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GROSS CAPITAL FLOWS BY BANKS, CORPORATES AND SOVEREIGNS

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Gross Capital Flows by Banks, Corporates and Sovereigns  
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### **ABSTRACT**

We construct a new quarterly data set of international capital flows broken down by sector: banks, corporates and sovereigns. Using our novel data set, we establish several key facts that demonstrate the importance of distinguishing in- and outflows by the domestic sectoral identity. We find that public sector flows may serve as a countervailing force to private sector flows, especially in emerging markets (EMs), as these flows respond differently not only to country-specific fundamentals but also to global shocks. The high inflow-outflow correlation observed in total capital flow data is driven by within-sector flows, especially those of AE banks. In general, inflows and outflows of AEs and inflows to EMs are primarily AE banks' transactions, and, as a consequence, respond similarly to capital flow drivers. By contrast, EM outflows respond differently to global shocks and changes in fundamentals, leading to lower inflow-outflows correlations for EMs.

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# 1 Introduction

The history of financial crises has taught us that the vulnerability to external shocks can vary greatly depending on which economic sector(s) are on the receiving side of capital inflows. Sovereign debt proved to be the Achilles' heel in the Latin American crises, while private sector debt financed by capital inflows was the key source of fragility in the Asian financial crises. During the global financial crisis of 2008 (GFC), in the US, the culprit was the domestic household debt held by global banks. By contrast, in the European debt crisis of 2010-12, sovereigns' and banks' external borrowing took the center stage.

In spite of this anecdotal evidence, breakdowns of gross capital flows by *sector* have received little attention in the empirical literature due to lack of data for a large set of countries and a long time period at the business cycle frequency. Our paper fills this gap by constructing a new comprehensive dataset based on residency principle for *gross* capital inflows and outflows at the *quarterly* frequency. We include a much larger set of countries than all the other publicly available datasets for quarterly capital flows, featuring a balanced panel of 85 countries for inflows and 31 countries for outflows, starting in 1996 and decomposing both inflows and outflows by the borrowing and lending domestic sector, (e.g. inflows into the corporate sector of a country, outflows from the banking sector of the country, etc.).<sup>1</sup> We focus on debt flows, rather than equity, as debt flows constitute the lion share of aggregate capital flows during the period we study, as we document.

Our approach is fundamentally different than standard decomposition of capital flows by instruments and asset classes, such as portfolio equity and debt flows or other investment flows. Corporates can borrow using all these instruments (equity, bonds and loans), whereas sovereigns most typically issue bonds. For our purposes, what matters is the *identity* of the borrower and the lender, rather than instruments through which the borrowing and lending is done. Our dataset on capital flows by *sector* provides new insights into the dynamic determinants of capital flows, sheds light on the ultimate risk bearing agents, and highlights stark differences between private and public borrowers and domestic and foreign lenders by sector.

Using our dataset, we document several important stylized facts. We find that public sector

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<sup>1</sup>As in the standard residency principle based balance of payments data (BOP data), in our data, inflows and outflows are on net basis, where inflows refer to the (changes in) positions of non-residents and outflows refer to the (changes in) positions of residents. Thus, negative inflows mean foreign investors are "leaving" the country by divesting and negative outflows mean domestic residents are reducing their external assets.

flows may serve as a countervailing force to private sector flows, especially in EMs. This is because, in EMs, public sector flows are countercyclical whereas bank and corporate sectors flows are procyclical.<sup>2</sup> In addition, EM public sector flows respond to global shocks in the opposite direction to private flows.<sup>3</sup> In AEs, public sector flows are procyclical and they do not respond to global shocks. Furthermore, we find that global shocks and country-specific GDP growth explain less of the variation in capital flows after the 2008 crisis, due to lower flows by AE banks and EM corporates. However, EM banks' flows still correlate strongly with both global shocks and GDP after GFC.<sup>4</sup> Lastly, we show that the correlation between capital inflows and outflows is driven by within sector flows, particularly those of AE banks. To establish our stylized facts about the drivers of flows, we run separate quarterly panel regressions of flows on countries' own lagged GDP growth (pull factor) and global shocks/financial conditions using the VIX index (push factor) with country fixed effects, identifying from the within variation.<sup>5</sup>

In terms of capital outflows, flows from banks and corporates in AEs respond negatively to global shocks. In EMs, however, it is bank and public outflows that respond significantly. For domestic cycles, only AE banks' outflows are procyclical. Outflows from EM investors do not systematically respond to the domestic cycle for any sector, with the possible exception of the public sector. This is an important result, since it implies that during a downturn/crisis in a given emerging market, domestic private agents do not bring their investment back (retrench) to their own country. During stress periods, when foreigners flee from EMs, it is the sovereigns who may provide much needed risk sharing. However, during a downturn in advanced economies, it is their banks that bring funds back to the country, helping to offset the shock.

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<sup>2</sup>Aguiar and Amador (2011), Gourinchas and Jeanne (2013), and Alfaro, Kalemli-Özcan, and Volosovych (2014) separate public and private flows at annual frequency and show that they move in opposite direction as a function of country-specific growth. They focus on *net* flows and show that a country may run a current account surplus during episodes of high growth, but private sector might be borrowing on net at the same time. Focusing on asset class only, Ju and Wei (2010), who show that FDI can flow in on net and reserves can flow out on net.

<sup>3</sup>Horn, Reinhart, and Trebesch (2020) show a similar result in 200 years of data where when private inflows leave during wars, natural disasters and financial crises, official flows to sovereign borrowers come in.

<sup>4</sup>This is consistent with Amiti, McGuire, and Weinstein (2018), who find that the common factor in international bank lending strongly diminished after the 2008 crisis, indicating that global push factors now have less influence. We show that this is due to diminished role of AE banks in international capital flows.

<sup>5</sup>Several papers document that gross flows respond systematically to changes in global conditions. See Forbes and Warnock (2012), Milesi-Ferretti and Tille (2011), Cerutti, Claessens, and Puy (2015), Broner, Didier, Erce, and Schmukler (2013), J. Caballero (2016), Obstfeld (2012), Catão and Milesi-Ferretti (2014), Borio and Disyatat (2011), Lane (2013), Cerutti, Claessens, and Rose (2018), and Barrot and Servén (2018), Rey (2013), Nier, Sedik, and Mondino (2014). Our contribution to this literature is that we show the patterns found by this literature are driven by flows in and out of banks and corporates.

The recent COVID-19 crisis clearly illustrates the importance of separating capital flows by sector. It will take some time before the official balance of payments (BOP) data for this period is available. Nevertheless, commercial data sources with real-time data provide some insight. Such sources with *only* portfolio flow data have shown stark outflows from emerging markets since late February 2020, largely in equities.<sup>6</sup> Most of these sources have limited coverage of countries and instruments (not capturing the massive amounts of loan flows, important for EMs), can have differing definitions from BOP flows, and do not provide a split of the flows by sector.

For 34 emerging markets, Figure 1 plots capital flows by non-residents to corporate, bank, and sovereign sectors during the GFC and Taper Tantrum on the left and mid panels and during COVID-19 on the right panel. We use our data (constructed in this paper) for the previous crises. For COVID-19 crisis, we utilize recently released BIS international debt securities (IDS) statistics in conjunction with syndicated loan data from Dealogic to capture both bond and loan flows for a large set of countries, defined comparably to BOP and split the flows by sector. Each bar denotes the change in non-resident inflows between the plotted quarter and the average of the previous two quarters.

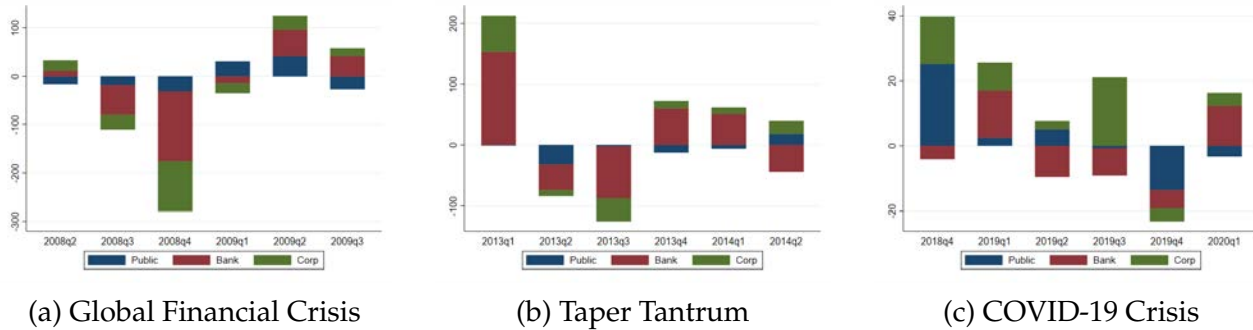
All of those crises teach the same lesson: during external shocks, capital flows out of EMs vary significantly by the borrowing sector. There are differences, however, in the ranking of sectors. During the GFC and Taper Tantrum, foreign investors pulled out of domestic banking sectors most, as well as the corporate sectors to a certain extent. However, adjustments to debt flows were limited during the COVID-19 shock. If anything, they were mostly out of the sovereign sector, as flows to the banking sector held stable. Since this data is mainly for the first quarter of 2020, it also includes large inflows into EMs (especially to corporates) in January and February before the crisis fully took hold. Updated data for the second quarter of 2020 may reveal larger declines in inflows, including to banks, as experienced during previous crises. Since COVID is mainly a health shock affecting first the real economy, it might propa-

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<sup>6</sup>Data from EPFR and IIF suggest a retrenchment of approximately \$100 billion in emerging market portfolio equity and roughly \$20 billion in emerging market portfolio bonds since February 2020. See <https://www.ft.com/content/8562417c-63c4-11ea-b3f3-fe4680ea68b5> and IMF (2020). IIF data is for a very limited set of countries. IIF collects real time data either through central banks who report real time portfolio flows or use fund level data from Bloomberg. For example, for bond flows, IIF only includes India, Indonesia, Thailand, South Africa, Hungary, Turkey, Mexico, Poland, and Ukraine. For countries whose data is not available, IIF does a valuation adjustment to stocks to nowcast the portfolio flows. EPFR data solely relies on investment funds and hence does not coincide with the residency based capital flows (outflows from a fund can be both by domestic and foreign investors and may not correspond to outflows by non-residents from a country).

gate differently than previous episodes that were financial shocks. Foreign investors may also expect higher sovereign defaults given the limited fiscal space of many EM governments, and hence leaving sovereign bond market first. The bottom line is that capital flows show different patterns across borrowing sectors depending on the shock, which is an important factor for detecting vulnerabilities related to capital flows.<sup>7</sup>

Figure 1: Crises and Debt Flows to Emerging Markets



Source: Dealogic, BOP, IIP, QEDS, and BIS, authors' calculations. Each bar shows changes in net debt inflows in the given quarter from the average of the previous two quarters for 34 EMs, expressed in billions USD. Figures 1a and 1b use our constructed data on net inflows by sector. Figure 1c plots net international bond and syndicated loan issuance by sector for the same set of countries from BIS IDS and Dealogic, respectively.

The standard data on capital inflows and outflow are from the BOP Statistics of the IMF. This data are organized by instrument (portfolio debt and equity flows, other investment flows and FDI) rather than by borrowing and lending sector (banks, corporates and sovereigns). Our dataset takes the IMF/BOP data as the base and combines this with several publicly available sources from other institutions (BIS and World Bank) in order to create the new dataset on inflows and outflows by sector instead of by instrument. Although IMF/BOP reports some data by sector during recent years, this breakdown is largely missing before 2005, especially for EMs. Our dataset has much broader coverage of developing countries and emerging markets at the quarterly frequency. The set of countries in our balanced 85 country panel of capital inflows data includes 25 advanced, 34 emerging, and 26 developing economies from 1996q1

<sup>7</sup> Appendix Figure C1 shows the flows in each quarter instead of looking at changes in flows relative to previous quarters. The message is the same where capital outflows during previous crises were out of banks, whereas for COVID, foreign investors reduced their investment in sovereign debt first (together with equities). We also plot portfolio debt flows from IIF and EPFR data in appendix Figure C2. This data shows a much larger change in net portfolio debt inflows in 2020q1 compared to the previous 2 quarters (around -30 billion). This discrepancy compared to Figure 1c is due to several possible reasons: we include loans in addition to portfolio debt; we have a more comprehensive set of emerging markets (34) compared to IIF (9) and EPFR (19); and EPFR data captures flows of EM debt in and out of investment funds by any investor, which may not reflect cross-border residency based flows that we plot (e.g. one fund sells the security to another cross-border investor).

to 2014q4. At the annual frequency, we have 89 countries for inflows, adding 4 more developing economies. For capital outflows data we have a balanced panel of 16 advanced and 15 emerging economies for 2004q1–2014q4. This data is less populated because foreign assets of residents are poorly recorded.<sup>8</sup>

We focus on debt flows by sector as we document that this is the largest asset class in international capital flows, in spite of all the advances made in increasing portfolio equity and FDI flows in the last decade. We also include flows of official reserves and FDI debt inflows. The literature focuses on analyzing flows of portfolio debt (e.g., bonds) and other investment debt (e.g. loans, deposits, trade credit, etc.), whereas we separate these asset classes by sectors, adding bonds and loans as both instruments used to borrow by banks and corporates.

There are number of interesting features of the allocation of capital flows and stocks by sector. Banks owe the lion's share of the external debt for advanced countries, but in emerging markets the outstanding external debt stocks are split roughly equally between banks, corporates and sovereigns. Additionally, while most of the portfolio debt in advanced economies is due to corporate borrowing and most of the non-portfolio debt is due to bank borrowers, this pattern changes when examining emerging markets. There, sovereigns account for most of the portfolio debt owed, while banks and corporates roughly split the other investment debt. These new findings underlie the importance of loans rather than bonds for the external borrowing of the private sector in emerging markets.

On the asset side, we find that sovereigns are the main lending sector for emerging markets, mainly due to their accumulation of reserve assets, while corporates in all countries typically lend externally via portfolio debt. Advanced economy banks do most of the lending in other investment debt, but in emerging markets the total is split again between banks and corporates. These data patterns, and others we discuss throughout the paper, highlight the importance of separating external debt liabilities and debt assets by sector for a more complete understanding of the drivers of capital flows and lead us to a re-evaluation of conventional stylized facts on capital flows.<sup>9</sup>

In terms of our contribution to the literature, most of the literature focuses on net capital

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<sup>8</sup>For total outflows one can have of course more countries but our aim here is to decompose outflows by banks, corporates and sovereigns as we do inflows. We combine the general government and central bank sectors into a single public sector in order to increase data coverage for outflows.

<sup>9</sup>There is also a literature that studies the long-term movements in gross capital flows that culminates into long-term external asset and liability positions such as [Gourinchas and Rey \(2007\)](#); [Lane and Milesi-Ferretti \(2001\)](#); [Obstfeld \(2012\)](#). We focus on capital flow dynamics at the quarterly business cycle frequency.



flows defined as purchases of domestic assets by foreign agents minus purchases of foreign assets by domestic agents. There have been recent papers, such as [Forbes and Warnock \(2012\)](#), [Broner et al. \(2013\)](#), and [Davis and van Wincoop \(2017\)](#), that focus on gross inflows and outflows separately—that is capital inflows by foreign agents and capital outflows by domestic agents—but no paper separated these gross inflows by foreigners and gross outflows by domestics into borrowing and lending by sectors, that is by banks, corporates and sovereigns before our paper. The existing literature on gross capital flows has found a high degree of correlation between capital inflows and outflows and an increase in this correlation over time. Some of these papers show that both capital inflows and outflows are procyclical. We document that the positive correlation between aggregate capital inflows and outflows is driven by within sector flows, especially the borrowing and lending patterns of AE banks. We note also that AE banks were the only sector to be procyclical in both its inflows and outflows. While the behavior of cross border activities of banks has been extensively studied, to our knowledge we are the first to show that the sectoral correlations of capital flows and document the importance of AE banks for this result.<sup>10</sup> In general, inflows and outflows of AEs and inflows to EMs are primarily driven by AE investors and so respond similarly to various capital flow drivers. However, EM outflows are determined by EM investors, and so respond differently to various drivers of capital flows. This difference in the inflow and outflow behavior from different investors leads to lower inflow-outflow correlations in EM, especially for private flows.

Overall, our results provide important insights into the nature of capital flows. We show that our findings cannot be documented using only raw BOP data. The facts and relationships we document stand in contrast to standard international macroeconomic models, which treat domestic and foreign investors symmetrically and ignore the sectoral identities of the flow recipient/lender. As we discuss in the conclusion, our findings are consistent with models not only including financial frictions and financial shocks, but also deviate from a representative agent framework that allows accounting for the different behavior investors and borrowers.

The rest of the paper is organized as follows: Section 2 describes the construction and coverage of our data; Section 3 illustrates descriptive patterns; Section 4 presents the results from our empirical analysis; Section 5 discusses the theoretical implications and concludes.

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<sup>10</sup>A few papers have documented how the internal capital markets of global banks can lead to a correlation of cross-border inflows and outflows for banks (e.g. [Cetorelli and Goldberg \(2012\)](#)), but these have been limited to the banking sector, while ignoring other types of capital flows.



## 2 A New Dataset for Capital Flows Research

We construct a new dataset for capital flows research that disaggregates inflows to and outflows from a country by sector in the domestic economy. We focus mainly on debt flows, which account for a substantial portion of international capital flows as we document below. We construct the dataset by taking the existing BOP data and performing internal and external data filling exercises. This enables us to keep the residency principle and to expand the coverage of our dataset at the same time. Our dataset's coverage surpasses all the other publicly available statistics, dramatically, in terms of both countries and time. Our methodology is similar to that of the capital flight literature, that also uses techniques of internal filling with the BOP and external filling with other datasets in order to identify unreported private capital outflows from a country (Chang, Claessens, & Cumby, 1997; Claessens & Naudé, 1993).

As a preview of our dataset and to illustrate the importance of our analysis, Figure 2 illustrates the size of debt in total external liabilities, as well as the breakdown of outstanding stocks by sector. The figure shows time series of the composition of external liability stocks to illustrate the relative importance of the different components.<sup>11</sup> Panel (a) shows the share of total debt in total external liabilities.<sup>12</sup> Debt represents the majority of external liabilities globally. In AEs, debt liabilities are 62 percent of external liabilities, whereas this number is 51 percent in EMs on average during our sample period. Panel (b) highlights that other investment debt (usually bank loans) accounts for the bulk of external debt stocks. Portfolio debt (bonds) in panel (c) represents nearly half of AE external debt and around a third of EM external debt. Thus, it is important to consider both types of external debt.

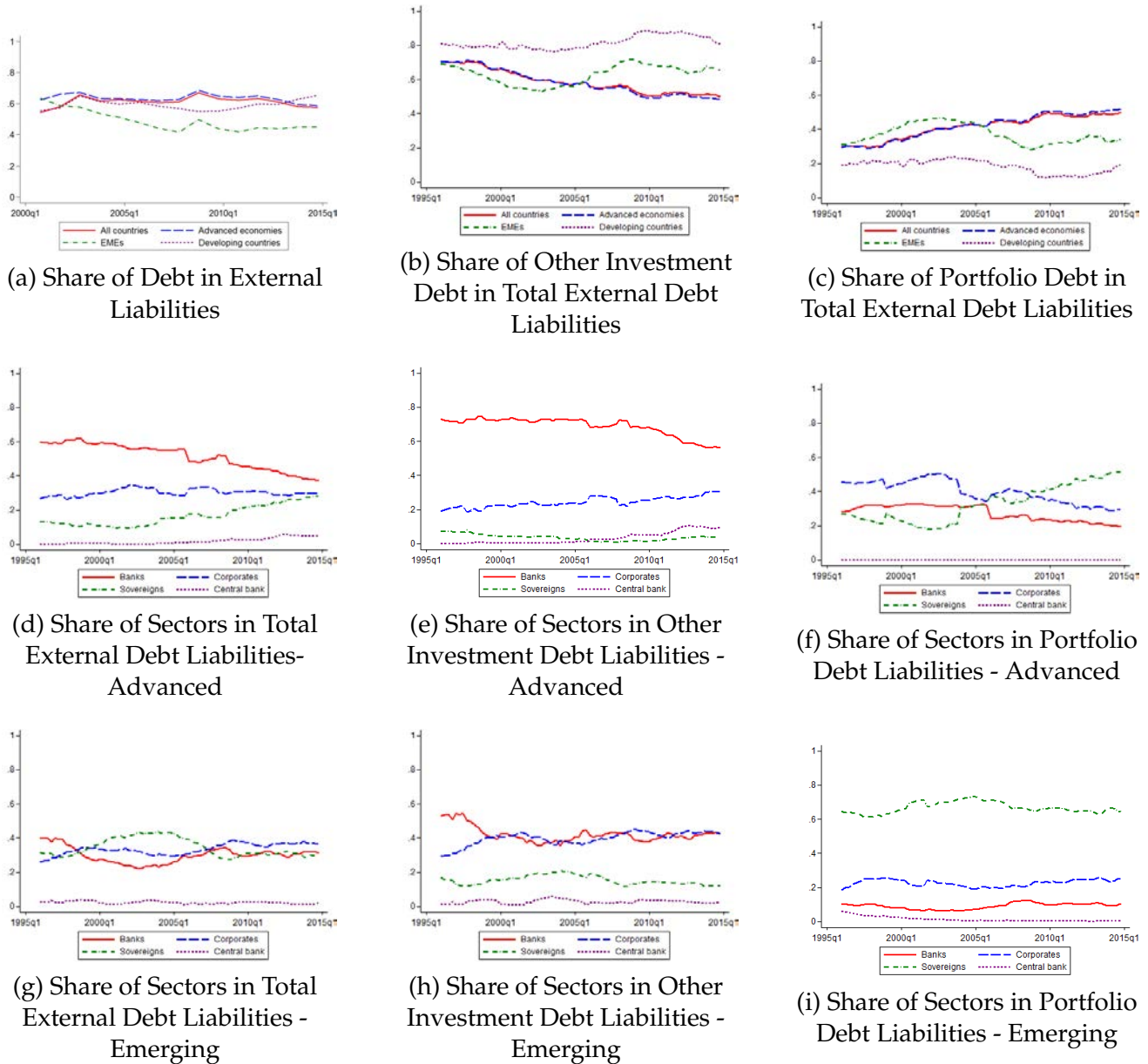
Employing our new dataset, panels (d)-(i) highlight the sectoral share of external debt stocks for each flow type and country group. In AE, banks account for the lion's share of external debt liabilities, whereas in EM, corporates, banks and sovereigns have more or less equal shares. This is interesting since in general it is thought that firms and governments would directly access international capital markets more in AE than in EM. One interpretation is that banks do most of the intermediation of external funds in AE, while corporates and sovereigns might be borrowing more domestically. Perhaps more surprising, the conventional

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<sup>11</sup>The flow version of this figure delivers a similar picture, though more noisy, and is shown in Figure C3 in Appendix C.

<sup>12</sup>Due to missing data for equity, we restrict our sample to 46 countries and a shorter time period in order to show trends from a balanced sample for panel (a).

Figure 2: Composition of External Debt Liabilities by Debt Type and Sector



Source: Raw data from IIP, QEDS, and BIS. Final data is constructed by the authors.

wisdom that other investment debt is primarily owed by banks and portfolio debt is primarily owed by corporates holds for AE but not for EM. In the latter, most of the portfolio debt is attributable to sovereigns, while banks and corporates have equal shares in other investment debt.

The composition of external debt is remarkably stable over time, with few exceptions.<sup>13</sup>

<sup>13</sup>In these figures we use a balanced sample over time (where every country has data for all sectors for every period) to prevent entry/exit of countries into the sample from distorting the time series patterns of the composition of debt.

The share of other investment debt in total external liabilities is decreasing and the share of portfolio debt is increasing in AE over time. This seems to be partly driven by the global financial crisis: in these countries, the share of bank-held debt (mostly other investment debt) declines and that of sovereign debt (mostly portfolio debt) increases following the crisis. For EM, sector shares are more stable over time, although during the pre-crisis period there is a small decline in the share of debt in total inflows.

Figure 3 shows the counterpart of Figure 2 for the composition of external asset stocks in debt instruments, including reserves.<sup>14</sup> Panel (a) shows the share of debt in total external assets. Debt assets represents the majority of external assets; 70 percent in EM and 60 percent in AE on average during 2000s, though the share of debt assets in total external assets is on a declining trend for both set of countries. Panel (b) highlights that other investment debt accounts for the bulk of debt asset stocks in AE, whereas portfolio debt assets in panel (c) represents only 40 percent of the AE economies external debt assets. For EM, other investment debt assets represent half of the external debt assets, portfolio debt assets are not important, and the remainder consists of reserves.

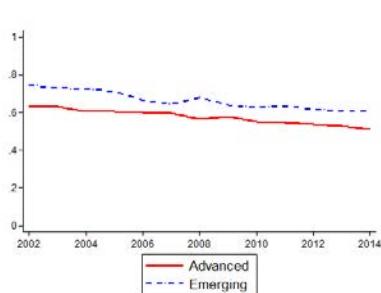
Panels (d)-(i) highlight the sectoral share of external debt asset stocks for each flow type and country group. In EM the public sector is overwhelmingly the main lender to other countries. This is primarily driven by their accumulation of reserve assets, which are included in the total debt figure. In AE, as is the case for borrowing, banks do the lion's share of external lending in loans, while corporates also have a big share of AE lending in portfolio debt assets. For EM, banks and corporates do about an equal share of lending in other investment debt, while corporates lead in terms of portfolio debt. The composition of external debt assets is also very stable over time, as in the case of debt liabilities.

To the best of our knowledge, there are no other papers and datasets examining capital flows by sector for all the sectors with an extensive coverage of countries and a long time period since 1996 at the quarterly frequency. [Milesi-Ferretti and Tille \(2011\)](#) and [Cerutti et al. \(2015\)](#) separate out the banking sector within the other investment debt category of the BOP to analyze it on its own, but not in tandem with the other sectors and other capital flow asset classes. Other studies examining gross capital inflows using only BOP data sometimes exclude official reserves and IMF credit (and sometimes central bank loans) in order to focus on pri-

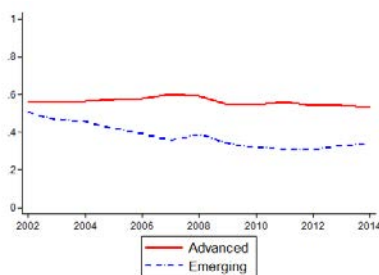
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<sup>14</sup>There are not enough developing countries in the outflows sample to include an average, so only lines for the advanced and emerging groups (exclusive of countries in the developing group) are included.

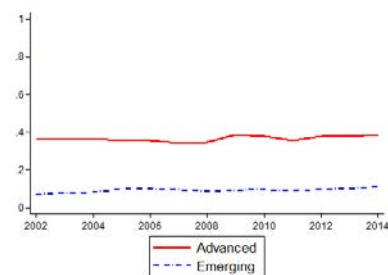
Figure 3: Composition of External Assets by Asset Type and Sector



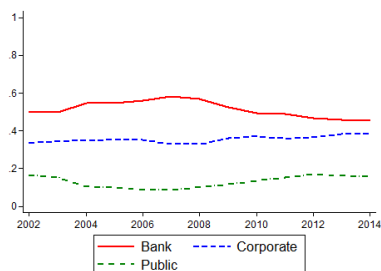
(a) Share of Debt in External Assets



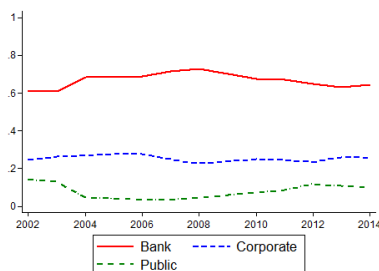
(b) Share of Other Investment Debt Assets in Total External Debt Assets



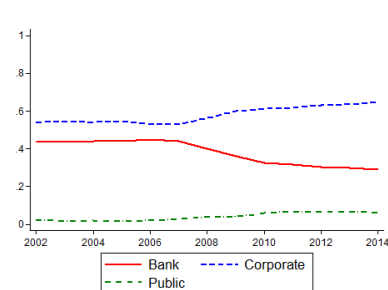
(c) Share of Portfolio Debt Assets in Total External Debt Assets



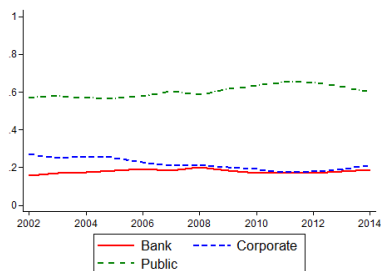
(d) Sector Shares of Total External Debt Assets - Advanced



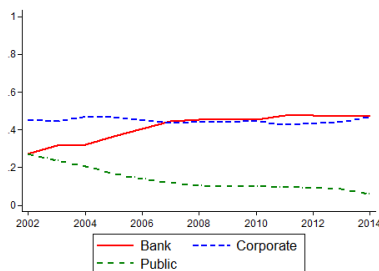
(e) Sector Shares of Other Investment Debt Assets - Advanced



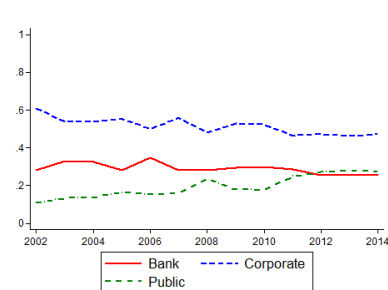
(f) Sector Shares of Portfolio Debt Assets - Advanced



(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

Source: Raw data from IIP and BIS. Final data is constructed by the authors. Total Debt includes official reserves.

vate inflows (see [Forbes and Warnock \(2012\)](#), [Bluedorn, Duttagupta, Guajardo, and Topalova \(2013\)](#), and [Milesi-Ferretti and Tille \(2011\)](#), [Bluedorn et al. \(2013\)](#), for example). Given the substantial amount of public sector debt under portfolio securities, the above studies will still have public flows as they do not separate portfolio debt into private and public sectors.

The closest papers to our paper are [Arslanalp and Tsuda \(2014b\)](#) and [Arslanalp and Tsuda \(2014a\)](#). These papers decompose sovereign/government loan and bond debt by creditor. They employ the IMF and World Bank's Quarterly External Debt Statistics (QEDS) data to

distinguish between foreign and domestic creditors. They also use BIS data to identify external bank lenders, similar to our approach (described below and in Appendix B). Their exercise is only for the sovereign sector and starts in 2005, whereas we consider all three sectors; sovereigns, banks, corporates and start in 1996.

We do not break down portfolio (non-FDI) equity flows by sector, due to the lack of available external datasets with which to fill in the missing data. We do however consider FDI debt inflows in our sector decomposition. Galstyan, Lane, Mehigan, and Mercado (2016) use data starting only after 2013 from the IMF’s Coordinated Portfolio Investment Survey (CPIS) to examine portfolio debt and portfolio equity stocks by the sectoral identity of the issuer and holder of the security. While this data has a more granular breakdown, it is only available for recent years, only for portfolio instruments, and only at a semi-annual frequency. In contrast, we focus on all the components of debt, that is the flow of portfolio debt and other investment debt by sector, over a much longer time horizon in quarterly data.

Due to its large coverage of countries, long time series, coverage of multiple instruments (asset classes), and quarterly frequency, our dataset is an important contribution to capital flows research. We next detail our methodology.

## 2.1 Data Construction

What is commonly called “gross flows” in the literature is actually more accurately described as “net inflows” and “net outflows”, which are broadly defined as follows:

$$NetInflows = GrossLiabilityFlows - Repayments \quad (1)$$

$$NetOutflows = GrossAssetFlows - Disinvestment \quad (2)$$

Thus, although these measures are often called “gross”, they can be positive or negative. The separation of flows into asset and liability flows allows interpreting liability flows as inflows from foreign agents, and asset flows as outflows by domestic agents. This is the primary working definition of capital flows in the BOP and elsewhere, which we use across all data sources for consistency.

The focus of this paper is on the differentiation of capital flows by source or destination sector in the domestic economy. The domestic economy refers to entities that are resident

in that economy, a rule known as the “Residence Principle” , regardless of the nationality of the entity. This is the basis upon which the BOP data is compiled, which we match when performing our filling exercise. The term “sector” is used here to refer to institutional sectors: general government, central banks, depository corporations except the central bank (“banks”), and other sectors (“corporates”).<sup>15</sup>

To build our dataset, we combine and harmonize several publicly available sources: Balance of Payments (BOP) and International Investment Position (IIP) statistics of the International Monetary Fund (IMF), Locational Bank Statistics (LBS) and Consolidated Bank Statistics (CBS) from the Bank for International Settlements (BIS), International Debt Securities (IDS) Statistics from the BIS, Quarterly External Debt Statistics (QEDS) of the IMF and World Bank (WB), and Debt Reporting System (DRS) data of the WB.<sup>16</sup>

The cornerstone of our dataset is the Balance of Payments (BOP) data produced by the IMF, which is the most comprehensive source of international capital flow data across countries. The BOP data, which is reported to the IMF by country statistical offices, captures capital flows into and out of a given country. The accompanying stock measures of external assets and liabilities are captured in the IMF’s International Investment Position (IIP) data. Capital flows are measured as asset flows (outflows), liability flows (inflows), and net flows (inflows - outflows). We focus on the financial account portion of the data and the latest (6th) version of the balance of payments manual (BPM6). More details on the BOP data, along with its different presentations and versions, are given in Appendix A.2.<sup>17</sup>

Figure 4 illustrates the structure of the BOP data. In simple terms, capital flows in the BOP are split into three main categories: direct investment, portfolio investment, and other investment; and an important public sector outflow category, official reserves.<sup>18</sup> Each of these categories, except reserves, can be split into debt and equity components, though other invest-

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<sup>15</sup>It should be noted that the BOP category “other sectors” is broader than what is captured by the term “corporates”. Nevertheless, in most cases, there is fairly broad overlap between the two categories. That is why, in the rest of this paper, we use the two terms interchangeably for presentational convenience.

<sup>16</sup>It should be noted that, even though combining different data sources to complement BOP/IIP statistics is rarely done at the global level, this is exactly what many country-level BOP/IIP compilers do on a regular basis (e.g. many country BOP/IIP compilers use the BIS IBS data series on banks’ cross-border deposit liabilities to the residents of their respective countries in order to enhance their BOP/IIP compilation).

<sup>17</sup>See the 6th Edition Balance of Payments Manual (BPM6) Appendix 8 for more details on the differences between the previous edition (BPM5) and BPM6.

<sup>18</sup>The remaining category is financial derivatives, which is small and sparsely reported, previously included as a part of portfolio investment.

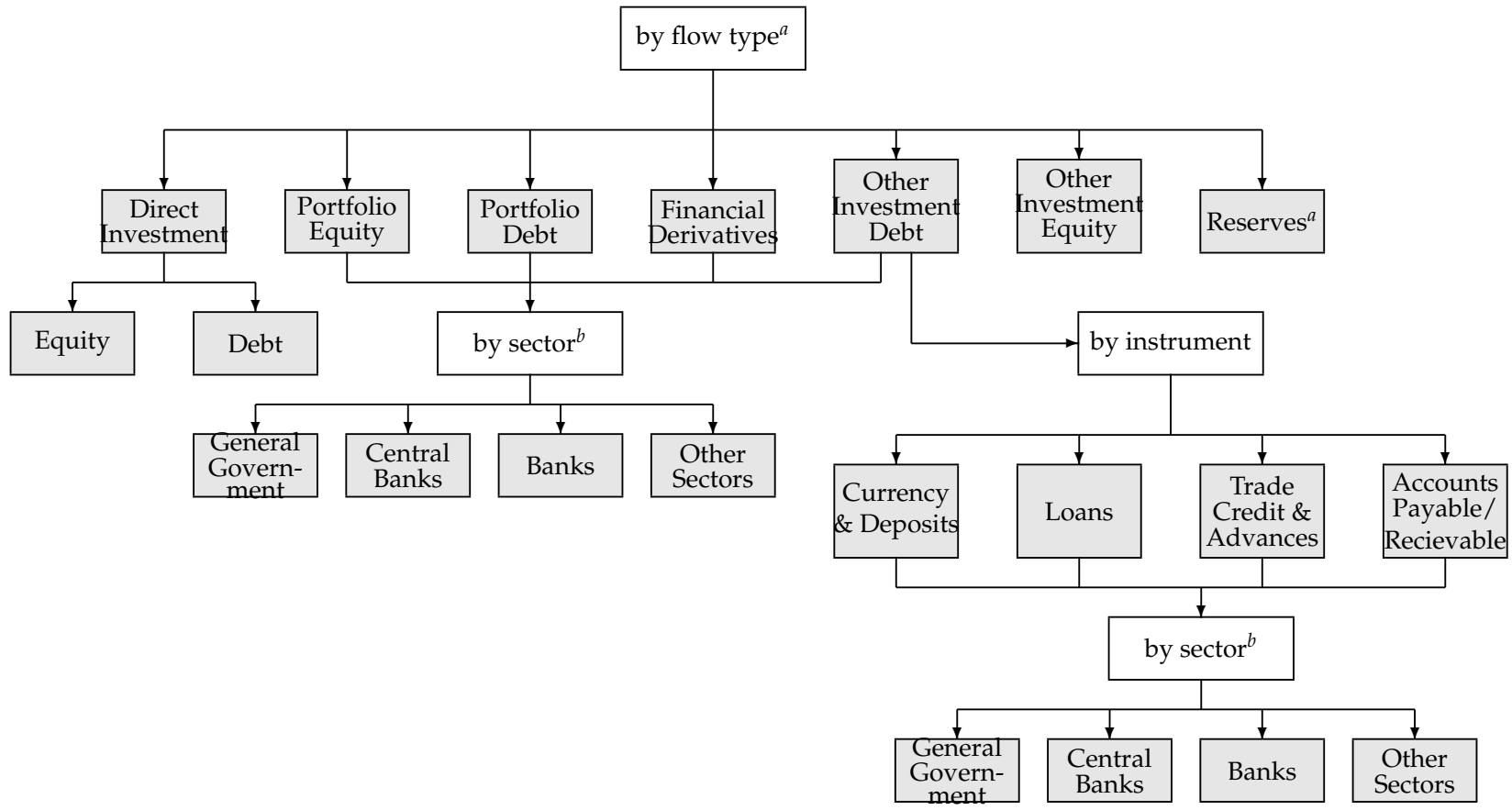
ment equity is negligible. Thus, inflows and outflows can be summarized as:

$$Inflows_t = DIE_t^{in} + DID_t^{in} + PE_t^{in} + PD_t^{in} + OID_t^{in} \quad (3)$$

$$Outflows_t = DIE_t^{out} + DID_t^{out} + PE_t^{out} + PD_t^{out} + OID_t^{out} + Res_t^{out} \quad (4)$$



Figure 4: 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.

where DIE is direct investment equity, DID is direct investment debt, PE is portfolio equity, PD is portfolio debt, OID is other investment debt, and Res is reserves. For portfolio investment debt and equity and other investment debt, the flows can be further subdivided by domestic sector. Other investment debt can also be decomposed by instrument and then by sector. While in theory each type of capital flow can be disaggregated by the domestic sector, in practice, however, the coverage of such disaggregated information in the BOP tends to be sparse, especially for EM/developing countries and earlier years. To be absolutely clear, capital flow types (asset classes) are generally very well reported in *aggregate* terms in the BOP data, and the reporting of the sectoral breakdowns has improved in recent years. Nevertheless, for most EMDE and years before 2005 the reporting of the data by sector is much less exhaustive.

Given the extent of missing observations<sup>19</sup> in the BOP data, we proceed with a “filling” exercise to replace these missing values. We focus on debt inflows, consisting primarily of other investment debt and portfolio debt. Other investment debt flows are important since the vast majority of external bank flows are in this category. Crucially, this category also includes some cross-border loans to corporates and loans to sovereigns, such as IMF credit. In most countries, sovereigns tend to borrow externally primarily via bonds, which appear under the portfolio debt category. When bond financing to emerging market borrowers, including governments, dries up, emerging market sovereigns rely more on loans.<sup>20,21</sup>

In order to get a larger, longer, and balanced panel of countries with debt flows split by sector, we proceed with the following methodology for our data filling exercise. When the BOP data contains the total for the category and for three out of the four sectors, we take the total and subtract the 3 reported sectors in order to obtain the fourth sector. This assumes that

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<sup>19</sup> Assuming missing data is zero may or may not be accurate depending on the country under consideration, as it is difficult to tell a true zero from a missing observation in the BOP data.

<sup>20</sup> Figure C3 in Appendix C shows that this is the case during the global financial crisis.

<sup>21</sup> Identifying the appropriate variables from the BOP data is not as easy as it sounds. Unfortunately, in the public download of the BOP data, available on the IMF’s website, the variables for other investment debt by sector are mislabeled as “other equity”, and so may be difficult to find. They are labeled as “...Other Investment, Other Equity..., Debt Instruments, ...”. For example, the full label for other investment debt for Other Sectors (which we refer to as “Corporates”) is “Financial Account, Other Investment, Other Equity, Net Incurrence of Liabilities, Debt Instruments, Other Sectors, US Dollars”. The letter codes (EDD2 Codes) for these variables are BFOLOO\_BP6\_USD, BFOLOGFR\_BP6\_USD, BFOLODC\_BP6\_USD, and BFOLOCBFR\_BP6\_USD. On the asset flow side, these variables are BFOADO\_BP6\_USD, BFOADG\_BP6\_USD, BFOADDC\_BP6\_USD, and BFOADCB\_BP6\_USD. In reality, other investment equity (which is usually very small) is the only category within other investment that is not split by borrowing sector. We thank Gian-Maria Milesi-Ferretti and IMF Statistics for helping us uncover this.

the reported BOP data is fully accurate, but our results are robust to eliminating this step and relying solely on external sources.

For the remaining observations where the sector data is still missing, we construct measures of portfolio debt and other investment debt inflows by sector from several alternative datasets. The data that fills in the most observations in our dataset is from the BIS. We use the BIS International Debt Securities dataset (IDS), which captures securities issued in international markets, to fill in the portfolio debt flows series.<sup>22</sup> The other important BIS dataset is the International Banking Statistics (IBS), capturing cross-border bank flows, which we use to fill the missing data under other investment debt.<sup>23</sup> Here, we only use loan lending by BIS reporting banks, so as not to capture direct investment flows or debt securities holdings.<sup>24,25</sup> We then complement these loans with any other non-missing data from the BOP for particular instruments within other investment debt (trade credit, IMF credit, etc.) to get a more complete and accurate measure of other investment debt flows for each sector.<sup>26</sup> While there may be reasons why the sectoral break down of debt inflows was not reported by particular countries in particular years, the BIS data has the benefit of being collected from the main lending countries instead of the borrower country (or in the case of debt securities, directly from the issued security itself). Thus, it avoids whatever underlying problems with data construction and reporting that may have generated the missing observation in the first place.<sup>27</sup>

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<sup>22</sup>The IMF's Coordinated Investment Portfolio Survey (CPIS) database also reports data on sectoral breakdowns for portfolio equity and portfolio debt flows. However, these breakdowns are available only since 2013 and only at a semiannual frequency; more importantly, the CPIS does not have data on other investment debt flows.

<sup>23</sup>The BIS bank data captures the overwhelming majority of cross-border banking activity (BIS, 2015), but some banking flows between non-BIS reporting EM may not be captured (e.g. Polish banks lending to Nigeria, etc.).

<sup>24</sup>Debt security flows would already be captured in portfolio debt (or the equivalent filling series). In principle, there could be an overlap between "direct investment debt" series and the "BIS loans" series if the loan is from a BIS reporting bank to an offshore non-financial entity in which the bank has at least a 10% ownership stake. In practice, we expect this to be small.

<sup>25</sup>A small number AEs exhibit some discrepancies between the BOP data and the BIS Bank data (e.g. Japan, Switzerland, and the US). These are isolated cases that have already been well documented. As a rule, we use BOP data, which is generally well reported for these cases, and other data sources first to avoid these issues.

<sup>26</sup>In some cases, the flows of other investment debt, by sector or in total, are reported as coming from just one instrument (usually loans) even though in reality they reflect flows from other instruments as well (e.g. trade credit). So, summing the subcomponents of other investment can capture the proper total in such cases, but this is almost always not necessary as other investment debt itself is reported when the underlying instruments have non-missing data (in some cases, an exception is the reporting of IMF credit, which may be known even if the total other investment debt is not known). We thank Gian-Maria Milesi-Ferretti for bringing these issues to our attention.

<sup>27</sup>We remove exceptional financing flows to banks and corporates, within portfolio debt and other investment debt, and reassign them to the central bank. Exceptional financing captures financial flows made or fostered by the authorities for balance of payments needs. Thus, they can be seen as a substitute for reserves or IMF Credit. See the 6th Edition BOP Manual, paragraph A1.1.

While the BIS data has extensive coverage and captures a vast amount of capital flows, in some cases it may not match well with the BOP data. An important example is that of advanced economy (AE) government bonds, which are issued domestically and then traded abroad. These flows would not be captured by the BIS debt securities data, which captures exclusively bonds that are issued in international markets. Thus for public sector debt generally, and for corporate sector portfolio debt in AEs, we rely first on measures derived from IIP, compiled concurrently with the BOP data by the IMF, and the QEDS data produced jointly by the IMF and World Bank. These data have the same sectoral and capital flow definitions and breakdowns, making them comparable to the BOP data. These are stock measures, which we first difference with a simple currency adjustment to approximate flows. While imperfect, these stock-derived measures often line up very well with reported BOP flow data.

We deflate GDP and all capital flows to 1996 USD and express them in billions.<sup>28</sup> Additionally, we construct accompanying stock measures of external debt by sector, which were previewed earlier. To do so, we rely first on the IIP data as the main source. When this is missing after the internal fill within the IIP dataset, we rely on QEDS data on external debt by sector. We fill any remaining observations with our BIS estimates.

A detailed description of the datasets and our construction of the data to fill missing observations can be found in Appendix A.3. Here, we briefly illustrate the validity of our approach. To gauge how well our estimates capture the true inflows, we undertake a counterfactual exercise. We take a sample of countries where BOP data by sector is non-missing over 2006q1-2013q4. Then we compare this data to our estimates done for this period as if the BOP data were missing. Then, for each country group, we plot the aggregate flows for each sector and capital flow type using non-missing BOP data, and our constructed estimates. Figures A3 and A4 in Appendix A.3 report these plots for both other investment debt flows and portfolio debt flows for each sector. The match is close, with a correlation for total debt inflows over 0.86, even though the period includes the volatile capital flows around the 2008 crisis. It thus speaks to the quality of our constructed estimates to fill missing data over the entire sample. On the whole, our filled series capture most of the volume and variation of inflows for most countries and allow us to extend substantially the coverage of our dataset.

The last debt category in the BOP is Direct Investment Debt (DID). Direct investment contains both debt and equity flows and is split by debt and equity components in the BOP data.

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<sup>28</sup>Quarterly GDP data is from Datastream and national sources. We deflate all series using US CPI from FRED.

However, it is not disaggregated by sector in the BOP data. Yet, with a mild assumption, DID inflows can be attributed almost entirely to the corporate sector.<sup>29</sup> We include direct investment debt in total debt and corporate debt inflows in our regression analysis. More details on the contribution of direct investment debt are given in Appendix C.2.

To complement our extensive dataset on capital inflows, we also construct a dataset of capital outflows. Due to a comparative lack of complementary external datasets, we do very little external filling of data for capital outflows, and hence describe them in less detail. As with inflows, we start from the BOP data and first do an internal filling exercise. We combine the general government and central bank sectors into a single (public) sector, so we can fill the missing sector if two sectors and the total are non-missing.<sup>30</sup> The one external fill that we do for outflows is for the banking sector. We fill in portfolio debt asset flows and other investment debt asset flows using the BIS banking data (Locational Banking Statistics by Residency, LBS/R), which has information on bank cross-border claims in each instrument.<sup>31</sup>

## 2.2 Coverage of the New Dataset

We divide the countries into three groups by level of development: advanced, emerging, and developing.<sup>32</sup> In our sample of annual capital inflows, we have 89 countries (25 advanced, 34 emerging, 30 developing).<sup>33</sup> We exclude financial centers (e.g. Panama, Hong Kong, Bermuda) to avoid distorting the patterns in the data for the typical country, but capital flows between

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<sup>29</sup>Debt flows between related enterprises are recorded as direct investment debt only when at least one counterparty is a non-financial firm. Direct investment debt flows between two financial firms (including banks) are instead classified as either portfolio investment debt or other investment debt (depending on the instrument type). If direct investment debt flows from non-financial firms to financial firms are negligible, then we can attribute all direct investment debt as flows either from financial firms to non-financial firms or flows from non-financial firms to non-financial firms. In either case, the borrowing sector is the non-financial sector and hence direct investment debt inflows can be assigned in full to the corporate sector.

<sup>30</sup>Note that combining government and central banks into a single sector makes the internal filling exercise more fruitful, as only banks and corporates need to be non-missing in order to fill missing data for the public sector.

<sup>31</sup>This data only covers banks resident in BIS reporting countries, and so is more limited in terms of coverage than the BIS data used for inflows. Additionally, most BIS reporting countries have decent reporting of the sectoral breakdown in the BOP data. Hence, this filling exercise complements a few gaps in the BOP data, but largely the outflows dataset is derived solely from the BOP.

<sup>32</sup>We rely on the 2000 IMF WEO classification to define the group of advanced economies. Generally, the WEO does not divide emerging and developing countries into separate groups. We use the MSCI and IEO-IMF classifications to guide the definition of our EM group.

<sup>33</sup>We are unable to make the outflow sample as large as the inflow sample because data on liabilities owed is more widely reported than data on assets owned, so we do not have many comparable filling series to replace missing outflows values in the BOP. Thus, while our efforts do improve our coverage of outflows, we focus on the contribution to inflow coverage in this section.

financial centers and the economies in our sample are still captured by the respective counterparty country's flows. At the quarterly frequency, our inflow sample drops to 85 countries, leaving off El Salvador, Mongolia, Montenegro, and Serbia.

Table A5 in the appendix illustrates the impact of our data filling exercise on sample coverage for inflows. For each capital flow type, sector, and country group, the table shows the percentage of observations in our balanced panel that come from the raw BOP data, from our internal filling procedure, and from our filling from external data sources. Generally speaking, developing countries, central banks, and portfolio debt tend to have less data available in the original BOP. Our internal filling procedure makes a large difference for the coverage of central banks, but otherwise does not provide many more observations for portfolio debt and/or developing countries. Our external filling procedure, on the other hand, makes a large difference, especially for the quarterly data, where it fills 25-40 percent of observations for EM and 75-90 percent of observations for developing countries that were missing under portfolio debt. In the case of other investment debt, only 11 percent of observations are filled for EM, but for developing countries 40-50 percent of observations are filled. A sizable number of observations are filled by external data also for advanced economies: 20-30 percent for portfolio debt observations, and 15-18 percent of other investment debt.

Our filling exercise has a dramatic impact on the time and country coverage of the inflow data. A balanced sample requires that portfolio debt and other investment debt not be missing for any of the 4 sectors in any period for each country. With 8 components required to be non-missing in each period, the probability that at least one is missing is high. With no adjustments to the BOP data, we have 0 countries in our sample (12 in the annual data). After our internal BOP fill, our sample of countries increases to 10 (16 in the annual data). After incorporating the BIS, IIP, and QEDS datasets, our balanced sample increases to 85 countries (89 in the annual data). Given the advantages of a balanced country sample for cross-section and panel regression analysis, the impact of our data filling on sample size can be very consequential.<sup>34</sup>

Figure A1 in the appendix compares aggregate inflows as measured by our filled data and from the BOP alone, for total external debt of banks and corporates in our samples of AE and EM. We plot annual flows here for clarity. These graphs show that generally both series tell the same story, but there are periods in which accounting for the missing data makes a significant difference. For advanced economy corporates, a significant expansion leading up to the 2008

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<sup>34</sup>Note that our inflow sample and outflow sample are not the same, but both samples are balanced panels.

crisis and the subsequent contraction are missed. This is due primarily to filling in portfolio debt data for the US and Spain for the 2008 surge, as well as a few other AE for the earlier 2001 peak. For EM, both banks and corporates had much larger flows relative to the BOP measure following the 2008 collapse, driven primarily by filling data for other investment debt inflows for China.

Figure A2 in the appendix plots total external debt inflows for government and central bank sectors. Missing U.S. government portfolio debt drives the difference for the AE in panel (a). EM governments and AE central banks are fairly well represented in terms of volume. Note that net inflows can be negative as well as positive, which is the case for EM central banks, where some missing data consists of negative net inflows, which brings our filled data below the raw BOP total. The surge at the end of the sample for EM central banks is driven by China.

In summary, our dataset captures a large volume of capital inflows by sector that would otherwise be missed. Additionally, our data increases the number of both large and small countries with debt inflow data by sector over a long time horizon at the quarterly frequency.

### 3 Descriptive Patterns

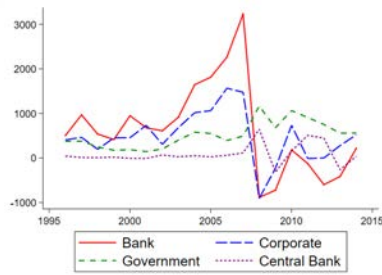
In this section, we present patterns and trends observed in our data over time. We use the annual version of the dataset for clarity in the figures.

Figure 5 (a)-(c) plots the aggregate debt inflows by sector for each country group. The buildup and collapse surrounding the 2008 global financial crisis (GFC) is the most striking feature in all of these figures. An interesting distinction between AE and EM is the response following the crisis. While flows to advanced economies collapse and remain fairly low, flows to emerging and developing countries rebound and increase across all sectors. An important difference in flows by sector is in the evolution of debt inflows to governments. Across all country groups, governments see an increase in debt inflows precisely when private flows collapse, with an especially large and sustained increase for developing nations relative to their private flows. Advanced-country central banks also see a small increase as private flows collapse.

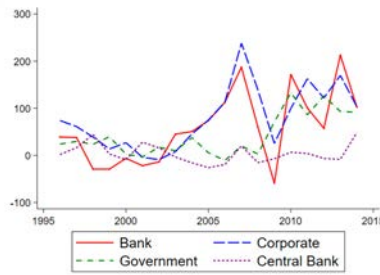
Panels (d)-(i) plot portfolio debt and other investment debt flows. They reveal that the increase in inflows for governments comes primarily in the form of bonds, with the exception of



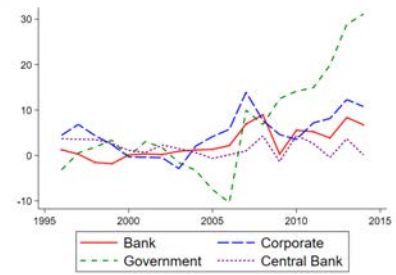
Figure 5: Aggregate External Debt Inflows, Billions 1996 USD



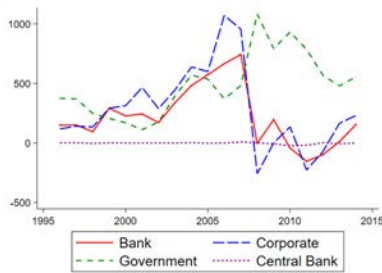
(a) Total Debt, Advanced



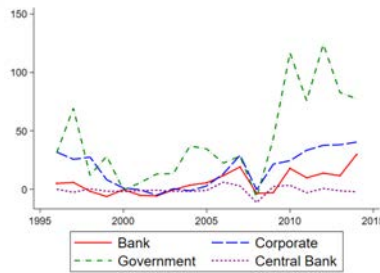
(b) Total Debt, Emerging



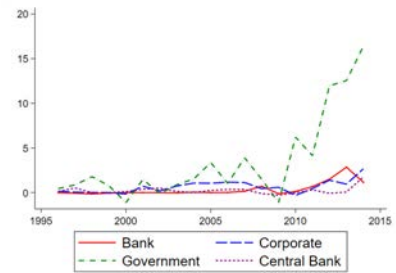
(c) Total Debt, Developing



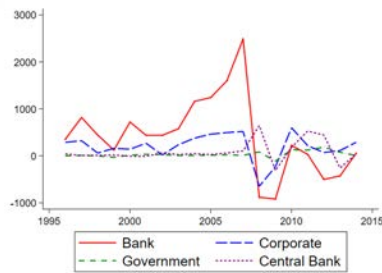
(d) Portfolio Debt, Advanced



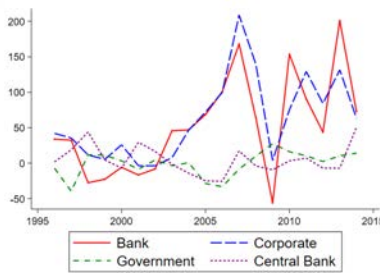
(e) Portfolio Debt, Emerging



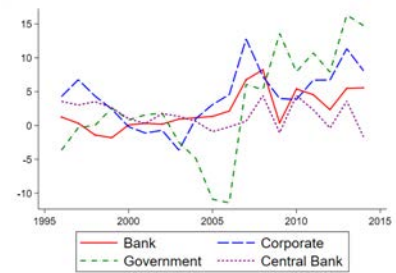
(f) Portfolio Debt, Developing



(g) Other Investment Debt, Advanced



(h) Other Investment Debt, Emerging

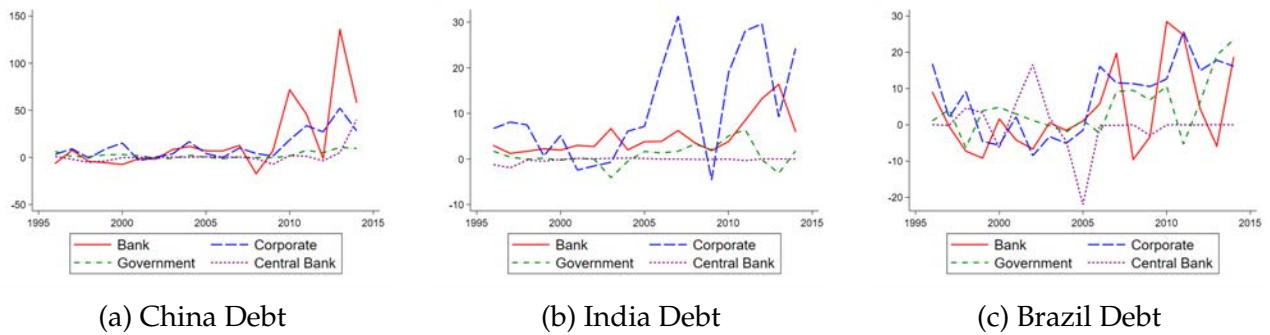


(i) Other Investment Debt, Developing

Source: BOP, IIP, QEDS, and BIS, authors' calculations. Total debt is portfolio debt + other investment debt.

developing country governments, which also see an increase in other investment debt funding (i.e. loans). Advanced economy corporates also have a significant share of their inflows coming in the form of portfolio debt. Although emerging market banks and corporates see an increase in bond flows in the wake of the GFC, the aggregate pattern of their flows is driven primarily by other investment debt. Advanced country banks get the lion's share of capital inflows prior to 2008, the majority of which is in the form of other investment. However, they see consistent negative net inflows for several years following the GFC, reflecting the deleveraging of these institutions. Developing country banks and corporates are also primarily receiving inflows in the form of other investment debt.

Figure 6: Emerging Market External Debt Inflows, Billions 1996 USD



Source: BOP, IIP, QEDS, and BIS, authors' calculations. Debt is portfolio debt + other investment debt.

Much of the increase in emerging-market private debt after 2008 is attributable to a few large EM. Foremost among these is China, whose debt inflows are shown in Figure 6. China has poor sector coverage in the BOP data, so much of the measured effect is derived from our data filling series. Both bank and corporate inflows increase substantially, but bank inflows to China have been much larger. In India, the corporate sector has been the dominant recipient of debt flows, though bank flows increased considerably after 2010. Brazil saw a sustained increase in corporate debt inflows, and volatile increases in bank and government flows.

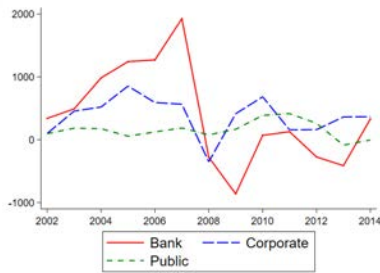
The result that public sector gross inflows increase when private gross inflows are falling, at the business cycle frequency, is an important finding that complements existing work on long-term movements in public vs private net flows (Aguilar & Amador, 2011; Alfaro, Kalemli-Özcan, & Volosovych, 2014; Gourinchas & Jeanne, 2013). The public sector is often able to borrow from abroad even as such funding dries up for the private sector. Thus, the public sector acts as a countervailing force to the private sector, smoothing the total debt inflows into the country.<sup>35</sup>

Turning to outflows, Figure 7 plots the debt asset flows for our sample of 31 countries over 2002-2014. The public sector is the sum of central banks and general government sectors, and total debt asset flows for the public sector include the flow of reserves.

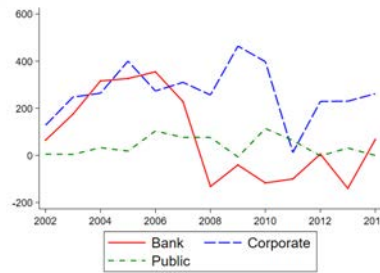
For advanced countries, we see the same pattern for total and other investment debt as

<sup>35</sup>Thus far our figures have plotted aggregate flows, but figures showing the dynamic patterns of average flows to GDP are shown in Appendix C. Figure C5 illustrates the impact of the public sector for an average country using the average of flows to GDP. It plots the cross-country average of total debt flows (portfolio debt + other investment debt) to GDP as compared to flows from just the private sectors (Banks and Corporates) for advanced and emerging countries, with the VIX shown in red (right axis), for reference. For both sets of countries, but especially for EM, the drops in private inflows are larger than the corresponding drops in total inflows, reflecting the potential role of the sovereign to smooth out sudden stops.

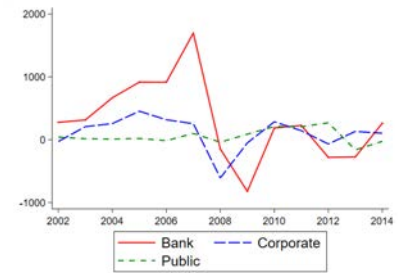
Figure 7: Aggregate Asset Outflows, Billions USD



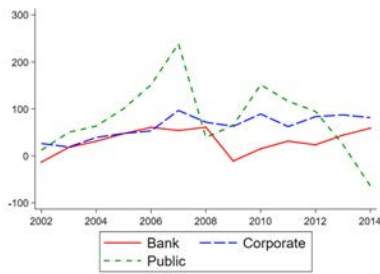
(a) Total Debt Asset Flows, Advanced



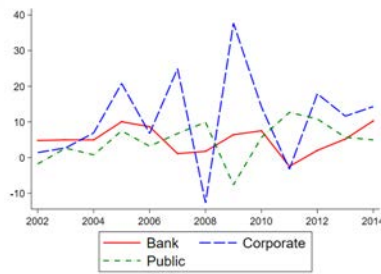
(b) Portfolio Debt Asset Flows, Advanced



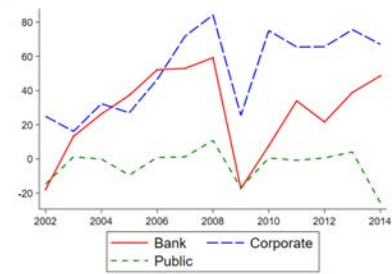
(c) Other Investment Debt Asset Flows, Advanced



(d) Total Debt Asset Flows, Emerging



(e) Portfolio Debt Asset Flows, Emerging



(f) Other Investment Debt Asset Flows, Emerging

Source: BOP and BIS, authors' calculations.

we see with inflows. More concretely, the landscape of flows is dominated by the buildup of private flows in the mid-2000s, led by the banking sector, followed by a sharp contraction at the time of the global financial crisis. The public sector plays a relatively small role for AE outflows. Portfolio debt outflows for AEs show a sharp contraction for banks at the time of the crisis. Nevertheless, there is actually an increase in external portfolio debt investment by the corporate sector, followed by a brief contraction coinciding more closely to the Eurozone crisis.

Emerging market banks and corporates show a contraction in their other investment debt outflows, followed by a much stronger rebound than that seen in AEs. However, the decline in corporate other investment debt is offset by an increase in corporate portfolio debt outflows. EM public sector sees a drop in both portfolio and other investment outward investment around the crisis, but portfolio debt recovers robustly in the following years. However, public sector outflows, and total EM debt outflows, are clearly dominated by reserves, as seen in panel (d), with a large buildup and collapse mirroring the private sector inflow and outflows pattern.

## 4 Empirical Analysis

### 4.1 Methodology

We examine the response of sectoral capital inflows to representative push and pull factors to highlight the important differences in response by sector. Our push factor is a proxy for the global financial cycle/global risk appetite (the VIX), and our pull factor is the domestic business cycle (GDP growth). We do this analysis in a panel regression setup with our quarterly data. We focus on the following simple specification:

$$\frac{INFLOW_{it}^s}{GDP_{it}} = \alpha_i^s + \beta^s \log(VIX_{t-1}) + \gamma^s GDPGrowth_{it-1} + \epsilon_{it}^s \quad (5)$$

Our dependent variable is capital flows as a percent of GDP. We run each regression separately for each sector and capital flow type.  $INFLOW_{it}^s$  is a measure of capital inflows (in total or by instrument) to sector  $s \in \{Public, Banks, Corp., All\}$  for country  $i$  in quarter  $t$ . The regressions are run separately by sector, so that for each sector,  $\alpha_i$  is effectively a country-sector fixed effect.  $VIX_{t-1}$  is the option-implied volatility of the S&P 500 index, which enters into the regression in logged values. The VIX is often used as a measure of global risk aversion or a proxy for the global financial cycle and global financial conditions, and represents a standard push factor for capital inflows, particularly to EM.  $GDPGrowth_{it-1}$  is real year-on-year GDP growth for country  $i$  in the previous period, which is a standard pull factor driving foreign capital to a particular country. Our standard errors are clustered at the country level.

There are several ways in which we could produce our estimated results. Our preferred method, described previously, we label as AHKS. One alternative is to skip the internal fill and rely solely on external data to replace missing BOP values. One may prefer this since the fact that the missing sector was not filled in may indicate that the BOP data is less trustworthy (eg the total for that instrument in the BOP may not be accurate). We label this "AHKS noIntFill". Another alternative is to take our AHKS estimation and force the sum of the sectors to match the reported total in the BOP. Thus, this version fully respects the BOP data, and only allocates the total reported there into the different sectors. We label this version "AHKS match". Lastly, direct investment debt (DID) may be an important component of debt inflows. Thus, we can also add DID to the all sectors total, as well as to the corporate sector. We show that our main results are robust to these alternative constructions.

We present our results using a sample which is balanced across sectors, but not across countries. That is to say, we keep country-year observations that have data for all sectors available. Thus across regressions for different sectors, we have the same set of country-year observations represented. We show robustness to different samples (fully unbalanced, which uses any available data in each regression; fully balanced across both sectors and countries, where we only keep observations for countries with data for all sectors over the entire time period) in the appendix. Our main sample covers 63 countries: 23 advanced, 31 emerging, and 9 developing over 1997q1-2014q4.<sup>36</sup>

## 4.2 Capital Inflows by Sector

Table 1 presents the results for inflows to all sectors (that is, the sum of the four sectors). We present the results using the raw Balance of Payments (BOP) in column 1 for comparison with our constructed data in column 2. Due to the missing data, column 1 has few observations and thus lacks statistical significance. While the topline items in BOP are well reported (i.e. total portfolio debt inflows, etc.), this illustrates the important gap in coverage that arises when using the data split by sector.

Column 2 shows the baseline relationship between our representative push and pull factors. Inflows respond negatively to increases in the VIX, while they respond positively to greater GDP growth in the domestic economy.

Importantly, our results are robust and consistent across alternative ways of constructing our dataset. Column 3 shows the outcome if we do not use an internal fill of the BOP data. Column 4 presents the results when we force our data to add up to the BOP total (i.e. the topline items by instrument). And column 5 shows results adding direct investment debt (DID) to the AHKS data. Significance and size of coefficients are all similar across specifications, including for both advanced economies (panel B) and emerging markets (panel C).

Table 2 focuses in on the sector splits, still showing the different constructions of the data and comparison with the raw BOP results. Again, we see that the raw BOP results are largely insignificant or otherwise inconsistent with results from our primary sample (columns (2), (6), and (10)).<sup>37</sup> Also, results are largely similar across the different dataset constructions.

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<sup>36</sup>Using quarterly GDP data significantly restricts our sample along both country and time dimensions. Table 3 relaxes this by using annual data. The samples of countries used are detailed in Appendix A.4.

<sup>37</sup>The coefficient on the VIX, when using the raw BOP sample, is significant for inflows to the public sector for

Table 1: Capital Inflows - All Sectors

Panel A: All Countries					
	(1) Raw BOP	(2) AHKS	(3) AHKS noIntFill	(4) AHKS match	(5) AHKS +DID
$\log(\text{VIX}_{t-1})$	-1.316 (2.021)	-3.260*** (0.737)	-3.249*** (0.733)	-3.309*** (0.707)	-3.927*** (0.933)
GDP Growth $_{it-1}$	0.0915 (0.0703)	0.142*** (0.0357)	0.138*** (0.0342)	0.140*** (0.0353)	0.142*** (0.0312)
Observations	290	4020	4009	4020	3721
$R^2$	0.040	0.035	0.034	0.035	0.040
Panel B: Advanced Economies					
	(1) Raw BOP	(2) AHKS	(3) AHKS noIntFill	(4) AHKS match	(5) AHKS +DID
$\log(\text{VIX}_{t-1})$	-1.787 (1.509)	-4.517*** (1.507)	-4.502*** (1.499)	-4.543*** (1.424)	-5.526*** (1.956)
GDP Growth $_{it-1}$	-0.0429 (0.166)	0.294** (0.105)	0.283*** (0.0990)	0.285** (0.105)	0.271*** (0.0812)
Observations	60	1656	1656	1656	1548
$R^2$	0.004	0.045	0.043	0.043	0.046
Panel C: Emerging Markets					
	(1) Raw BOP	(2) AHKS	(3) AHKS noIntFill	(4) AHKS match	(5) AHKS +DID
$\log(\text{VIX}_{t-1})$	-1.678 (2.556)	-2.733*** (0.663)	-2.709*** (0.666)	-2.811*** (0.656)	-2.928*** (0.753)
GDP Growth $_{it-1}$	0.113 (0.0804)	0.0813*** (0.0256)	0.0810*** (0.0255)	0.0816*** (0.0252)	0.0963*** (0.0294)
Observations	223	2036	2036	2036	1919
$R^2$	0.067	0.062	0.061	0.064	0.065

Sample is from 1997q1–2014q4. All regressions include country fixed effects. Errors are clustered at the country level. \*\* p < 0.05, \*\*\* p < 0.01

Capital inflows respond to these factors differently across sectors. Inflows to banks and corporates are quite similar, but inflows to AE corporates don't respond to domestic GDP growth like inflows to AE banks. The most notable difference is between these private sectors and the public sector. There is no response to the VIX for total inflows to the public sector.<sup>38</sup> In response to higher domestic GDP growth, inflows to sovereigns react differently between advanced and emerging countries. The response is positive (procyclical) in advanced countries, similar to their banks, but negative in emerging markets (countercyclical), opposite of the private sector.

These differences by sector are robust across a number of alternative specifications. Table C1 shows that the results are not driven by the 2008-9 period of the great financial crisis. Interestingly, it also reveals that the VIX is a stronger factor pre-crisis than post crisis, in line with [Amiti et al. \(2018\)](#). Inflows to advanced economy banks appear to become more procyclical after the crisis.

Table C2 shows that these results are robust to different ways of balancing the sample: fully unbalanced, fully balanced over 1997q1-2014q4, and fully balanced over 2002q4-2014q4.<sup>39</sup> This last sample includes more countries than the previous fully balanced sample, and shows EME public inflows moving positively with the VIX and corporate inflows including direct investment debt responding positively to GDP and negatively to the VIX. The results are also robust to normalizing by trend GDP instead of contemporaneous GDP (Table C4).

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all countries and especially emerging markets. We find this result in a few other specifications as well, which we note in our analysis below.

<sup>38</sup>Table C1 finds a positive coefficient in the period following the great financial crisis. Table C2 shows a positive response for inflows to emerging market sovereigns for a fully balanced panel over 2002q4-2014q4. Table C5 shows that other investment debt inflows to the public sector responds positively. These responses move opposite that of private inflows. Portfolio debt inflows to emerging market sovereigns responds negatively to the VIX, so emerging market sovereign bonds appear to be treated the same as their private sector borrowers when it comes to a tightening of international financial conditions.

<sup>39</sup>Fully balanced means that every country in the sample as data for all sectors and both instruments over the whole time frame.



Table 2: Inflows by Sector

Panel A: All Countries													
	Public				Banks				Corporates				
	(1) Raw BOP	(2) AHKS	(3) AHKS noIntFill	(4) AHKS match	(5) Raw BOP	(6) AHKS	(7) AHKS noIntFill	(8) AHKS match	(9) Raw BOP	(10) AHKS	(11) AHKS noIntFill	(12) AHKS match	(13) AHKS +DID
log(VIX <sub>t-1</sub> )	1.337** (0.483)	0.467 (0.364)	0.483 (0.364)	0.562 (0.354)	-2.708 (1.755)	-2.418*** (0.525)	-2.423*** (0.525)	-2.668*** (0.522)	-0.206 (0.212)	-1.045*** (0.243)	-1.043*** (0.243)	-0.987*** (0.232)	-1.280*** (0.385)
GDP Growth <sub>it-1</sub>	0.0179 (0.0289)	-0.0124 (0.0101)	-0.0144 (0.00991)	-0.0128 (0.0104)	0.0699 (0.0441)	0.116*** (0.0270)	0.116*** (0.0270)	0.112*** (0.0272)	0.00823 (0.00791)	0.0359*** (0.00772)	0.0362*** (0.00772)	0.0379*** (0.00795)	0.0442*** (0.00844)
Observations	290	4020	4009	4020	290	4020	4009	4020	290	4020	4009	4020	3721
R <sup>2</sup>	0.015	0.002	0.003	0.003	0.075	0.034	0.034	0.031	0.004	0.025	0.026	0.025	0.025
Panel B: Advanced Economies													
log(VIX <sub>t-1</sub> )	0.493 (0.962)	0.410 (0.791)	0.421 (0.793)	0.590 (0.760)	-0.919 (2.050)	-3.069*** (1.074)	-3.069*** (1.074)	-3.513*** (1.031)	-0.823 (0.847)	-1.160** (0.476)	-1.157** (0.476)	-0.997** (0.445)	-1.446 (0.803)
GDP Growth <sub>it-1</sub>	0.0376 (0.0393)	0.0563*** (0.0190)	0.0496** (0.0194)	0.0535** (0.0213)	0.00642 (0.124)	0.209** (0.0784)	0.209** (0.0784)	0.201** (0.0798)	-0.0463 (0.0476)	0.0225 (0.0170)	0.0226 (0.0170)	0.0280 (0.0179)	0.0202 (0.0171)
Observations	60	1656	1656	1656	60	1656	1656	1656	60	1656	1656	1656	1548
R <sup>2</sup>	0.016	0.008	0.006	0.007	0.002	0.032	0.032	0.029 R <sup>2</sup>	0.020	0.009	0.009	0.009	0.008
Panel C: Emerging Markets													
log(VIX <sub>t-1</sub> )	1.504** (0.545)	0.438 (0.263)	0.460 (0.266)	0.481 (0.268)	-3.282 (2.241)	-2.199*** (0.535)	-2.200*** (0.535)	-2.340*** (0.567)	-0.284 (0.211)	-0.956*** (0.291)	-0.957*** (0.291)	-0.976*** (0.286)	-1.179*** (0.392)
GDP Growth <sub>it-1</sub>	0.0127 (0.0336)	-0.0383*** (0.00934)	-0.0383*** (0.00925)	-0.0377*** (0.00938)	0.0823 (0.0503)	0.0842*** (0.0217)	0.0842*** (0.0217)	0.0827*** (0.0217)	0.0165*** (0.00344)	0.0334*** (0.00598)	0.0334*** (0.00598)	0.0337*** (0.00634)	0.0486*** (0.00814)
Observations	223	2036	2036	2036	223	2036	2036	2036	223	2036	2036	2036	1919
R <sup>2</sup>	0.018	0.025	0.025	0.024	0.154	0.098	0.098	0.094	0.017	0.059	0.059	0.058	0.062

Sample is from 1997q1–2014q4. All regressions include country fixed effects. Errors are clustered at the country level. \*\* p < 0.05, \*\*\* p < 0.01

We construct capital inflows by sector for a large number of countries, many of which do not have quarterly GDP data. This results in many emerging and developing economies being dropped from our primary regressions. In order to include these countries and analyze their inflows, we utilize the annual version of our dataset and perform the same regression. This adds 4 EMEs and 20 developing countries back into our sample, enough that we can present results for developing countries on their own (where previously they were only in the “All countries” regressions). These are shown in Table 3.

For EMEs, the results in the slower moving annual panel are consistent with our previous results at the quarterly frequency. Additionally, the positive coefficient on the VIX for inflows to sovereigns is significant, perhaps because these flows respond to larger global shocks rather than more frequent fluctuations. This movement opposite the private sector further highlights how different capital inflows to the public sector are, especially for emerging markets.

For developing countries, inflows are largely not reactive to either our selected push or pull factors. Nevertheless, inflows to banks in developing economies do appear to be negatively linked to the VIX, as they are for other country groups. This result highlights the importance of banks for connecting developing economies to the international financial system.

Regressions of capital flows on push and pull factors tend to have low  $R^2$  when using quarterly data. When using annual data, however,  $R^2$ 's tend to be closer to 0.2-0.3, considerably larger than those seen in Table 3. This is actually an artifact of the time period, as illustrated in Table 4. Regressions that are largely using data points from before the GFC, as would naturally be the case with most of the existing literature, have  $R^2$ 's of the expected magnitude. This holds for the topline flows from the BOP, as well as for the sector breakdowns in our data, particularly for AE and EM banks and EM corporates. As documented by [Amiti et al. \(2018\)](#), the post-GFC capital flow environment is quite different. Nevertheless, the two factors we examine still explain a considerable fraction of the variation in inflows to EM banks during the post-GFC period. Interestingly, the variation explained by them is quite low across the board for public inflows as well as flows to advanced economy corporates.

The above results once again underscore the importance of analyzing capital flows separately by sector, as different factors explain flows to each sector. Indeed, we present results using just two such factors in order to clearly illustrate the role of sectors in understanding capital flows. Table C6 shows other drivers of capital flows also have differing effects by sector and/or across AE vs EM countries. Thus, our findings suggest properly understanding the

Table 3: Annual Inflows - Emerging and Developing Economies

Panel A: Emerging Markets				
	(1) All	(2) Public	(3) Banks	(4) Corp.
log(VIX <sub>t-1</sub> )	-3.515*** (0.882)	0.662*** (0.228)	-3.056*** (0.793)	-1.153*** (0.228)
GDP Growth <sub>it-1</sub>	0.0746*** (0.0222)	-0.0320*** (0.00731)	0.0706*** (0.0180)	0.0365*** (0.00524)
Observations	628	628	628	628
R <sup>2</sup>	0.115	0.043	0.138	0.134
Panel B: Developing Countries				
log(VIX <sub>t-1</sub> )	-2.366 (1.179)	-0.407 (0.584)	-0.945** (0.441)	0.0547 (1.153)
GDP Growth <sub>it-1</sub>	0.0602 (0.0564)	-0.0142 (0.00731)	-0.0100 (0.0188)	0.0980 (0.0889)
Observations	516	516	516	516
R <sup>2</sup>	0.006	0.007	0.006	0.010

Sample is annual from 1997-2014. All regressions include country fixed effects. Errors are clustered at the country level. \*\* p < 0.05, \*\*\* p < 0.01

drivers of capital flows requires analyzing them while distinguishing among sectors.

### 4.3 Capital Outflows by Sector

Total capital outflows (i.e. the sum of all sectors) respond similarly to total capital inflows: negative response to the VIX (reflecting in part tighter conditions in international financial markets) and a positive response to GDP (procyclical). Emerging market outflows, however, don't significantly respond to domestic GDP. Looking at results by sector in columns (2)-(4), we see that again banks and corporates drive the negative response to the VIX. As for GDP response, outflows from the public sector and from banks are both procyclical.

Flows of official reserves are procyclical. This procyclicality at the global level is driven by EME sovereigns. Although the coefficient is only significant in the full-country sample, when results normalized by trend GDP, this result is significant for the EME sample (Table C4). This, along with the results for inflows, indicates that the public sector can serve as a countervailing force in terms of capital flows, as it borrows more when flows to the private sector fall, and it

Table 4: Annual Inflows and  $R^2$  by Period

Sample	Regression	1997 -2014	1997 -2007	2008 -2014
Advanced Economies	All BOP	0.13	0.19	0.08
	All AHKS	0.09	0.20	0.02
	Public AHKS	0.01	0.03	0.02
	Banks AHKS	0.08	0.19	0.003
	Corporates AHKS	0.05	0.06	0.03
Emerging Markets	All BOP	0.12	0.21	0.04
	All AHKS	0.11	0.17	0.04
	Public AHKS	0.04	0.04	0.03
	Banks AHKS	0.14	0.17	0.12
	Corporates AHKS	0.13	0.22	0.03

Numbers in this table are the the within- $R^2$  for annual regressions of capital inflows (for the indicated sector) on country fixed effects, log VIX, and GDP growth. Sample period indicated by the column.

builds up reserves when times are good and capital is flowing to the private sector.

Flows to EME banks and the public sector respond negatively to the VIX, including flows of reserves, but outflows by corporates do not show a significant response. EME outflows thus are more driven by external factors rather than internal factors.

Our results are again robust to a number of alternative specifications. Table C3 shows the outflow regressions for different ways of balancing the sample. There are not enough observations for a large balanced sample extending back to 1997, but a shorter balanced sample from 2002q4-2014q4 shows largely similar results. Results are also robust to normalizing by trend GDP (Table C4), with a few interesting results becoming more significant: outflows from AE sovereigns are shown to be procyclical, outflows of EM sovereigns, when including reserves, are also procyclical, and corporate outflows are procyclical for all countries and especially EMEs. And, as with inflows, Table C6 shows that other push or pull factors also show these important differences across sectors for outflows.

Table 5: Outflows by Sector

Panel A: All Countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Public	Banks	Corp.	Reserves	Total+ Reserves	Public+ Reserves
$\log(\text{VIX}_{t-1})$	-3.337*** (0.775)	-0.00978 (0.358)	-3.438*** (0.788)	-0.788*** (0.277)	-0.185 (0.342)	-3.582*** (0.859)	-0.266 (0.581)
$\text{GDP Growth}_{it-1}$	0.0723*** (0.0261)	0.0123** (0.00545)	0.0668** (0.0266)	0.00984 (0.00531)	0.0213** (0.0106)	0.0926*** (0.0279)	0.0341** (0.0129)
Observations	2620	2620	2620	2620	2620	2620	2620
$R^2$	0.033	0.002	0.033	0.007	0.003	0.033	0.005
Panel B: Advanced Economies							
$\log(\text{VIX}_{t-1})$	-5.669*** (1.486)	0.495 (0.757)	-6.100*** (1.467)	-1.451** (0.532)	0.606 (0.483)	-5.148*** (1.721)	1.067 (1.087)
$\text{GDP Growth}_{it-1}$	0.210*** (0.0742)	0.0236 (0.0118)	0.219*** (0.0750)	0.0122 (0.0123)	-0.000451 (0.0114)	0.214** (0.0768)	0.0270 (0.0215)
Observations	1170	1170	1170	1170	1170	1170	1170
$R^2$	0.066	0.003	0.077	0.011	0.005	0.058	0.005
Panel C: Emerging Markets							
$\log(\text{VIX}_{t-1})$	-1.648*** (0.389)	-0.560** (0.215)	-1.355*** (0.339)	-0.282 (0.242)	-0.985** (0.456)	-2.703*** (0.580)	-1.636*** (0.502)
$\text{GDP Growth}_{it-1}$	0.0107 (0.0118)	0.00268 (0.00464)	0.00350 (0.0109)	0.00877 (0.00529)	0.0275 (0.0137)	0.0347 (0.0190)	0.0293 (0.0156)
Observations	1301	1301	1301	1301	1301	1301	1301
$R^2$	0.020	0.007	0.011	0.006	0.010	0.026	0.014

Sample is from 1997q1–2014q4. All regressions include country fixed effects. Errors are clustered at the country level.

\*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4.4 Comovement of Capital Inflows and Outflows

Inflows and outflows have been shown in the literature to be highly correlated. Nevertheless, inflows and outflows to each sector can have different drivers, as shown above. We next examine correlations of capital inflows and outflows by sector to better understand their comovement and what drives the high correlation in aggregate inflows and outflows. Table 6 presents correlations conditional on country fixed effects, lagged GDP growth, and lagged log VIX (as from previous regressions). Our results are robust to using unconditional correlations, shown in Table C8.<sup>40</sup>

The strongest inflow-outflow correlations tend to be within-sectors (e.g. inflows to banks with outflows from banks) rather than across sectors. The highest correlation is between bank inflows with bank outflows. It is particularly strong in the case of AE banks. The negative correlations seen in the table always involve the public sector, once again reflecting the fact that public sector flows tend to move in the opposite direction to private sector flows. Emerging markets have much lower within-sector correlations for the private sector than advanced economies, though the within-public sector correlation is comparable.

These correlations, coupled with the regression results discussed above, provide an important insight into the nature of capital flows. Capital inflows to any country are largely controlled by investors in advanced economies. Outflows from advanced economies are also (by definition) driven by investors in advanced economies. Hence, inflows to both advanced and emerging economies tend to behave similarly, as do the inflows and outflows to and from advanced economies. Outflows from EMEs, which are driven by investors in EMEs, follow a different pattern. As a consequence, we see stronger correlations for advanced economy inflows and outflows (since they are driven by the same decision makers) than we do for emerging market inflows and outflows (since they are driven by different decision makers).

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<sup>40</sup>Tables C9 and C10 show heatmaps of conditional and unconditional correlations of flows split by both sector and instrument.

Table 6: Inflow and Outflow Conditional Correlations, by Sector

Panel A: All countries							
		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Inflows	Public	1					
	Banks	-0.0870***	1				
	Corps.	-0.0679***	0.155***	1			
Outflows	Public	0.346***	0.107***	0.00330	1		
	Banks	0.142***	0.686***	0.221***	-0.00916	1	
	Corps.	0.0483*	0.199***	0.515***	0.0205	0.206***	1
Panel B: Advanced Economies							
		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Inflows	Public	1					
	Banks	-0.112***	1				
	Corps.	-0.0774**	0.151***	1			
Outflows	Public	0.359***	0.109***	-0.00158	1		
	Banks	0.133***	0.745***	0.258***	-0.00606	1	
	Corps.	0.0401	0.193***	0.588***	-0.0103	0.216***	1
Panel C: Emerging Markets							
		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Inflows	Public	1					
	Banks	-0.121***	1				
	Corps.	-0.0648*	0.115***	1			
Outflows	Public	0.325***	0.0150	-0.00255	1		
	Banks	0.114***	0.306***	0.0582*	-0.105***	1	
	Corps.	0.0335	0.0692*	0.215***	-0.000202	0.0325	1

Correlations conditional on country fixed effects, lagged log VIX, and lagged GDP growth. Sample covers 1997q1-2014q4. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01



## 5 Discussion and Conclusion

We construct a novel data set for gross capital flows during 1996–2015 for a large set of countries at a quarterly frequency, focusing primarily on debt flows. We decompose debt inflows and outflows by borrower and lender type: banks, corporates and sovereigns. We use the standard BOP data from IMF as the starting source. In order to get a larger, longer, and more balanced panel of countries with debt flows split by sector, we proceed with a data filling exercise. When the BOP data by sector is missing, we use an internal filling procedure and then complement the gaps with other publicly available data from the IMF, WB, and BIS. Our data captures fairly accurately the volume and variation of aggregate flows for most countries and allows us to extend the coverage of the standard samples substantially.

We establish several novel facts with the new data. Public sector flows respond quite differently to (global and local) capital flow drivers, and thus tend to act as a countervailing force to private sector flows, especially in EMs. The impact of the main capital flow drivers has declined since the 2008 Global Financial Crisis, especially for AE banks and EM corporates but less so for EM banks. The high correlation between capital inflows and capital outflows is mainly driven by within-sector flows, especially those of AE banks. Since inflows and outflows of AEs and inflows to EMs are all primarily made by AE investors, they all respond to the main capital flow drivers in a similar fashion. Conversely, EM outflows respond differently to those drivers, resulting in lower EM inflow-outflows correlations.

These facts provide evidence against the predictions of a large class of models that assume only productivity shocks. Unsurprisingly, standard international real business cycle models with a single asset cannot account for these patterns. In these models, the only shock is a shock to productivity in a single country, so capital inflows go in one direction only and hence procyclicality and co-movement cannot be accounted for. A certain class of models have tried to account for the co-movement.<sup>41</sup> For example in [McGrattan and Prescott \(2010\)](#), a positive productivity shock generates both capital inflows and outflows. The country with the positive productivity shock receives inflows from multinationals. At the same time, it also experiences outflows as affiliates of multinationals invest in other countries given their increased productivity. These patterns can also create procyclicality.

However, our findings point to procyclical outflows only by banks in advanced countries

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<sup>41</sup>See [Bai \(2013\)](#) for a summary.

and sovereigns in emerging markets, not by FDI debt investors as predicted by this model, which would be corporates in our paper. The model by [Bianchi, Boz, and Mendoza \(2012\)](#) assumes sovereigns borrow and accumulate reserves. When a sudden stop occurs, capital outflows decline along with inflows since reserves are used to smooth consumption. This model would be able to account for capital inflow-outflow comovement in EM if the comovement were driven only by sovereigns, but as we show it is not. Sovereign inflows are countercyclical - in bad times, the sovereign sector borrows, increasing inflows, and runs down reserves, decreasing outflows.

Models with financial shocks, as in [Kalemli-Özcan, Papaioannou, and Perri \(2013\)](#), can generate the positive correlation of banking inflows and outflows found in the data. Models in which domestic financial frictions tighten for certain sectors during bad times, can also match our findings. For example, [R. Caballero and Simsek \(2018\)](#) assume that, during crisis times, financial frictions bind for domestic banks but not for foreign banks. Their model can provide a rationale for our findings. These authors argue that models featuring only portfolio investors ignore the important role of banks in intermediating capital flows. In their model both banks and sovereigns play a role in EM, consistent with our data.

Overall, our findings are consistent with models including financial shocks and/or financial frictions, giving a role to sovereigns and the banking sector. The results highlight the importance of separating capital flows by borrower and lender sector to understand better their effects, as well as the systemic risks that they may pose for borrowing and lending countries. They also show the difficulty of establishing robust stylized facts about the business cycle properties of capital flows and their relationship with global push factors, especially in a sample that combines EM and AE countries. Our new dataset, which will be updated continually and shared with the research community, should prove very useful for future research on capital flows.

## References

- Aguiar, M., & Amador, M. (2011). Growth in the shadow of expropriation. *Quarterly Journal of Economics*, 126, 651–697.
- Alfaro, L., Şebnem Kalemli-Özcan, & Volosovych, V. (2014). Capital flows in a globalized world: the role policies and institutions. In S. Edwards (Ed.), *Capital controls and capital flows in emerging economies: Policies, practices and consequences*.
- Alfaro, L., Kalemli-Özcan, Şebnem., & Volosovych, V. (2014). Sovereigns, upstream capital flows, and global imbalances. *Journal of the European Economic Association*, 12(5), 1240–1284.
- Amiti, M., McGuire, P., & Weinstein, D. (2018). International bank flows and the global financial cycle. *IMF Economic Review*, 67(1), 61–108.
- Arslanalp, S., & Tsuda, T. (2014a). Tracking global demand for advanced economy sovereign debt. *IMF Economic Review*, 62(3).
- Arslanalp, S., & Tsuda, T. (2014b). Tracking global demand for emerging market sovereign debt. *IMF Working Paper*, 14(39).
- Avdjiev, S., Chui, M., & Shin, H. S. (2014). Non-financial corporations from emerging market economies and capital flows. *BIS Quarterly Review*, December.
- Avdjiev, S., McCauley, R., & Shin, H. S. (2016). Breaking free of the triple coincidence in international finance. *Economic Policy*, 31(87), 409–451.
- Avdjiev, S., McGuire, P., & Wooldridge, P. (2015). Enhanced data to analyse international banking. *BIS Quarterly Review*, September 2015.
- Bai, Y. (2013). Discussion on “Gross capital flows: Dynamics and crises” by Broner, Didier, Erce, and Schmukler. *Journal of Monetary Economics*, 60, 134–137.
- Barrot, L., & Servén, L. (2018). Gross capital flows, common factors, and the global financial cycle. *World Bank Policy Research Working Paper*, 8354.
- Bianchi, J., Boz, E., & Mendoza, E. (2012). Macro-prudential policy in a Fisherian model of financial innovation. *IMF Economic Review*, 60(1), 223–269.
- BIS. (2015). Introduction to bis statistics. *BIS Quarterly Review*, September 2015.
- Bluedorn, J., Duttagupta, R., Guajardo, J., & Topalova, P. (2013). Capital flows are fickle: anytime, anywhere. *IMF Working Paper*, 13(183).
- Borio, C., & Disyatat, P. (2011). Global imbalances and the financial crisis: link or no link. *BIS*

*Working Papers, No. 346.*

- Broner, F., Didier, T., Erce, A., & Schmukler, S. (2013). Gross capital flows: dynamics and crises. *Journal of Monetary Economics*, 60, 113–133.
- Caballero, J. (2016). Do surges in international capital inflows influence the likelihood of banking crises? *Economic Journal*, 126, 281–316.
- Caballero, R., & Simsek, A. (2018). A model of fickle capital flows and retrenchment. *mimeo*.
- Catão, L., & Milesi-Ferretti, G. (2014). External liabilities and crises. *Journal of International Economics*, 94(1), 18–32.
- Cerutti, E., Claessens, S., & Puy, D. (2015). Push factors and capital flows to emerging markets: why knowing your lender matters more than fundamentals. *IMF Working Paper, WP/15/127*.
- Cerutti, E., Claessens, S., & Rose, A. (2018). How important is the global financial cycle? Evidence from capital flows. *NBER Working Paper, No 23699*.
- Cetorelli, N., & Goldberg, L. (2012). Banking globalization and monetary transmission. *Journal of Finance*, 67(5), 1811–1843.
- Chang, P. K., Claessens, S., & Cumby, R. (1997). Conceptual and methodological issues in the measurement of capital flight. *International Journal of Finance and Economics*, 2, 101–119.
- Claessens, S., & Naudé, D. (1993). Recent estimates of capital flight. *World Bank Policy Research Working Paper, 1186*.
- Davis, J. S., & van Wincoop, E. (2017). Globalization and the increasing correlation between capital inflows and outflows. *NBER Working Paper, No 23671*.
- Forbes, K., & Warnock, F. (2012). Capital flows waves: surges, stops, flight and retrenchment. *Journal of International Economics*, 88(2), 235–251.
- Galstyan, V., Lane, P., Mehigan, C., & Mercado, R. (2016). The holders and issuers of international portfolio securities. *NBER Working Paper, 22466*.
- Gourinchas, P.-O., & Jeanne, O. (2013). Capital flows to developing countries: the allocation puzzle. *Review of Economic Studies*, 80(4), 1484–1515.
- Gourinchas, P.-O., & Rey, H. (2007). International financial adjustment. *Journal of Political Economy*, 115(4), 665–703.
- Gruić, B., & Wooldridge, P. (2012). Enhancements to the bis debt securities statistics. *BIS Quarterly Review, December 2012*, 63–76.
- Horn, S., Reinhart, C., & Trebesch, C. (2020). Coping with disasters: two centuries of interna-

- tional official lending. *NBER Working Papers, No 27343*.
- Ju, J., & Wei, S. (2010). Domestic institutions and the bypass effect of financial globalization. *American Economic Journal: Economic Policy*, 2(4), 173–204.
- Kalemli-Özcan, Şebnem., Papaioannou, E., & Perri, F. (2013). Global banks and crisis transmission. *Journal of International Economics*, 89(2), 495–510.
- Lane, P. (2013). Risk exposures in international and sectoral balance sheets. *mimeo, IMF Statistics Forum*.
- Lane, P., & Milesi-Ferretti, G. (2001). The external wealth of nations: measures of foreign assets and liabilities for industrial and developing countries. *Journal of International Economics*, 55, 263–294.
- McGrattan, E., & Prescott, E. (2010). Technology capital and the US current account. *American Economic Review*, 100(4), 1493–1522.
- Milesi-Ferretti, G., & Tille, C. (2011). The great retrenchment: international capital flows during the global financial crisis. *Economic Policy*, 66, 289–346.
- Nier, E., Sedik, T. S., & Mondino, T. (2014). Gross private capital flows to emerging markets: can the global financial cycle be tamed? *IMF Working Paper, 14/196*.
- Obstfeld, M. (2012). Does the current account still matter? *American Economic Review*, 102(3), 1–23.
- Rey, H. (2013). Dilemma not trilemma: the global financial cycle and monetary policy independence. *Jackson Hole conference proceedings, Kansas City Fed*.
- Shin, H. S. (2013). The second phase of global liquidity and its impact on emerging economies. *Asia Economic Policy Conference, Keynote address at the Federal Reserve Bank of San Francisco*.

# Appendix

## A Dataset Construction

This appendix describes the construction of the dataset used in this paper, as well as the relevant background information for capital flow data generally and the underlying data sources specifically. The purpose of this dataset is to split capital inflows and outflows by capital flow type and by sector of the domestic economy, focusing primarily on debt flows. We base our dataset on the Balance of Payments (BOP) dataset, which includes capital flow data with breakdowns by flow type and sector, but also has some missing data. We fill in gaps in the data using some external datasets, such as the Quarterly External Debt Statistics (QEDS) and banking and bond data from the Bank for International Settlements (BIS).

We describe first the basics of capital flow data, the structure and coverage of the BOP data. We then explain the filling exercise and the external datasets that are used. We present comparisons to illustrate the quality of the fit of our external data and the contribution of our filling exercise. Lastly, we summarize the samples and coverage of our completed dataset. In Appendix B, we give more detail on the BIS datasets and how those series are constructed.

### A.1 Capital Flow Data

Some of the presentations and definitions of international capital flow data can be ambiguous or inconsistent across data sources. In order to be clear about what we are doing, we briefly highlight some basic concepts regarding capital flow data generally.

#### A.1.1 Net Flows vs Gross Flows

In the literature and in the data, there is some ambiguity of terms when referring to net and gross flows. Essentially, there are three distinctions:

**Gross Flows:** Strictly speaking, gross inflows and outflows refer to one-way flows without netting out any capital flowing in the opposite direction. This definition of gross flows is generally what comes to mind when the term is used. Nevertheless, data that actually matches this definition are quite scarce.

**Net Inflows and Outflows:** What is commonly called “gross flows” in the literature is actually more accurately described as “net inflows” and “net outflows”. There are no comprehensive datasets on flows that are truly gross. Instead, researchers tend to use net inflows and net outflows, which can be obtained from the IMF’s BOP dataset. Net inflows are gross liability flows, net of repayments. Net outflows are gross asset flows, net of disinvestment. Thus, although these measures are often called “gross”, they can be positive or negative. The separation of flows into asset and liability flows allows interpreting liability flows as net inflows from foreign agents, and asset flows as net outflows by domestic agents. This is the primary working definition of capital flows, which we use across all data sources for consistency.

**Net Flows:** This relates to the net movement of capital into and out of a country. This is the equivalent of the negative of the current account, that is, the difference between Net Inflows and Net Outflows (or equivalently the difference between Gross Inflows and Gross Outflows).

**Stock/Position Data:** In general, there is no standard definition of “net” stocks, as some countries report outstanding debt net of some financial assets (Arslanalp & Tsuda, 2014b), while others do not. A more widely-agreed view is that the net stock of external wealth should be equivalent to the Net International Investment Position, which is the difference between outstanding external stock of assets and outstanding external stock of liabilities. Gross positions then refer to the outstanding stocks of assets and liabilities separately.

### A.1.2 External Borrowing of Sectors

The focus of this paper is on the differentiation of capital flows by sector in the domestic economy. The term “sector” is used here to refer to institutional sectors: general government, central banks, depository corporations except the central bank (“banks”), and other sectors (“corporates”).<sup>42</sup> There are other ways to define the sectors of the economy, but this breakdown is the most common in the data.<sup>43</sup> For much of our analysis, and all analysis using asset flows, we combine the central bank and general government sectors into a single sector called “public sector”.

These broad sectors can sometimes be decomposed into various institutional subsectors

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<sup>42</sup>It should be noted that the BOP category “other sectors” is broader than what is captured by the term “corporates”. Nevertheless, in most cases, there is fairly broad overlap between the two categories. That is why, in the rest of this paper, we use the two terms interchangeably for presentational convenience.

<sup>43</sup>See Chapter 4 Section D of the 6th Edition Balance of Payments Manual for an overview of Systems of National Accounts sectoral breakdowns, and the sectoral breakdowns used in the BOP (and often other) data sources.

(for example, other sectors are sometimes split into other non-bank financial and other non-financial sectors in the BOP data). Thus, sectors can also be defined differently depending on the dataset or measure. For instance, several datasets such as the WB DRS produce statistics on public and publicly guaranteed (PPG) debt. In this case, public refers to general government, central banks, and the public sector portions of banks and corporates. Non-publicly guaranteed private sector debt is defined precisely as its name suggests and is the complement to PPG. Otherwise, most datasets using a sectoral breakdown conform to the standard definition of the main institutional sectors and subsectors given above. We consider PPG vs. PNG debt in Appendix [C.3](#).

### **A.1.3 Sign of Flows**

There remains some confusion about the sign of capital inflows and outflows in the data. This is primarily due to a change in sign conventions that occurred when the BOP data switched from the BPM5 to the BPM6 version. In BPM5, a negative sign indicated that capital was leaving the country on net, regardless of whether it was an asset or liability flow. In the current version of the BOP data (BPM6), a positive asset flow represents capital leaving the country on net by domestic residents, while a positive liability flow represents capital entering the country on net by foreigners. We use the updated convention, where a positive sign indicates an increase in either assets or liabilities, and adjust our interpretation accordingly.

## **A.2 Balance of Payments Data**

The IMF's Balance of Payments (BOP) data is the most comprehensive dataset available on international capital flows and the basis for our dataset. It comprises two main accounts – the Current Account and the Financial Account.<sup>44</sup> The current account records transactions from the real side, capturing imports and exports, factor income, and transfer payments. The financial account records transaction from the financial side, capturing the acquisition of financial assets and the incurrence of financial liabilities. We focus on the Financial Account portion of the BOP data.

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<sup>44</sup>A third account, the Capital Account, is generally much smaller than these two. Since the BOP uses double entry bookkeeping, the sum of the accounts should be zero, so a Balancing Account called "Net errors and omissions" is defined to satisfy the identity: current account + financial account + capital account + net errors and omissions = 0. Errors and omissions are usually interpreted as unrecorded private capital flows (see [Forbes and Warnock \(2012\)](#)).



There are several presentations of the BOP data.<sup>45</sup> The standard presentation disaggregates the data by flow type and instrument. Figure 4 illustrates this structure, with the available breakdowns by sector. The analytic presentation, which is the one available within the IMF's International Financial Statistics (IFS), reports exceptional financing (used to meet balance-of-payments financing needs) separately from the standard presentation.<sup>46</sup> The analytic presentation can be useful to separate some public flows from private flows, because exceptional financing can be viewed as an alternative instrument to the use of reserve assets or IMF credit to help deal with balance of payments shortfalls.<sup>47</sup> We use the sectoral presentation, which breaks down the standard presentation by domestic institutional sector, but we also use measures of exceptional financing from the analytic presentation to allocate all exceptional financing flows to the public sector.

In theory, the structure of the BOP dataset should allow separating the flows by institutional sector, but the requisite data is sometimes missing. It is difficult to determine if missing data is truly missing, or if it is zero. Data on outflows are generally more sparse than data on inflows. Further, the time coverage of the data varies greatly across countries. Especially for variables with sectoral breakdown, the coverage is weighted heavily towards recent years.

### A.2.1 Types of Flows

Capital flows in the Financial Account of the BOP are disaggregated first by type of flow. The main types are direct investment, portfolio equity, portfolio debt, other investment, financial derivatives, and reserves. For each of these flow types, the BOP reports asset flows and liability flows. We describe each type of flow and how it can be broken down into the various institutional sectors.<sup>48</sup> We focus on the debt portions of capital flows (portfolio debt, other investment debt, reserves, and sometimes direct investment debt) in our dataset, but we describe all components of capital flows here.

**Direct Investment:** Direct investment, commonly called FDI, captures investment involving at least 10% ownership. It is meant to reflect investment relationships based on control

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<sup>45</sup>See Chapter 14 Section C of the 6th edition BOP manual for a description of the various presentations.

<sup>46</sup>Exceptional Financing is usually classified under the other investment category.

<sup>47</sup>See the 6th edition BOP manual Appendix 1 for a description of Exceptional Financing. See [Alfaro, Şebnem Kalemli-Özcan, and Volosovych \(2014\)](#) for discussion and use of IFS data to divide net flows into public and private components.

<sup>48</sup>See Appendix 9 of the Balance of Payments Manual for a list of all the components of the Financial Account with their structure in the BOP data.

and influence. In addition to equity investment, it also captures other investments under a controlling relationship, including debt and reverse investment.

Direct investment is not broken down by sector. Unlike the BPM5 version of the data, the BPM6 data does have splits according to liability and asset flows for direct investment (consistent with other BOP flows).<sup>49</sup> Direct investment does not have a split in the BOP by sector, but the debt portion of direct investment inflows can be allocated with some assumptions. Direct investment debt inflows between affiliated parties are only recorded as direct investment debt if at least one party is a non-financial firm. Thus for inflows, we can attribute all direct investment debt to the Corporate sector if we assume that such lending from offshore non-financial firms to onshore banks is negligible.

**Portfolio Equity:** Portfolio equity captures investment in equity securities not included in direct investment.<sup>50</sup> It is broken down by institutional sector and, in principle, asset and liability flows are defined for all sectors. Note, however, that liability flows for central banks and general government should equal zero regardless of data reporting.<sup>51</sup>

**Portfolio Debt:** Portfolio debt consists of all debt securities not captured under direct investment. It is separated into asset and liability flows, and then disaggregated by institutional sector.

**Financial Derivatives:** Financial derivatives tend to be a quantitatively small category of gross flows, covering derivatives and employee stock options. Financial derivatives that are associated with reserve asset management are excluded. Both asset and liability flows offer breakdowns by institutional sector.<sup>52</sup> Due to its small size and sparse data, we ignore this component in our analysis.

**Other Investment:** Other investment captures all other investments not included in the previous categories. It is first broken into other investment equity<sup>53</sup> and other investment debt. Other investment debt is then disaggregated as follows: currency and deposits, loans

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<sup>49</sup>This is one of the main differences between the BPM5 and BPM6 versions of the data.

<sup>50</sup>Equity not in the form of securities is not captured here.

<sup>51</sup>Some countries report positive equity liability flows for the government or central bank, but we believe this is equity from state-owned or quasi-public enterprises (banks or corporates) that was mis-recorded.

<sup>52</sup>Some countries may report financial derivatives on a net basis only. See 6th edition BOP manual paragraphs 6.60 and 8.34.

<sup>53</sup>This is equity investment that is not direct investment or reserve assets, and is not in the form of securities. Equity securities are captured under portfolio equity. This category, introduced with the BPM6 version of the BOP data, is sparsely reported.

(including use of IMF credit and loans), insurance and pensions,<sup>54</sup> trade credit and advances, other accounts payable/receivable, and SDR allocations.<sup>55</sup>

Other investment debt as a whole, and each of its component instruments, is broken down into asset and liability flows, and then further broken down by institutional sector. However, there is no sectoral breakdown of Other Investment Equity.

**Reserves:** Reserve Assets are external assets held by the Central Bank or Monetary Authority that are readily available for use to meet Balance of Payments financing needs. These include foreign currency, convertible gold, SDRs, and other reserve assets. Thus, this component is an asset flow of the public sector only.

While in principle the structure of the BOP data contains all the ingredients required to compute each type of flow for each sector, with the exception of direct investment, in practice there are some countries which do not exhaustively provide these breakdowns, especially for earlier years.<sup>56</sup> Table A1 highlights the coverage by flow type and sector in the quarterly BOP data.<sup>57</sup> For each component, the table displays the number of countries reporting data, the number of quarters with at least one country reporting data, the number of country-quarter observations with non-missing data, and the number of countries that have data for that component in every period over the 1996q1-2014q4 period. Next to each of these numbers, in brackets we report the implied coverage as percentage of the theoretical maximum, given by 190 countries, 144 quarters, and 27360 total observations. The direct investment and reserves lines give us an idea of the coverage of the more standard items that are not disaggregated by sector. Generally, we see that for most sectors and flow types, most countries and periods show some data. However, the data is skewed towards recent years, and few countries show coverage over the full 1996q1-2014q4 period.

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<sup>54</sup>This includes non-life insurance technical reserves, life insurance and annuities entitlements, pension entitlements, and provisions for calls under standardized guarantees. This component is likely also small, and very sparsely reported.

<sup>55</sup>SDR holdings (as opposed to SDR allocations) are included in reserve assets. A one time increase in SDR allocations occurred in the 3rd quarter of 2009 for all IMF member countries, so those flows are removed.

<sup>56</sup>Table A3 lists the BOP variables required to compute each type of capital flow by sector. Variable names are as they are found in the bulk public download of the BP6 version BOP data, as of May 2016. The Balance of Payments data also includes International Investment Position (IIP) data, which is the stock equivalent of the BOP flow measures. Variable names for IIP construction by sector are also included, for reference.

<sup>57</sup>Some items in the BOP data are available back to 1948, but this applies to very few of them. For this table, we consider data only from 1980 onwards. The annual BOP data does have somewhat better coverage. For instance, when shifting from quarterly to annual frequency, the number of countries with full coverage of portfolio debt liability flows over 1996-2014 goes from (1,21,13,19) to (4,32,18,27) for central banks, general government, banks, and other sectors, respectively.

Table A2 shows the coverage breakdown for Other investment Debt by instrument, with each instrument listed separately under Asset and Liability by sector. The table illustrates how more detailed breakdowns tend to result in poorer coverage, as not all countries provide such detail to the IMF. Generally, if other investment debt by sector is missing, then all of the underlying instruments (with the exception of IMF credit) are also missing. When data for instruments is reported, it can be the case that all of other investment debt is recorded under a single instrument (usually loans), despite the number representing other instruments as well (such as trade credit, etc.).<sup>58</sup>

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<sup>58</sup>We thank Gian-Maria Milesi-Ferretti for pointing this out.

Table A1: BOP Data Coverage by Sector

Flow Type	A/L	Sector	Country	Quarter	Country-Quarter	Panel
Direct Investment	Assets	All	133 (70%)	143 (99%)	8495 (31%)	35 (18%)
	Liabilities	All	146 (77%)	143 (99%)	10920 (40%)	63 (33%)
Portfolio Equity	Assets	Central Banks	23 (12%)	60 (42%)	309 (1%)	0 (0%)
		General Gov	58 (31%)	91 (63%)	1480 (5%)	0 (0%)
		Banks	84 (44%)	127 (88%)	3611 (13%)	8 (4%)
		Corporates	107 (56%)	143 (99%)	5045 (18%)	13 (7%)
	Liabilities	Central Banks	1 (0.5%)	18 (13%)	18 (0.0%)	0 (0%)
		General Gov	8 (4%)	73 (51%)	98 (0.0%)	0 (0%)
		Banks	71 (37%)	143 (99%)	3283 (12%)	11 (6%)
		Corporates	102 (59%)	143 (99%)	5338 (20%)	27 (14%)

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Flow Type	A/L	Sector	Country	Quarter	Country-Quarter	Panel
Portfolio Debt	Assets	Central Banks	44 (23%)	86 (60%)	1154 (4%)	0 (0%)
		General Gov	60 (32%)	104 (72%)	1990 (7%)	3 (2%)
		Banks	100 (53%)	134 (93%)	5097 (17%)	18 (9%)
		Corporates	101 (53%)	143 (99%)	5090 (19%)	18 (9%)
	Liabilities	Central Banks	38 (20%)	143 (99%)	981 (4%)	1 (0.5%)
		General Gov	104 (55%)	143 (99%)	6243 (23%)	21 (11%)
		Banks	91 (48%)	143 (99%)	4037 (15%)	13 (7%)
		Corporates	93 (49%)	143 (99%)	5217 (19%)	19 (10%)

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Flow Type	A/L	Sector	Country	Quarter	Country-Quarter	Panel
Other Investment Debt	Assets	Central Banks	92 (48%)	143 (99%)	3734 (14%)	2 (1%)
		General Gov	104 (55%)	143 (99%)	5653 (21%)	12 (6%)
		Banks	138 (73%)	143 (99%)	9793 (36%)	53 (28%)
		Corporates	135 (71%)	143 (99%)	9209 (34%)	45 (24%)
	Liabilities	Central Banks	130 (68%)	143 (99%)	8768 (32%)	29 (15%)
		General Gov	138 (73%)	143 (99%)	10292 (38%)	47 (25%)
		Banks	137 (72%)	143 (99%)	10372 (38%)	54 (28%)
		Corporates	139 (73%)	143 (99%)	10307 (38%)	56 (29%)

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Flow Type	A/L	Sector	Country	Quarter	Country-Quarter	Panel
Financial Derivatives	Assets	Central Banks	14 (7%)	95 (66%)	225 (1%)	0 (0%)
		General Gov	25 (13%)	86 (60%)	578 (2%)	0 (0%)
		Banks	58 (31%)	103 (72%)	1906 (7%)	3 (2%)
		Corporates	53 (28%)	111 (77%)	1620 (6%)	4 (2%)
	Liabilities	Central Banks	9 (5%)	85 (59%)	136 (0.5%)	0 (0%)
		General Gov	17 (9%)	95 (66%)	346 (1%)	0 (0%)
		Banks	52 (27%)	103 (72%)	1603 (6%)	2 (1%)
		Corporates	49 (26%)	113 (78%)	1400 (5%)	2 (1%)
Reserves	Assets	Central Bank	146 (77%)	143 (99%)	11387 (42%)	65 (34%)

The dataset covers 190 Countries over 1980q1-2015q4 (144 Quarters), yielding 27360 Country-Quarter observations. The first number in each cell is the total number of countries, quarters, observations, and countries (respectively) with non-missing data, while the second number is the percent of total countries, quarters, observations, and countries, respectively. The Panel column is the number (and percent) of countries with non-missing observations over 1996q1-2014q4. Note that, at the time of download, most 2015q4 variables have not yet been reported. Data for Other Equity is extremely sparse, and so is not reported in this table.

Table A2: Other Investment Debt Instrument Coverage by Sector

Instrument	A/L	Sector	Country	Quarter	Country-Quarter	Panel
		Central Banks	60 (32%)	137 (95%)	2212 (8%)	0 (0%)
		General Gov	80 (42%)	143 (99%)	2913 (11%)	4 (2%)
	Assets					

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<b>Instrument</b>	<b>A/L</b>	<b>Sector</b>	<b>Country</b>	<b>Quarter</b>	<b>Country-Quarter</b>	<b>Panel</b>
		Banks	140 (74%)	143 (99%)	9377 (34%)	49 (22%)
		Corporates	130 (68%)	143 (99%)	7531 (28%)	30 (16%)
	Liabilities	Central Banks	97 (51%)	143 (99%)	4779 (17%)	9 (5%)
		General Gov	21 (11%)	143 (99%)	627 (2%)	1 (0.5%)
		Banks	137 (72%)	143 (99%)	9413 (34%)	41 (22%)
		Corporates	51 (27%)	143 (99%)	1496 (5%)	2 (1%)

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<b>Instrument</b>	<b>A/L</b>	<b>Sector</b>	<b>Country</b>	<b>Quarter</b>	<b>Country-Quarter</b>	<b>Panel</b>
Loans	Assets	Central Banks	37 (19%)	134 (93%)	840 (3%)	0 (0%)
		General Gov	62 (33%)	143 (99%)	2910 (11%)	7 (4%)
		Banks	110 (58%)	143 (99%)	6287 (23%)	24 (13%)
		Corporates	98 (52%)	143 (99%)	5377 (20%)	19 (10%)
	Liabilities	Central Banks	107 (56%)	143 (99%)	5521 (20%)	5 (3%)
		General Gov	140 (74%)	143 (99%)	9918 (36%)	44 (23%)
		Banks	117 (62%)	143 (99%)	6477 (24%)	23 (12%)
		Corporates	136 (72%)	143 (99%)	9835 (36%)	48 (25%)

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<b>Instrument</b>	<b>A/L</b>	<b>Sector</b>	<b>Country</b>	<b>Quarter</b>	<b>Country-Quarter</b>	<b>Panel</b>
Trade Credit and Advances	Assets	Central Banks	3 (2%)	55 (38%)	113 (0.4%)	0 (0%)
		General Gov	38 (20%)	143 (99%)	1376 (5%)	2 (1%)
		Banks	16 (8%)	107 (74%)	438 (2%)	2 (1%)
		Corporates	108 (57%)	143 (99%)	6423 (23%)	26 (14%)
	Liabilities	Central Banks	5 (3%)	83 (58%)	127 (0.4%)	0 (0%)
		General Gov	39 (21%)	143 (99%)	1177 (4%)	0 (0%)
		Banks	20 (11%)	105 (73%)	456 (2%)	0 (0%)
		Corporates	121 (64%)	143 (99%)	7431 (27%)	34 (18%)

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Table A2 – Continued from previous page

<b>Instrument</b>	<b>A/L</b>	<b>Sector</b>	<b>Country</b>	<b>Quarter</b>	<b>Country-Quarter</b>	<b>Panel</b>
Other Accounts Payable/Receivable	Assets	Central Banks	61 (3%)	143 (99%)	1722 (6%)	1 (0.5%)
		General Gov	82 (43%)	143 (99%)	3235 (12%)	5 (3%)
		Banks	92 (48%)	143 (99%)	4280 (16%)	12 (6%)
		Corporates	105 (55%)	143 (99%)	5256 (19%)	9 (5%)
	Liabilities	Central Banks	81 (43%)	143 (99%)	3305 (12%)	2 (1%)
		General Gov	90 (47%)	143 (99%)	3348 (12%)	7 (4%)
		Banks	95 (50%)	143 (99%)	4257 (16%)	8 (4%)
		Corporates	110 (58%)	143 (99%)	6067 (22%)	13 (7%)

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Instrument	A/L	Sector	Country	Quarter	Country-Quarter	Panel
Insurance and Pensions	Assets	Central Banks	n/a	n/a	n/a	n/a
		General Gov	n/a	n/a	n/a	n/a
		Banks	1 (0.5%)	4 (3%)	4 (0.0%)	0 (0%)
		Corporates	29 (15%)	107 (74%)	891 (3%)	3 (2%)
	Liabilities	Central Banks	n/a	n/a	n/a	n/a
		General Gov	n/a	n/a	n/a	n/a
		Banks	n/a	n/a	n/a	n/a
		Corporates	34 (18%)	107 (74%)	1030 (4%)	2 (1%)

The dataset covers 190 countries over 1980q1-2015q4 (144 quarters), yielding 27360 country-quarter observations. The first number in each cell is the total number of countries, quarters, observations, and countries (respectively) with non-missing data, while the second number is the percent of total countries, quarters, observations, and countries, respectively. The Panel column is the number (and percent) of countries with non-missing observations over 1996q1-2014q4. Note that, at the time of download, most 2015q4 variables have not yet been reported.

Table A3: BOP Variables by Sector

<b>Flow Type</b>	<b>A/L</b>	<b>Sector</b>	<b>New BP6</b>	<b>New IIP</b>
Direct Investment	Assets	All	BFDA_BP6_USD	IAD_BP6_USD
	Liabilities	All	BFDL_BP6_USD	ILD_BP6_USD

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Table A3 – Continued from previous page

Flow Type	A/L	Sector	New BP6	New IIP
Portfolio Equity	Assets	Central Banks	(BFPAECB_BP6_USD + BF-PAEMA_BP6_USD)	(IAPECB_BP6_USD + IA-PEMA_BP6_USD)
		General Government	BFPAEG_BP6_USD	IAPEG_BP6_USD
		Banks	BFPAEDC_BP6_USD	IAPEDC_BP6_USD
		Corporates	BFPAEO_BP6_USD	IAPEO_BP6_USD
	Liabilities	Central Banks	BFPLECB_BP6_USD	ILPECB_BP6_USD
		General Government	BFPLEG_BP6_USD	ILPEG_BP6_USD
		Banks	BFPLEDC_BP6_USD	ILPEDC_BP6_USD
		Corporates	BFPLEO_BP6_USD	ILPEO_BP6_USD

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Table A3 – Continued from previous page

Flow Type	A/L	Sector	New BP6	New IIP
Portfolio Debt	Assets	Central Banks	(BFPADCB_BP6_USD + BF-PADMA_BP6_USD)	(IAPDCB_BP6_USD + IAPDMA_BP6_USD)
		General Government	BFPADG_BP6_USD	IAPDG_BP6_USD
		Banks	BFPADC_BP6_USD	IAPDDC_BP6_USD
		Corporates	BFPADO_BP6_USD	IAPDO_BP6_USD
	Liabilities	Central Banks	(BFPLDCB_BP6_USD + BF-PLDMA_BP6_USD)	ILPDCB_BP6_USD
		General Government	BFPLDG_BP6_USD	ILPDG_BP6_USD
		Banks	BFPLDDC_BP6_USD	ILPDDC_BP6_USD
		Corporates	BFPLDO_BP6_USD	ILPDO_BP6_USD

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Table A3 – Continued from previous page

Flow Type	A/L	Sector	New BP6	New IIP
Other Investment Debt	Assets	Central Banks	BFOADCB_BP6_USD	IAODCB_BP6_USD
		General Gov-ernment	BFOADG_BP6_USD	IAODG_BP6_USD
		Banks	BFOADDC_BP6_USD	IAODDC_BP6_USD
		Corporates	BFOADO_BP6_USD	IAODO_BP6_USD
	Liabilities	Central Banks	BFOLOCBFR_BP6_USD	ILOOCBFR_BP6_USD
		General Gov-ernment	BFOLOGFR_BP6_USD	ILOOGFR_BP6_USD
		Banks	BFOLODC_BP6_USD	ILOODC_BP6_USD
		Corporates	BFOLOO_BP6_USD	ILOOO_BP6_USD

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Table A3 – Continued from previous page

Flow Type	A/L	Sector	New BP6	New IIP
Financial Derivatives	Assets	Central Banks	BFFACB_BP6_USD +	IADFCB_BP6_USD +
			BFFAMA_BP6_USD	IADFMA_BP6_USD
		General Government	BFFAG_BP6_USD	IADFG_BP6_USD
		Banks	BFFADC_BP6_USD	IADFDC_BP6_USD
		Corporates	BFFAO_BP6_USD	IADFO_BP6_USD
	Liabilities	Central Banks	BFFLCB_BP6_USD	ILFCB_BP6_USD
		General Government	BFFLG_BP6_USD	ILFG_BP6_USD
		Banks	BFFLDC_BP6_USD	ILFDC_BP6_USD
Corporates		BFFLO_BP6_USD	ILFO_BP6_USD	
Reserves	Assets	Central Bank	BFRA_BP6_USD	IAR_BP6_USD

### A.3 Filling Missing Data

We proceed in two steps to fill the gaps in the BOP data. The first step is an internal fill. When the BOP data reports the total for a flow type and reports 3 out of the 4 sectors, we fill the fourth sector by subtracting the three reported sectors from the total, the residual being allocated to the missing sector. In the case of capital outflows (asset flows), we combine general government and central bank into a single public sector. So, when one or both of general government or central bank are missing data, we fill the public sector with the residual of the total minus banks and corporate sectors. After performing our internal filling exercise, we use external data to fill the remaining gaps.

We draw on 3 separate sources for data to construct measures of capital inflows that can be used when the BOP data is missing. The first is banking and bond data from the BIS, which is described in detail in Appendix B. We also draw on the International Investment Position (IIP) data that accompanies the BOP data, and the Quarterly External Debt Statistics (QEDS) data which is produced jointly by the World Bank and IMF. Both of these are stock measures, and have the same sector and capital flow type classifications as the BOP data. The QEDS data is quarterly and is compiled from a combination of data reported to the IMF via their Special Data Dissemination Standard (SDDS) and their General Data Dissemination System (GDDS), thus sometimes giving it better coverage than the reported IIP stock data. The IIP data comes either quarterly or annually.

The dataset with the broadest coverage by sector and capital flow type, and thus fills the most observations, is derived from the BIS data. The BIS produces a database on international bond issuances and databases on international banking flows (e.g. loans), which are described in more detail below and in Appendix B. While the BIS data in many cases captures much of the international financial flows we are trying to measure, it is not always an appropriate fill and so we do not want to use just a single data source for our external filling exercise. Specifically, bond inflows are measured in the BIS data as net issuance of debt securities in international markets. While this measure is appropriate for many countries, countries that have many foreigners buying domestically issued bonds or domestics buying international issued bonds will introduce error. An important example of this is government debt issued by advanced economies. The US has a substantial amount of sovereign debt that is traded abroad, but nearly all of the debt is issued domestically, making the BIS measure an inappropriate way

to fill that missing series.<sup>59</sup> Thus to increase the accuracy of our filling process, we turn first to the IIP and QEDS data. To approximate flows, we first difference the stocks with a simple correction for exchange rate valuation effects.<sup>60</sup> When both IIP and QEDS data are available, we use the IIP measures for consistency with the BOP data. We use these stock measures to fill both portfolio debt and other investment debt for the government and central bank sectors. We also use these measures to fill Corporate portfolio debt in AE.

For the remaining missing data, we use our BIS constructed measures. Table A4 summarizes the process of constructing matching series for inflows using the BIS data.<sup>61</sup>

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<sup>59</sup>The only national data that we include is for the United States, which has substantial capital flows that won't be captured by the BIS data, but also a gap between the availability of QEDS and IIP data and the coverage of the BOP data. Specifically, we fill in the stock IIP measure of government portfolio debt for the US using the TIC data from the US Treasury, Securities data (B) Tables A.2.d and A.2.a, for the period 1999q1-2003q2, and then take the first difference.

<sup>60</sup>Data on currency composition of external debt, split by capital flow type and sector, is scarce. We assume the external debt is denominated in domestic currency. While this is not always the case, changing the assumption to denominated in USD does not appreciably change our filling accuracy.

<sup>61</sup>Recall that other investment debt can be decomposed into loans, currency and deposits, trade credit and advances, other accounts payable/receivable, and pension and insurance.

Table A4: BIS Data Alignment with BOP

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	BOP	OID to DC	OID to OS	OID to GG	OID to CB
Investment Debt	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

For the BIS data, we construct our measure of portfolio debt flows from the BIS International Debt Securities (IDS) data. It captures net issuance of debt securities (bonds) in a market other than that of the country where the borrower resides (Gruić & Wooldridge, 2012). This does not necessarily imply that the securities are held by foreigners, but can be taken as an approximation for external financing flows through debt securities.<sup>62</sup> Since the IDS data are compiled on a security-by-security basis, granular sectoral splits are easy to obtain; we thus construct these net issuances by sector using the same sector definitions as the BOP data.

For other investment debt, we construct our series from our BIS estimates as follows: First, we examine the underlying components of other investment debt. The primary instruments are loans (for corporates and governments) and currency and deposits (for banks and central banks). If loans are missing for corporates or government, or currency and deposits is missing for banks or central banks, we rely on the BIS Locational Banking Statistics (LBS) to fill in the data.<sup>63</sup> The BIS data captures cross-border lending from banks in BIS reporting countries.<sup>64,65</sup> This lending can be broken by instrument into loans, debt securities holdings, and other instruments. We use just the loan instrument in our measure, and so avoid capturing any bond holdings or equity investment made by banks. Since the BIS data will not capture official lending, we add IMF Credit to these series to capture that component of loans.<sup>66</sup> The Locational Banking Statistics by Residence (LBSR) historically only break the counterparty sector for Bank lending into banks and non-banks, though recent data includes additional sector splits. We employ the BIS Consolidated Banking Statistics (CBS) and the Locational Banking Statistics by Nationality (LBSN), both of which have further counterparty breakdowns, in order to construct estimates for Bank lending flows for all 4 sectors for the entire period, as described in Appendix B.

After augmenting the Loans (or Currency and Deposits) with the BIS data, we sum them

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<sup>62</sup>As discussed above, the assumption does not hold well for sovereign debt, particularly in advanced economies, but is otherwise appropriate for many economies.

<sup>63</sup>Interbank loan flows are automatically classified as deposits in the BOP data. Thus, all loans from BIS reporting banks to bank counterparties, including the central bank, would be captured in the currency and deposits instrument in the BOP.

<sup>64</sup>This captures about 95% of all cross-border interbank business (BIS, 2015).

<sup>65</sup>There have been some discrepancies noted in the past between the BOP and BIS data due to a few specific cases, such as trustee accounts in Japan and custodial accounts in Switzerland. We give priority to the BOP data, which is well reported for these series.

<sup>66</sup>IMF Credit is a subcomponent of the Loans instrument in other investment debt for general government and central banks. This figure is known by the IMF even if the actual loans by sector are not reported by the country. For central banks, since we fill the currency and deposits instrument with BIS loans, we add IMF Credit to the central bank back in only if the Loans instrument is missing.

with any remaining non-missing instruments within other investment debt. This sum becomes our estimate for other investment debt from BIS data.<sup>67</sup>

Our corresponding stock measures are similarly constructed. We rely first on IIP data, with an internal fill. We next fill any missing data with QEDS measures. And finally any remaining missing observations are filled with our BIS stock estimates derived above.<sup>68</sup>

Table A5 shows the percentage of observations for inflows that are filled by each step of our filling exercise for each sector-instrument category for each country group. For outflows (asset flows), there are few external datasets to do comparable filling. Thus, we rely primarily on our internal filling strategy and end up with a much smaller sample of countries. In one case, we can and do fill using external data. The BIS banking data has data for cross border lending of banks in countries that report to the BIS, separated into loans and bonds. Thus, we use this data to fill for the banking sector when missing, but given that most BIS member reporting countries are advanced, this does not fill many observations.

Figure A1 compares aggregate inflows as measured by our filled data and from the BOP alone, for total external debt of banks and corporates in our samples of AE and EM. We plot annual flows here for clarity. These graphs show that generally both series tell the same story, but there are periods in which accounting for the missing data makes a significant difference. For advanced economy corporates, a significant expansion leading up to the 2008 crisis and a the subsequent contraction are missed. This is due primarily to filling in portfolio debt data for the US and Spain for the 2008 surge, as well as a few other AE for the earlier 2001 peak. For EM, both banks and corporates had much larger flows relative to the BOP measure following the 2008 collapse, driven primarily by filling data for other investment debt inflows for China.

Figure A2 plots total external debt inflows for government and central bank sectors. Missing U.S. government portfolio debt drives the difference for the AE in panel (a). EM governments and AE central banks are fairly well represented in terms of volume. Note that net inflows can be negative as well as positive, which is the case for EM central banks, where some missing data consists of negative net inflows, which brings our filled data below the raw BOP

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<sup>67</sup>In general, when other investment debt is missing, most data on the underlying instruments are also missing. A few countries are exceptions to this, and only for a very few periods: Eritrea and Equatorial Guinea in the annual data, and Eritrea and Kosovo in the quarterly data. None of these countries are included in our analysis with this data.

<sup>68</sup>Even though the sector data may be missing in the BOP, the total for portfolio debt or other investment debt inflows often is not. We do not constrain our filled series by sector to match the total of the flow type as reported in the BOP. However, the two series correlate highly (.86 for total debt inflows) and exhibit similar patterns.

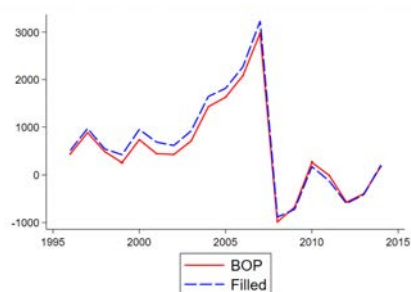
Table A5: Data Filling Summary

			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

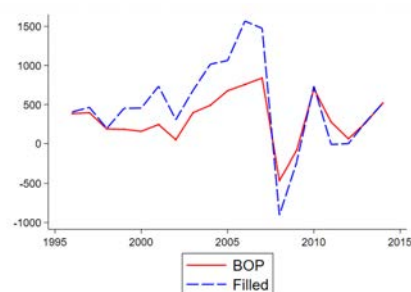
This table displays the percentage of total observations in our final sample of Advanced (Adv.), Emerging (Em.) and Developing (Dev.) countries (89 for annual, 85 for quarterly) that is derived from each step of our data construction. BOP = Percent coverage of sample from raw BOP data; Int. Fill = Percent coverage of sample from Internal Filling exercise; Ext. Fill = Percent coverage of sample from non BOP data sources. OID = other investment debt; PD = portfolio debt; GG = General Government; CB = Central Bank; DC = Banks; OS = Corporates. The last line indicates the number of countries in our balanced sample 1996 to 2014 that we have data for each sector non-missing.



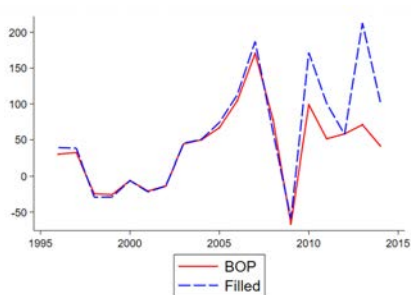
Figure A1: Aggregate External Debt Inflows for Banks and Corporates, Billions 1996 USD



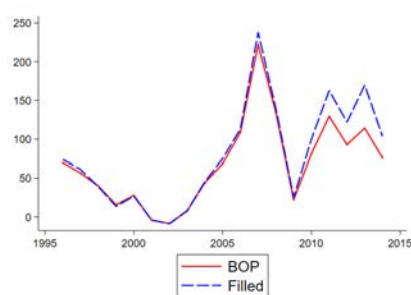
(a) Advanced Bank



(b) Advanced Corporate



(c) Emerging Bank



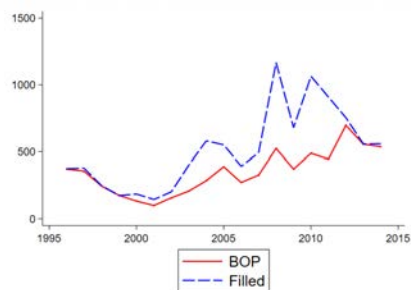
(d) Emerging Corporate

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.

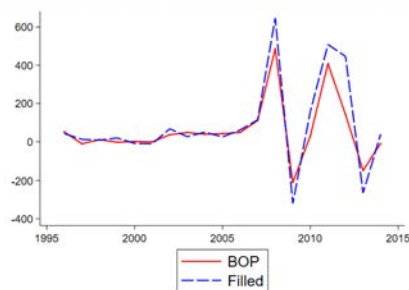
total. The surge at the end of the sample for EM central banks is driven by China.

To illustrate the quality of our inflow filling series, we compare it with the available BOP data. Figures A3 and A4 illustrates this match by plotting the aggregate inflows for each series by sector, capital flow type, and country group. For each sector and capital flow type, we keep only countries that had non-missing BOP data over 2006q1-2013q4.

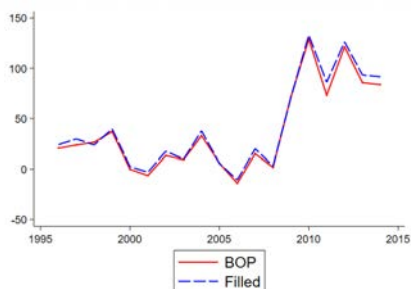
Figure A2: Aggregate External Debt Inflows for Governments and Central Banks, Billions 1996 USD



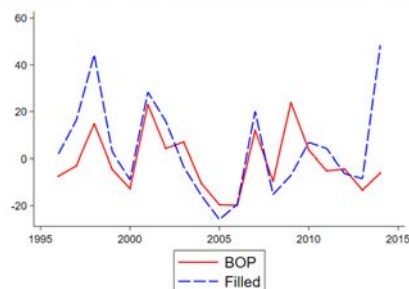
(a) Advanced Government



(b) Advanced Central Bank



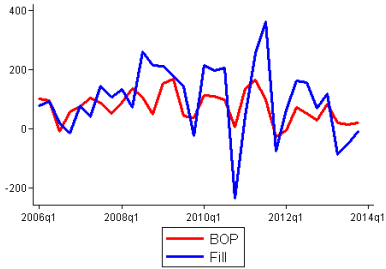
(c) Emerging Government



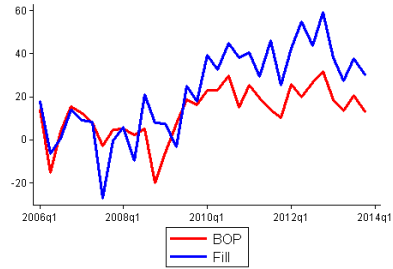
(d) Emerging Central Bank

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.

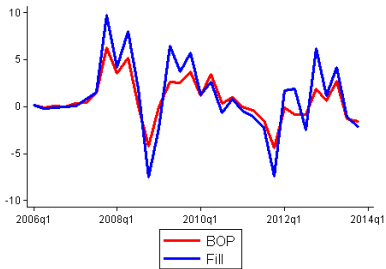
Figure A3: Aggregate Portfolio Debt, Billions USD



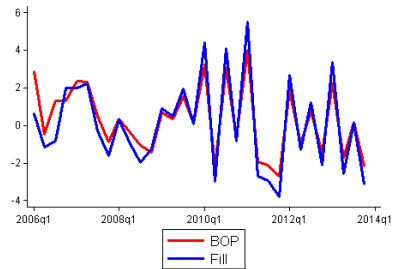
(a) Advanced Government



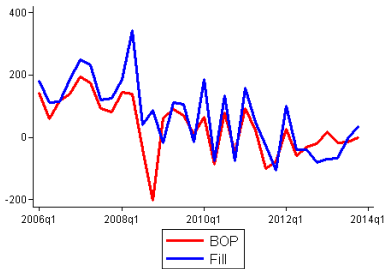
(b) Emerging Government



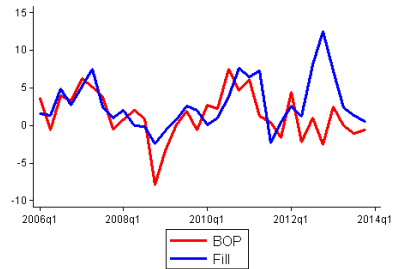
(c) Advanced Central Bank



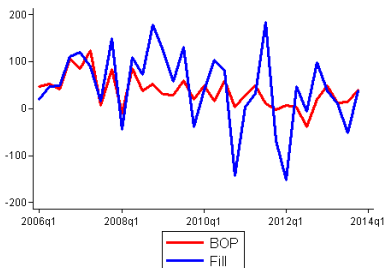
(d) Emerging Central Bank



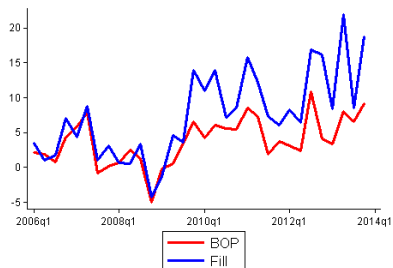
(e) Advanced Banks



(f) Emerging Banks

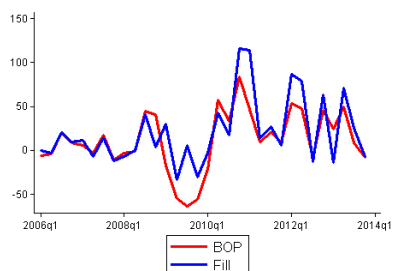


(g) Advanced Corporates

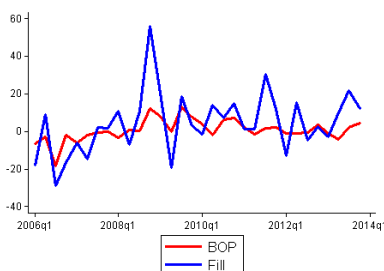


(h) Emerging Corporates

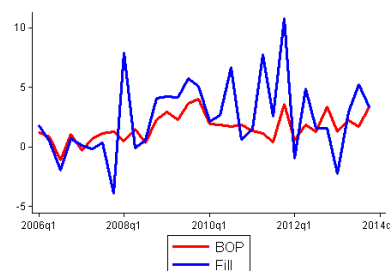
Figure A4: Aggregate Other Investment Debt , Billions USD



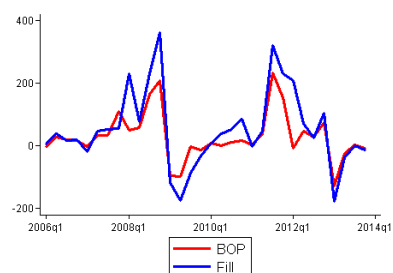
(a) Advanced Government



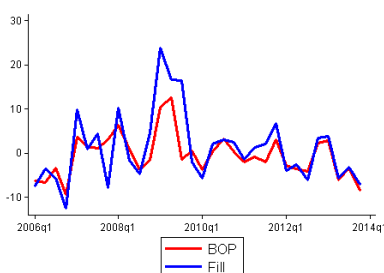
(b) Emerging Government



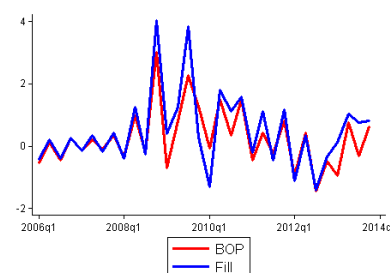
(c) Developing Government



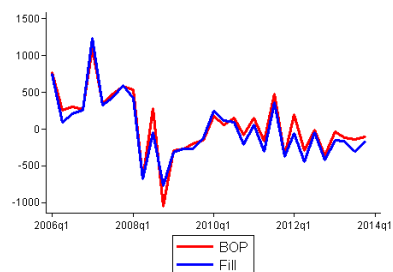
(d) Advanced Central Bank



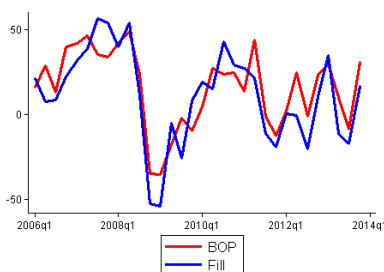
(e) Emerging Central Bank



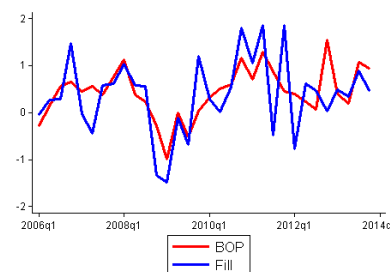
(f) Developing Central Bank



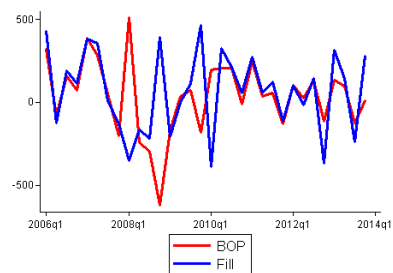
(g) Advanced Banks



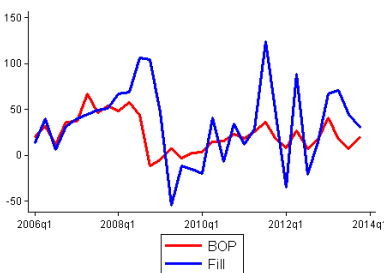
(h) Emerging Banks



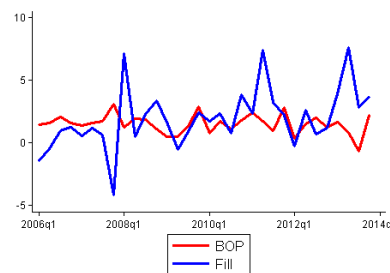
(i) Developing Banks



(j) Advanced Corporates



(k) Emerging Corporates



(l) Developing Corporates

## A.4 Samples

### A.4.1 Inflow Figures

There are 89 countries in our annual data sample of capital inflows:<sup>69</sup>

**Advanced (25):** Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

**Emerging (34):** Argentina, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czech Republic, Egypt, Estonia, Hungary, India, Indonesia, Jordan, Kazakhstan, Latvia, Lebanon, Lithuania, Macedonia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, South Africa, Thailand, Turkey, Ukraine, Uruguay, Venezuela

**Developing (30):** Albania, Angola, Bangladesh, Belarus, Bolivia, Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, El Salvador, Gabon, Ghana, Guatemala, Jamaica, Kenya, Liberia, Mongolia, Montenegro, Morocco, Namibia, Nigeria, Pakistan, Papua New Guinea, Paraguay, Serbia, Sri Lanka, Sudan, Trinidad and Tobago, Tunisia, Vietnam

**Countries dropped for the Direct Investment figures (22):** Angola, Austria, Belgium, Cote d'Ivoire, El Salvador, Gabon, Greece, India, Ireland, Jamaica, Jordan, Lebanon, Liberia, Malaysia, Montenegro, Morocco, New Zealand, Serbia, Trinidad and Tobago, Ukraine, Venezuela, Vietnam

### A.4.2 Inflow Regressions

Main regression sample consists of country-year observations with data for debt flows (both portfolio and other investment) for all 4 sectors, as well as quarterly GDP data. Sample spans 1997q1-2014q4.

**Advanced (23):** Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

**Emerging (31):** Argentina, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czech Republic, Egypt, Estonia, Hungary, India, Indonesia, Kazakhstan, Latvia, Lithuania, North Macedonia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russian Federation, Slovak Re-

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<sup>69</sup>If we use quarterly data for these figures our sample drops to 85, leaving off El Salvador, Mongolia, Montenegro, and Serbia.

public, Slovenia, South Africa, Thailand, Turkey, Ukraine, Uruguay

**Developing (9):** Bolivia, Costa Rica, Ecuador, Guatemala, Kenya, Montenegro, Nigeria, Serbia, Sri Lanka

Note that we drop Cyprus and Iceland due to their large debt flows relative to individual GDP.

### A.4.3 Outflow Sample

Our outflow regression sample consists of 52 countries (spanning 1997q1-2014q4):<sup>70</sup>

**Advanced (22):** Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, United Kingdom, United States

**Emerging (25):** Argentina, Brazil, Bulgaria, Chile, Colombia, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, North Macedonia, Malaysia, Mexico, Philippines, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, South Africa, Thailand, Turkey, Uruguay

**Developing (5):** Bolivia, Costa Rica, Guatemala, Montenegro, Serbia

## B BIS Data

### B.1 International Debt Securities

The Bank for International Settlements (BIS) produces datasets on international bond issuance and bonds outstanding, by sector and by residence or nationality of the issuer. International debt securities (IDS) are defined as those issued in a market other than that of the country where the borrower resides ([Gruić & Wooldridge, 2012](#)). This does not necessarily imply that the securities are held by foreigners, but can be taken as an approximation for external holdings of debt securities.<sup>71</sup> Since the IDS data are compiled on a security-by-security basis, gran-

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<sup>70</sup>The outflow figures are based on a balanced sample using annual data for 31 countries.

<sup>71</sup>While this is a reasonable assumption for most borrowing sectors and countries in the world, there are some exceptions. Most notably, the gap between the set of IDS and the set of externally-held debt securities tends to be considerable in the case of government bonds issued by reserve currency countries, since these countries often issue large amounts of government debt in domestic markets, which are then traded abroad. Lately, this has also been the case for the government bonds of several large EMEs (e.g. Brazil, Mexico, and Poland), albeit to a lesser degree than for government bonds issued by reserve currency countries. For most of these cases, BOP data is available and used. Otherwise, we rely on other data sources first to avoid this issue.

ular sectoral splits are easy to obtain, unlike the data on debt from international bank creditors which requires some construction to obtain the split.

The IDS data are important for our exercise. While the BOP data relies on reporting by national statistical offices (which can result in incomplete coverage of portfolio debt securities by sector), the IDS data are compiled directly on a security-by-security basis, which can result in much better coverage. The IDS data can also be presented on a residency basis or by the nationality of the issuing institution. See [Avdjiev, Chui, and Shin \(2014\)](#) and [Shin \(2013\)](#) for a more detailed discussion of this issue.

There are several options for how we allocate international debt securities to each sector. As noted earlier, bonds can be classified based on the residence of the issuer or the nationality of the issuer. Further, the BIS classifies IDS according to sector with several subsectors which can be aggregated up to our public, bank, and corporate sectors: Public banks, private banks, central banks, public other financial corporations, private other financial corporations, public non-financial corporations, private non-financial corporations, and general government sectors.

We keep general government and central bank sectors as they are found. Public and private banks are allocated to the bank sector. Public and private other financial and public and private non-financial corporations are allocated to the corporate sector. This aligns the bonds up with the standard institutional sector definitions in the BOP data. However, the role of public banks and corporations can be quite important in some countries.

## **B.2 BIS External Bank Credit Data**

The BIS compiles two sets of statistics on international banking activity. The Locational Banking Statistics (LBS) capture outstanding claims and liabilities of internationally active banks located in 44 reporting countries against counterparties residing in more than 200 countries. Banks record their positions on an unconsolidated basis, including intragroup positions between offices of the same banking group. The data are compiled based on the residency principle (as done for BOP or QEDS). The LBS capture the overwhelming majority of cross-border banking activity.<sup>72</sup> The historical LBS data breaks down counterparties in each country into

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<sup>72</sup>Due to the fact that not all countries in the world report data to the LBS, these statistics do not capture the entire global stock of outstanding external bank credit. Most countries which host large internationally active banks have reported to the LBS for several decades (the full list of LBS reporting countries is available at:

banks (banks and central bank sectors) and non-banks (corporate and government sectors).<sup>73</sup> The LBS reports outstanding stocks, and based on them BIS calculates exchange rate- and break-adjusted flows.<sup>74</sup>

The second set of banking data is the Consolidated Banking Statistics (CBS). This differs from the LBS in that the positions of banks reporting to the BIS are aggregated by the nationality (rather than by the residence) of the reporting bank.<sup>75</sup> Currently, banking groups from 31 countries report to the CBS. We use the CBS on an immediate counterparty basis (CBS/IC).<sup>76</sup> The CBS data does provide a borrower breakdown of the Non-Bank Sector into Public and Private. Since there is no currency breakdown available for the CBS, the BIS does not calculate adjusted flows.

### B.3 Obtaining Borrowing Sector Splits for Bank Creditor Data

In this section, we describe our methodology for constructing gross capital inflows and debt outstanding from BIS sources. Our goal is to obtain the stocks and flows measured based on residency (consistent with the LBS data), but we also employ the CBS to obtain certain (non-bank) borrowing sector splits. We deviate from residency in some cases to gain a more complete picture of flows.

The bank loan data is from the LBS by residency (LBSR). For observations prior to 2013, the LBS only provide the breakdown between bank and non-bank debtors (where non-bank

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[http://www.bis.org/statistics/rep\\_countries.htm](http://www.bis.org/statistics/rep_countries.htm)). Nevertheless, there are a small number of notable exceptions, such as China and Russia (the LBS series for both of which starts only as recently as Q4/2015). That said, the LBS capture around 95% of all global cross-border interbank business (BIS, 2015). While there is no similar estimate for the share of cross-border bank lending to non-banks captured by the LBS, it is reasonable to assume that it is also above 90%.

<sup>73</sup>Data on total cross border claims by BIS reporting banks separated by bank and non-bank counterparties are available going back to 1978. The recent enhancements to the BIS LBS data have provided more granular counterparty sector splits. Most importantly in the context of our study, in the enhanced LBS data the non-bank sector has been divided into the non-bank private sector and the public sector (Avdjiev, McGuire, & Wooldridge, 2015).

<sup>74</sup>Breaks may arise from changes in reporting practices, methodology, population of reporting institutions, etc. Other valuation adjustments besides exchange rates are less concerning, as loans are generally not traded in secondary markets.

<sup>75</sup>For example, the positions of a French bank's subsidiary located in New York - which in the LBS are included in the positions of banks in the United States - are consolidated in the CBS with those of its parent and included in the positions of French banks.

<sup>76</sup>The CBS are compiled in two different ways: by immediate counterparty and by ultimate risk. The immediate counterparty is the entity with whom the bank contracts to lend or borrow. Ultimate risk takes account of credit risk mitigants, such as collateral, guarantees and credit protection bought, which transfer the bank's credit exposure from one counterparty to another. (BIS, 2015)



captures both the non-bank private and the public sector).<sup>77</sup> We focus on cross-border bank lending in the LBS in the form of loans, for which we have data starting in 1996. However, our methodology described below can also be applied to total cross-border bank claims (in all instruments).<sup>78</sup>

Next, we describe how we use the sectoral split information contained in the CBS/IC data in order to divide the Non-Bank sector in the LBS data into Non-Bank Public sector and Non-Bank Private sector. This is described next. First, we go over our methodology for constructing the split for the outstanding stocks of LBS cross-border bank loans. Then, we describe our methodology for constructing the split for exchange rate adjusted changes, which relies on currency composition information available in the LBS.

### B.3.1 Borrowing Sector Splits for Outstanding Stocks

For outstanding stocks, we use the share of international bank debt for each sector from the CBS to estimate the split of the Non-Bank LBS data into Public and Private components.<sup>79</sup> We calculate that as follows:

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

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

where *nbp* indicates Non-Bank Private, *nb* indicates Non-Bank, *pub* indicates Public, *j* denotes the borrowing country, and *t* denotes the time period.  $\widehat{XBS}$  is our estimated cross border bank debt, *XBC* denotes the cross border claims (from the LBS) of BIS reporting banks, and *INTC* is international claims (from the CBS on immediate counterparty basis). The CBS international claims are defined as the sum of *XBC* and the local claims by foreign affiliates that are denominated in foreign currencies (LCFC).

This construction of the split of bank debt makes the following assumptions: First, the sectoral shares for *INTC* are the same as the sectoral shares for *XBC*. This is reasonable since

<sup>77</sup>The enhanced BIS data, available from 2013 on, splits the non-bank sector into public and private sub-sectors. Note that the LBS include central banks with banks instead of public, but central banks tend to compose a very small portion of cross-border bank claims in the BIS data.

<sup>78</sup>Starting in 1984, we have data for total bank cross-border credit (in all instruments). We don't use this in our initial analysis in order to avoid double counting external bond flows. In practice, the difference between total bank credit and bank credit in just the loan and deposit instruments tends to be small.

<sup>79</sup>This estimation is also used in [Arslanalp and Tsuda \(2014a\)](#) and [Arslanalp and Tsuda \(2014b\)](#).

for most countries, LCFC tends to be small relative to XBC.<sup>80</sup> Second, the sectoral shares for the set of banks that report LBS data (44 countries) are the same as the sectoral shares for the set of banks that report CBS data (31 countries). The 31 CBS reporting countries account for about 90% of the XBC in the LBS, and the CBS captures the activities of the subsidiaries of banks from these 31 countries worldwide. As a result, the CBS data are sufficiently representative to make the above assumption a reasonable one. Third, data for the CBS that allows us to estimate the split of Non-Bank into Public and Private is not available for advanced economies before 2000, and is only available on a semiannual basis for EM for the period before 2000. We linearly extrapolate the semiannual shares to Public and Private into a quarterly series for EM. For advanced economies, we assume constant shares from 2000 backwards.<sup>81</sup>

Having made these assumptions and constructed the external debt to bank creditors, we can then estimate total external debt by sector by adding  $\widehat{XBS}$  to *IDS* for each sector. This will produce a longer series of external debt estimates by sector than the Quarterly External Debt Statistics (QEDS)<sup>82</sup>, and cover more countries.

Recently, the BIS has released its enhanced banking data, starting in 2013. This data contain more granular borrowing sector splits - Bank, Public, and Non-Bank Private. We use this short, recent series to judge the quality of our decomposition. Our methodology for estimating borrowing sector splits for the non-bank borrowing sector and the public sector generates estimates that are very close to the actual (reported) underlying figures.<sup>83</sup>

### B.3.2 Borrowing Sector Splits for Outstanding Flows

Obtaining exchange rate-adjusted flows to all sectors and to banks is straightforward since they are reported in the LBS data. However, as discussed above, the historical LBS data do not have a split of the non-banks sector into its public and private components. Thus, in order to get estimates for exchange rate-adjusted flows to the non-bank private sector and to the public

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<sup>80</sup>While for most countries, LCFC tends to be small relative to XBC, there are a small number of exceptions. For example, this is not the case in dollarized economies (e.g. Ecuador) and some emerging European economies (e.g. Hungary and Poland), where lending denominated in euro and in Swiss francs has been non-negligible.

<sup>81</sup>The assumption of constant shares for advanced economies before 2000 is not too concerning when we are only extending back 4 years.

<sup>82</sup>The QEDS data starts in 2004, and provides data on stocks of external debt by institutional sector for a wide range of countries.

<sup>83</sup>Since not all LBS reporting countries have started providing the enhanced borrowing sector splits, these comparisons are based on the set of LBS reporting countries which had started reporting enhanced LBS data as of March 2016.

sector, we rely on the estimated stocks for those sectors obtained in the previous section.<sup>84</sup> We assume that the currency compositions of claims on these sectors are the same as the currency composition of claims on the non-bank sector as a whole.

Using the above assumption, we can obtain estimates of the stock of bank lending to the non-bank private Sector denominated in currency  $j$  as follows:

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

where  $\widehat{XBS}_{i,t}^{j,nbp}$  is the *estimated* stock of claims denominated in currency  $j$  on the non-bank private Sector in country  $i$  at the end of period  $t$ ;  $\widehat{XBS}_{i,t}^{all,nbp}$  is the *estimated* stock of claims denominated in *all* currencies on the Non-Bank Private Sector in country  $i$  at the end of period  $t$ ;  $XBS_{i,t}^{j,nb}$  is the *reported* stock of claims denominated in currency  $j$  on the Non-Bank Private Sector in country  $i$  at the end of period  $t$ ; and  $XBS_{i,t}^{all,nb}$  is the *reported* stock of claims denominated in *all* currencies on the Non-Bank Private Sector in country  $i$  at the end of period  $t$ .

We then estimate the flow of bank lending to the Non-Bank Private Sector in each currency by converting the USD values of the estimated stocks into their corresponding values in the currency in which they are denominated using the same period USD exchange rate, differencing them, and then converting back into USD using the average exchange rate:

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

where  $\widehat{XBF}_{i,t}^{j,nbp}$  is the *estimated* flow of claims denominated in currency  $j$  on the Non-Bank Private Sector in country  $i$  during period  $t$ ;  $FX_t^{j,usd}$  is the end-of-period  $t$  exchange rate between currency  $j$  and *USD*; and  $\widetilde{FX}_t^{j,usd}$  is the average exchange rate during period  $t$  between currency  $j$  and *USD*.

Now that we have the estimated flow for each currency, we sum these individual flows to obtain the total estimated flow:

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

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<sup>84</sup>Note that since most bank credit is not traded in secondary markets (e.g. loans), fluctuations in market valuations should be negligible.

where  $nbp$  denotes the Non-Bank Private Sector.

Estimates of flows to the Public Sector can be obtained in an analogous fashion:

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

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

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

where  $pub$  denotes the Public Sector.

## C Additional Results

Table C1: Inflows by Period

Panel A: All Countries												
	Excluding crisis (2008-9)				1997-2007				2008-2014			
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) All	(6) Public	(7) Banks	(8) Corps.	(9) All	(10) Public	(11) Banks	(12) Corps.
log(VIX <sub>t-1</sub> )	-2.777*** (0.647)	0.538 (0.275)	-2.028*** (0.531)	-1.110*** (0.264)	-6.436*** (0.877)	0.159 (0.287)	-4.552*** (0.721)	-2.024*** (0.406)	0.0620 (1.430)	1.992** (0.770)	-1.819 (1.156)	0.419 (0.320)
GDP Growth <sub>it-1</sub>	0.136*** (0.0345)	-0.00856 (0.0107)	0.116*** (0.0276)	0.0304*** (0.00732)	0.0383 (0.0203)	-0.0116 (0.0126)	0.0451*** (0.0139)	0.00331 (0.00692)	0.125*** (0.0380)	-0.00565 (0.0176)	0.106*** (0.0318)	0.0219 (0.0118)
Observations	3548	3548	3548	3548	2293	2293	2293	2293	1255	1255	1255	1255
R <sup>2</sup>	0.026	0.002	0.028	0.019	0.049	0.002	0.042	0.034	0.010	0.008	0.014	0.005
Panel B: Advanced Economies												
log(VIX <sub>t-1</sub> )	-3.627*** (1.237)	0.352 (0.527)	-2.652** (1.131)	-0.981** (0.447)	-9.333*** (1.456)	-0.398 (0.424)	-6.759*** (1.324)	-2.219*** (0.749)	1.108 (3.426)	3.296 (1.671)	-2.112 (2.889)	1.273** (0.606)
GDP Growth <sub>it-1</sub>	0.266*** (0.0924)	0.0537*** (0.0173)	0.212** (0.0783)	0.0135 (0.0183)	0.0847 (0.0470)	0.0380** (0.0174)	0.0601 (0.0349)	-0.0133 (0.0154)	0.354*** (0.116)	0.0557 (0.0505)	0.279** (0.105)	0.0306 (0.0303)
Observations	1472	1472	1472	1472	1012	1012	1012	1012	460	460	460	460
R <sup>2</sup>	0.030	0.007	0.027	0.005	0.057	0.007	0.041	0.024	0.027	0.018	0.028	0.007
Panel C: Emerging Markets												
log(VIX <sub>t-1</sub> )	-2.832*** (0.697)	0.420 (0.256)	-2.024*** (0.427)	-1.139*** (0.369)	-4.699*** (0.991)	0.354 (0.385)	-3.022*** (0.679)	-1.906*** (0.461)	-0.574 (1.128)	1.492 (0.816)	-1.946** (0.726)	-0.0576 (0.316)
GDP Growth <sub>it-1</sub>	0.0838*** (0.0287)	-0.0328*** (0.0105)	0.0820*** (0.0222)	0.0312*** (0.00621)	0.0367 (0.0217)	-0.0286 (0.0149)	0.0501*** (0.0143)	0.0127 (0.00687)	0.0338 (0.0236)	-0.0303 (0.0164)	0.0414*** (0.0140)	0.0165 (0.0130)
Observations	1796	1796	1796	1796	1181	1181	1181	1181	615	615	615	615
R <sup>2</sup>	0.057	0.017	0.084	0.054	0.087	0.022	0.101	0.075	0.003	0.009	0.024	0.007

Errors are clustered at the country level. All regressions include country fixed effects. \*\* p < 0.05, \*\*\* p < 0.01

Table C2: Inflows by Sample Balance

Panel A: All Countries															
	Fully unbalanced, 1997q4-2014q4					Fully balanced, 1997q4-2014q4					Fully balanced, 2002q4-2014q4				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID
log(VIX <sub>t-1</sub> )	-3.260*** (0.737)	0.467 (0.364)	-2.422*** (0.523)	-1.045*** (0.243)	-1.280*** (0.385)	-3.819*** (0.858)	0.427 (0.434)	-2.757*** (0.612)	-1.116*** (0.287)	-1.369*** (0.444)	-4.115*** (0.936)	0.706 (0.432)	-3.200*** (0.650)	-1.262*** (0.266)	-1.536*** (0.429)
GDP Growth <sub>it-1</sub>	0.142*** (0.0357)	-0.0124 (0.0101)	0.115*** (0.0269)	0.0359*** (0.00772)	0.0442*** (0.00844)	0.149*** (0.0426)	-0.00772 (0.0121)	0.126*** (0.0324)	0.0282*** (0.00668)	0.0359*** (0.00774)	0.219*** (0.0531)	-0.00798 (0.0118)	0.184*** (0.0415)	0.0391*** (0.00936)	0.0544*** (0.0111)
Observations	4020	4020	4037	4020	3721	3312	3312	3312	3312	3120	2695	2695	2695	2695	2615
R <sup>2</sup>	0.035	0.002	0.034	0.025	0.025	0.037	0.001	0.036	0.020	0.020	0.060	0.003	0.062	0.032	0.032

Panel B: Advanced Economies															
	Fully unbalanced, 1997q4-2014q4					Fully balanced, 1997q4-2014q4					Fully balanced, 2002q4-2014q4				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID
log(VIX <sub>t-1</sub> )	-4.517*** (1.507)	0.410 (0.791)	-3.069*** (1.074)	-1.160** (0.476)	-1.446 (0.803)	-4.517*** (1.507)	0.410 (0.791)	-3.069*** (1.074)	-1.160** (0.476)	-1.446 (0.803)	-6.788*** (1.956)	0.661 (0.970)	-5.011*** (1.258)	-1.531** (0.566)	-2.060** (0.919)
GDP Growth <sub>it-1</sub>	0.294** (0.105)	0.0563*** (0.0190)	0.209** (0.0784)	0.0225 (0.0170)	0.0202 (0.0171)	0.294** (0.105)	0.0563*** (0.0190)	0.209** (0.0784)	0.0225 (0.0170)	0.0202 (0.0171)	0.455*** (0.138)	0.0547** (0.0233)	0.338*** (0.103)	0.0454 (0.0230)	0.0514** (0.0213)
Observations	1656	1656	1656	1656	1548	1656	1656	1656	1656	1548	1127	1127	1127	1127	1109
R <sup>2</sup>	0.045	0.008	0.032	0.009	0.008	0.045	0.008	0.032	0.009	0.008	0.090	0.007	0.074	0.021	0.021

Panel C: Emerging Markets															
	Fully unbalanced, 1997q4-2014q4					Fully balanced, 1997q4-2014q4					Fully balanced, 2002q4-2014q4				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID
log(VIX <sub>t-1</sub> )	-2.733*** (0.663)	0.438 (0.263)	-2.199*** (0.535)	-0.956*** (0.291)	-1.179*** (0.392)	-3.093*** (0.728)	0.445 (0.327)	-2.433*** (0.547)	-1.070*** (0.323)	-1.297*** (0.391)	-2.442*** (0.751)	0.786** (0.321)	-2.140*** (0.667)	-1.067*** (0.251)	-1.143*** (0.358)
GDP Growth <sub>it-1</sub>	0.0813*** (0.0256)	-0.0383*** (0.00934)	0.0842*** (0.0217)	0.0334*** (0.00598)	0.0486*** (0.00814)	0.0791** (0.0296)	-0.0396*** (0.0111)	0.0858*** (0.0257)	0.0312*** (0.00595)	0.0435*** (0.00823)	0.119*** (0.0358)	-0.0360*** (0.0109)	0.117*** (0.0345)	0.0380*** (0.00928)	0.0575*** (0.0134)
Observations	2036	2036	2036	2036	1919	1656	1656	1656	1656	1572	1372	1372	1372	1372	1310
R <sup>2</sup>	0.062	0.025	0.098	0.059	0.062	0.067	0.028	0.104	0.069	0.067	0.080	0.027	0.117	0.075	0.067

Errors are clustered at the country level. All regressions include country fixed effects. Fully balanced indicates that every country in the sample has data for all sectors and for both instruments over the entire time period. \*\* p < 0.05, \*\*\* p < 0.01

Table C3: Outflows by Sample Balance

	Fully unbalanced, 1997q4-2014q4					Fully balanced, 1997q4-2014q4					Fully balanced, 2002q4-2014q4				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	All	Public	Banks	Corps.	Public +Res.	All	Public	Banks	Corps.	Public +Res.	All	Public	Banks	Corps.	Public +Res.
log(VIX <sub><i>t-1</i></sub> )	-3.368*** (0.789)	-0.0182 (0.358)	-2.895*** (0.715)	-0.814*** (0.263)	-0.266 (0.581)	-3.629** (1.530)	-0.0767 (1.112)	-3.005** (1.095)	-1.660*** (0.444)	-0.386 (1.527)	-3.324*** (0.958)	-0.218 (0.557)	-3.010*** (0.989)	-0.858** (0.341)	-0.308 (0.895)
GDP Growth <sub><i>it-1</i></sub>	0.0722*** (0.0262)	0.0120** (0.00547)	0.0549** (0.0212)	0.00854 (0.00545)	0.0341** (0.0129)	0.121 (0.0575)	0.0186 (0.0114)	0.121 (0.0580)	0.0132 (0.0117)	0.0374 (0.0273)	0.119*** (0.0392)	0.0133 (0.00801)	0.116*** (0.0413)	0.0132 (0.00860)	0.0396** (0.0191)
Observations	2622	2622	3285	2759	2620	720	720	720	720	720	1274	1274	1274	1274	1274
R <sup>2</sup>	0.033	0.002	0.022	0.007	0.005	0.038	0.002	0.039	0.018	0.004	0.052	0.002	0.048	0.008	0.006
Panel B: Advanced Economies															
log(VIX <sub><i>t-1</i></sub> )	-5.717*** (1.515)	0.497 (0.757)	-4.884*** (1.338)	-1.462** (0.532)	1.067 (1.087)	-4.108 (1.874)	0.0579 (1.397)	-3.611** (1.265)	-1.784** (0.516)	-0.122 (1.844)	-5.497*** (1.746)	0.0614 (1.085)	-5.560*** (1.762)	-1.209 (0.637)	0.903 (1.593)
GDP Growth <sub><i>it-1</i></sub>	0.211*** (0.0745)	0.0235 (0.0118)	0.177*** (0.0559)	0.0120 (0.0122)	0.0270 (0.0215)	0.141 (0.0807)	0.0222 (0.0161)	0.141 (0.0810)	0.0133 (0.0152)	0.0410 (0.0348)	0.269** (0.0984)	0.0202 (0.0199)	0.287** (0.102)	0.0116 (0.0172)	0.0162 (0.0332)
Observations	1171	1171	1558	1173	1170	576	576	576	576	576	637	637	637	637	637
R <sup>2</sup>	0.067	0.003	0.049	0.011	0.005	0.040	0.002	0.046	0.018	0.004	0.086	0.002	0.101	0.008	0.003
Panel C: Emerging Markets															
log(VIX <sub><i>t-1</i></sub> )	-1.666*** (0.391)	-0.578** (0.219)	-1.226*** (0.315)	-0.350 (0.236)	-1.636*** (0.502)	-1.651 (1.149)	-0.619 (0.513)	-0.506** (0.0231)	-1.155 (1.015)	-1.454 (2.876)	-1.595*** (0.480)	-0.551 (0.344)	-0.869*** (0.227)	-0.529** (0.235)	-1.366 (0.794)
GDP Growth <sub><i>it-1</i></sub>	0.0103 (0.0119)	0.00222 (0.00472)	0.00197 (0.00862)	0.00640 (0.00587)	0.0293 (0.0156)	0.0725 (0.0161)	0.00834 (0.00712)	0.0745 (0.0411)	0.0138 (0.0221)	0.0261 (0.0513)	0.0474** (0.0154)	0.00804 (0.00754)	0.0349** (0.0130)	0.0169 (0.00993)	0.0365 (0.0219)
Observations	1302	1302	1505	1394	1301	144	144	144	144	144	588	588	588	588	588
R <sup>2</sup>	0.021	0.007	0.009	0.005	0.014	0.038	0.005	0.019	0.024	0.007	0.065	0.011	0.021	0.019	0.015

Errors are clustered at the country level. All regressions include country fixed effects. Fully balanced indicates that every country in the sample has data for all sectors and for both instruments over the entire time period. \*\* p < 0.05, \*\*\* p < 0.01

Table C4: Inflows and Outflows - Trend GDP Normalization

Panel A: All countries										
	Inflows					Outflows				
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) Corps +DID	(6) All	(7) Public	(8) Banks	(9) Corps.	(10) Corps +DID
$\log(\text{VIX}_{t-1})$	-3.685*** (0.781)	0.421 (0.358)	-2.761*** (0.557)	-1.112*** (0.259)	-1.376*** (0.400)	-3.613*** (0.833)	-0.0468 (0.385)	-3.592*** (0.840)	-0.909*** (0.280)	-0.313 (0.605)
$\text{GDP Growth}_{it-1}$	0.163*** (0.0374)	-0.00709 (0.00925)	0.126*** (0.0283)	0.0424*** (0.00882)	0.0547*** (0.0103)	0.0884*** (0.0285)	0.0153** (0.00594)	0.0786*** (0.0289)	0.0163*** (0.00591)	0.0446*** (0.0133)
Observations	4020	4020	4020	4020	3721	2620	2620	2620	2620	2620
$R^2$	0.044	0.001	0.039	0.031	0.031	0.038	0.003	0.035	0.010	0.007
Panel B: Advanced Economies										
$\log(\text{VIX}_{t-1})$	-5.253*** (1.539)	0.279 (0.783)	-3.660*** (1.075)	-1.336** (0.520)	-1.678 (0.844)	-6.193*** (1.582)	0.395 (0.825)	-6.369*** (1.571)	-1.636*** (0.517)	0.917 (1.159)
$\text{GDP Growth}_{it-1}$	0.326*** (0.105)	0.0616*** (0.0189)	0.227*** (0.0785)	0.0293 (0.0180)	0.0306 (0.0183)	0.237*** (0.0791)	0.0264** (0.0120)	0.244*** (0.0804)	0.0200 (0.0134)	0.0317 (0.0205)
Observations	1656	1656	1656	1656	1548	1170	1170	1170	1170	1170
$R^2$	0.056	0.009	0.039	0.013	0.012	0.074	0.003	0.082	0.014	0.004
Panel C: Emerging Markets										
$\log(\text{VIX}_{t-1})$	-3.010*** (0.757)	0.460 (0.251)	-2.418*** (0.628)	-0.983*** (0.288)	-1.209*** (0.391)	-1.747*** (0.407)	-0.551** (0.220)	-1.416*** (0.341)	-0.372 (0.263)	-1.659*** (0.505)
$\text{GDP Growth}_{it-1}$	0.0983*** (0.0295)	-0.0327*** (0.00769)	0.0922*** (0.0248)	0.0387*** (0.00728)	0.0577*** (0.0104)	0.0220 (0.0152)	0.00559 (0.00539)	0.00977 (0.0133)	0.0142** (0.00595)	0.0418** (0.0162)
Observations	2036	2036	2036	2036	1919	1301	1301	1301	1301	1301
$R^2$	0.069	0.019	0.097	0.063	0.067	0.025	0.008	0.012	0.011	0.019

Sample period is 1997Q1–2014Q4. All regressions include country fixed effects. Errors are clustered at the country level. \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Table C5: Inflows by Instrument

Panel A: All Countries								
	Other Investment Debt				Portfolio Debt			
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) All	(6) Public	(7) Banks	(8) Corps.
$\log(\text{VIX}_{t-1})$	-2.119*** (0.661)	0.620** (0.286)	-1.844*** (0.519)	-0.792*** (0.195)	-0.936** (0.364)	-0.188 (0.213)	-0.434** (0.173)	-0.269 (0.140)
$\text{GDP Growth}_{it-1}$	0.132*** (0.0279)	-0.00451 (0.00807)	0.102*** (0.0223)	0.0329*** (0.00626)	0.00669 (0.0130)	-0.00528 (0.00790)	0.00986 (0.00509)	0.00262 (0.00397)
Observations	4020	4020	4020	4020	4020	4020	4020	4020
$R^2$	0.034	0.003	0.032	0.026	0.004	0.000	0.006	0.003
Panel B: Advanced Economies								
$\log(\text{VIX}_{t-1})$	-3.294** (1.325)	0.0102 (0.589)	-1.983 (1.072)	-0.866** (0.369)	-0.732 (0.828)	0.385 (0.405)	-0.757 (0.404)	-0.368 (0.333)
$\text{GDP Growth}_{it-1}$	0.207** (0.0772)	0.0345 (0.0199)	0.166** (0.0605)	0.00591 (0.00701)	0.0736 (0.0375)	0.0259 (0.0222)	0.0297 (0.0164)	0.0163 (0.0133)
Observations	1656	1656	1656	1656	1656	1656	1656	1656
$R^2$	0.032	0.005	0.025	0.005	0.013	0.004	0.012	0.008
Panel C: Emerging Markets								
$\log(\text{VIX}_{t-1})$	-1.642** (0.688)	0.973*** (0.272)	-2.010*** (0.538)	-0.727*** (0.247)	-1.084*** (0.234)	-0.619*** (0.199)	-0.183** (0.0796)	-0.211*** (0.0607)
$\text{GDP Growth}_{it-1}$	0.102*** (0.0254)	-0.0181** (0.00747)	0.0799*** (0.0208)	0.0377*** (0.00593)	-0.0196** (0.00765)	-0.0183*** (0.00570)	0.00351 (0.00279)	-0.00369** (0.00143)
Observations	2036	2036	2036	2036	2036	2036	2036	2036
$R^2$	0.070	0.024	0.094	0.069	0.013	0.010	0.006	0.007

Sample is from 1997Q1–2014Q4. All regressions include country fixed effects. Errors are clustered at the country level. \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table C6: Other Push and Pull Factors

Panel A: Inflows										
	Advanced Economies					Emerging Markets				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	Public	Banks	Corps.	Corps +DID	All	Public	Banks	Corps.	Corps +DID
Broad dollar index <sub><i>t-1</i></sub>	0.0700 (0.0723)	-0.0930** (0.0411)	0.151** (0.0606)	0.0163 (0.0275)	0.0142 (0.0395)	-0.0352 (0.0199)	0.00972 (0.0115)	-0.00907 (0.0145)	-0.0359*** (0.0117)	-0.0702*** (0.0227)
Yield Curve <sub><i>t-1</i></sub>	-0.409 (0.820)	1.194** (0.463)	-1.263 (0.624)	-0.357 (0.269)	-0.470 (0.444)	-0.322 (0.239)	0.135 (0.143)	-0.194 (0.144)	-0.264** (0.102)	-0.406*** (0.134)
Wu/Xia shadow rate <sub><i>t-1</i></sub>	1.234** (0.493)	0.560** (0.258)	0.532 (0.273)	0.0527 (0.146)	0.200 (0.212)	-0.0127 (0.223)	-0.0734 (0.0911)	-0.00805 (0.123)	0.0688 (0.0639)	0.0505 (0.109)
Global GDP growth <sub><i>t-1</i></sub>	1.440** (0.510)	0.212 (0.192)	0.693** (0.272)	0.344** (0.127)	0.452*** (0.156)	0.239** (0.0979)	0.0617 (0.0666)	0.168*** (0.0514)	0.00916 (0.0454)	-0.0658 (0.0909)
Domestic credit growth <sub><i>it-1</i></sub>	0.453 (0.441)	-0.0352 (0.165)	0.507 (0.283)	0.146 (0.111)	0.193 (0.139)	0.226 (0.106)	0.0649 (0.0334)	0.0992 (0.0608)	0.0616*** (0.0179)	0.0609** (0.0272)
Exchange rate depreciation <sub><i>it-1</i></sub>	-0.295*** (0.0839)	-0.0206 (0.0238)	-0.258*** (0.0634)	-0.0133 (0.0185)	-0.0173 (0.0221)	-0.0998** (0.0458)	-0.00130 (0.0194)	-0.0574** (0.0243)	-0.0411*** (0.00760)	-0.0556*** (0.0175)
Current account <sub><i>it-1</i></sub>	-0.0920** (0.0430)	-0.0271** (0.0101)	-0.0443 (0.0250)	-0.0122 (0.0136)	-0.0187 (0.0163)	-0.0675 (0.0356)	-0.000394 (0.0144)	-0.0326 (0.0196)	-0.0345** (0.0146)	-0.0418** (0.0191)
Capital control (inflow) <sub><i>it-1</i></sub>	-4.006 (8.274)	-2.044 (3.113)	-4.919 (6.973)	3.278 (2.494)	4.141 (4.264)	-0.561 (1.131)	-1.889** (0.858)	0.403 (0.644)	0.925** (0.358)	0.785 (0.580)
Observations	1331	1331	1331	1331	1331	859	859	859	859	855
R <sup>2</sup>	0.127	0.023	0.114	0.047	0.062	0.143	0.038	0.122	0.171	0.100

Panel B: Outflows										
Broad dollar index <sub><i>t-1</i></sub>	0.142** (0.0529)	0.0128 (0.0510)	0.0688 (0.0597)	0.0649*** (0.0207)	-0.00462 (0.0579)	0.0105 (0.0161)	-0.0166** (0.00679)	-0.00240 (0.0184)	0.0291 (0.0132)	-0.0553 (0.0428)
Yield Curve <sub><i>t-1</i></sub>	-0.435 (0.639)	0.287 (0.495)	-0.862** (0.323)	-0.158 (0.252)	0.622 (0.516)	-0.405** (0.129)	-0.0983 (0.0570)	-0.285 (0.139)	-0.180 (0.0946)	0.0475 (0.305)
Wu/Xia shadow rate <sub><i>t-1</i></sub>	0.688 (0.375)	0.101 (0.237)	0.651** (0.270)	0.0612 (0.166)	0.245 (0.258)	-0.0365 (0.0815)	0.0231 (0.0320)	-0.0205 (0.0810)	-0.0947 (0.0468)	0.259 (0.211)
Global GDP growth <sub><i>t-1</i></sub>	1.596*** (0.529)	0.356 (0.206)	1.286** (0.557)	0.329 (0.215)	0.0571 (0.321)	0.201** (0.0801)	0.0907 (0.0901)	0.144 (0.0701)	0.0243 (0.0345)	-0.0440 (0.135)
Domestic credit growth <sub><i>it-1</i></sub>	0.261 (0.393)	-0.0291 (0.0549)	0.530 (0.568)	0.00653 (0.0769)	-0.0489 (0.0639)	0.0658 (0.0425)	0.00268 (0.0134)	0.0465 (0.0294)	0.0413 (0.0283)	-0.00000713 (0.0189)
Exchange rate depreciation <sub><i>it-1</i></sub>	-0.209*** (0.0669)	0.00411 (0.0178)	-0.250*** (0.0791)	-0.0135 (0.0158)	0.00107 (0.0218)	-0.0285** (0.0107)	-0.00244 (0.00487)	-0.0179 (0.00897)	-0.0181 (0.00828)	-0.0472 (0.0249)
Current account <sub><i>it-1</i></sub>	-0.0400 (0.0671)	0.000654 (0.0221)	-0.0487 (0.0535)	0.0204 (0.0282)	0.0164 (0.0178)	0.0343 (0.0316)	0.0316** (0.0108)	0.0212 (0.0225)	-0.00331 (0.0197)	-0.00246 (0.0475)
Capital control (inflow) <sub><i>it-1</i></sub>	3.075 (10.66)	1.076 (2.975)	8.821 (13.15)	-0.571 (2.545)	3.877 (3.279)	-0.276 (0.816)	-1.016 (0.798)	0.145 (0.638)	0.374 (0.641)	-0.275 (1.094)
Observations	996	996	996	996	995	591	591	591	591	591
R <sup>2</sup>	0.136	0.013	0.140	0.029	0.006	0.076	0.083	0.048	0.027	0.032

Sample is from 1997Q1–2014Q4. All regressions include country fixed effects. Errors are clustered at the country level. \*\* p < 0.05, \*\*\* p < 0.01

Table C7: Outflows by Instrument

Panel A: All Countries								
	Other Investment Debt				Portfolio Debt			
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) All	(6) Public	(7) Banks	(8) Corps.
$\log(\text{VIX}_{t-1})$	-2.498*** (0.573)	0.105 (0.231)	-2.841*** (0.622)	-0.446** (0.204)	-0.669** (0.269)	-0.00625 (0.103)	-0.433** (0.185)	-0.311 (0.182)
$\text{GDP Growth}_{it-1}$	0.0642*** (0.0235)	0.00552 (0.00367)	0.0635** (0.0248)	0.0154*** (0.00561)	0.00911 (0.00662)	0.00896** (0.00420)	0.00407 (0.00534)	-0.00342 (0.00333)
Observations	2620	2620	2620	2620	2620	2620	2620	2620
$R^2$	0.029	0.001	0.031	0.008	0.007	0.004	0.005	0.002
Panel B: Advanced Economies								
$\log(\text{VIX}_{t-1})$	-4.095*** (1.091)	0.668 (0.415)	-5.011*** (1.161)	-0.711 (0.358)	-1.220** (0.559)	-0.000253 (0.178)	-0.727** (0.346)	-0.646 (0.394)
$\text{GDP Growth}_{it-1}$	0.182** (0.0662)	0.0115 (0.00756)	0.200*** (0.0682)	0.0219 (0.0147)	0.0306 (0.0192)	0.0140 (0.0104)	0.0217 (0.0145)	-0.00296 (0.00987)
Observations	1170	1170	1170	1170	1170	1170	1170	1170
$R^2$	0.060	0.004	0.075	0.009	0.015	0.005	0.012	0.005
Panel C: Emerging Markets								
$\log(\text{VIX}_{t-1})$	-1.378*** (0.329)	-0.471 (0.241)	-1.107*** (0.238)	-0.274 (0.242)	-0.245 (0.168)	-0.00664 (0.139)	-0.241 (0.184)	-0.0187 (0.0879)
$\text{GDP Growth}_{it-1}$	0.0101 (0.0109)	-0.00165 (0.00253)	0.00600 (0.0121)	0.0115** (0.00460)	0.000914 (0.00405)	0.00695 (0.00403)	-0.00320 (0.00393)	-0.00273 (0.00211)
Observations	1301	1301	1301	1301	1301	1301	1301	1301
$R^2$	0.018	0.006	0.009	0.009	0.002	0.005	0.003	0.001

Sample is from 1997Q1–2014Q4. All regressions include country fixed effects. Errors are clustered at the country level. \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table C8: Inflow and Outflow Unconditional Correlations, by Sector

		Panel A: All countries					
		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Inflows	Public	1					
	Bank	-0.0958***	1				
	Corp	-0.0736***	0.174***	1			
Outflows	Public	0.344***	0.111***	0.00641	1		
	Bank	0.132***	0.694***	0.235***	-0.00530	1	
	Corp	0.0444*	0.205***	0.517***	0.0209	0.214***	1
		Panel B: Advanced Economies					
		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Inflows	Public	1					
	Bank	-0.0949**	1				
	Corp	-0.0748*	0.162***	1			
Outflows	Public	0.362***	0.110***	-0.00183	1		
	Bank	0.144***	0.759***	0.266***	-0.00123	1	
	Corp	0.0384	0.203***	0.590***	-0.0135	0.227***	1
		Panel C: Emerging Markets					
		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Inflows	Public	1					
	Bank	-0.164***	1				
	Corp	-0.101***	0.185***	1			
Outflows	Public	0.310***	0.0376	0.0170	1		
	Bank	0.102***	0.312***	0.0761**	-0.0953***	1	
	Corp	0.0179	0.0968***	0.231***	0.00595	0.0383	1

## C.1 Additional Figures

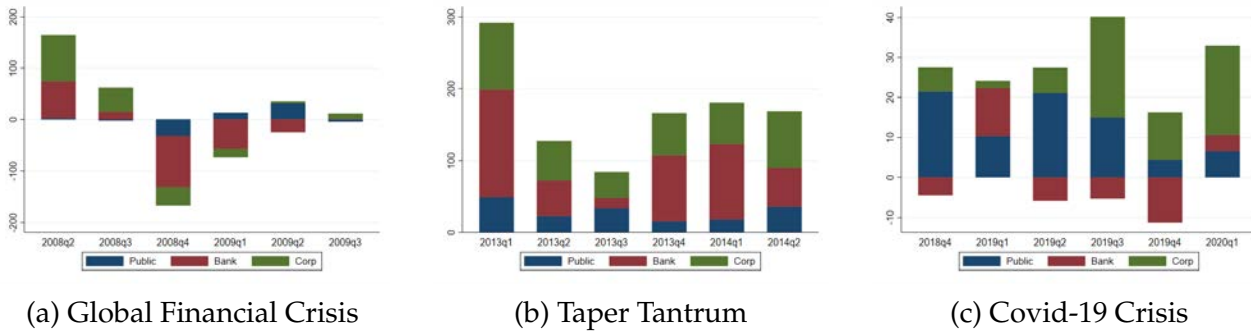
Table C9: Inflow and Outflow Conditional Correlations, by Sector and Instrument

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	Blue												
		OID	Red	Blue											
	Bank	PD	Light Red	Red	Blue										
		OID	Light Red	Red	Light Blue	Blue									
	Corp	PD	Light Red	Red	Light Blue	Light Blue	Blue								
		OID	Light Red	Red	Light Blue	Light Blue	Light Blue	Blue							
Outflows		PD	Light Red	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue			
		OID	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue		
		Res.	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue	
	Bank	PD	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Red	Blue	
		OID	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Blue
		Corp	PD	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Light Red
		OID	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red
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	Blue												
		OID	Red	Blue											
	Bank	PD	Light Red	Red	Blue										
		OID	Light Red	Red	Light Red	Blue									
	Corp	PD	Light Red	Red	Light Red	Light Red	Blue								
		OID	Light Red	Red	Light Red	Light Red	Light Red	Blue							
Outflows		PD	Light Red	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue	
		OID	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue
		Res.	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red
	Bank	PD	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Light Red	Blue
		OID	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red
		Corp	PD	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red
		OID	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Light Red	Light Red	Light Red	Light Red	

Table C10: Inflow and Outflow Unconditional Correlations, by Sector and Instrument

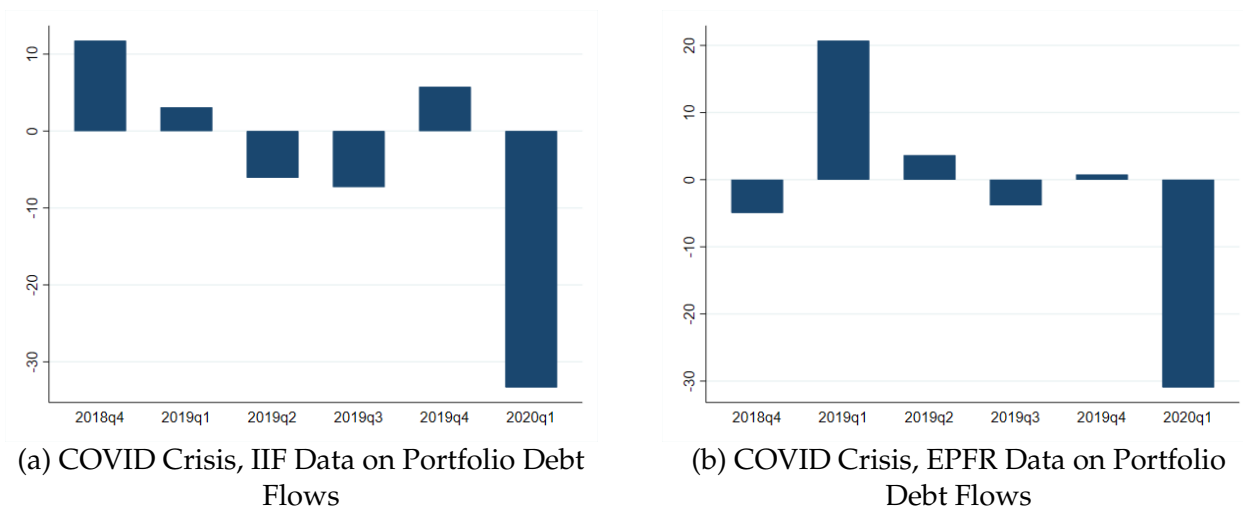
Advanced Economies			Inflows						Outflows						
			Public		Bank		Corp		Public			Bank		Corp	
			PD	OID	PD	OID	PD	OID	PD	OID	Res.	PD	OID	PD	OID
Inflows	Public	PD	Blue												
		OID	Red	Blue											
	Bank	PD	Light Red	Red	Blue										
		OID	Light Red	Red	Light Blue	Blue									
	Corp	PD	Light Red	Red	Light Blue	Blue									
		OID	Light Red	Red	Light Blue	Blue	Light Blue	Blue							
Outflows		PD	Light Red	Light Blue			Light Red	Light Red	Blue						
		OID	Light Blue	Light Red			Red	Red	Blue	Blue					
		Res.		Light Red		Light Red	Red	Red	Red	Blue	Blue				
	Bank	PD	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Red	Red	Blue			
		OID	Light Red	Light Red	Light Blue	Light Blue	Light Blue	Light Blue	Light Red	Red	Red	Light Blue	Blue		
	Corp	PD	Light Red	Red	Light Red	Light Red	Light Red	Light Red	Light Red	Red	Red	Light Red	Light Red	Blue	
		OID	Light Red	Red	Light Red	Light Red	Light Red	Light Red	Red	Red	Light Red	Light Red	Light Red	Blue	Blue
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	Blue												
		OID	Red	Blue											
	Bank	PD	Light Red	Red	Blue										
		OID	Light Red	Red	Light Red	Blue									
	Corp	PD	Light Red	Red	Light Red	Blue									
		OID	Light Red	Red	Light Red	Blue	Light Red	Blue							
Outflows		PD	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue						
		OID	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Red	Blue	Blue				
		Res.	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue	Blue			
	Bank	PD	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Red	Red	Blue		
		OID	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Red	Red	Light Red	Blue	
	Corp	PD	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue
		OID	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Light Red	Blue

Figure C1: Crises and Debt Flows to Emerging Markets



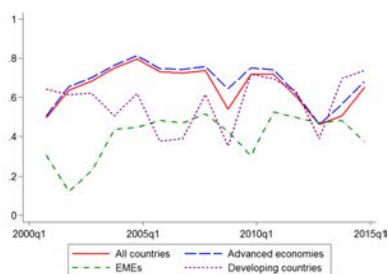
Source: Dealogic, BOP, IIP, QEDS, and BIS, authors' calculations. Each bar shows the net debt inflows in the given quarter, expressed in billions USD. Figures C1a and C1b use our constructed data on net inflows by sector. Figure C1c plots net international bond and syndicated loan issuance by sector for the same set of countries from BIS IDS and Dealogic, respectively.

Figure C2: EPFR and IIF Portfolio Debt Flows to Emerging Markets

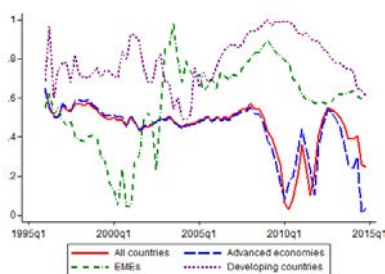


Source: EPFR, IIF, authors' calculations. Figure C2a plots IIF data, capturing net portfolio debt inflows for the following 9 countries: Indonesia, India, Thailand, South Africa, Hungary, Turkey, Mexico, Poland, and Ukraine. Figure C2b plots EPFR data, capturing flows of portfolio debt holdings of EM debt (from 19 countries) into investment funds (negative values indicating investment funds are selling their holdings to some other investor). Each bar shows changes in net inflows in the given quarter from the average of the previous two quarters.

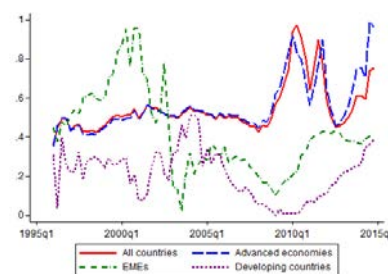
Figure C3: Composition of External Debt Inflows by Debt Type and Sector



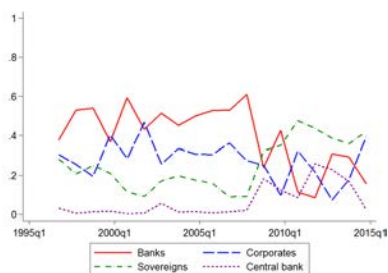
(a) Share of Debt in Total Stocks



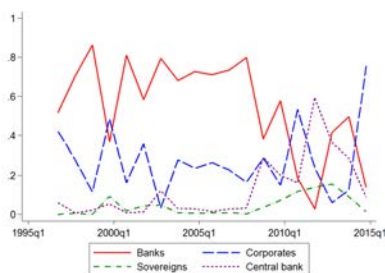
(b) Share of Other Investment in Total Debt Stocks



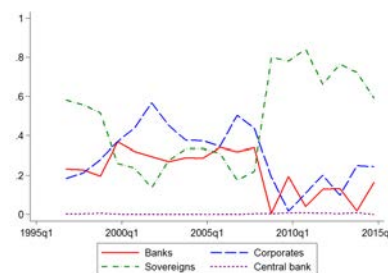
(c) Share of Portfolio Debt in Total Debt Stocks



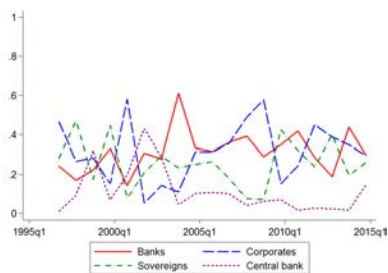
(d) Share of Sectors in Total Debt - Advanced



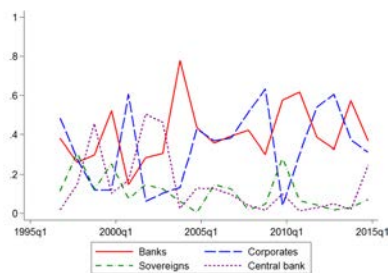
(e) Share of Sectors in Other Investment Debt - Advanced



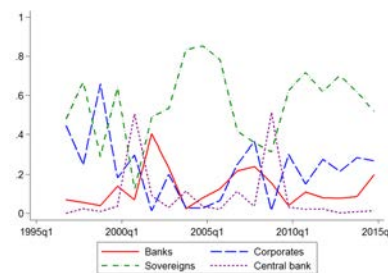
(f) Share of Sectors in Portfolio Debt - Advanced



(g) Share of Sectors in Total Debt - Emerging



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

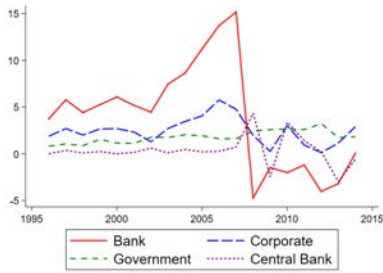


(i) Share of Sectors in Portfolio Debt - Emerging

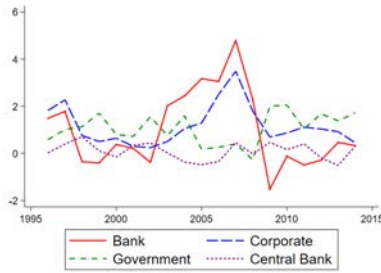
Source: BOP, IIP, QEDS, and BIS, authors' calculations. Panel (a) uses annual data after 2001 in order to get a balanced sample.



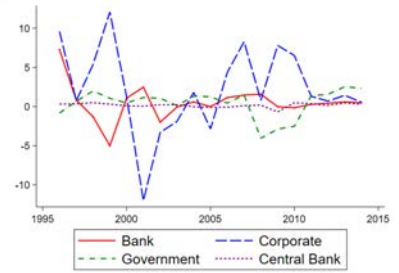
Figure C4: Average External Debt Inflows, Percent of GDP



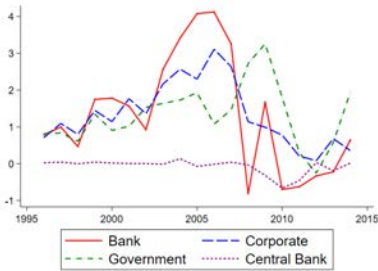
(a) Total Debt, Advanced



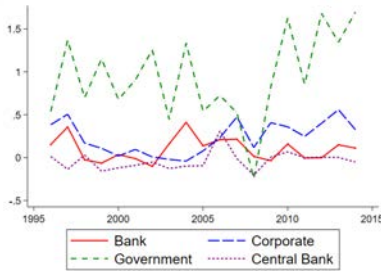
(b) Total Debt, Emerging



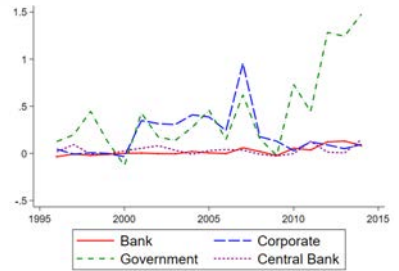
(c) Total Debt, Developing



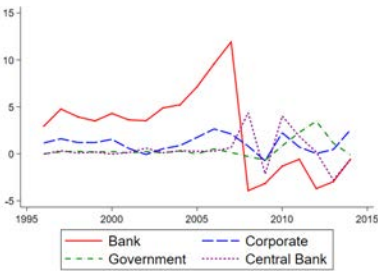
(d) Portfolio Debt, Advanced



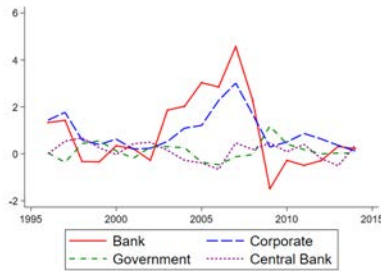
(e) Portfolio Debt, Emerging



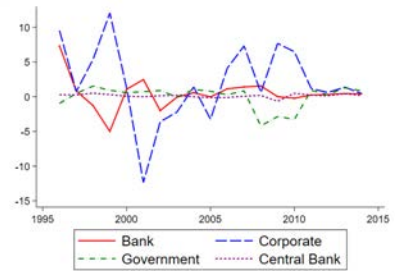
(f) Portfolio Debt, Developing



(g) Other Investment Debt, Advanced



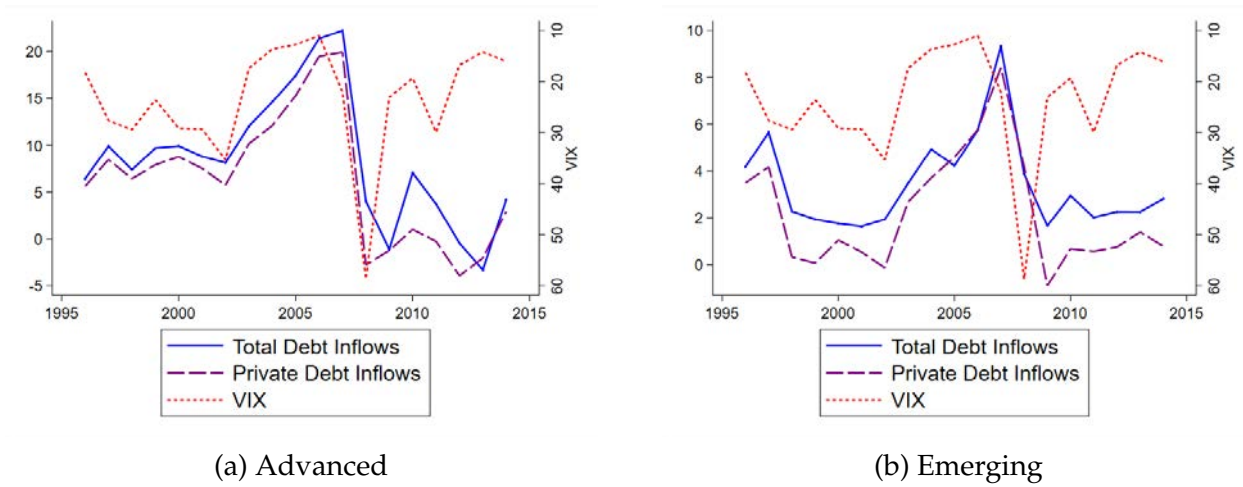
(h) Other Investment Debt, Emerging



(i) Other Investment Debt, Developing

Source: BOP, IIP, QEDS, and BIS, authors' calculations. Total debt is portfolio debt + other investment debt.

Figure C5: Total vs Private Average Debt Inflows, Percent of GDP



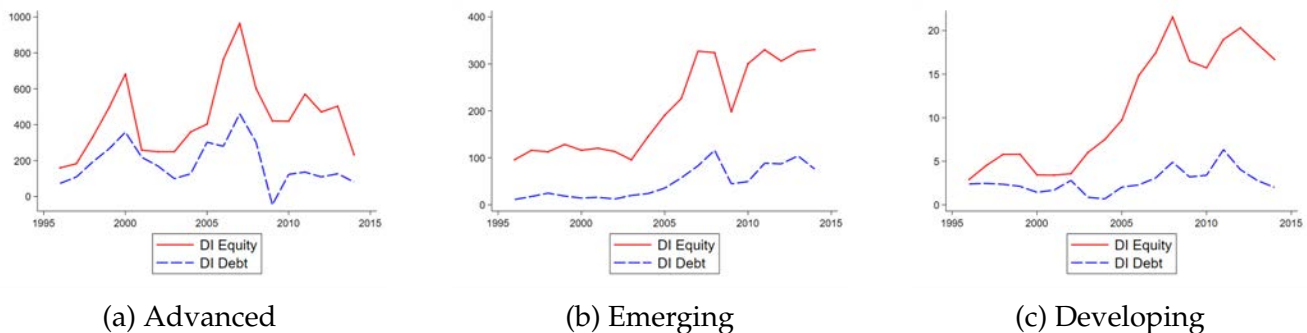
Source: BOP, IIP, QEDS, and BIS, authors' calculations.

## C.2 Direct Investment Debt

The direct investment debt (DID) component of the data is not as extensively reported as our augmented data for portfolio debt and other investment inflows, so we limit our sample for this analysis.<sup>85</sup> The balanced DID sample is a subsample of 67 countries, of which there are 20 advanced, 28 emerging, and 19 developing. Details of the 22 countries that are dropped can be found in Appendix A.4.

Direct investment debt is an important part of direct investment flows, as shown in Figure C6 where we plot it against direct investment equity, in aggregate terms. The figure shows that they share the same pattern over time. However, with the rise in offshore issuance much of direct investment debt may really be more like portfolio debt flows and hence less stable than its equity counterpart (Avdjiev et al., 2014). Direct investment debt makes up a larger share of direct investment for AE, but less so for EM and especially developing countries. It is interesting to note that, for both debt and equity, direct investment has decreased substantially in advanced economies following the global financial crisis, but has leveled off somewhat in emerging and developing economies. Thus, while direct investment debt plays a larger role in the advanced world prior to the crisis, its influence will be felt relatively more in other economies.

Figure C6: Aggregate Direct Investment Inflows, Billions 1996 USD



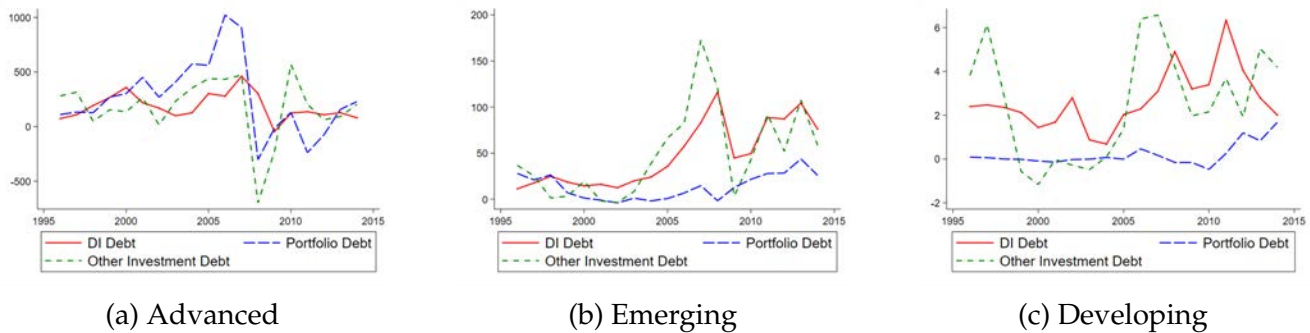
Source: BOP data and authors' calculations.

Direct investment debt is only recorded in the BOP if one of the (related) counterparties involved is a non-financial entity. Debt flows between related financial enterprises (including banks) are captured in either portfolio debt or other investment debt. We make the assumption

<sup>85</sup>When DID is missing, we fill it by subtracting direct investment equity (DIE) from total direct investment, as with our other data series.

that direct investment debt flows from offshore non-financial firms to onshore financial firms (or banks) are negligible. With this assumption, we can allocate direct investment debt to the corporate sector. We compare direct investment debt, portfolio debt, and other investment debt for the corporate sector in Figure C7.<sup>86</sup>

Figure C7: Aggregate Corporate Debt Inflows, Billions 1996 USD



Source: BOP data and authors' calculations.

We see that direct investment debt can be significant in size, relative to other capital flow types. It tends to follow the same trends as other forms of debt in the aggregate, but can have some influence on the evolution of total debt. In fact, it is larger than the other debt components in some periods.

### C.3 PPG vs PNG Debt Inflows

We have focused in this paper on the sectoral split of inflows by government, central bank, banks, and corporates, and found important differences between public and private flows. Another way to examine the roles of the public and private sector is to split the data by Public and Publicly-Guaranteed Debt (PPG) vs Private Non-Guaranteed Debt (PNG). This allows us to capture flows nominally allocated to the private sector which should actually be considered liabilities of the public sector, such as borrowing by public and quasi-public corporations common in many EM.<sup>87</sup> We can do this for emerging and developing economies using the World

<sup>86</sup>When comparing direct investment with our other series that have been filled using BIS data, we need to assume that direct investment debt flows from banks to non-financial firms are negligible (else they would be double counted). This assumption applies to less than 3% of observations in our direct investment debt sample, as most observations with non-zero direct investment debt are not missing the other investment debt for corporates series in the BOP.

<sup>87</sup>The usual definitions allocate flows to the sector of the immediate borrower, not the sector who is ultimately owes the debt, which may result in effectively misattributing the debt to the wrong sector. Also, note that all of

Bank's Debtor Reporting System (DRS) data found within the World Bank International Debt Statistics (WB-IDS). This data is annual going back to 1970 for many countries, but we use a balanced sample of 14 EM and 60 developing countries over 1981-2014.<sup>88</sup>

**Emerging (14):** Brazil, Bulgaria, China, Colombia, Egypt, India, Indonesia, Jordan, Malaysia, Mexico, Peru, Philippines, Thailand, Turkey

**Developing (60):** Algeria, Bangladesh, Belize, Benin, Bhutan, Bolivia, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Republic of Congo, Costa Rica, Cote d'Ivoire, Dominica, Dominican Republic, Ecuador, El Salvador, Ethiopia, Fiji, Gabon, Ghana, Grenada, Guatemala, Guinea-Bissau, Guyana, Honduras, Jamaica, Kenya, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, Rwanda, Senegal, Sierra Leone, Solomon Islands, Sri Lanka, Sudan, Swaziland, Togo, Tunisia, Uganda, Vanuatu, Zambia, Zimbabwe

Figure C8 (a)-(b) plots aggregate debt inflows from the DRS data, with flows split by PPG and PNG debt. Panels (c)-(d) plot the average of PPG and PNG debt to GDP ratio for each group of countries. According to these measures, PNG debt in EM soared leading up to the GFC, as most measures of debt inflows did. Following a brief collapse, PNG debt rebounded significantly in the aggregate, but this rebound is muted if we examine flows relative to GDP for the average country. This is consistent with what we see in Figures 5 and C4, where much of the post-2008 increase in aggregate flows is driven by large and quickly growing EM such as China.<sup>89</sup>

In both emerging and developing economies, and in both the aggregate and average GDP figures, we see a steady decline in PPG debt until the GFC, after which it rebounds, and significantly so in the case of developing economies. This is similar to what we observe in Figures 5

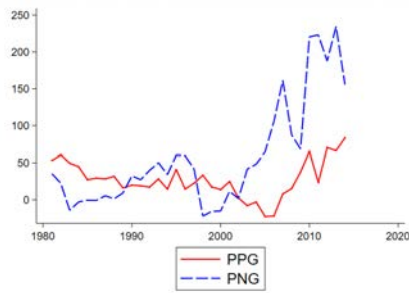
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our measures are based on the residency principle, however the recent increase in offshore bond issuance can also be a source of mismeasurement of capital flows. Offshore bond issuance has received significant recent attention in Shin (2013), Avdjiev et al. (2014), Avdjiev, McCauley, and Shin (2016), and others, so we refer the interested reader to those sources for a more complete discussion of the issue.

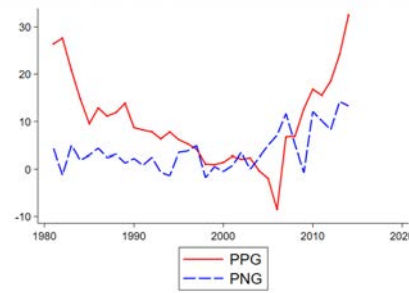
<sup>88</sup>The DRS data is first split into short term, long term, and IMF credits. The long term data can be further subdivided by PNG debt and PPG debt. The PPG debt can further be split by creditor. We assume that the portion of PPG debt that is short term is negligible, and so attribute all Short Term Debt to PNG. We further combine IMF credit into PPG debt to get our split of total external debt into public and private components. This is analogous to the decomposition done in Alfaro, Kalemli-Özcan, and Volosovych (2014), who do their analysis in the context of net flows.

<sup>89</sup>These figures will not be exactly comparable in terms of magnitude with our previous dataset in Figure 5, as the underlying sample of countries is somewhat different.

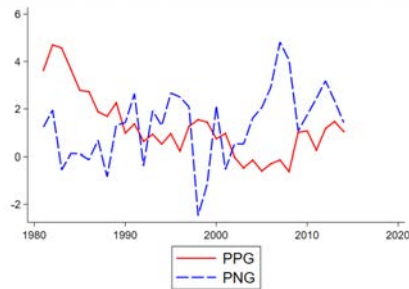
Figure C8: PPG vs. PNG Debt Inflows



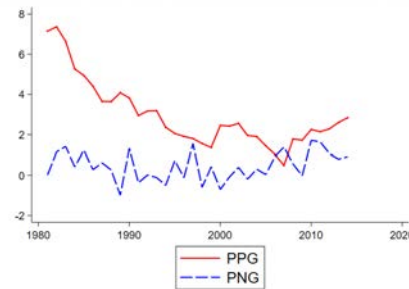
(a) Aggregate, Billions 1996 USD, Emerging



(b) Aggregate, Billions 1996 USD, Developing



(c) Average, Percent GDP, Emerging



(d) Average, Percent GDP, Developing

Source: World Bank DRS data and authors' calculations.

and C4, but in those figures the decrease leading up to 2008 is not as pronounced as when you take the longer time horizon.

These figures also highlight how private and public capital flows can move opposite each other, consistent with our previous results. This is particularly noticeable for EM around the 2008 crisis, where we see PNG flows fall dramatically while PPG flows rise, thus smoothing out the total debt inflows.