change in Net External Position vis a vis Global Banks



Note. This chart shows a scatter plot of the change in a country's net external asset position vis a vis global banks between 2014/2015 and 2007/2008 against its net external asset position vis a vis global banks in 2007/2008.

Global Leverage Meets Imbalances: Country-specific

	Dependent Variable: Change in Net Assets on Global Banks			
Net Assets on Global Banks	Total pre-GFC (1)	Total post-GFC (2)	Banks pre-GFC (3)	Banks post-GFC (4)
Total 2004-2005	0.179**			
	[0.076]			
Total 2007-2008		-0.595***		
		[0.066]		
Banks 2004-2005			0.269***	
			[0.088]	
Banks 2007-2008				-0.667***
				[0.075]
Constant	-0.031**	-0.045***	-0.028***	-0.027**
	[0.014]	[0.016]	[0.009]	[0.011]
Observations	41	41	41	41
R-squared	0.124	0.673	0.194	0.669

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note. This table shows the output of a cross-country regression of the change in net total assets on global banks versus the initial net total assets on global banks.

Global Leverage Meets Imbalances: Global Economy

Figure: Actual versus Predicted Global Imbalances

Note. This chart shows the actual and predicted values of global imbalances. Predicted global imbalances are computed as the quarterly sum of the absolute value of predicted current account balances obtained from the baseline panel regression across countries, normalized by world nominal GDP. Source: IMF BOP, author's calculations.

Conclusion

- GFC and Global Imbalances largely studied separately.
- I propose a multi-country model with both local and global banks.
- In model and data, changes in global banks' leverage not only has impact on gross flows, but also on net flows

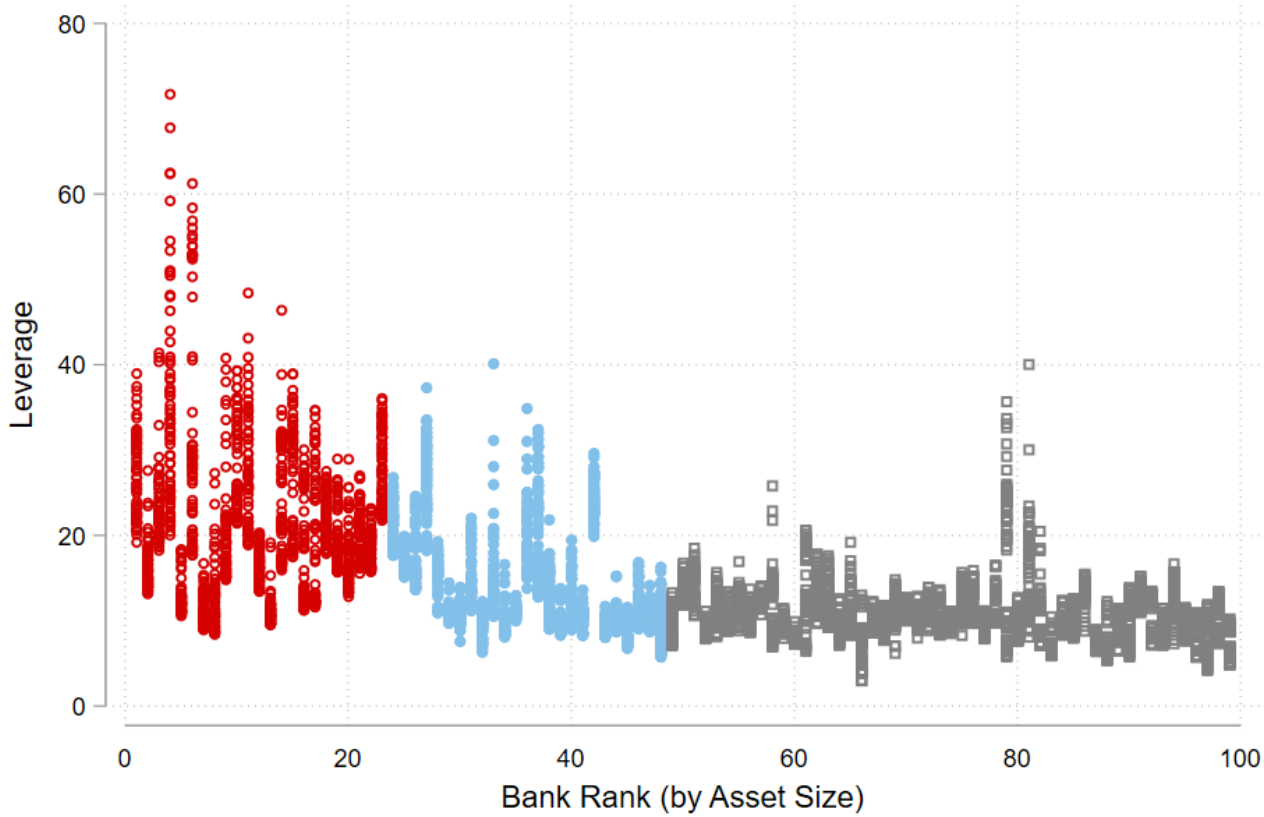
$$\rightarrow \textbf{GFC meets Global Imbalances}.$$

- The net external position of a country on global banks explains the differentiated impact of changes in global banks' leverage across countries.
- Potential extensions: Welfare analysis. Equity / REER. Equity

Appendix

Stylized Fact #1 (Leverage): Leverage = Assets / Equity

Figure: Individual Banks' Leverage by Rank



Note. Banks are ordered by rank from the largest (left-most) to the smallest (right-most) bank by average asset size. Each dot represents the leverage of a bank for a given quarter. Source: Capital IQ and Bloomberg.

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Regressions

Stylized Fact #1 (Leverage)

Table: Leverage Moments and Banks' Average Assets

LEVERAGE	(1) Average	(2) Std Dev	(3) Coef. Var	(4) Average	(5) Std Dev	(6) Coef. Var
Average Assets	6.762***	2.049***	0.037**	6.508***	2.160***	0.042***
	[0.511]	[0.320]	[0.016]	[0.777]	[0.319]	[0.015]
Constant	11.006***	1.954***	0.169***	11.346***	1.806***	0.161***
	[0.209]	[0.131]	[0.007]	[0.550]	[0.226]	[0.011]
Observations	298	298	298	100	100	100
R-squared	0.372	0.122	0.017	0.417	0.318	0.075

Standard errors in brackets
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note. Average assets are expressed in trillion US dollars. Source: Capital IQ and Bloomberg.

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Table: List of Global Banks

Ticker	Bank Name	Country	Weight	Average Leverage	Std Dev Leverage
BNPQY	BNP PARIBAS	FRA	5.8%	26.9	5.0
HSBC	HSBC HLDGS PLC	GBR	5.7%	16.3	2.6
MUFG	MITSUBISHI UFJ FINANCIAL GRP	JPN	5.4%	23.2	4.9
DB	DEUTSCHE BANK AG	DEU	5.2%	34.8	12.3
JPM	JPMORGAN CHASE & CO	USA	5.0%	12.8	2.1
BCS	BARCLAYS PLC	GBR	4.9%	32.1	13.3
CITI	CITIGROUPINC	USA	4.9%	12.7	4.1
BAC	BANK OF AMERICA CORP	USA	4.8%	11.0	1.7
NWG	NATWEST GROUP PLC	GBR	4.6%	20.3	6.3
SMFG	SUMITOMO MITSUI FINANCIAL GR	JPN	3.7%	26.9	6.8
SCGLY	SOCIETE GENERALE GROUP	FRA	3.6%	27.9	5.4
SAN	BANCO SANTANDER SA	ESP	3.4%	16.4	1.8
WFC	WELLS FARGO & CO	USA	2.9%	11.2	1.7
CSW	CREDITSUISSE	CHE	2.7%	27.2	6.7
LYG	LLOYDS BANKING GROUP PLC	GBR	2.7%	24.1	6.7
MS	MORGANSTANLEY	USA	2.3%	19.5	7.9
GS	GOLDMANSACHSGP	USA	2.2%	17.0	5.9
RY	ROYAL BANK OF CANADA	CAN	2.1%	21.7	2.8
TD	TORONTO DOMINION BANK	CAN	1.8%	19.4	3.2
BBVA	BBVA	ESP	1.8%	17.1	3.5

Note. This Table shows the list of the largest 20 global banks, the location of their headquarters, and summary statistics for their leverage ratio. Weight represents their average share in all 298 banks' total assets over the sample period 2000-2019. Source: Capital IQ and Bloomberg. Back

Stylized Fact #2 (Counter-party)

Table: BIS Reporting Banks Cross-border Positions (in value)

Sectors	% Total	Instruments	% Total
Claims - All sectors	100%	Claims - All instruments	100%
Claims - Banks, total	60%	Claims - Loans and deposits	72%
Claims - Non-banks, total	39%	Claims - Debt securities	21%
Claims - Unallocated by sector	1%	Claims - Other instruments	7%
Liabilities - All sectors	100%	Liabilities - All instruments	100%
Liabilities - Banks, total	64%	Liabilities - Loans and deposits	88%
Liabilities - Non-banks, total	29%	Liabilities - Debt securities	8%
Liabilities - Unallocated by sector	7%	Liabilities - Other instruments	4%

Note. The table provides the decomposition of total claims and liabilities of all BIS reporting banks by counter-party sector and by instrument. The numbers correspond to the average over the period from 2000 to 2020. Source: BIS LBS.

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Stylized Fact #3 (External positions)

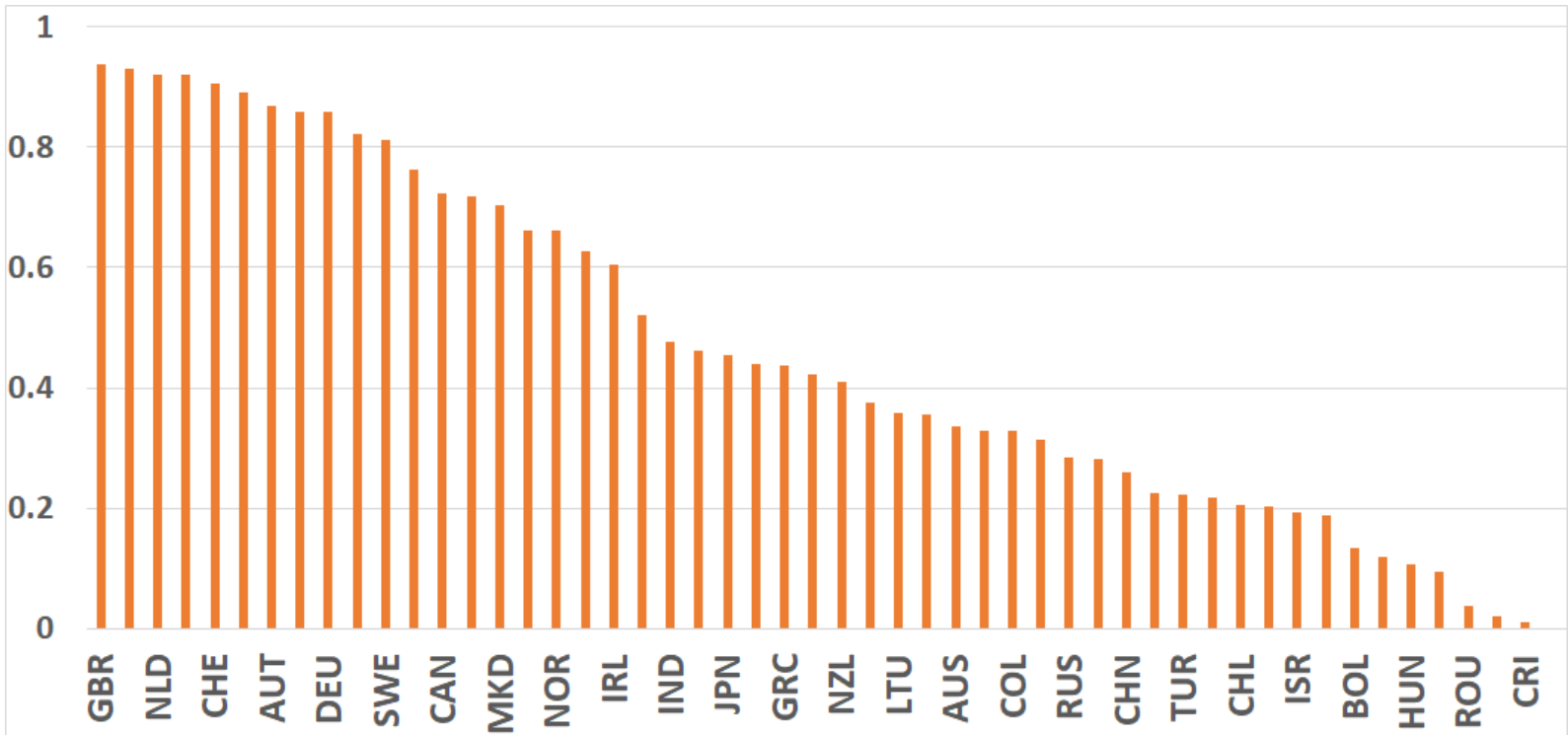
Table: Net Debtors and Creditors vs Global Banks (Selected Countries)

Country Name	Group	Average Net Position (%GDP)	Prob.
Portugal	AE	-43	0%
Spain	AE	-28	0%
Hungary	EMDE	-27	6%
Italy	AE	-26	0%
Croatia, Rep. of	EMDE	-26	26%
Slovenia, Rep. of	EMDE	-24	40%
France	AE	-18	0%
Australia	AE	-15	0%
Romania	EMDE	-14	40%
Turkey	EMDE	-12	28%
Poland, Rep. of	EMDE	-12	34%
Canada	AE	-10	23%
Brazil	EMDE	-7	70%
Chile	EMDE	-7	74%
United States	AE	-7	93%
Japan	AE	-4	78%
India	EMDE	-4	88%
Mexico	EMDE	-1	100%
China, P.R.: Mainland	EMDE	0	100%
Germany	AE	0	85%
South Africa	EMDE	2	100%
Belgium	AE	5	84%
Israel	EMDE	10	100%
Uruguay	EMDE	25	100%

Note. Average Net Position measures the average net position vis a vis global banks over the period 2000Q1-2019Q4 as a share of GDP. Prob measures the probability that the net position vis a vis global banks is above the unconditional average of -8% GDP. Back

Stylized Fact #4 (Correlations)

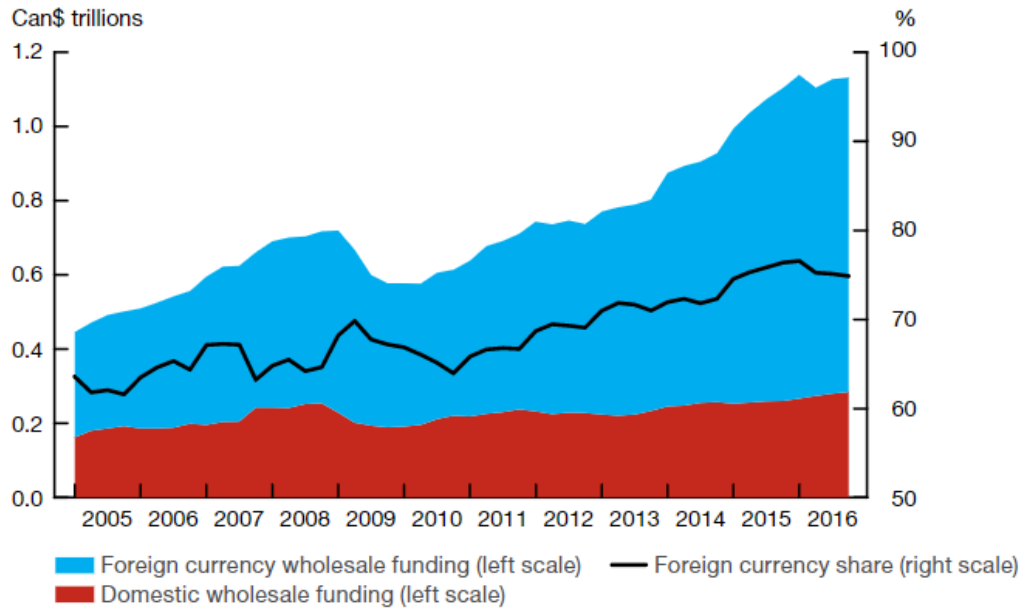
Figure: Correlation between Gross Banking Inflows and Outflows



Note. Source: IMF BOP. Back

Share Foreign Currency Wholesale Funding

Chart 5: Increase in reliance on foreign currency wholesale deposits



Note: Domestic wholesale funding represents Canadian-dollar non-personal fixed-term deposits, whereas foreign currency wholesale funding represents non-personal fixed-term deposits in foreign currencies.

Source: Regulatory filings of Canadian banks — Last observation: 31 October 2016

Note. This chart shows the share of wholesale funding denominated in foreign currency for the 6 largest banks in Canada.

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Change in Assets - Decomposition

Note. This chart shows a scatter plot of change in banks'equity and banks' debt against change in banks' assets for my large panel of banks. The chart shows that balance sheet expansions and contractions tend to be done through changes in debt and not through movements in equity.

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Equilibrium: Wholesale

Segmented inter-bank market $\rightarrow$ spread between borrowing and lending rates. The two rates are equalized when the leverage constraint of global banks does not bind anymore, i.e. when $\lambda \geq \lambda^*$.

Lemma

If $\lambda < \lambda^*$, then the inter-bank lending rate R_M^l is given by:

$$R_M^l = G^{-1}\left(\frac{\lambda}{N\left(E_L + d\right)}\right) \tag{1}$$

and is increasing in λ. Moreover, the inter-bank borrowing rate R_M^d is given by:

$$R_M^d = G^{-1}\left(1 - \frac{\lambda + E_G}{N\left(\bar{k} - E_L - d\right)}\right) \tag{2}$$

and is decreasing in λ.
If $\lambda \geq \lambda^*$, then:

$$R_M^l = R_M^d$$

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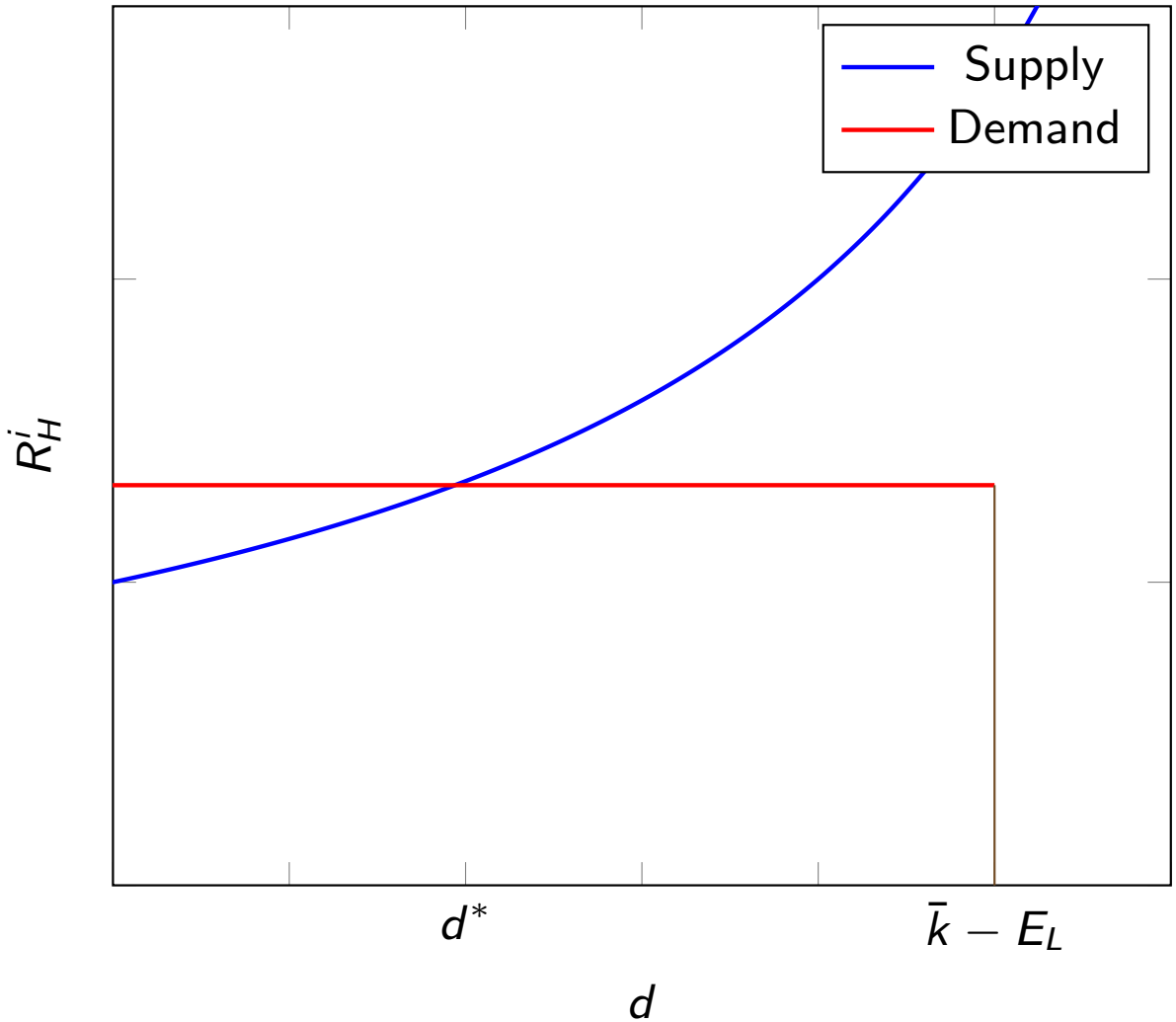
Retail Market



Note This figure shows the equilibrium on the retail market for local deposits.

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Private Capital Does Flow to High Productivity Countries

Average Net Private Capital Flows (%GDP)	(1) LM	(2) IFS	(3) LM	(4) IFS
Average GDP/capita Growth	0.416***	0.299**	0.832***	0.670***
	[0.125]	[0.123]	[0.166]	[0.187]
Constant	1.452***	1.611***	-0.834	-0.651
	[0.370]	[0.371]	[0.514]	[0.578]
Observations	199	189	46	46
R-squared	0.053	0.030	0.362	0.226

Standard errors in brackets
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note. International net private capital flows (inflows minus outflows of private capital) are positively correlated with countries' productivity growth. Source: Alfaro et al. (2014). LM: Lane and Milesi-Ferretti (External Wealth of Nations), IFS: IMF International Financial Statistics.

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Summary Statistics

Variable	Count	Mean	Std. Dev.
Global Banks' Median Leverage	3,680	20.19	2.94
Global Banks' Asset Weighted Leverage	3,680	21.55	4.61
Leverage Factor (GIV)	3,128	1.04	1.62
Leverage U.S. Broker Dealer	3,680	28.12	9.18
Net Assets on Global Banks (%GDP) - Total	3,680	-0.10	0.16
Net Assets on Global Banks (%GDP) - Banks	3,680	-0.04	0.11
Current Account (%GDP)	3,640	-0.85	5.98
Net Outflows (%GDP)	3,638	-0.84	6.43
Investment (%GDP)	3,059	23.10	5.16
Savings (%GDP)	3,039	22.36	6.60
World Real GDP Growth	3,634	0.67	0.50
VIX	3,680	19.49	7.81
Global Financial Factor	3,128	0.14	1.64
International Business Cycle factor	3,128	2.10	2.09
Real GDP Growth	3,128	0.68	1.19

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Baseline Results - Full Table

Table: Impact on the Current Account, Investment, and Savings

	Dependent Variable (%GDP)			
	Current Account	Net Outflows	Investment	Savings
	(1)	(2)	(3)	(4)
Global Banks Leverage	0.757***	1.463***	-0.820***	0.086
# Net Assets on Global Banks	[0.248]	[0.390]	[0.293]	[0.357]
Global Banks Leverage	0.010	0.040	0.026	0.087
	[0.055]	[0.071]	[0.069]	[0.056]
Net Assets on Global Banks	-12.894**	-26.355***	17.143**	2.584
	[5.603]	[9.256]	[6.415]	[8.178]
World Real GDP Growth	0.015	-0.108	-0.183	-0.173
	[0.212]	[0.277]	[0.486]	[0.307]
VIX	0.011	-0.014	-0.018	-0.008
	[0.012]	[0.018]	[0.022]	[0.017]
Real GDP Growth	-0.128*	-0.210*	0.357***	0.299***
	[0.067]	[0.111]	[0.079]	[0.089]
Lagged Dependent Variable	0.410***	0.156***	0.272***	0.145**
	[0.045]	[0.041]	[0.079]	[0.055]
Constant	-0.178	-0.134	16.596***	18.566***
	[1.040]	[1.472]	[2.345]	[1.805]
Country FE	Yes	Yes	Yes	Yes
Country-specific Time Trend	Yes	Yes	Yes	Yes
Observations	2,756	2,753	2,581	2,561
R-squared	0.776	0.526	0.650	0.786
R-squared (within)	0.233	0.082	0.128	0.056

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

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Table: Correlation GIV

Variables	GIV
Global Banks' Leverage	0.829
	(0.000)
VIX	0.196
	(0.109)
World RGDP Growth	-0.133
	(0.281)

Note. This table shows the correlation between the Leverage factor Z_t obtained from the GIV procedure, quarterly value of the asset weighted global banks' leverage, the VIX, and the world real GDP growth for the entire sample period. Significance levels are in parentheses.

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Robustness Checks

Counter-party: All				Dependent Variable (% GDP)			
Leverage	Lag	Sample	Add. Controls	Current Account	Net Outflows	Investment	Savings
Median	Yes	Entire	No	0.757***	1.463***	-0.820***	0.086
				[0.248]	[0.390]	[0.293]	[0.357]
Median	No	Entire	No	1.261***	1.707***	-1.139***	0.086
				[0.432]	[0.480]	[0.398]	[0.416]
Median	Yes	Pre	No	1.581***	2.074***	-1.510***	0.101
				[0.435]	[0.659]	[0.469]	[0.534]
Median	No	Pre	No	1.683***	2.084***	-1.563***	0.073
				[0.419]	[0.664]	[0.438]	[0.518]
Median	Yes	Post	No	3.281***	5.778***	-3.014**	1.470
				[1.104]	[1.338]	[1.137]	[1.016]
Median	No	Post	No	4.126***	5.688***	-2.877***	1.390
				[1.242]	[1.299]	[1.046]	[1.013]
Median	Yes	Entire	Yes	1.051***	1.924***	-1.330***	0.002
				[0.295]	[0.415]	[0.397]	[0.463]
Median	No	Entire	Yes	1.774***	2.241***	-1.794***	0.010
				[0.498]	[0.514]	[0.502]	[0.536]
GIV	Yes	Entire	No	1.014**	1.939***	-1.185***	0.103
				[0.388]	[0.546]	[0.413]	[0.624]
GIV	No	Entire	No	1.608**	2.200***	-1.533***	0.085
				[0.598]	[0.638]	[0.555]	[0.688]
GIV	Yes	Entire	Yes	1.435***	2.445***	-1.690***	0.202
				[0.380]	[0.523]	[0.475]	[0.719]
GIV	No	Entire	Yes	2.253***	2.757***	-2.133***	0.225
				[0.589]	[0.615]	[0.621]	[0.785]

Note. This table shows the β_2 coefficient from regressions using the total net position against global banks.

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Change in Current Account

A positive change in leverage is associated with a higher increase in the current account in countries with higher net assets on global banks.

VARIABLES	(1) Δ Current Account (%GDP)	(2) Δ Current Account (%GDP)	(3) Δ Net Flows (%GDP)	(4) Δ Net Flows (%GDP)
Δ Leverage	-0.049	0.038	0.098	0.119
	[0.089]	[0.088]	[0.091]	[0.086]
Δ Leverage #Net Assets (%GDP)	**0.086***	**0.471*****	**0.499*****	**0.367****
	[0.049]	[0.112]	[0.165]	[0.177]
Observations	3,832	3,410	3,825	3,403
R-squared	0.631	0.717	0.405	0.426
R-squared (within)	0.631	0.717	0.405	0.426
Controls	YES	YES	YES	YES

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note. (1) and (3): Entire sample. (2) and (4): Excluding Financial centers.

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Change in Current Account - Decomposition

Same message as before, but financial centers may play a special role.

VARIABLES	(5) Δ Investment (%GDP)	(6) Δ Investment (%GDP)	(7) Δ Savings (%GDP)	(8) Δ Savings (%GDP)
Δ Leverage	0.037	-0.024	-0.024	0.025
	[0.087]	[0.084]	[0.041]	[0.045]
Δ Leverage #Net Assets (%GDP)	**-0.078*** **	**-0.178***	**-0.001**	**0.271** **
	[0.023]	[0.105]	[0.050]	[0.127]
Observations	3,384	2,934	3,336	2,914
R-squared	0.655	0.770	0.750	0.778
R-squared (within)	0.654	0.769	0.750	0.777
Controls	YES	YES	YES	YES

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note. (5) and (7): Entire sample. (6) and (8): Excluding Financial centers.

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Extra: Real Equity Returns

A positive change in leverage is associated with a higher increase in real asset prices in countries with higher net liabilities against global banks.

VARIABLES	(9) Real Equity Returns	(10) Real Equity Returns
Δ Leverage	-0.465	-0.555*
	[0.285]	[0.312]
Δ Leverage #Net Assets (%GDP)	**-0.248*** **	**-0.910** **
	[0.040]	[0.396]
Observations	2,833	2,383
R-squared	0.487	0.468
R-squared (within)	0.471	0.452
Controls	YES	YES

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Note. (9): Entire sample. (10): Excluding Financial centers.

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