



BANK FOR INTERNATIONAL SETTLEMENTS

# Gross Capital Flows by Banks, Corporates and Sovereigns

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*The views expressed in this presentation are those of the authors and not necessarily those of the Bank for International Settlements, the National Bureau of Economic Research, or the World Bank.*



# Motivation

- International capital flows matter for macroeconomic outcomes
- Vulnerabilities to external financial shocks, and their consequences, depend on which **sector(s)** of the economy is involved
  - Latin American crises: sovereign debt
  - Asian crises: private sector debt
  - GFC: household debt held by banks
- Essentially no empirical work on **gross** capital flows split by **sector**
  - **Gross** flows, but no **sector** breakdown
    - e.g. Forbes and Warnock (2012); Broner et al. (2013)
  - Partial **sector** breakdown, but for **net** flows
    - e.g. Gourinchas and Jeanne (2013); Alfaro et al. (2014)



# What we do

- Construct a new dataset on **gross** capital **inflows** and **outflows**
- **Inflows**
  - Quarterly from 1996q1-2014q4
  - Balanced panel of 85 countries: 25 AE, 34 EM, 26 DE
  - Breakdown by **sector**: General Government, Central Banks, Banks, Corporates/Other
- **Outflows**
  - Quarterly from 2004q1-2014q4
  - Balanced panel of 31 countries: 15 AE, 16 EM
  - Breakdown by **sector**: Public (GG+CB), Banks, Corporates/Other
- Also matching series for external asset and liability **stocks** by **sector**

# Preview of analytical results with new dataset

- **Inflow-outflow** correlation of capital flows driven by **banks**, particularly in AEs
- Procyclicality of capital **inflows** driven by **banks** and **corporates**
  - **Sovereign inflows** move countercyclically in EM
- Procyclicality of capital **outflows** driven by AE **banks** and EM **sovereigns** (via reserves)
- Capital **inflows** and **outflows** decline for **banks** and **corporates** when global risk aversion is high (i.e. high VIX)
- Patterns of aggregate capital flows do not hold when disaggregated across different **sectors**, and are further different across **capital flow types** and **country groups**



# Road map for presentation

- Background on capital flows data
- Data construction
- Broad patterns in the data
- Regression results



# Primer on capital flow data

- Gross is not what you think...
  - Internationally comparable data on true gross flows essentially does not exist
    - Exception: BIS IDS data → gross issuance
  - What is called “**gross**” is actually **net** inflows + **net** outflows
    - “**Gross**” inflows are **net** of repayments: positive value indicates capital flowing into the country
      - **Capital inflows by foreigners**
    - “**Gross**” outflows are **net** of disinvestments: positive value indicates capital leaving the country
      - **Capital outflows by residents**
  - **Net** flows = **net** inflows – **net** outflows ( $\approx$  –current account)



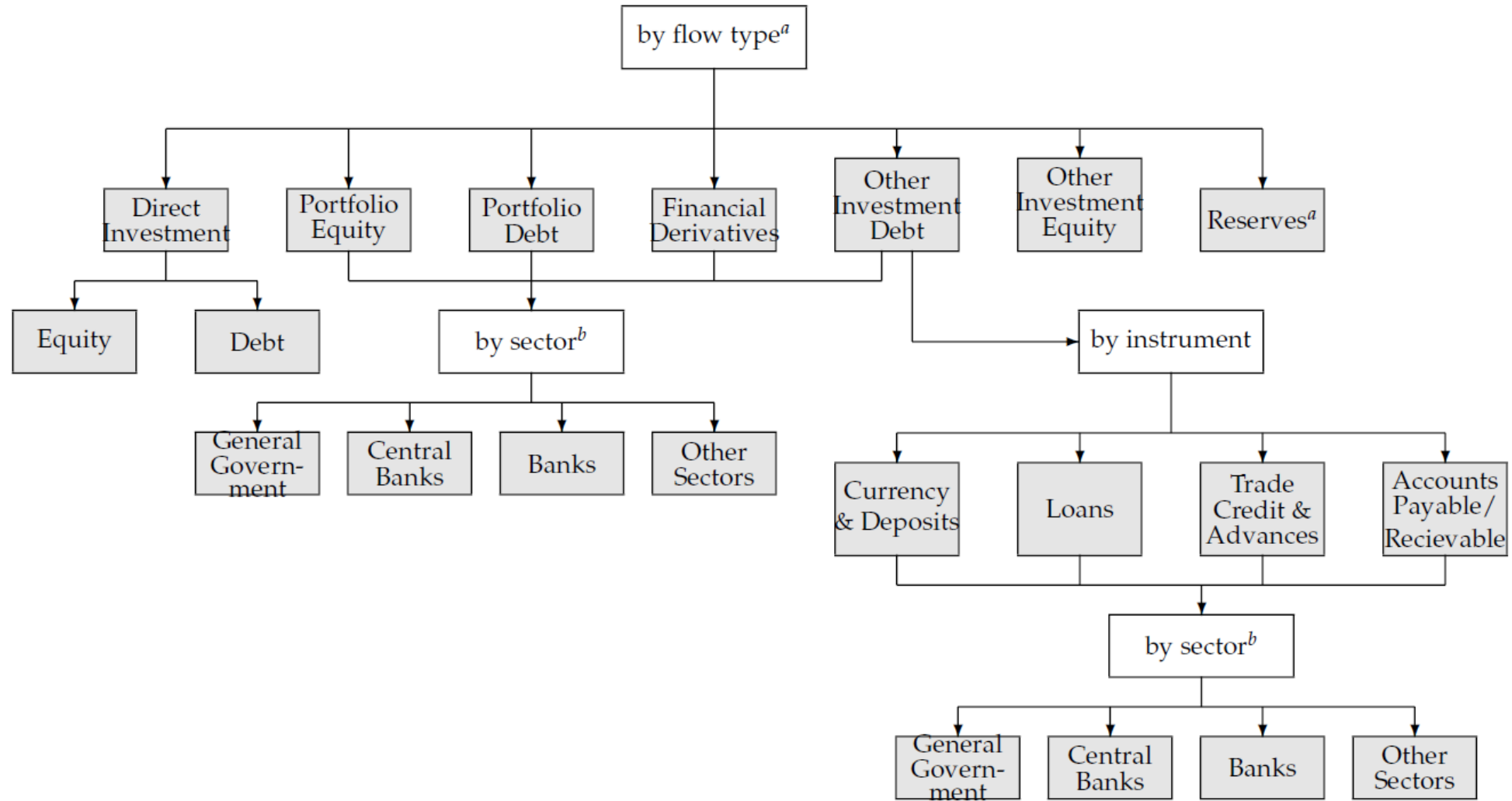
# Primer on capital flow data

- Flows/stocks based on residency principle
- **Sectors** are broadly defined
  - **Public**
    - General Government
    - Central Bank/Monetary Authority
  - Deposit taking institutions (except the central bank) → **Banks**
  - Other sectors → **Corporates**



# Structure of the BOP data

Figure 3: BOP Data Structure



<sup>a</sup> This structure is the same for inflows and outflows. Reserves are only classified as outflows.

<sup>b</sup> The breakdowns of these variables by sector exist in the BOP data but the coverage is sparse for many countries and quarters.



# Data filling exercise

- Start with the Balance of Payments (BOP) dataset
- Internal (accounting) fill
  - When BOP data has **total** for the category AND **3 out of the 4 sectors**, we subtract the 3 reported sectors from total to obtain 4<sup>th</sup>
- External fill
  - **BIS International Debt Securities (IDS) Statistics**
  - **BIS International Banking Statistics (IBS)**
    - Locational Bank Statistics by Residency (LBS/R)
    - Consolidated bank statistics (CBS)
  - IMF International Investment Position (IIP) statistics (IMF)
  - IMF/WB Quarterly External Debt Statistics (QEDS)

IBFS data



# Utilizing the BIS data

- IDS data is collected security by security, and so is already easily broken down by **sector**
  - **Net issuance** measure lines up most closely with “**gross**” inflows
  - Assume that international bond issuance is representative of portfolio debt inflows
    - Use IIP and QEDS data first where this assumption is less accurate: government debt and AE corporate bond debt
- IBS data capture nearly all cross-border banking activity
  - We combine the CBS and LBS data to estimate counterparty **sector** splits for the entire sample
  - Use recent enhancements (since Q2 2012) to counterparty sector breakdown in IBS to check

# Data filling methodology

- BIS data filling for **inflows** summarized in table below:

| Capital Flow Type     |     | Sector  |                     |  |                                      |
|-----------------------|-----|---|---------------------|--|--------------------------------------|
|                       |     | Banks   | Corporates          | Government                                   | Central Bank                         |
| Bonds                 | BOP | PD to DC  | PD to OS            | PD to GG                                     | PD to CB                             |
|                       | BIS | NI by Banks   | NI by Corporates    | NI by Government                             | NI by Central Bank                   |
| Loans                 | BOP | CD to DC  | LN to OS            | LN to GG                                     | CD to CB                             |
|                       | BIS | Loans to Banks  | Loans to Corporates | Loans to Government + IMF Credit to GG (BOP) | Loans to CB + IMF Credit to CB (BOP) |
| Other Investment Debt | BOP | OID to DC   | OID to OS           | OID to GG                                    | OID to CB                            |
|                       | BIS | BIS Filled Loans plus any other non-missing other investment debt instruments from BOP, by sector |                     |  |                                      |

DC = Depository Corporations, except the Central Bank; OS = Other Sectors; GG = General Government; CB = Central Bank; CD = Currency & Deposits; LN = Loans; PD = portfolio debt; OID = other investment debt; NI = Net Issues in International Markets by Residency

- Very little filling for **outflows** from BIS data
  - Only data for bank outflows from BIS reporting countries

# Data filling summary

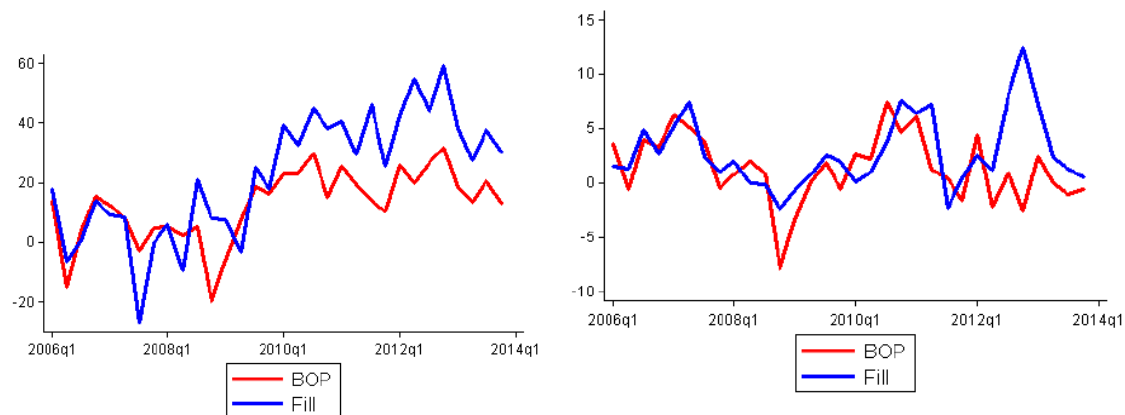
- Percentage of observations derived from each step

|                 |       |       | Annual |           |           | Quarterly |           |           |
|-----------------|-------|-------|--------|-----------|-----------|-----------|-----------|-----------|
| Flow            | Sect. | Group | BOP    | Int. Fill | Ext. Fill | BOP       | Int. Fill | Ext. Fill |
| PD              | GG    | Adv.  | 80.6   | 0.0       | 19.4      | 79.4      | 0.0       | 20.6      |
| PD              | GG    | Em.   | 82.4   | 0.3       | 17.3      | 74.2      | 0.8       | 25.0      |
| PD              | GG    | Dev.  | 40.2   | 0.7       | 59.1      | 25.0      | 0.1       | 74.9      |
| PD              | CB    | Adv.  | 9.5    | 58.3      | 32.2      | 7.5       | 60.5      | 32.0      |
| PD              | CB    | Em.   | 23.5   | 40.6      | 35.9      | 19.5      | 35.6      | 44.9      |
| PD              | CB    | Dev.  | 11.2   | 8.2       | 80.5      | 2.6       | 4.8       | 92.7      |
| PD              | DC    | Adv.  | 67.6   | 3.6       | 28.8      | 67.7      | 3.4       | 28.8      |
| PD              | DC    | Em.   | 61.7   | 4.1       | 34.3      | 55.6      | 3.5       | 40.9      |
| PD              | DC    | Dev.  | 18.6   | 1.6       | 79.8      | 10.3      | 0.7       | 89.0      |
| PD              | OS    | Adv.  | 75.4   | 0.0       | 24.6      | 74.7      | 0.0       | 25.3      |
| PD              | OS    | Em.   | 69.8   | 2.3       | 28.0      | 64.4      | 1.9       | 33.6      |
| PD              | OS    | Dev.  | 29.3   | 0.5       | 70.2      | 13.3      | 0.3       | 86.5      |
| OID             | GG    | Adv.  | 80.0   | 2.1       | 17.9      | 78.4      | 3.2       | 18.4      |
| OID             | GG    | Em.   | 93.7   | 0.8       | 5.6       | 88.1      | 0.9       | 11.0      |
| OID             | GG    | Dev.  | 87.7   | 0.0       | 12.3      | 49.7      | 0.0       | 50.3      |
| OID             | CB    | Adv.  | 68.2   | 13.9      | 17.9      | 65.8      | 15.4      | 18.7      |
| OID             | CB    | Em.   | 87.4   | 6.6       | 6.0       | 79.2      | 9.8       | 11.0      |
| OID             | CB    | Dev.  | 74.6   | 13.3      | 12.1      | 46.0      | 6.7       | 47.3      |
| OID             | DC    | Adv.  | 81.9   | 0.0       | 18.1      | 81.4      | 0.0       | 18.6      |
| OID             | DC    | Em.   | 94.0   | 0.0       | 6.0       | 89.0      | 0.0       | 11.0      |
| OID             | DC    | Dev.  | 77.7   | 6.1       | 16.1      | 48.0      | 1.8       | 50.2      |
| OID             | OS    | Adv.  | 84.0   | 0.4       | 15.6      | 82.8      | 0.1       | 17.2      |
| OID             | OS    | Em.   | 94.4   | 0.0       | 5.6       | 89.0      | 0.0       | 11.0      |
| OID             | OS    | Dev.  | 88.4   | 1.1       | 10.5      | 52.5      | 0.7       | 46.8      |
| Balanced Sample |       |       | 12     | 16        | 89        | 0         | 10        | 85        |

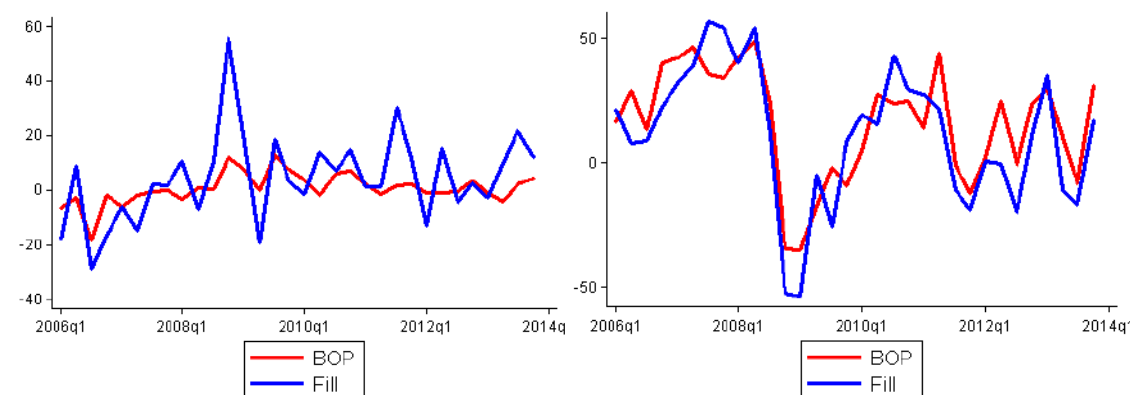


# Comparison of external filling series with BOP

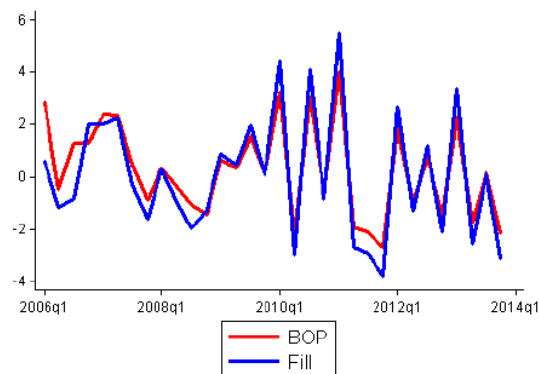
Portfolio Debt (Billions USD)



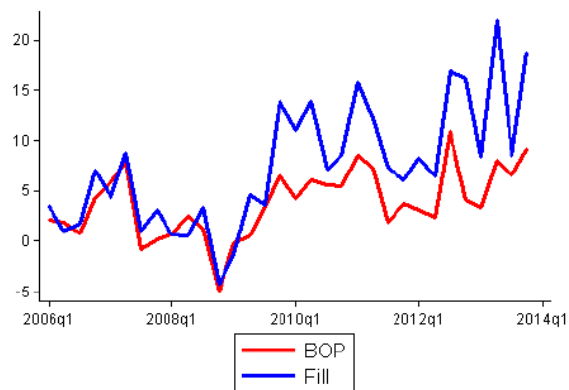
Other Investment Debt (Billions USD)



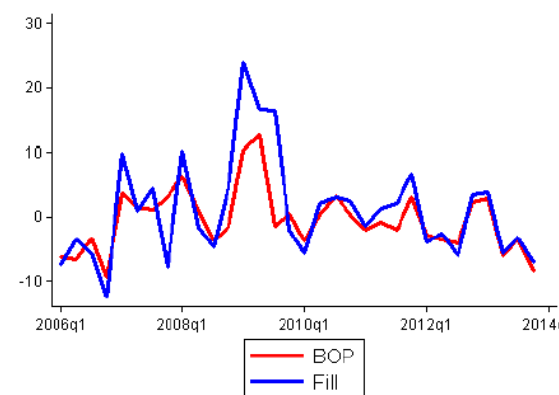
(b) Emerging Government



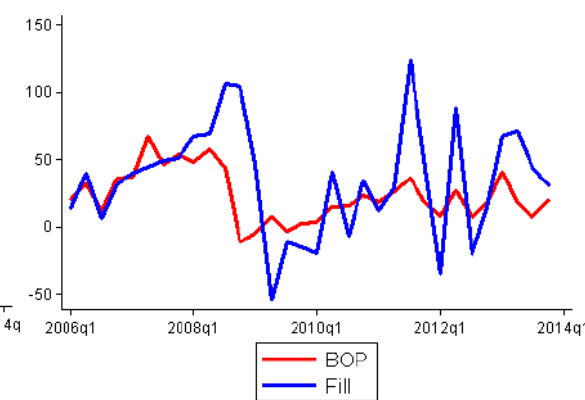
(f) Emerging Banks



(b) Emerging Government



(h) Emerging Banks



(d) Emerging Central Bank

(h) Emerging Corporates

(e) Emerging Central Bank

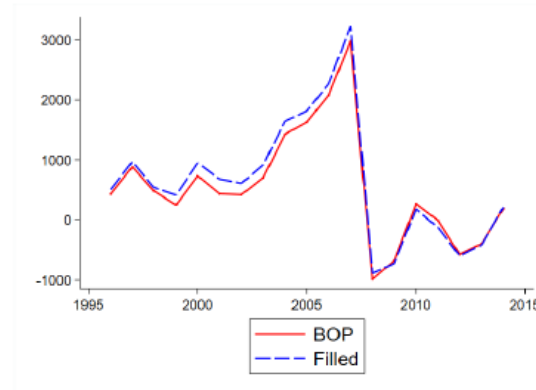
(k) Emerging Corporates



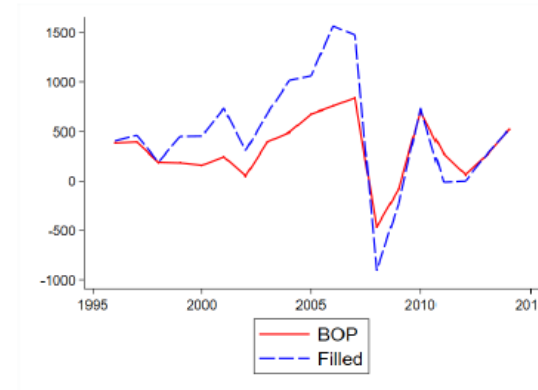
# Comparison of our dataset with BOP

Figure A1: Aggregate External Debt Inflows for Banks and Corporates, Billions 1996 USD

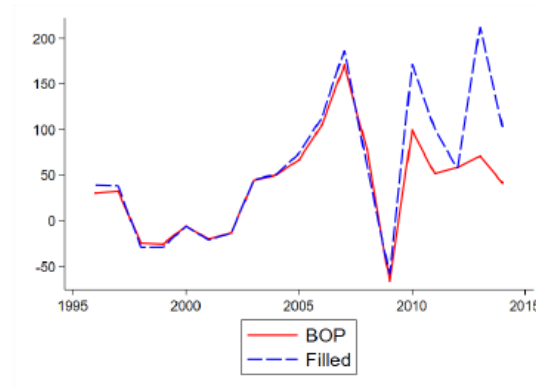
● GG/CB



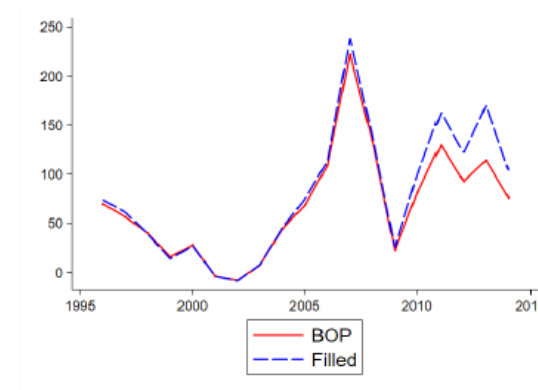
(a) Advanced Bank



(b) Advanced Corporate



(c) Emerging Bank



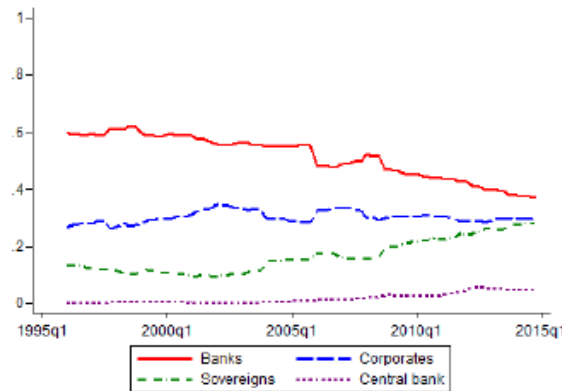
(d) Emerging Corporate

Source: BOP, IIP, QEDS, and BIS, authors' calculations. Debt is portfolio debt + other investment debt. BOP series is only BOP data, Filled is BOP data filled by other data sources when missing.

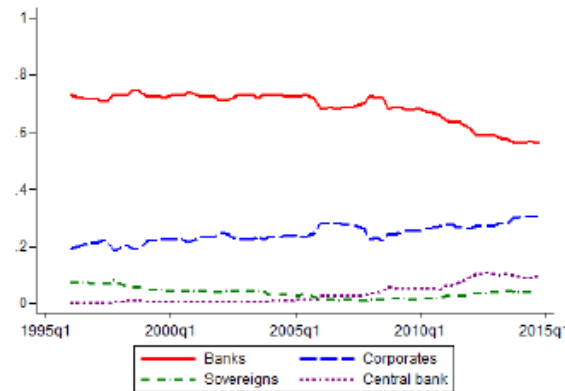




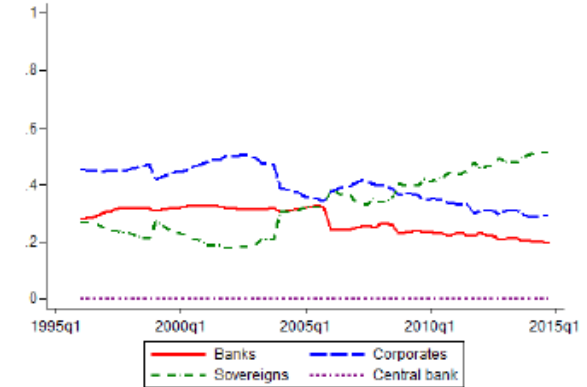
# Differences by sector: liability stocks



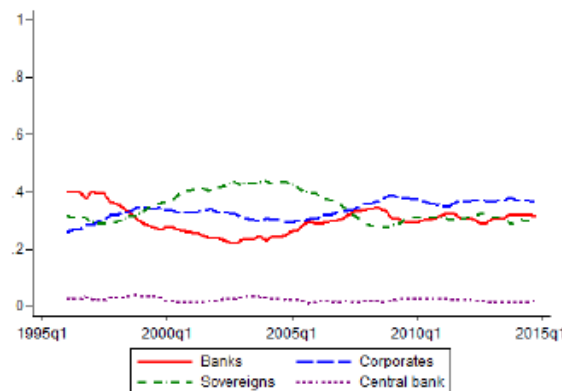
(d) Share of Sectors in Total External Debt Liabilities-Advanced



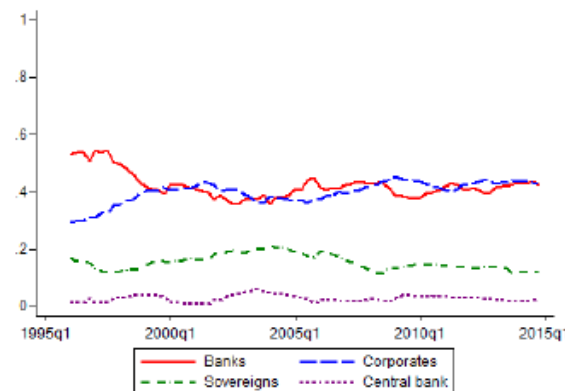
(e) Share of Sectors in Other Investment Debt Liabilities - Advanced



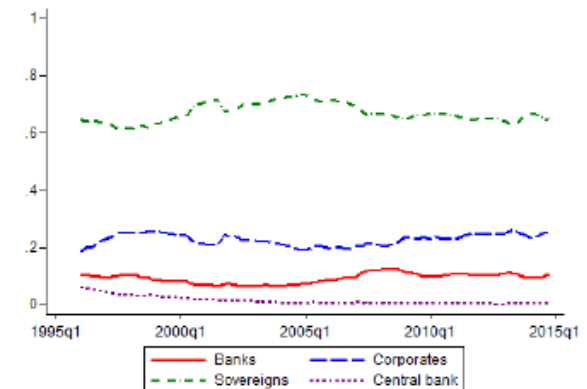
(f) Share of Sectors in Portfolio Debt Liabilities - Advanced



(g) Share of Sectors in Total External Debt Liabilities - Emerging



(h) Share of Sectors in Other Investment Debt Liabilities - Emerging



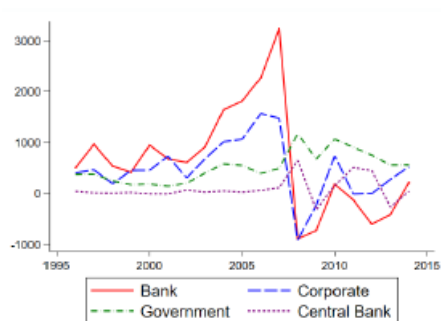
(i) Share of Sectors in Portfolio Debt Liabilities - Emerging

Assets

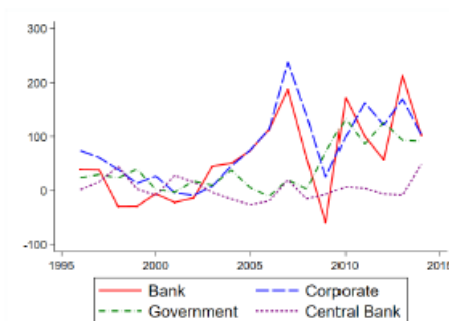


# Differences by sector: inflows

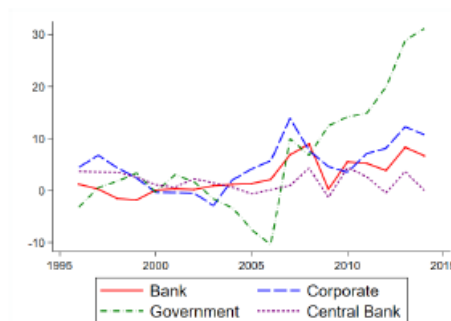
Figure 4: Aggregate External Debt Inflows, Billions 1996 USD



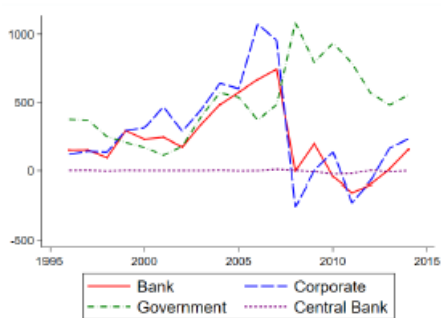
(a) Total Debt, Advanced



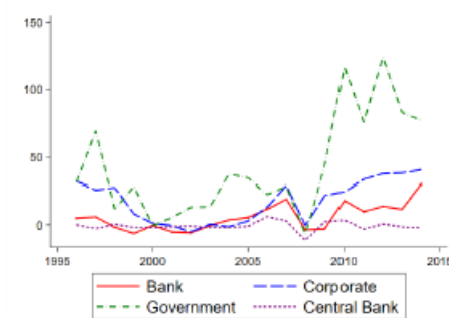
(b) Total Debt, Emerging



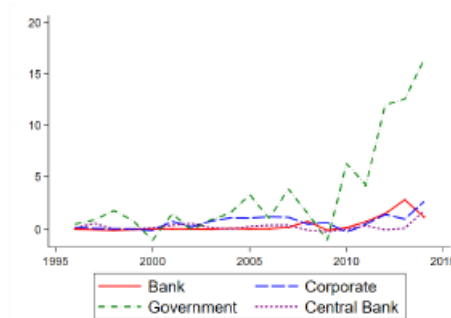
(c) Total Debt, Developing



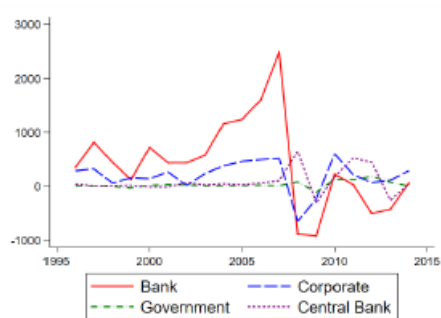
(d) Portfolio Debt, Advanced



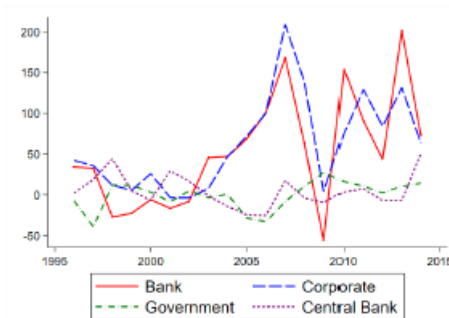
(e) Portfolio Debt, Emerging



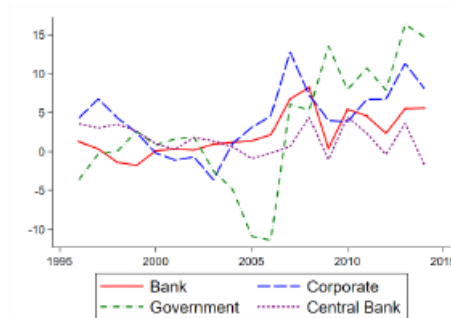
(f) Portfolio Debt, Developing



(g) Other Investment Debt, Advanced



(h) Other Investment Debt, Emerging



(i) Other Investment Debt, Developing

outflows





# Inflow-Outflow correlations

| All Countries      |        | Inflows  |         |         | Outflows |         |      |
|--------------------|--------|----------|---------|---------|----------|---------|------|
|                    |        | Public   | Bank    | Corp    | Public   | Bank    | Corp |
| Inflows            | Public | 1.00     |         |         |          |         |      |
|                    | Bank   | -0.10*** | 1.00    |         |          |         |      |
|                    | Corp   | 0.04     | 0.10*** | 1.00    |          |         |      |
| Outflows           | Public | 0.24***  | 0.17*** | 0.03    | 1.00     |         |      |
|                    | Bank   | 0.15***  | 0.77*** | 0.19*** | -0.08*** | 1.00    |      |
|                    | Corp   | 0.14***  | 0.33*** | 0.50*** | -0.03    | 0.32*** | 1.00 |
| Advanced Economies |        | Inflows  |         |         | Outflows |         |      |
|                    |        | Public   | Bank    | Corp    | Public   | Bank    | Corp |
| Inflows            | Public | 1.00     |         |         |          |         |      |
|                    | Bank   | -0.14*** | 1.00    |         |          |         |      |
|                    | Corp   | 0.04     | 0.10*** | 1.00    |          |         |      |
| Outflows           | Public | 0.27***  | 0.20*** | 0.01    | 1.00     |         |      |
|                    | Bank   | 0.14***  | 0.81*** | 0.21*** | -0.03    | 1.00    |      |
|                    | Corp   | 0.14***  | 0.35*** | 0.50*** | -0.02    | 0.34*** | 1.00 |
| Emerging Markets   |        | Inflows  |         |         | Outflows |         |      |
|                    |        | Public   | Bank    | Corp    | Public   | Bank    | Corp |
| Inflows            | Public | 1.00     |         |         |          |         |      |
|                    | Bank   | -0.08**  | 1.00    |         |          |         |      |
|                    | Corp   | -0.04    | 0.04    | 1.00    |          |         |      |
| Outflows           | Public | 0.23***  | 0.18*** | 0.11*** | 1.00     |         |      |
|                    | Bank   | 0.08**   | 0.27*** | 0.02    | -0.33*** | 1.00    |      |
|                    | Corp   | 0.03     | 0.07    | 0.21*** | -0.04    | 0.01    | 1.00 |

AE heatmap

EM heatmap



# Regression approach

- Basic regression with push and pull factors:

$$\frac{Flow_{it}^s}{GDP_{it}} = \alpha_i^s + \beta^s \log(VIX_{t-1}) + \gamma^s GDPGrowth_{it-1} + \epsilon_{it}^s$$

- s = sector, i = country, t = time (quarter)
- Regressions are run separately by
  - **sector**: public, banks, corporates, total
  - **flow direction**: inflow, outflow
  - **flow type**: portfolio debt, other investment debt, total debt

# Regression results: inflows

- PD results
- OID results

| Panel B: Advanced Economies |                      |                        |                      |                        |                      |                       |
|-----------------------------|----------------------|------------------------|----------------------|------------------------|----------------------|-----------------------|
|                             | (1)                  | (2)                    | (3)                  | (4)                    | (5)                  | (6)                   |
|                             | Total                | Public                 | Banks                | Corp.                  | Total<br>w/DI Debt   | Corp.<br>w/DI Debt    |
| $\log(\text{VIX}_{t-1})$    | -9.101***<br>(2.676) | 0.813<br>(1.400)       | -7.630***<br>(2.068) | -2.284**<br>(0.962)    | -10.57***<br>(3.132) | -3.196<br>(1.563)     |
| $\text{GDP Growth}_{it-1}$  | 0.506***<br>(0.179)  | 0.0616<br>(0.0340)     | 0.363**<br>(0.131)   | 0.0819<br>(0.0466)     | 0.480***<br>(0.141)  | 0.101**<br>(0.0420)   |
| Observations                | 1127                 | 1127                   | 1127                 | 1127                   | 1109                 | 1109                  |
| $R^2$                       | 0.065                | 0.002                  | 0.056                | 0.026                  | 0.065                | 0.027                 |
| CountryFE                   | Yes                  | Yes                    | Yes                  | Yes                    | Yes                  | Yes                   |
| Panel C: EM                 |                      |                        |                      |                        |                      |                       |
|                             | (1)                  | (2)                    | (3)                  | (4)                    | (5)                  | (6)                   |
|                             | Total                | Public                 | Banks                | Corp.                  | Total<br>w/DI Debt   | Corp.<br>w/DI Debt    |
| $\log(\text{VIX}_{t-1})$    | -2.261**<br>(0.829)  | 1.077<br>(0.652)       | -2.265***<br>(0.706) | -1.073***<br>(0.253)   | -2.336**<br>(0.922)  | -1.117***<br>(0.374)  |
| $\text{GDP Growth}_{it-1}$  | 0.116***<br>(0.0347) | -0.0394***<br>(0.0123) | 0.118***<br>(0.0346) | 0.0381***<br>(0.00928) | 0.142***<br>(0.0416) | 0.0635***<br>(0.0161) |
| Observations                | 1372                 | 1372                   | 1372                 | 1372                   | 1310                 | 1310                  |
| $R^2$                       | 0.071                | 0.021                  | 0.116                | 0.075                  | 0.073                | 0.053                 |
| CountryFE                   | Yes                  | Yes                    | Yes                  | Yes                    | Yes                  | Yes                   |



# Regression results: outflows

- PD results
- OID results

| Panel B: Advanced Economies |                      |                       |                      |                     |                       |                      |
|-----------------------------|----------------------|-----------------------|----------------------|---------------------|-----------------------|----------------------|
|                             | (1)                  | (2)                   | (3)                  | (4)                 | (5)                   | (6)                  |
|                             | Total                | Public                | Banks                | Corp.               | Total + Reserves      | Public + Reserves    |
| $\log(\text{VIX}_{t-1})$    | -11.61***<br>(3.772) | 0.0888<br>(2.400)     | -9.121**<br>(3.233)  | -2.575**<br>(0.966) | -10.66**<br>(3.965)   | 1.040<br>(2.606)     |
| $\text{GDP Growth}_{it-1}$  | 0.339**<br>(0.116)   | 0.0553<br>(0.0361)    | 0.263**<br>(0.0969)  | 0.0204<br>(0.0230)  | 0.337**<br>(0.118)    | 0.0533<br>(0.0401)   |
| Observations                | 660                  | 660                   | 660                  | 660                 | 660                   | 660                  |
| $R^2$                       | 0.082                | 0.004                 | 0.087                | 0.025               | 0.074                 | 0.004                |
| CountryFE                   | Yes                  | Yes                   | Yes                  | Yes                 | Yes                   | Yes                  |
| Panel C: EM                 |                      |                       |                      |                     |                       |                      |
|                             | (1)                  | (2)                   | (3)                  | (4)                 | (5)                   | (6)                  |
|                             | Total                | Public                | Banks                | Corp.               | Total + Reserves      | Public + Reserves    |
| $\log(\text{VIX}_{t-1})$    | -2.223***<br>(0.588) | -0.813<br>(0.495)     | -1.048***<br>(0.309) | -0.362**<br>(0.152) | -2.906***<br>(0.831)  | -1.496<br>(0.958)    |
| $\text{GDP Growth}_{it-1}$  | 0.0387<br>(0.0195)   | -0.00157<br>(0.00914) | 0.0269<br>(0.0154)   | 0.0135<br>(0.00989) | 0.0746***<br>(0.0234) | 0.0343**<br>(0.0159) |
| Observations                | 704                  | 704                   | 704                  | 704                 | 704                   | 704                  |
| $R^2$                       | 0.045                | 0.009                 | 0.017                | 0.011               | 0.067                 | 0.020                |
| CountryFE                   | Yes                  | Yes                   | Yes                  | Yes                 | Yes                   | Yes                  |



# Summary of Regressions: Total Debt flows

|    |            | Inflows     |              | Outflows    |              |
|----|------------|-------------|--------------|-------------|--------------|
|    |            | Local Cycle | Global Cycle | Local Cycle | Global Cycle |
| AE | Sovereigns | O           | O            | O           | O            |
|    | Banks      | +           | +            | +           | +            |
|    | Corporates | O/+         | + / O        | O           | +            |
| EM | Sovereigns | -           | O            | +           | O            |
|    | Banks      | +           | +            | O           | +            |
|    | Corporates | +           | +            | O           | +            |



# Conclusion

- Our new dataset will be broadly useful for future research
  - Intermediation patterns of international capital
  - Imbalances and sudden stops
  - Role of sovereigns in capital flows (especially in EMEs)
- Theoretical models about capital flows need to account for the new patterns
  - Banks' inflow-outflow correlation
  - EM sovereigns' countercyclical inflows and procyclical outflows
  - Private outflows procyclical only for AE banks
- Sector breakdown in enhanced IBS data should be increasingly utilized



# Thank you!





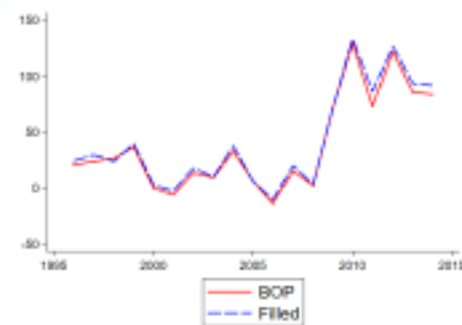
Figure A2: Aggregate External Debt Inflows for Governments and Central Banks, Billions 1996 USD



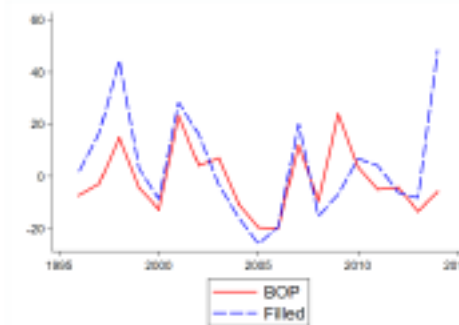
(a) Advanced Government



(b) Advanced Central Bank



(c) Emerging Government



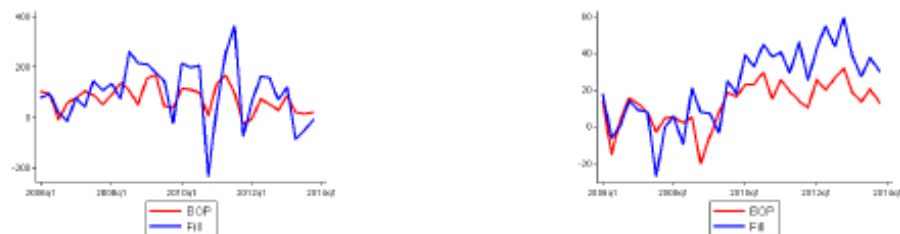
(d) Emerging Central Bank

Source: BOP, IIP, QEDS, and BIS, authors' calculations. Debt is portfolio debt + other investment debt. BOP series is only BOP data, Filled is BOP data filled by other data sources when missing.



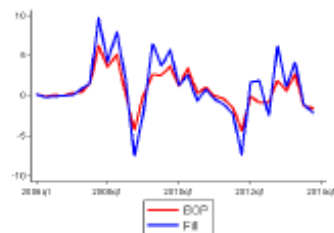


Figure A3: Aggregate Portfolio Debt, Billions USD

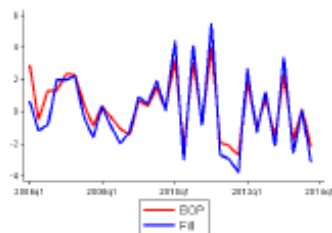


(a) Advanced Government

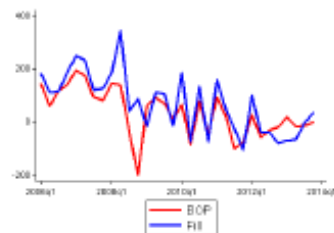
(b) Emerging Government



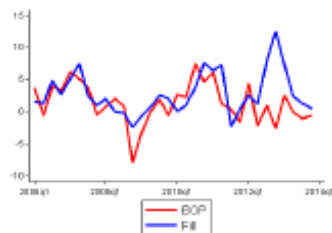
(c) Advanced Central Bank



(d) Emerging Central Bank



(e) Advanced Banks



(f) Emerging Banks

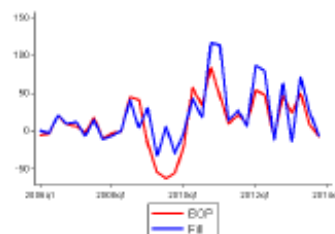


(g) Advanced Corporates

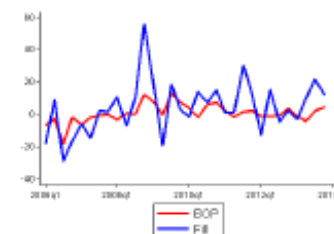


(h) Emerging Corporates

Figure A4: Aggregate Other Investment Debt, Billions USD



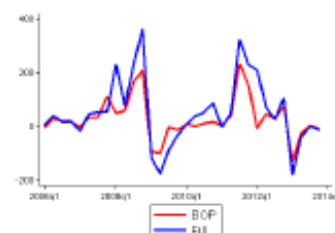
(a) Advanced Government



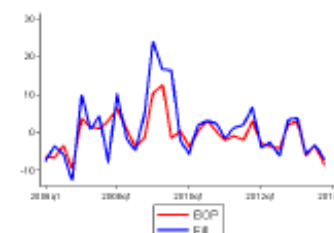
(b) Emerging Government



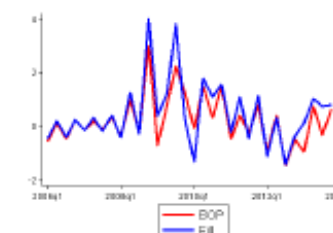
(c) Developing Government



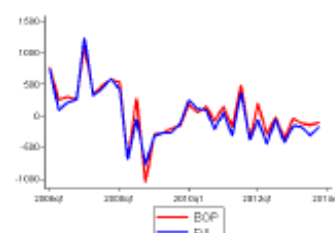
(d) Advanced Central Bank



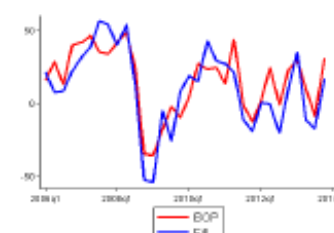
(e) Emerging Central Bank



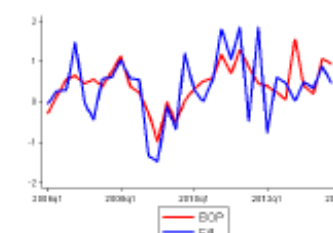
(f) Developing Central Bank



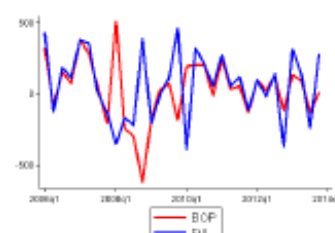
(g) Advanced Banks



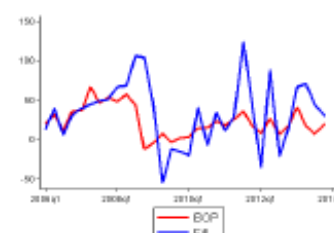
(h) Emerging Banks



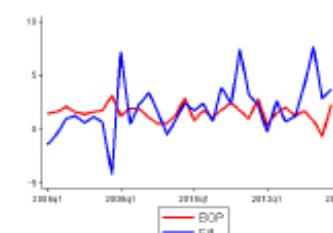
(i) Developing Banks



(j) Advanced Corporates



(k) Emerging Corporates

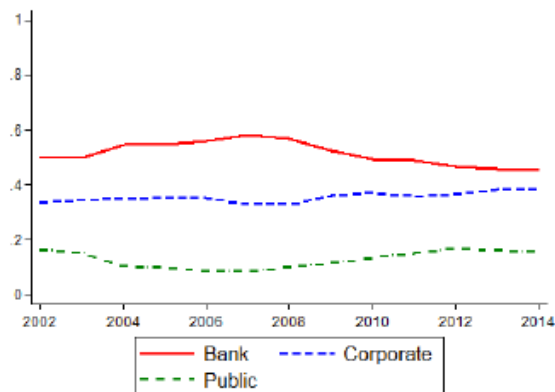


(l) Developing Corporates

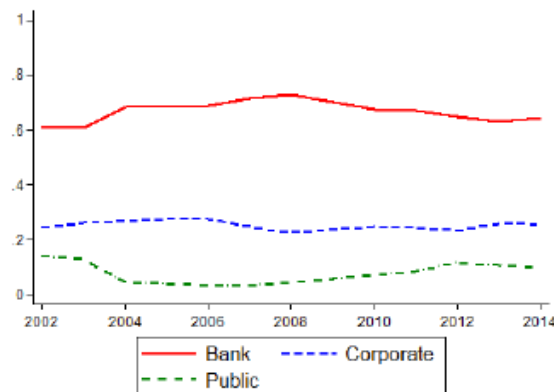
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# Differences by sector: asset stocks

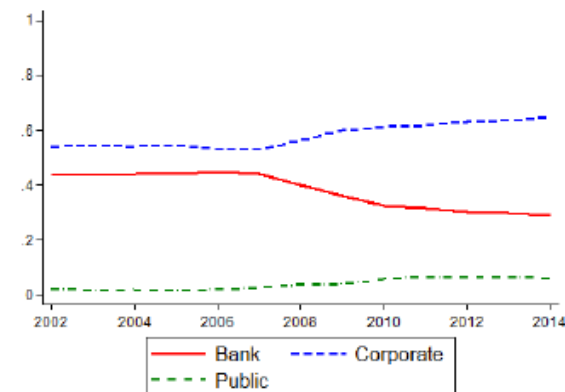
[back](#)



(d) Sector Shares of Total External Debt Assets - Advanced



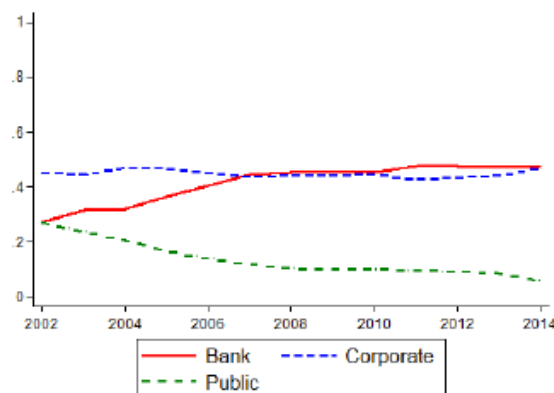
(e) Sector Shares of Other Investment Debt Assets - Advanced



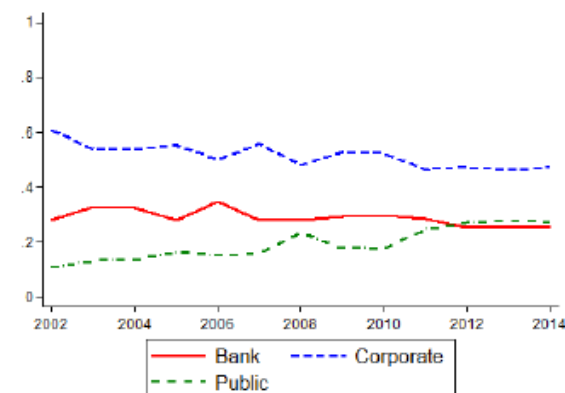
(f) Sector Shares of Portfolio Debt Assets - Advanced



(g) Sector Shares of Total External Debt Assets - Emerging



(h) Sector Shares of Other Investment Debt Assets - Emerging



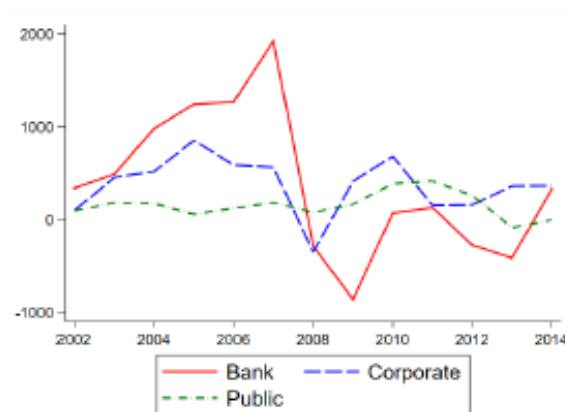
(i) Sector Shares of Portfolio Debt Assets - Emerging



# Differences by sector: outflows

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Figure 6: Aggregate Asset Outflows, Billions USD



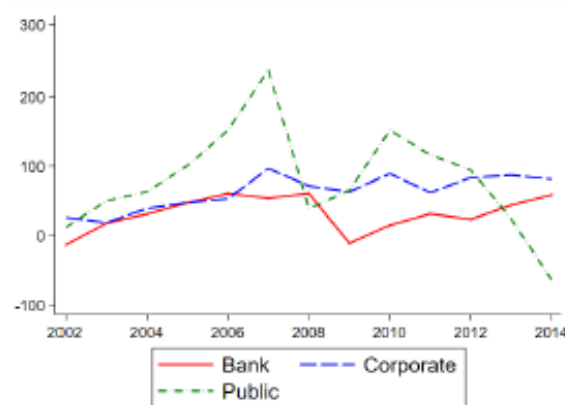
(a) Total Debt Asset Flows,  
Advanced



(b) Portfolio Debt Asset Flows,  
Advanced



(c) Other Investment Debt  
Asset Flows, Advanced



(d) Total Debt Asset Flows,  
Emerging



(e) Portfolio Debt Asset Flows,  
Emerging



(f) Other Investment Debt  
Asset Flows, Emerging



# Inflow-Outflow correlations

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| Advanced economies |        |      | Inflows |     |      |     |      |     | Outflows |     |      |      |     |      |     |
|--------------------|--------|------|---------|-----|------|-----|------|-----|----------|-----|------|------|-----|------|-----|
|                    |        |      | Public  |     | Bank |     | Corp |     | Public   |     |      | Bank |     | Corp |     |
|                    |        |      | PD      | OID | PD   | OID | PD   | OID | PD       | OID | Res. | PD   | OID | PD   | OID |
| Inflows            | Public | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    | Bank   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
| Corp               | PD     |      |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    | OID    |      |         |     |      |     |      |     |          |     |      |      |     |      |     |
| Outflows           | Public | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | Res. |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    | Bank   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    | Corp   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                    |        | Res. |         |     |      |     |      |     |          |     |      |      |     |      |     |



# Inflow-Outflow correlations

[back](#)

| Emerging Markets |        |      | Inflows |     |      |     |      |     | Outflows |     |      |      |     |      |     |
|------------------|--------|------|---------|-----|------|-----|------|-----|----------|-----|------|------|-----|------|-----|
|                  |        |      | Public  |     | Bank |     | Corp |     | Public   |     |      | Bank |     | Corp |     |
|                  |        |      | PD      | OID | PD   | OID | PD   | OID | PD       | OID | Res. | PD   | OID | PD   | OID |
| Inflows          | Public | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  | Bank   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  | Corp   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
| Outflows         | Public | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  |        | Res. |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  | Bank   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  |        | OID  |         |     |      |     |      |     |          |     |      |      |     |      |     |
|                  | Corp   | PD   |         |     |      |     |      |     |          |     |      |      |     |      |     |



# Regression Results: Portfolio Debt Inflows

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| Panel B: Advanced Economies |                   |                    |                    |                    |
|-----------------------------|-------------------|--------------------|--------------------|--------------------|
|                             | (1)<br>Total      | (2)<br>Public      | (3)<br>Banks       | (4)<br>Corp.       |
| $\log(\text{VIX}_{t-1})$    | -1.736<br>(1.263) | 0.526<br>(0.360)   | -1.557<br>(0.901)  | -0.705<br>(0.435)  |
| $\text{GDP Growth}_{it-1}$  | 0.147<br>(0.0938) | 0.0311<br>(0.0363) | 0.0689<br>(0.0476) | 0.0466<br>(0.0364) |
| Observations                | 1127              | 1127               | 1127               | 1127               |
| $R^2$                       | 0.025             | 0.004              | 0.019              | 0.018              |
| CountryFE                   | Yes               | Yes                | Yes                | Yes                |

| Panel C: EM                |                      |                        |                      |                          |
|----------------------------|----------------------|------------------------|----------------------|--------------------------|
|                            | (1)<br>Total         | (2)<br>Public          | (3)<br>Banks         | (4)<br>Corp.             |
| $\log(\text{VIX}_{t-1})$   | -0.750***<br>(0.234) | -0.423<br>(0.207)      | -0.135<br>(0.108)    | -0.192***<br>(0.0567)    |
| $\text{GDP Growth}_{it-1}$ | -0.0242<br>(0.0121)  | -0.0228**<br>(0.00906) | 0.00457<br>(0.00625) | -0.00596***<br>(0.00170) |
| Observations               | 1372                 | 1372                   | 1372                 | 1372                     |
| $R^2$                      | 0.010                | 0.010                  | 0.003                | 0.010                    |
| CountryFE                  | Yes                  | Yes                    | Yes                  | Yes                      |





# Regression Results: Other Investment Debt Inflows

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| Panel B: Advanced Economies |                      |                      |                      |                        |
|-----------------------------|----------------------|----------------------|----------------------|------------------------|
|                             | (1)<br>Total         | (2)<br>Public        | (3)<br>Banks         | (4)<br>Corp.           |
| $\log(\text{VIX}_{t-1})$    | -7.365***<br>(2.380) | 0.287<br>(1.269)     | -6.073***<br>(1.817) | -1.579**<br>(0.672)    |
| $\text{GDP Growth}_{it-1}$  | 0.360***<br>(0.120)  | 0.0304<br>(0.0490)   | 0.294***<br>(0.0938) | 0.0353**<br>(0.0159)   |
| Observations                | 1127                 | 1127                 | 1127                 | 1127                   |
| $R^2$                       | 0.044                | 0.001                | 0.048                | 0.012                  |
| CountryFE                   | Yes                  | Yes                  | Yes                  | Yes                    |
| Panel C: EM                 |                      |                      |                      |                        |
|                             | (1)<br>Total         | (2)<br>Public        | (3)<br>Banks         | (4)<br>Corp.           |
| $\log(\text{VIX}_{t-1})$    | -1.511<br>(0.875)    | 1.500**<br>(0.704)   | -2.130***<br>(0.719) | -0.880***<br>(0.213)   |
| $\text{GDP Growth}_{it-1}$  | 0.140***<br>(0.0360) | -0.0167<br>(0.00855) | 0.113***<br>(0.0330) | 0.0440***<br>(0.00917) |
| Observations                | 1372                 | 1372                 | 1372                 | 1372                   |
| $R^2$                       | 0.087                | 0.018                | 0.113                | 0.090                  |
| CountryFE                   | Yes                  | Yes                  | Yes                  | Yes                    |



# Regression Results: Portfolio Debt Outflows and Reserves

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| Panel B: Advanced Economies |                       |                      |                       |                       |                         |
|-----------------------------|-----------------------|----------------------|-----------------------|-----------------------|-------------------------|
|                             | (1)                   | (2)                  | (3)                   | (4)                   | (5)<br>Reserves<br>Only |
|                             | Total                 | Public               | Banks                 | Corp.                 |                         |
| $\log(\text{VIX}_{t-1})$    | -2.232**<br>(0.958)   | -0.455<br>(0.734)    | -0.992<br>(0.595)     | -0.784<br>(0.778)     | 0.951<br>(0.583)        |
| $\text{GDP Growth}_{it-1}$  | 0.0329<br>(0.0467)    | 0.0334<br>(0.0291)   | 0.00661<br>(0.0276)   | -0.00711<br>(0.0166)  | -0.00203<br>(0.00951)   |
| Observations                | 660                   | 660                  | 660                   | 660                   | 660                     |
| $R^2$                       | 0.018                 | 0.010                | 0.008                 | 0.006                 | 0.021                   |
| CountryFE                   | Yes                   | Yes                  | Yes                   | Yes                   | Yes                     |
| Panel C: EM                 |                       |                      |                       |                       |                         |
|                             | (1)                   | (2)                  | (3)                   | (4)                   | (5)<br>Reserves<br>Only |
|                             | Total                 | Public               | Banks                 | Corp.                 |                         |
| $\log(\text{VIX}_{t-1})$    | -0.775**<br>(0.351)   | -0.545<br>(0.316)    | -0.310**<br>(0.132)   | 0.0796<br>(0.171)     | -0.683<br>(0.774)       |
| $\text{GDP Growth}_{it-1}$  | -0.00891<br>(0.00879) | 0.00358<br>(0.00559) | -0.00840<br>(0.00529) | -0.00409<br>(0.00392) | 0.0358**<br>(0.0129)    |
| Observations                | 704                   | 704                  | 704                   | 704                   | 704                     |
| $R^2$                       | 0.014                 | 0.018                | 0.010                 | 0.003                 | 0.017                   |
| CountryFE                   | Yes                   | Yes                  | Yes                   | Yes                   | Yes                     |





# Regression Results: Other Investment Debt Outflows

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| Panel B: Advanced Economies |                      |                       |                     |                       |
|-----------------------------|----------------------|-----------------------|---------------------|-----------------------|
|                             | (1)<br>Total         | (2)<br>Public         | (3)<br>Banks        | (4)<br>Corp.          |
| $\log(\text{VIX}_{t-1})$    | -9.375**<br>(3.614)  | 0.544<br>(1.748)      | -8.129**<br>(2.948) | -1.791<br>(1.084)     |
| GDP Growth $_{it-1}$        | 0.306**<br>(0.111)   | 0.0219<br>(0.0423)    | 0.256**<br>(0.0876) | 0.0275<br>(0.0277)    |
| Observations                | 660                  | 660                   | 660                 | 660                   |
| $R^2$                       | 0.071                | 0.001                 | 0.084               | 0.020                 |
| CountryFE                   | Yes                  | Yes                   | Yes                 | Yes                   |
| Panel C: EM                 |                      |                       |                     |                       |
|                             | (1)<br>Total         | (2)<br>Public         | (3)<br>Banks        | (4)<br>Corp.          |
| $\log(\text{VIX}_{t-1})$    | -1.447***<br>(0.461) | -0.268<br>(0.278)     | -0.737**<br>(0.330) | -0.442**<br>(0.185)   |
| GDP Growth $_{it-1}$        | 0.0477**<br>(0.0187) | -0.00515<br>(0.00711) | 0.0353<br>(0.0188)  | 0.0175**<br>(0.00805) |
| Observations                | 704                  | 704                   | 704                 | 704                   |
| $R^2$                       | 0.040                | 0.001                 | 0.019               | 0.022                 |
| CountryFE                   | Yes                  | Yes                   | Yes                 | Yes                   |



# Borrowing sector splits for outstanding stocks

$$\widehat{XBS}_{nbp,j,t} = XBC_{nb,j,t} \frac{INTC_{nbp,j,t}}{INTC_{nbp,j,t} + INTC_{pub,j,t}} \quad (6)$$

$$\widehat{XBS}_{pub,j,t} = XBC_{nb,j,t} \frac{INTC_{pub,j,t}}{INTC_{nbp,j,t} + INTC_{pub,j,t}} \quad (7)$$



# Borrowing sector splits for flows: non-bank private

$$\widehat{XBS}_{i,t}^{j,nbp} = \widehat{XBS}_{i,t}^{all,nbp} \left( \frac{XBS_{i,t}^{j,nb}}{XBS_{i,t}^{all,nb}} \right) \quad (8)$$

$$\widehat{XBF}_{i,t}^{j,nbp} = \frac{\widehat{XBS}_{i,t}^{j,nbp} FX_t^{j,usd} - \widehat{XBS}_{i,t-1}^{j,nbp} FX_{t-1}^{j,usd}}{\widetilde{FX}_t^{j,usd}} \quad (9)$$

$$\widehat{XBF}_{i,t}^{all,nbp} = \sum_j \widehat{XBF}_{i,t}^{j,nbp} \quad (10)$$

# Borrowing sector splits for flows: non-bank public

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$$\widehat{XBS}_{i,t}^{j, pub} = \widehat{XBS}_{i,t}^{all, pub} \left( \frac{XBS_{i,t}^{j, nb}}{XBS_{i,t}^{all, nb}} \right) \quad (11)$$

$$\widehat{XBF}_{i,t}^{j, pub} = \frac{\widehat{XBS}_{i,t}^{j, pub} FX_t^{j, usd} - \widehat{XBS}_{i,t-1}^{j, pub} FX_{t-1}^{j, usd}}{\widetilde{FX}_t^{j, usd}} \quad (12)$$

$$\widehat{XBF}_{i,t}^{all, pub} = \sum_j \widehat{XBF}_{i,t}^{j, pub} \quad (13)$$

